BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Carole Groom and Members
of the Board of Directors

From: Jack P. Broadbent
Executive Officer/APCO

Date: December 8, 2015

Re: Public Hearing to Consider Proposed New Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units and to Consider Proposed Amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks and Regulation 11: Hazardous Pollutants, Rule 10: Hexavalent Chromium and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers, and adoption of a CEQA Negative Declaration

RECOMMENDED ACTION

Adoption of proposed new Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units and amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks and Regulation 11: Hazardous Pollutants, Rule 10: Hexavalent Chromium and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers, and adoption of a CEQA Negative Declaration.

BACKGROUND

Bay Area refineries are among the largest sources of air pollutants—criteria, toxic, and climate—in the region. Refineries process crude oil into various products, such as gasoline, diesel fuel, jet fuel, heating oil, and asphalt. In light of this, the Bay Area Air Quality Management District (Air District) has developed a strategy for addressing air pollution from Bay Area petroleum refineries. This strategy stems from a Board of Directors' resolution (2014-17) adopted in October 2014, in which the Board instructed staff to develop a regulatory strategy that would further reduce emissions from petroleum refineries, with a goal of an overall reduction of 20 percent (or as much as feasible) no later than 2020. The strategy targets a spectrum of criteria pollutants, including volatile organic compounds (VOC), particulate matter (PM), sulfur dioxide (SO_2), and oxides of nitrogen (NO_x).

DISCUSSION

The regulatory actions to be considered at the hearing include the following:

- New proposed Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units (FCCU), to address emissions of ammonia and also to address condensable particulate matter (PM) formation;
- Proposed amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks, to address fugitive emissions of reactive organic gases (ROG) and toxic pollutants from equipment in heavy liquid service; and

- Proposed amendments to Regulation 11: Hazardous Pollutants, Rule 10: Hexavalent Chromium and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers, to address ROG and toxic compounds from refinery cooling towers.

The new rule and amendments would affect the five Bay Area petroleum refineries:

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

There are also four associated support facilities that may be affected:

1. Chemtrade West (sulfuric acid plant that supports Chevron);
2. Eco Services (formerly called Solvay; sulfuric acid plant that supports Shell and Valero regularly, and Tesoro as needed when its acid plant is down for maintenance);
3. Air Products (hydrogen plant that supports Tesoro);
4. Air Liquide (hydrogen plant that supports Phillips 66).

Pursuant to the California Environmental Quality Act (Public Resources Code § 21000 et seq.), an initial study for the proposed rule and amendments has been conducted, concluding that the proposed rule and amendments would not have significant adverse environmental impacts.

RULE DEVELOPMENT PROCESS

During this multi-phased rule development effort staff engaged all interested stakeholders, including affected industry, nearby community members, environmental organizations, other governmental agencies, the media, and other interested parties. There are several aspects to this public engagement, including:

- Development of conceptual versions of draft rules with discussions of those concepts;
- An advanced Call for Comments, released May 26, 2015;
- Hosting a series of Refinery Rules Open House Workshops to solicit public input / comment on the Petroleum Refinery Emissions Reduction Strategy in September 2015; the Open Houses were held in Martinez, Benicia, and Richmond;
- Briefings to both the Stationary Source Committee and the Board;
- Meetings and consultations with interested stakeholders in less formal settings to discuss concerns and issues; and,
- An informational Board meeting on November 30, 2015 with input from a wide variety of stakeholders.

Pursuant to the California Environmental Quality Act, the Air District prepared a CEQA Negative Declaration for the proposed new Regulation 6, Rule 5, and amendments to Regulation 8, Rule 18 and Regulation 11, Rule 10. The Negative Declaration concludes that there are no potential significant adverse environmental impacts associated with these proposed actions.

BUDGET CONSIDERATIONS/FINANCIAL IMPACT

None. Current Air District resources are sufficient to implement the proposed rules.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

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Reviewed by: Jean Roggenkamp

Attachments: Regulation 6 - Particulate Matter, Rule 5 -Particulate Emissions from Refinery Fluidized Catalytic Cracking Units
Regulation 8 – Organic Compounds, Rule 18 – Equipment Leaks
Regulation 11 – Hazardous Pollutants, Rule 10 – Hexavalent Chromium from all Cooling Towers and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers
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REGULATION 6
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REGULATION 6
PARTICULATE MATTER
RULE 5
PARTICULATE EMISSIONS FROM REFINERY FLUIDIZED CATALYTIC CRACKING UNITS

(Adopted [Adoption Date])

6-5-100 GENERAL

6-5-101 Description: This rule limits the emissions of condensable particulate matter emissions from petroleum refinery fluidized catalytic cracking units (FCCUs) as well as emissions of precursors of secondary particulate matter. Regulation 6, Rule 1 addresses filterable particulate emissions from FCCUs. For the purposes of this rule, commingled ammonia, condensable particulate and sulfur dioxide emissions from an FCCU and one or more other sources from a single exhaust point shall all be considered to be FCCU emissions.

6-5-110 EXEMPTIONS

6-5-111 Exemption, Emissions Abated by Wet Scrubber: The emission limits in Section 6-5-301 shall not apply to emissions that are abated by a wet scrubber that is required to be operated by a District permit and that constitutes best available control technology (BACT) for any pollutant.

6-5-112 Limited Exemption, Emissions during Startup or Shutdown Periods: The requirements of Section 6-5-301 shall not apply to emissions during an FCCU startup or shutdown period. FCCU startup and shutdown periods shall be as defined in this rule, unless a different period is specified in a District Permit to Operate for an FCCU, in which case the Permit to Operate shall take precedence. This exemption is also applicable to a non-FCCU source with startup or shutdown provisions specified in a Permit to Operate, if that source is subject to the requirements of Section 6-5-301 because the source emissions are commingled with those of an FCCU at a single exhaust point; the startup or shutdown provisions specified in the Permit to Operate shall be the basis for this exemption. Whenever this exemption applies to any source, it shall apply to all sources with commingled emissions.

6-5-113 Limited Exemption, Installation of Wet Scrubber: The emission limit effective date for ammonia in Section 6-5-301 may be extended to a later date specified in a District Authority to Construct for an existing FCCU to be controlled with a new wet scrubber, but may not be extended by more than 36 months.

6-5-114 Limited Exemption, FCCU without Nitrogen-Based Additives: The emission limit for ammonia in Section 6-5-301 shall not apply to an FCCU where ammonia, urea or any other nitrogen-based additive is not used in a way that contributes to ammonia or condensable particulate FCCU emissions.

6-5-115 **Limited Exemption, Ammonia Optimization:** The ammonia emission limit in Section 6-5-301 shall not apply to the owner/operator of a refinery that implements an optimization of ammonia and/or urea injection in accordance with Section 6-5-403.

6-5-200 DEFINITIONS

6-5-201 **Ammonia Slip:** Ammonia slip is the amount of unreacted ammonia emitted to the atmosphere from the FCCU, regardless of the source of the ammonia.

6-5-202 **Catalyst Regeneration Unit (CRU):** A catalyst regeneration unit regenerates spent FCCU catalyst by burning off the coke that has deposited on the catalyst surface. The resulting CRU flue gas is the primary emission source addressed by this rule.

6-5-203 **Condensable Particulate Matter:** Liquid droplets that coalesce, or gaseous emissions that condense to form liquid or solid particles. These liquid and/or solid particles are identified as condensable organic or condensable inorganic particulate matter using EPA Test Method 202.

6-5-204 **Daily Average:** The arithmetic mean of the measured ammonia emissions subject to Section 6-5-301 on any calendar day that the FCCU operates.

6-5-205 **FCCU Shutdown:** Unless otherwise specified in a District Permit to Operate, FCCU shutdown is a period which begins when fresh feed flow to the FCCU reactor stops and ends when the main blower for catalyst recirculation is shutdown.

6-5-206 **FCCU Startup:** Unless otherwise specified in a District Permit to Operate, FCCU startup is a period not exceeding 120 hours which begins with the startup of the main blower for introduction of catalyst and ends after fresh feed is introduced to the FCCU reactor, when the process reaches steady state.

6-5-207 **Fluidized Catalytic Cracking Unit (FCCU):** A fluidized catalytic cracking unit (FCCU) is a processing unit that converts heavy petroleum fractions, typically from crude oil distillation units, into lighter fuel intermediates by using a fine, powdered catalyst to promote a chemical reaction in which the heavy petroleum molecules are broken into smaller molecules. In addition to the cracking reactor, an FCCU includes a catalyst regeneration unit (CRU), ancillary equipment including blowers, and all equipment for controlling air pollutant emissions and recovering heat.

6-5-208 **Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. Petroleum refinery processes include separation processes (e.g., atmospheric or vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking) petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, blending, loading, and unloading), auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).

6-5-209 **Primary Particulate Matter:** Material emitted to the atmosphere as filterable or condensable particulate matter.

6-5-210 **Secondary Particulate Matter:** Material emitted to the atmosphere in a gaseous form that will not coalesce or condense to a solid or liquid form at atmospheric temperature and pressure, but that may react in the atmosphere into a solid or liquid form. For the purposes of this rule, precursors of Secondary Particulate Matter shall include sulfur dioxide (SO_2) and ammonia.

6-5-211 **Wet Scrubber:** A device that removes air pollutants from gas streams by contacting the gas stream with a scrubbing liquid.

6-5-300 STANDARDS

6-5-301 **Fluidized Catalytic Cracking Unit (FCCU) Emission Limits:** The owner/operator of a Petroleum Refinery that includes an FCCU shall not cause emissions to the atmosphere from the FCCU that exceed the limits in Table 1 on or after the indicated effectiveness date:

Table 1 – FCCU Emission Limits

Pollutant	Emission Limit	Effective Date
Ammonia	10 ppmvd at 3% O_2 as a daily average	January 1, 2018
Condensable Particulate Matter	[future]	[future]
Sulfur Dioxide (SO_2)	[future]	[future]

6-5-400 ADMINISTRATIVE REQUIREMENTS

6-5-401 **Ammonia Control Plan and Permit Applications:** No later than January 1, 2017, the owner/operator of a Petroleum Refinery subject to the ammonia emission limit in Section 6-5-301 shall submit to the APCO a control plan detailing the measures, if any, to be taken in order to meet the requirements of Section 6-5-301, and also applications for all Authorities to Construct necessary for compliance with Section 6-5-301.

6-5-402 **Ammonia Monitoring Plan:** No later than January 1, 2017, the owner/operator of a Petroleum Refinery that includes an FCCU subject to the ammonia emission limit in Section 6-5-301 shall submit to the APCO a plan for the installation of an ~~continuous~~ ammonia monitoring system to perform monitoring as required by Section 6-5-501. This plan shall identify the proposed monitoring technique, monitoring equipment, installation details and installation schedule.

6-5-403 **Ammonia Optimization:** As an alternative to compliance with the ammonia emission limit of Section 6-5-301, the owner/operator of a refinery may instead establish an enforceable ammonia emission limit for the FCCU that results in the minimization of total FCCU $PM_{2.5}$ emissions (including all condensable particulate matter), as follows:

403.1 No later than March 1, 2016, the refinery owner/operator shall submit to the APCO an Optimization and Demonstration Protocol for the purpose of establishing the minimum rate of ammonia and/or urea injection necessary to minimize total $PM_{2.5}$ FCCU emissions (including all condensable particulate matter) while complying with all existing permit requirements, excluding permit requirements that are not based on District BACT requirements, on District prohibitory rule limits or on federal consent decrees. The Optimization Protocol shall include the ammonia and/or urea injection rates to be evaluated and the criteria for selecting these rates, and also the criteria for determining the Optimized Ammonia Emissions Concentration that minimizes total FCCU $PM_{2.5}$ emissions.

403.2 Within 60 days, the APCO shall either approve or disapprove the Optimization and Demonstration Protocol.

403.3 The refinery owner/operator shall commence and complete the Optimization and Demonstration Protocol, approved by the APCO, no later than December 31, 2016.

403.4 The refinery owner/operator shall report to the APCO the results of the Optimization and Demonstration Protocol and the proposed Optimized Ammonia Emissions Concentration no later than February 28, 2017. No later than this same date, the refinery owner/operator shall submit a District permit application to 1) establish the Optimized Ammonia Emissions Concentration as an enforceable permit requirement, and to 2) relax any existing permit conditions that are not based on District BACT requirements, on District prohibitory rule limits or on federal consent decrees to the extent necessary to minimize total FCCU $PM_{2.5}$ emissions.

403.5 Disapproval of an Optimization and Demonstration Protocol, or a failure to meet any requirement or deadline in this section shall not constitute a violation of this rule, but shall preclude the applicability of the limited exemption in Section 6-5-115.

6-5-500 **MONITORING AND RECORDS**

6-5-501 **Ammonia Monitoring:** The owner/operator of a Petroleum Refinery that includes an FCCU subject to the ammonia emission limit in Section 6-5-301 shall, no later than January 1, 2018, operate one~~all~~ of the following;

~~501.1 Continuous emission monitors that comply with District Regulation 1, Section 522 to continuously measure:~~

501.1 A mass-balance monitoring system that includes all of the following:

1.1 Parametric monitors that comply with District Regulation 1, Section 523 to continuously measure the injection or addition rate (pounds per hour) of ammonia, urea or any other nitrogen-based additive into the emission stream, and;

1.2 Continuous emission monitors that comply with District Regulation 1, Section 522 to continuously measure NOx and oxygen concentrations at appropriate locations to allow a calculation of the amount of ammonia and/or urea consumed in NOx-reduction reactions, and therefore the remaining, emitted amount of non-consumed ammonia.

~~1.1 Oxygen concentrations downstream of the addition point of ammonia, urea or any other nitrogen based additive into the emission stream; and,~~

~~1.2 NOx concentrations either:~~

~~2.1 Upstream and downstream of the addition point of ammonia, urea or any other nitrogen-based additive into the emission stream, or;~~

~~2.2 Downstream of the addition point of ammonia, urea or any other nitrogen based additive into the emission stream, with the capability to measure NOx and NOx plus ammonia to obtain ammonia by difference, or;~~

~~1.3 Any other ammonia emission monitoring system approved in writing by the APCO.~~

~~501.2 Parametric monitors that comply with District Regulation 1, Section 523 to continuously measure the injection or addition rate (pounds per hour) of ammonia, urea or any other nitrogen based additive into the emission stream.~~

501.2 Any other ammonia emission monitoring system approved in writing by the APCO.

6-5-502 **Ammonia Records:** The owner/operator of a Petroleum Refinery subject to the ammonia emission limit in Section 6-5-301 shall maintain records of the data required to be measured in Section 6-5-501. These records shall be kept for a period of at least five years and shall be made available to the APCO on request.

6-5-600 **MANUAL OF PROCEDURES**

6-5-601 **Compliance Determination:** All compliance determinations shall be made in the as-found operating condition. No compliance determinations shall be made during periods subject to the exemption in Section 6-5-112.

6-5-602 Determination of Ammonia and Oxygen: Determination of ammonia shall be by Regulation 1, Section 522 NOx monitors or other APCO approved ammonia monitoring system. Determination of oxygen shall be by Regulation 1, Section 522 oxygen monitor.

REGULATION 8
ORGANIC COMPOUNDS
RULE 18
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8-18-400 ADMINISTRATIVE REQUIREMENTS

8-18-500 MONITORING AND RECORDS

8-18-600 MANUAL OF PROCEDURES

REGULATION 8
ORGANIC COMPOUNDS
RULE 18
EQUIPMENT LEAKS

(Adopted October 1, 1980)

8-18-100 GENERAL

8-18-101 Description: The purpose of this Rule is to limit emissions of total organic compounds ~~organic compounds and methane~~ from ~~leaking~~ equipment leaks at petroleum refineries, chemical plants, bulk plants and bulk terminals including, but not limited to: valves, connectors, pumps, compressors, pressure relief devices, diaphragms, hatches, sight-glasses, fittings, sampling ports, meters, pipes, and vessels.

(Amended 3/17/82; 3/4/92; 1/7/98; 1/21/04, 9/15/04)

8-18-110 Exemption, Controlled Seal Systems and Pressure Relief Devices: The provisions of this Rule shall not apply to seal systems and pressure relief devices vented to a vapor recovery or disposal system which reduces the emissions of organic compounds from the equipment by 95% or greater as determined according to Section 8-18-603.

(Amended, Renumbered 1/7/98; Amended 1/21/04)

8-18-111 Exemption, Small Facilities: The provisions of this rule shall not apply to facilities which have less than 100 valves or less than 10 pumps and compressors. Such facilities are subject to the requirements of Regulation 8, Rule 22.

(Adopted 3/4/92; Amended, Renumbered 1/7/98)

8-18-112 Exemption, Bulk Plant and Terminal Loading Racks: The provisions of this rule shall not apply to those connections at the interface between the loading rack and the vehicle being loaded.

(Adopted 3/4/92; Amended, Renumbered 1/7/98)

8-18-113 Limited Exemption, Initial Boiling Point: Until January 1, 2018, t~~T~~he provisions of Sections 8-18-400 shall not apply to equipment which handle organic liquids having an initial boiling point greater than 302° F.

(Adopted 3/4/92; Amended, Renumbered 1/7/98)

8-18-114 Limited Exemption, Research and Development: The provisions of Sections 8-18-401, 402 and 502 shall not apply to research and development plants which produce only non-commercial products solely for research and development purposes.

(Adopted 3/4/92; Amended, Renumbered 1/7/98)

8-18-115 Limited Exemption, Storage Tanks: The provisions of this rule shall not apply to appurtenances on storage tanks including pressure relief devices, which are subject to requirements contained in Regulation 8, Rule 5: Storage of Organic Liquids.

(Adopted January 7, 1998)

8-18-116 Limited Exemption, Vacuum Service: The provisions of Sections 8-18-400 and 502 shall not apply to equipment in vacuum service.

(Amended January 7, 1998)

8-18-117 Limited Exemption, Visual Inspection: The provisions of Section 8-18-403 shall not apply to days when a facility is not staffed.

(Amended, Renumbered January 7, 1998)

8-18-118 Deleted January 7, 1998

8-18-119 Limited Exemption, Open-Ended Valve or Line: The provisions of Section 8-18-309 shall not apply to the following:

119.1 Open-ended valves or lines in an emergency shutdown system which are designed to open automatically in the event of a process upset.

119.2 Open-ended valves or lines containing materials which would autocatalytically polymerize or would present an explosion, serious

overpressure, or other safety hazard if capped or equipped with a double block and bleed system

8-18-120 Limited Exemption, Non-repairable Equipment: The provisions of Sections 8-18-306 and 311 shall not apply to equipment added to the non-repairable equipment list prior to [date of amendment adoptions] except that:

120.1 The equipment must be counted toward the total number of pieces of equipment allowed by Section 8-18-306.2.

120.2 Any connection on the list must be counted as two valves toward the total number of non-repairable valves allowed by Section 8-18-306.2.

120.3 Any valve on the list with a leak that cannot be minimized below a concentration of 10,000 parts per million (ppm), expressed as methane, may not remain on the list for more than 45 days after leak discovery unless the mass emission rate has been measured in accordance with Section 8-18-604 and has been determined to be less than 15 pounds per day.

120.4 The equipment must be repaired or replaced within five years or at the next scheduled turnaround, whichever date comes first.

8-18-200 DEFINITIONS

8-18-201 Background: The ambient concentration of total organic compounds determined at least 3 meters (10 feet) upwind from the equipment to be inspected and not influenced by any specific emission point as indicated by a hydrocarbon analyzer specified by Section 8-18-501.

(Amended March 4, 1992)

8-18-202 Bulk Plants and Terminals: A distribution facility ~~which~~ that is subject to Regulation 8, Rule 6, 33 or 39.

(Amended, Renumbered January 7, 1998)

8-18-203 Chemical Plant: Any facility engaged in producing organic or inorganic chemicals and/or manufacturing products by chemical processes~~.~~, including (1) a~~A~~ny facility or operation that has 325 as the first three digits in the North American Industrial Classification Standard (NAICS) code~~. Chemical plants may include, but are not limited to the manufacture of:~~, (2) any facility that manufactures industrial inorganic and organic chemicals; plastic and synthetic resins, synthetic rubber, synthetic and other man~~-~~made fibers; drugs; soap, detergents and cleaning preparations~~,~~; perfumes, cosmetics, and other toilet preparations; paints, varnishes, lacquers, enamels, and allied products; agricultural chemicals; safflower and sunflower oil extracts; and (3) any facility engaged in re-refining.

(Amended, Renumbered 1/7/98; Amended 1/21/04)

8-18-204 Connection: Flanged, screwed, or other joined fittings used to connect any piping or equipment, including any fitting connecting equipment to piping or other equipment, such as a valve bonnet flange or pump flange

(Amended, Renumbered 1/7/98; Amended 1/21/04)

8-18-205 Equipment: All components including, but not limited to: valves, connections, pumps, compressors, pressure relief devices, diaphragms, hatches, fittings, sampling ports, pipes, plugs, ~~open-ended lines~~, gauges or sight-glasses.

(Amended, Renumbered January 7, 1998)

8-18-206 Inaccessible Equipment: Any equipment located over 13 feet above the ground when access is required from the ground; or any equipment located over 6.5 feet away from a platform when access is required from a platform.

(Amended, Renumbered January 7, 1998)

8-18-207 Inspection: The determination of the concentration of total organic compounds leaking from equipment using EPA Reference Method 21 as required by Section 8-18-501.

(Amended, Renumbered January 7, 1998)

8-18-208 Leak: The concentration of total organic compounds above background, expressed as methane, as measured ~~1 centimeter or less from the leak using EPA Reference Method 21~~ in accordance with Section 8-18-602.

(Amended, Renumbered 1/7/98; 1/21/04)

8-18-209 **Leak Minimization:** Reducing the leak to the lowest achievable level using best modern practices and without shutting down the process the equipment serves. Leak minimization is the most common method for repair. Leak minimization includes but is not limited to tightening of packing gland nuts, injecting lubricant into lubricated packing, tightening bonnet bolts, tightening flange bolts, or installing plugs or caps into open ended lines or valves. Cleaning, scrubbing, or washing equipment alone is not considered best modern practice.

(Renumbered 3/17/82; Amended 3/4/92; 1/7/98)

8-18-210 **Leak Repair:** The tightening, adjustment, ~~or~~ addition of material, or the replacement of the equipment using best modern practices, which reduces the leakage to the atmosphere below the applicable standard in Section 8-18-300.

(Renumbered 3/17/82; Amended 3/4/92; 1/7/98)

8-18-211 **Liquid Leak:** Dripping of liquid at a rate of greater than 3 drops per minute and a concentration of total organic compounds greater than the applicable leak standard in Section 8-18-300.

(Amended, Renumbered January 7, 1998)

8-18-212 **Organic Compound:** Any compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

(Amended, Renumbered January 7, 1998)

8-18-213 **Petroleum Refinery:** Any facility that processes petroleum products as defined in North American Industrial Classification Standard Number 32411, Petroleum Refining.

(Amended, Renumbered January 7, 1998)

8-18-214 **Pressure Relief Device:** The automatic pressure-relieving device actuated by the static pressure upstream of the device ~~-~~ including, but not limited to pressure relief valves and rupture disks.

(Amended, Renumbered January 7, 1998)

8-18-215 **Process Unit:** A manufacturing process which is independent of other processes and is continuous when supplied with a constant feed or raw materials and has sufficient storage facilities for product.

(Amended, Renumbered January 7, 1998)

8-18-216 **Quarter:** One of the four consecutive 3-month divisions of the calendar year beginning on January 1.

(Amended, Renumbered January 7, 1998)

8-18-217 **Reinspection:** Any inspection following the minimization or repair of leaking equipment.

(Amended, Renumbered January 7, 1998)

8-18-218 **Rupture Disc:** The thin metal diaphragm held between flanges.

(Amended, Renumbered January 7, 1998)

8-18-219 **Total Organic Compounds:** The concentration of organic compounds and methane as indicated by a hydrocarbon analyzer as specified by Section 8-18-501.

(Amended, Renumbered 1/7/98; Amended 1/21/04)

8-18-220 **Turnaround:** The scheduled shutdown of a process unit for maintenance and repair work.

(Amended, Renumbered January 7, 1998)

8-18-221 **Valve:** Any device that regulates the flow of process material by means of an external actuator acting to permit or block passage of liquids or gases.

(Amended, Renumbered January 7, 1998)

8-18-222 **Weephole:** A drain hole in the discharge horn of a pressure relief device.

(Adopted January 7, 1998)

8-18-223 **Deleted January 7, 1998**

8-18-224 **Deleted January 7, 1998**

~~**8-18-225** **Major Leak:** Any leak that cannot be minimized below a concentration of 10,000 parts per million (ppm) total organic compounds, expressed as methane.~~

~~(Adopted January 21, 2004)~~

8-18-226 **Essential Equipment:** Any valve, connection, pressure relief device, pump or compressor that cannot be taken out of service without shutting down the process unit that it serves.

8-18-227 Open-Ended Valve or Line: Any valve, except a safety relief valve, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping.

8-18-228 Double Block Bleed System: Two block valves connected in series with a bleed valve or line that can vent the line between the two block valves.

8-18-300 STANDARDS

8-18-301 General: Except for valves, pumps and compressors, connections and pressure relief devices subject to the requirements of Sections 8-18-302, 303, 304, 305 and 306, a person shall not use any equipment that leaks total organic compounds in excess of 100 ppm unless the leak has been discovered by the operator, minimized within 24 hours and repaired within 7 days.

(Amended 7/15/81; 3/17/82; 9/6/89; 3/4/92; 1/7/98)

8-18-302 Valves: Except as provided in Section 8-18-306, ~~A~~a person shall not use any valve that leaks total organic compounds in excess of 100 ppm unless one of the following conditions is met:

302.1 If the leak has been discovered by the operator, minimized within 24 hours and repaired within 7 days; or

302.2 If the leak has been discovered by the APCO, the leak must be repaired within 24 hours.~~; or~~

~~302.3 The valve meets the applicable provisions of Section 8-18-306.~~

(Adopted 3/4/92; Amended 1/7/98; 1/21/04)

8-18-303 Pumps and Compressors: Except as provided in Section 8-18-306, ~~A~~a person shall not use any pump or compressor that leaks total organic compounds in excess of 500 ppm unless one of the following conditions is met:

303.1 If the leak has been discovered by the operator, minimized within 24 hours and repaired within 7 days; or

303.2 If the leak has been discovered by the APCO, the leak must be repaired within 24 hours~~; or~~

~~303.3 The pump or compressor meets the applicable provisions of Section 8-18-306.~~

(Adopted 3/4/92; Amended 1/7/98; 1/21/04)

8-18-304 Connections: Except as provided in Section 8-18-306, ~~A~~a person shall not use any connection that leaks total organic compounds in excess of 100 ppm unless one of the following conditions is met:

304.1 If the leak has been discovered by the operator, ~~must be~~ minimized within 24 hours and repaired within 7 days; or

304.2 If the leak has been discovered by the APCO, the leak must be repaired within 24 hours.~~If the connection is inspected as required by Section 8-18-401.6 and the leak has been discovered by the APCO, the leak must be repaired within 24 hours~~.~~; or~~

~~304.3 The connection meets the applicable provisions of Section 8-18-306.~~

(Adopted 3/4/92; Amended 1/7/98; 1/21/04)

8-18-305 Pressure Relief Devices: Except as provided in Section 8-18-306, a ~~A~~ person shall not use any pressure relief device that leaks total organic compounds in excess of 500 ppm unless the leak has been discovered by the operator, minimized within 24 hours and repaired within 15 days; or if the leak has been discovered by the APCO, minimized within 24 hours and repaired within 7 days.

(Amended January 7, 1998)

8-18-306 Non-repairable Equipment: Any essential equipment leak ~~valve, connection, pressure relief device, pump or compressor which~~ that cannot be repaired as required by Section 8-18-302, 303, 304 or 305 may be placed on a non-repairable list provided the operator ~~shall comply~~complies with the following conditions:

306.1 Any essential equipment leak must be less than 10,000 ppm and mass emissions must be determined within 30 days of placing on the non-

repairable list. The APCO must be notified no less than 96 hours prior to conducting mass emissions measurements. ~~The valve, connection, pressure relief device, pump or compressor is repaired or replaced within 5 years or at the next scheduled turnaround, whichever date comes first.~~

306.2 ~~Effective July 1, 2004, T~~the number of individual pieces of equipment awaiting repair does not exceed ~~the percentages~~that portion of the total population for each equipment type expressed in the table below~~or 1 piece of equipment~~, rounded to the next higher whole number.

Equipment	Total Number of Non-repairable Equipment Allowed (%)
Valves ~~(including Valves with Major Leaks)~~ and Connections as allowed by Section 8-18-306.3	0.15~~30~~% of total number of valves
~~Valves with Major Leaks as allowed by Section 8-18-306.4~~	~~0.025% of total number of valves~~
Pressure Relief Devices	0.5~~1.0~~% of total number of pressure relief devices
Pumps and Compressors	0.5~~1.0~~% of total number of pumps and compressors

306.3 A connection ~~that leaks in excess of 100 ppm and no greater than 10,000 ppm~~ can be considered non-repairable equipment pursuant to Section 8-18-306 provided each non-repairable connection is ~~considered~~ counted as two valves toward the total number of non-repairable ~~equipment~~ valves allowed.

306.4 The essential equipment is repaired or replaced within five years or at the next scheduled turnaround, whichever date comes first.

~~Effective July 1, 2004, a valve with a major leak may not be considered non-repairable equipment pursuant to Section 8-18-306 for more than 45 days after leak discovery, unless the mass emission rate has been measured in accordance with Section 8-18-604 and has been determined to be less than 15 pounds per day. The APCO shall be notified no less than 96 hours prior to conducting measurements required by this section.~~

(Adopted 3/4/92, Amended 1/7/98; 1/21/04)

8-18-307 Liquid Leak: A person shall not use any equipment that leaks liquid as defined in Section 8-18-211, unless the leak has been discovered by the operator, minimized within 24 hours and repaired within 7 days.

(Adopted 3/4/92; Amended 1/7/98)

8-18-308 Alternate Compliance: The requirements of Sections 8-18-301, 302, 303, 304, 305, 306 and 307 shall not apply to any facility which complies with an alternative emission reduction plan that satisfies all the requirements in Sections 8-18-405 and 406.

(Adopted January 7, 1998)

8-18-309 Open-Ended Valve or Line: Open-ended valves or lines shall be equipped with a cap, blind flange, plug or second valve which shall seal the open end at all times except during operations requiring process fluid flow through the open-ended valve or line.

309.1 When a double block and bleed system is installed, the second valve shall be operated in a manner such that the valve on the process fluid end is closed before the second valve is closed.

309.2 When a double block and bleed system is in use, the bleed valve or line may remain open during operations that require venting the line between the block valves, but shall comply with Sections 8-18-309 and 309.1 at all times.

309.3 When a double block and bleed system is not in use, the open end of the second valve shall not leak greater than 100 ppm.

8-18-310 Recurrent Leaks: If a valve, pump, compressor or PRD is found leaking more than 3 consecutive quarters, the inspection frequency shall change from quarterly to monthly pursuant to Section 8-18-407.

8-18-311 Mass Emissions: A person shall not use any equipment that emits total organic compounds in excess of five pounds per day except during any repair periods allowed by Sections 8-18-301, 302, 303, 304, and 305.

8-18-400 ADMINISTRATIVE REQUIREMENTS

8-18-401 Inspection: Any person subject to this Rule shall comply with the following inspection requirements:

401.1 All equipment ~~connections~~ that has~~ve~~ been opened during a turnaround shall be inspected for leaks within 90 days after start-up is completed following a turnaround.

401.2 Except as provided under Subsection 8-18-401.3, 404, 405, and 406 all valves, pressure relief devices, pumps or compressors subject to this Rule shall be inspected quarterly.

401.3 Inaccessible valves and pressure relief devices subject to this Rule shall be inspected at least once a year unless found leaking pursuant to Subsection 403.

401.4 Any equipment subject to this Rule may be inspected at any time by the APCO.

401.5 Any equipment found to have a leak in excess of the standard in Section 8-18-300 shall be reinspected within 24 hours after any leak repair or minimization.

401.6 Any connections subject to this rule ~~that is~~shall be inspected annually or be ~~that is~~ part of an APCO and EPA approved connection inspection program. ~~is subject to the provisions of Subsection 8-18-304.2.~~

401.7 Any pressure relief device equipped with a weephole shall be inspected quarterly at the outlet of the weephole if the horn outlet is inaccessible.

401.8 Any pressure relief device that releases to the atmosphere shall be inspected within 5 working days after the release event.

401.9 ~~Effective July 1, 2004, a~~Any ~~valve~~ essential equipment placed on the non-repairable list shall be inspected at least once per quarter.

401.10 ~~Effective July 1, 2004, t~~The mass emission rate of any essential equipment ~~valve with a major leak~~ placed on the non-repairable list in accordance with Section 8-18-306 shall be determined at least once per calendar year. The APCO shall be notified no less than 96 hours prior to conducting the measurements required by this section.

401.11 The owner/operator shall identify the equipment and/or source of any background reading greater than 50 ppm.

8-18-402 Identification: Any person subject to this Rule shall comply with the following identification requirements:

402.1 All valves, connectors, pressure relief devices, pumps and compressors shall be identified with a unique permanent identification code approved by the APCO. This identification code shall be used to refer to the valve, connector, pressure relief device, pump or compressor location. Records for each valve, connector, pressure relief device, pump or compressor shall refer to this identification code.

402.2 All equipment with a leak in excess of the applicable leak limitation in Section 8-18-300 shall be tagged with a brightly colored weatherproof tag indicating the date the leak was detected.

(Amended 3/4/92; 1/7/98)

8-18-403 Visual Inspection Schedule: All pumps and compressors shall be visually inspected daily for leaks. If a leak is observed, the concentration shall be determined within 24 hours of discovery pursuant to Section 8-18-602.~~All pumps and compressors subject to this rule shall~~

(Renumbered January 7, 1998)

8-18-404 **Alternative Inspection Schedule:** The inspection frequency for valves or pumps may change from quarterly to annually provided all of the conditions in Subsection 404.1 and 404.2 are satisfied.

404.1 The valve or pump has been operated leak free for five consecutive quarters; and

404.2 Records are submitted to the District and approvedal ~~from~~ by the APCO. ~~is obtained.~~

404.3 The valve or pump remains leak free pursuant to the Sections 8-18-302 and 303. If a leak is discovered, the inspection frequency will revert back to quarterly.

(Adopted January 7, 1998)

8-18-405 **Alternate Emission Reduction Plan:** Any person may comply with Section 8-18-308 by developing and submitting an alternate emission reduction plan to the APCO that satisfies all of the following conditions:

405.1 The plan shall contain all information necessary to establish, document, measure progress and verify compliance with an emission reduction level set forth in this rule.

405.2 All emission reductions must be achieved solely from equipment and connections subject to this rule.

405.3 Public notice and a 60-day public comment period shall be provided.

405.4 Following the public comment period, the plan shall be submitted to and approved in writing by the EPA, Region IX prior to the APCO approval of the plan.

405.5 An alternate emission reduction plan must provide for emission reductions equal to or greater than required by the specific limits in this rule.

(Adopted 1/7/98; Amended 11/27/02)

8-18-406 **Interim Compliance:** A facility is subject to the limits contained in Sections 8-18-301, 302, 303, 304, 305, 306 and 307 until receipt of the written approvals of both the APCO and the EPA of an Alternate Emission Reduction Plan that complies with Section 8-18-405.

(Adopted1/7/98; Amended 11/27/02)

8-18-407 **Recurrent Leak Schedule:** For any valve, pump, compressor or pressure relief device found leaking in more than three consecutive quarters, a person subject to this Rule shall comply with the following requirements:

407.1 The inspection frequency shall be changed from quarterly to monthly; and

407.2 Records of each valve, pump, compressor and pressure relief device changed to monthly monitoring shall be submitted to the District each quarter pursuant to Section 8-18-503.1.

407.3 If the valve, pump, compressor or pressure relief device remains leak free for four consecutive months pursuant to Sections 8-18-302, 303 and 305 the inspection frequency will revert back to quarterly upon request and after APCO approval.

8-18-500 MONITORING AND RECORDS

8-18-501 **Portable Hydrocarbon Detector:** Any instrument used for the measurement of total organic compounds shall be a combustible gas indicator that has been approved by the APCO and meets the specifications and performance criteria of and has been calibrated in accordance with EPA Reference Method 21 (40 CFR 60, Appendix A).

(Amended 3/17/82; 9/6/89; 3/4/92)

8-18-502 **Records:** Any person subject to the requirements of this rule shall maintain records that provided the following information:

502.1 For equipment subject to Section 8-18-402.1, the equipment identification code, equipment type and the location of the equipment.

502.2 The date, time, type of repairs and corresponding leak concentrations measured on~~of~~ all inspections and reinspections ~~and the corresponding leak concentrations measured~~ as specified by Section 8-18-401.

502.3 Records shall be maintained for at least 5 years and shall be made available to the APCO for inspection at any time.

502.4 Records of all non-repairable equipment subject to the provisions of Section 8-18-306 shall be maintained and contain the equipment identification code, equipment type, equipment location, initial leak concentration measurement and date, quarterly leak concentration measurements and dates, the duration the equipment has been on the non-repairable list, date of any repair attempts made to equipment, ~~any~~ mass emission rate determinations, date the determination was made, last process unit turnaround date, ~~and~~ total number of non-repairable equipment awaiting repair, and explanation why equipment was deemed essential equipment. *(Adopted 3/4/92; Amended 1/7/98; 1/21/04)*

502.5 Records of all equipment and/or sources identified as a result of background readings greater than 50 ppm.

502.6 Effective January 1, 2018, Piping and Instrumentation Diagrams (P&IDs) with all components in heavy liquid service clearly identified.

8-18-503 Reports: Any person subject to the requirements of this rule shall submit the following information to the District:

503.1 Effective July 1, 2016, a report shall be submitted to the APCO quarterly that includes the following information:

3.1.1 The equipment identification code, equipment type, stream service, equipment location, leak concentration measurement and date, leak repair method and concentration measurements of any valves, pumps, compressors and PRDs found leaking in more than 3 consecutive quarters pursuant to Section 8-18-310.

3.1.2 Records of all non-repairable equipment subject to the provisions of Section 8-18-306 shall be submitted to the District quarterly and contain the equipment identification code, equipment type, equipment location, initial leak concentration measurement and date, the duration the equipment has been on the non-repairable list, any repair attempts made to equipment, mass emission rate determination, date the determination was made, last process unit turnaround date, ~~and~~ total number of non-repairable equipment awaiting repair and explanation why equipment was deemed essential equipment.

503.2 Effective July 1, 2016, a person subject to this rule shall submit to the District a~~A~~n inventory identifying~~of~~ the total numbers of valves, pressure relief devices, pumps and compressors and connections to which this rule applies broken down per unit or other grouping if component is not associated with an individual unit. After review and approval of the initial inventory by the APCO, annual inventory updates shall be submitted to the District every January 1st. ~~to which this rule applies shall be submitted to the District at least once a year.~~

503.4 Inspection records of all equipment opened during a turnaround shall be submitted to the District the first month following completion of the 90-day startup up leak inspections pursuant to Section 8-18-401.1.

503.5 By January 1, 2018, submit records required by Section 8-18-502.6 and annually thereafter for information that has changed since last submittal.

(Adopted January 21, 2004)

8-18-600 MANUAL OF PROCEDURES

8-18-601 Analysis of Samples: Samples of organic compounds as defined in Section 8-18-113 shall be analyzed for Initial Boiling Point as prescribed in ASTM D-1078- 98 or ASTM D-86.

(Adopted 3/17/82; Amended 3/4/92; 1/7/98)

8-18-602 Inspection Procedure: Inspections of equipment shall be conducted as prescribed by EPA Reference Method 21 (40 CFR 60, Appendix A).

(Adopted 9/6/89; Amended 3/4/92; 1/7/98)

8-18-603 Determination of Control Efficiency: The control efficiency as specified by Section 8-18-110 shall be determined by any of the following methods: 1) BAAQMD Manual of Procedures, Volume IV, ST-7, 2) EPA Method 25 or 25A. A source shall be considered in violation if the emissions of organic compounds measured by any of the referenced test methods exceed the standards of this rule.

(Amended, Renumbered 1/7/98; Amended 1/21/04)

8-18-604 Determination of Mass Emissions: The mass emission determination as specified by Section 8-18-306 and Section 8-18-311 shall be made using any of the following methods: 1) EPA Protocol for Equipment Leak Emission Estimates, Chapter 4, Mass Emission Sampling, (EPA-453/R-95-017) November, 1995 or 2) or a mass emission monitoring method determined to be equivalent by the EPA and approved by the APCO.

(Adopted 1/7/98; Amended 1/21/04)

REGULATION 11
HAZARDOUS POLLUTANTS
RULE 10
HEXAVALENT CHROMIUM FROM ALL COOLING TOWERS AND TOTAL HYDROCARBON EMISSIONS FROM PETROLEUM REFINERY COOLING TOWERS

11-10-100 GENERAL

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REGULATION 11
HAZARDOUS POLLUTANTS
RULE 10
HEXAVALENT CHROMIUM FROM ALL COOLING TOWERS AND

TOTAL HYDROCARBON EMISSIONS FROM PETROLEUM REFINERY COOLING TOWERS

(Adopted November 15, 1989)

11-10-100 GENERAL

11-10-101 Description: The purpose of this Rule is to reduce emissions of hexavalent chromium from all cooling towers and reduce total hydrocarbon emissions from cooling towers at petroleum refineries~~by eliminating chromium based circulating water treatment programs~~.

~~**11-10-102 Exemption, Discontinued Chromate Treatment**: Sections 11-10-502 and 503 do not apply to cooling tower operators who have not used hexavalent chromium for water treatment since March 1, 1989.~~

11-10-103 Limited Exemption, Fin-Fan Coolers and HVAC Systems: Fin-Fan Coolers and HVAC Systems associated with petroleum refinery cooling towers are exempt from the total hydrocarbon emission requirements of this rule.

11-10-104 Limited Exemption, Continuous Hydrocarbon Analyzers: When a continuous hydrocarbon analyzer, as defined in Section 11-10-201, is installed pursuant to Section 11-10-602 and is used to detect total hydrocarbon concentrations in cooling tower water, the cooling tower return line (s), and/or the heat exchanger exit line(s) monitored by the analyzer(s) are exempt from the requirements of Section 11-10-402.

11-10-105 Limited Exemption, Recirculation Rates Less Than 500 Gallons Per Minute: Petroleum refinery cooling towers with a water recirculation rate less than 500 gallons per minute may demonstrate compliance with the requirements in Section 304 of this rule by monitoring for leaks at least once every 14 days, rather than continuously or daily as provided for in Section 11-10-304, with any of the Air District approved total hydrocarbon detection methods outlined in Section 11-10-304 .

11-10-106 Limited Exemption, Recirculation Rates Less Than 2,500 Gallons Per Minute: Petroleum refinery cooling towers with a water recirculation rate less than 2,500 gallons per minute may demonstrate compliance with the requirements in Section 304 of this rule by monitoring for leaks at least once every seven days, rather than continuously or daily as provided for in Section 11-10-304, with any of the Air District approved total hydrocarbon detection methods outlined in Section 11-10-304.

11-10-107 Exemption, Cooling Towers Servicing Hydrogen Production, Carbon Dioxide Recovery and Power Generation Facilities: Excluded from the total hydrocarbon emission requirements of this rule are cooling towers that are not in petroleum refining process service, including those that serve power generation operations, hydrogen production facilities and carbon dioxide recovery facilities located at petroleum refineries, provided they are not involved with the refining of crude oil and their cooling systems are separate from those used in petroleum refining operations.

11-10-200 DEFINITIONS

11-10-201 Continuous Hydrocarbon Analyzer: An Air District-approved parametric monitoring device that measures total hydrocarbon concentration to detect leaks in a heat exchanger system.

11-10-202 Cooling Tower: ~~Any open water recirculation device that uses fans or natural draft to draw or force air to contact and cool water by evaporation~~ A device used to remove heat by circulating cooling water systems by transferring heat to the atmosphere using either a natural or mechanical draft.

11-10-203 Hexavalent Chromium/Chromate: Hexavalent chromium is a cancer-causing (toxic) substance existing as part of various inorganic chromate compounds, for example, sodium dichromate or lead chromate.

~~**11-10-203 Water Treatment Chemicals:** Any combination of chemicals added to cooling tower water including tracers, corrosion inhibitors, antiscalants, dispersants, biocides.~~

11-10-204 Leak Action Level: A total hydrocarbon concentration greater than any one of the following:

204.1 84 ppbw (as methane) as measured in cooling tower water prior to exposure to air for cooling towers in operation prior to July 1, 2016, or 42 ppbw (as methane) as measured in cooling tower water prior to exposure to air for new or modified cooling towers operating on or after July 1, 2016.

204.2 6 ppmv (as methane) as measured in stripped air by a continuous hydrocarbon analyzer or an APCO approved alternative method.

11-10-205 Leak Repair: A leak repair shall reduce the concentration of total hydrocarbon in cooling tower water to comply with the applicable leak action level and may include but not be limited to the following actions:

205.1 Permanent physical repair of leaking equipment, replacement of equipment, and/or blocking or plugging equipment.

205.2 Replacing the leaking heat exchanger or heat exchanger bundle; or permanently isolating, bypassing, or otherwise removing the leaking heat exchanger from service until it is repaired.

11-10-206 Petroleum Refinery: An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. Petroleum refinery processes include separation processes (e.g., atmospheric or vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking) petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, blending, loading, and unloading), and auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).

11-10-207 Heat Exchange System: A device or series of devices used to transfer heat from process fluids to water without intentional direct contact of the process fluid with the water (i.e., non-contact heat exchanger) and to transport and/or cool the water in a closed-loop recirculation system (cooling tower system). For closed-loop recirculation systems, the heat exchange system consists of a cooling tower, all petroleum refinery process unit heat exchangers that

are serviced by that cooling tower, and all water lines to and from the petroleum refinery process unit heat exchanger(s).

11-10-208 Heat Exchanger: A device consisting of fins and/or tubes used to transfer heat from process equipment or process fluid streams to cooling water.

11-10-209 Total Hydrocarbon: Any compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

~~**11-10-212 Water Treatment Chemicals:** Cooling tower water may include tracers, corrosion inhibitors, antiscalants, dispersants, and biocide that improve the physical properties of the water.~~

11-10-210 Cooling Tower Return Line: The main water trunk lines at the inlet to the cooling tower before exposure to the atmosphere.

11-10-211 Heat Exchanger Exit Line: A cooling water line from the exit of one or more heat exchangers (where cooling water leaves the heat exchangers) to the entrance of the cooling tower return line.

11-10-300 STANDARDS

11-10-301 Hexavalent Chromium Removal: Effective March 1, 1990, a person shall not operate any cooling tower that uses hexavalent chromium chemicals.

~~**11-10-302 Circulating Water Concentration-Wooden Cooling Towers:** Effective March 1, 1990, a person shall not operate a wooden cooling tower in the District unless the following requirements are met:~~

~~302.1 March 1, 1990 to September 1, 1990: Hexavalent chromium levels in the circulating water are not to exceed 8 milligrams/liter of circulating water~~

~~302.2 After September 1, 1990: Hexavalent chromium levels in the circulating water are not to exceed 0.15 milligrams/liter of circulating water.~~

~~**11-10-303 Circulating Water Concentration-Non-Wooden Cooling Towers:** Effective March 1, 1990, a person shall not operate a non-wooden cooling tower unless the hexavalent chromium levels do not exceed 0.15 milligrams/liter of circulating water~~.

11-10-304 Total Hydrocarbon Leak Monitoring Requirement: Effective July 1, 2016, the owner/operator of a cooling tower located at a petroleum refinery shall use one of three options to monitor for total hydrocarbon leaks from cooling towers:

304.1 Sample and analyze cooling tower water at each cooling tower return line(s), and/or at each heat exchanger exit line(s) prior to exposure to air to demonstrate compliance with the leak action level in Subsection 11-10-204.1 (84 ppbw in the cooling water for existing units and 42 ppbw for new/modified units) at least once every calendar day (365 samples per year) pursuant to the requirements of Sections 11-10-603 , 11-10-604 and the BAAQMD Manual of Procedures; or

304.2 Install a continuous hydrocarbon analyzer(s) at each cooling tower return line(s), and/or at each heat exchanger exit line(s) prior to exposure to air to demonstrate compliance with the leak action level in Subsection 11-10-204.2 (6 ppmv in the stripped air). The owner/operator shall ensure that the continuous hydrocarbon

analyzer(s) is capable of taking at least 4 measurements every hour (96 measurements per day); or

304.3 Employ an alternative APCO-approved method to monitor each cooling tower return line(s), and/or each heat exchanger exit line(s) prior to exposure to air daily to demonstrate compliance with the leak action level in Subsection 11-10-204.2 (6 ppmv in the stripped air). Cooling tower owner/operators must receive prior approval from the APCO to use an alternative monitoring method.

11-10-305 Leak Action Requirement: Effective July 1, 2016, if any of the hydrocarbon leak detection methods in Section 11-10-304 result in cooling tower water containing total hydrocarbon concentrations greater than the applicable leak action level in Section 11-10-204, the cooling tower owner/operator shall minimize the leak as soon as practicable or within 5-calendar days, whichever is sooner, and conduct a leak repair and/or remove the defective piece of equipment from service within 21-calendar days of first detecting the leak. The owner/operator shall also speciate and quantify the Toxic Air Contaminants (TACs) associated with the leak within one calendar day of discovering the leak and each day thereafter until the leak is fully repaired, using water sampling pursuant to the requirements of Sections 11-10-603, 11-10-604 and the BAAQMD Manual of Procedures. The TACs requiring speciation and quantification are defined in Regulation 2, Rule 5, Section 2-5-222 and are summarized in Table 2-5-1 of Regulation 2, Rule 5.

11-10-400 ADMINISTRATIVE REQUIREMENTS

11-10-401: Petroleum Refinery Cooling Tower Reporting Requirements: When the sampling of cooling tower water exceeds the applicable leak action level the cooling tower owner/operator shall:

401.1 Within one calendar day, notify the APCO of the total hydrocarbon, pH, iron and chlorine concentration in the cooling water at time and date of leak discovery. List all of the heat exchangers that are served by this cooling tower.

401.2 If the leak has not been repaired after 21 days, the owner/operator shall notify the APCO regarding the magnitude of the leak, the specific repairs performed to date, whether the leaking component was reinspected for leaks following the repair, the cause of the leak, whether further repair or replacement of equipment will be required at the next turnaround, whether the hydrocarbons associated with the leak were speciated and quantified, and submit mass emission calculations to demonstrate the total hydrocarbon emissions from the leak are below 15 pounds per day, and the hourly and annual (if applicable) Toxic Air Contaminant (TAC) emissions from the leak are below their corresponding Acute and/or Chronic TAC trigger levels in Table 2-5-1 of Regulation 2, Rule 5.

11-10-402 Best Modern Practices: Effective July 1, 2016, the owner/operator of a cooling tower located at a petroleum refinery shall minimize total hydrocarbon emissions from cooling tower equipment and operations by employing best modern practices that shall include but are not limited to:

402.1 Visual examination and/or non-destructive testing of all heat exchangers upstream of the cooling tower during turnaround for corrosion/damage and back flushing;

402.2 Repassivation of the steel contained in the heat exchangers during turnaround;

402.3 Seal tubes within the heat exchangers if there is evidence of corrosion or pitting during turnaround;

402.4 Perform visual observations, at least once every shift, of the cooling water to detect any changes in the appearance of the water that could indicate hydrocarbon contamination and confirm presence of microbial growth such as turbidity or algae growth below the water line;

402.5 Monitor cooling tower decks at least once every shift, if access to the decks is possible, to detect any unexpected odors from the water via the human olfactory system;

402.6 Measure the residual chlorine in the cooling tower water once every shift;

402.7 Use hand-held monitors, such as or FIDs, once every shift, to detect the presence of total hydrocarbons in the air above the cooling tower water;

402.8 Measure the oxidation reduction potential in the cooling tower water with hand-held monitors a least once every shift; and,

402.9 At least once every shift, track and record the amount of chlorine (or biocide) added to the cooling tower water.

Data collected per the requirements in Section 11-10-402 shall be retained for at least 5-years from the date of entry and shall be analyzed in a written report by the cooling tower owner/operator once per week. The purpose of the written report is to examine for trends that could serve as an early warning/detection system for potential hydrocarbon leaks.

11-10-500 MONITORING AND RECORDS

~~**11-10-501 Reporting General:** By December 1, 1989, any owner/operator of a cooling tower shall notify the District in writing regarding the following information about the cooling tower. After December 1, 1989, any operator/owner of any newly constructed cooling water tower shall provide the APCO with the following information at least 90 days before the tower is operated.~~

~~1) Where the cooling tower is located.~~

~~2) Who is the owner/operator of the tower.~~

~~3) Cooling tower type and materials of construction.~~

~~4) Whether hexavalent chromium based treatment chemicals were used in the cooling tower.~~

~~5) If hexavalent chromium based chemicals were previously used, when they were discontinued.~~

~~6) A description of the alternate treatment program chosen, as well as the circulating water monitoring plan.~~

~~**11-10-502 Monitoring General:** Effective March 1, 1990, any person subject to Sections 11-10-302 and 303 shall test the circulating water at least once every six calendar months to determine the concentration of hexavalent chromium. The first test shall be performed during March, 1990. Testing may be discontinued when two consecutive required tests show hexavalent chromium concentrations less than 0.15 milligrams per liter of circulating water. The APCO reserves the right to require testing of the circulating water at any time, if the District has reason to believe the water may contain hexavalent chromium.~~

~~**11-10-503 Monitoring-Wooden Cooling Towers:**~~

~~503.1 March 1, 1990 until September 1, 1990: Any person subject to Section 11-10-302.1 shall test the circulating water at least once every calendar month to determine the concentration of hexavalent chromium.~~

~~503.2 After September 1, 1990: Any person subject to Section 11-10-302.2 shall test the circulating water at least once every six calendar months to determine the concentration of hexavalent chromium. Testing may be discontinued when two consecutive required tests show hexavalent chromium concentrations less than 0.15 milligrams per liter of circulating water. The APCO reserves the right to require testing of the circulating water at any time, if the District has reason to believe the water may contain hexavalent chromium.~~

11-10-504 Operating Records: ~~Any person subject to Sections 11-10-302 and 303 shall maintain records of the results of all required tests of circulating water for two years and give them to the District when requested.~~ Owner/operators subject to the requirements of Sections 11-10-301, 304, 305, 401, 402, 601, 602, 603 and/or 604 shall retain records of the results of all sampling and/or monitoring conducted, leak minimizations and repairs made, best modern practices employed and other required data on site for at least five years from the date of entry. Owner/operators claiming any of the limited exemptions from petroleum refinery cooling tower requirements in this rule shall keep records on site for at least five years to demonstrate qualification for exemption.

11-10-600 MANUAL OF PROCEDURES

11-10-601 Determination of Hexavalent Chromium in Circulating Water: Samples of circulating water shall be analyzed for hexavalent chromium as prescribed by American Public Health Method 312B or an equivalent method, as approved by the APCO.

11-10-602 Total Hydrocarbon Analyzer Location: Effective July 1, 2016, if the owner/operator of a cooling tower at a petroleum refinery installs one or more Air District-approved total hydrocarbon analyzers in a cooling tower to demonstrate compliance with Subsections 11-10-304.2 and 304.3, such analyzers shall be installed at: A) each cooling tower return line to continuously measure the total hydrocarbon concentration in the cooling tower water prior to exposure to air, or B) the exit line for each heat exchanger or group of heat exchangers within that heat exchanger system prior to exposure to air. Location of analyzer installations shall be subject to APCO approval. Analyzer sensitivity shall respond to the compounds being processed. Analyzers shall be maintained and operated in accordance with Regulation 1, Section 523.

11-10-603 Cooling Tower Water Lab Analysis Methodology: Effective July 1, 2016, when the owner/operator of a cooling tower located at a petroleum refinery performs cooling water sampling and analysis for hydrocarbon concentration in cooling tower water pursuant to Subsection 11-10-304.1, the laboratory analysis shall follow EPA Method 8015D.

11-10-604 Cooling Tower Water Sampling Methodology: Effective July 1, 2016, when the owner/operator of a cooling tower located at a petroleum refinery performs cooling water sampling and analysis for total hydrocarbon concentration in cooling tower water pursuant to Subsection 11-10-304.1, the cooling water shall be sampled at each cooling tower return line(s) and/or each heat exchanger exit line(s) prior to exposure to air. Sampling methodology shall follow the BAAQMD Manual of Procedures.

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

Petroleum Refinery Emissions Reduction Strategy:

Staff Report

Prepared by the staff of the

Bay Area Air Quality Management District

December 2015

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Petroleum Refinery Emissions Reduction Strategy: Staff Report

I. EXECUTIVE SUMMARY

The Bay Area Air Quality Management District (Air District) has developed a strategy for addressing air pollution from Bay Area petroleum refineries. This strategy stems from a Board of Directors' resolution (2014-17) adopted in October 2014, in which the Board instructed staff to develop a regulatory strategy that would further reduce emissions from petroleum refineries, with a goal of an overall reduction of 20 percent (or as much as feasible) no later than 2020. The strategy targets a spectrum of criteria pollutants and/or their precursors, including reactive organic gases (ROG), particulate matter (PM), sulfur dioxide (SO_2), and oxides of nitrogen (NOx).

The first set of these rules, designed to reduce harmful emissions, will be considered by the Board in December 2015 and is expected to reduce overall emissions from refineries by approximately 14 percent. This first set of rule actions would reduce smog-forming and toxic emissions from equipment leaks and cooling towers. These rules also would limit ammonia emissions from fluid catalytic cracking units (FCCUs), which will reduce associated formation and emission of fine particulate matter ($PM_{2.5}$).[1] In mid-2016, the second set of regulations will be developed to further reduce $PM_{2.5}$ emissions from fluid catalytic cracking units (if needed) and SO_2. The second set of regulations also would reduce SO_2 from other refinery sources including coke calcining and would reduce smog-forming emissions from turbines. The development of these sets of regulations is also known as the Petroleum Refinery Emission Reduction Strategy.

Overview of Proposed Rules and Rule Amendments

In this first phase of the Petroleum Refinery Emission Reduction Strategy, staff has developed three regulatory proposals: one new rule, and amendments to two existing Air District rules.

- New rule, Rule 6-5: Fluidized Catalytic Cracking Unit (FCCU), to minimize $PM_{2.5}$ emissions from FCCUs at three refineries;
- Amendments to Rule 8-18: Equipment Leaks, to address fugitive emissions of reactive organic gases (ROG) and toxic compounds from refinery equipment; and
- Amendments to Rule 11-10: Toxic and ROG emissions from Cooling Towers, to address emissions of ROG and toxic compounds from cooling towers.

These emissions reductions will make substantial progress toward achievement and maintenance of the state and federal ambient air quality standards.

[1] $PM_{2.5}$ is the portion of particulate matter with an aerodynamic diameter of less than 2.5 micrometers.

II. BACKGROUND

The Petroleum Refinery Emissions Reduction Strategy is intended to reduce emissions of criteria pollutants and their precursors (SO_2, NO_X, $PM_{2.5}$, reactive organic gases (ROG)) and toxic compounds from the five Bay Area refineries and associated facilities. The Air District plans to accomplish these refinery emissions reductions by amending several Air District rules affecting petroleum refineries and developing additional rules aimed at specific refinery processes.

The Air District is moving these individual actions through the rulemaking process as a package. This enables the Air District to use its staff resources more efficiently, streamline coordination and consultation with the public and the regulated community and respond to requests by the public. There should be no inference that this approach creates dependencies between these rule actions. Each rulemaking action is independent from the others and will be individually evaluated and considered for adoption according to the requirements of the California Health and Safety Code (H&SC).

This report and the proposed regulatory language reflect the input of stakeholders as a result of the Request for Comment on the Initial Report released in May 2015, open houses conducted in refinery communities in September 2015, and publishing of the public hearing package for these regulatory items, and internal staff deliberations. Staff considered the input received in drafting the proposed rules and the final staff report. The proposed rules and final staff report will be presented to the Air District Board of Directors for their consideration at a public hearing on December 16, 2015.

Goals: On December 17, 2014, the Air District's Board of Directors approved the following overall goals for the Petroleum Refinery Emission Reduction Strategy:

1. Strive to achieve a 20 percent reduction in emissions of criteria pollutants and precursors in the next five years.
2. Strive to achieve an additional 20 percent reduction in health risk from the emission of toxic pollutants.

Criteria pollutants are pollutants for which federal or state air quality standards have been established, such as SO_2, ozone, and $PM_{2.5}$. Precursors are pollutants that interact in the atmosphere to form criteria pollutants. For example, NO_X and ROG when exposed to sunlight combine to form ozone, and SO_2 and NO_x react with ammonia in the atmosphere to form $PM_{2.5}$. Toxic pollutants (toxic air contaminants (TACs)) are compounds identified by the ARB as air pollutants that may cause or contribute to an increase in mortality or in serious illness or that may pose a present or potential hazard to human health.

A. Air Quality Standards and Attainment Status

The Air District is a nonattainment area for the California ozone, PM_{10} and $PM_{2.5}$ clean air standards and for the National ozone and $PM_{2.5}$ standards.

Ozone

Ozone is the chemical name for what is generally known as photochemical smog. Exposure to ozone can trigger a variety of health problems including chest pain, coughing, throat and eye irritation and congestion. It can worsen bronchitis emphysema and asthma and, after repeated exposure may

permanently scar lung tissue. Ozone forms when nitrogen oxides (NO_X) and ROG react in the atmosphere, particularly when the weather is warm. Table 1 provides a summary of the number of times and locations the ozone standards have been exceeded in each of the last 5 years. This reflects the recent decision by the US Environmental Protection Agency (EPA) to strengthen the ozone standard to 0.070 part per million (ppm).

Table 1: Ozone Standards, and Exceedances[2]

Standard	Year	Exceedances	Locations
1 hour = 0.090 ppm	2010	26	13
	2011	6	3
	2012	5	4
	2013	3	1
	2014	3	1
8 hour = 0.070 ppm	2010	51	12
	2011	25	9
	2012	23	10
	2013	12	8
	2014	30	8

Particulate Matter

Particulate matter (particulates, PM) comes from natural sources (dust and sea salt), motor vehicles (mostly diesel soot), and industrial sources (catalyst emissions from refineries, black carbon from power plants). Particulates can also form in the air from reaction of ammonia with NO_x and sulfur oxides (SO_x). Particulates cause health impact because the smallest particles can penetrate deep into the lungs, causing damage to the lungs and creating breathing issues. The finest of these particles can penetrate through lung tissue into the bloodstream causing a variety of health issues, and are discussed below. Particulates are classified by size – the term Total Suspended Particulates (TSP) describes the entire range of particulate matter size. Particulates smaller than 10 microns are known as PM_{10}, and very fine particulates smaller than 2.5 microns are known as $PM_{2.5}$ or fine particulate.

PM_{10} Levels in the Bay Area

Table 2 provides a summary of the number of times and locations the PM_{10} standards have been exceeded in each of the last 5 years.

Table 2: PM_{10} Standards, and Exceedances[3]

Standard	Year	# of Times Exceeded	Locations
Annual = 20 $\mu g/m^3$	2011	1	Napa
	2013	1	San Jose
24 hour = 50 $\mu g/m^3$	2010	12	Bethel Island, San Rafael

[2] http://www.arb.ca.gov/adam/select8/sc8display.php
[3] http://www.arb.ca.gov/adam/select8/sc8display.php

	2011	24	Concord, Napa, San Pablo, San Rafael
	2012	15	Bethel Island, San Francisco, San Jose
	2013	21	San Jose, San Rafael
	2014	3	San Jose

$PM_{2.5}$ Levels in the Bay Area

$PM_{2.5}$ can penetrate deeply into sensitive parts of the lungs and cause or worsen respiratory disease, such as emphysema and bronchitis, even for short exposure times. Fine particulates can also aggravate existing heart disease, leading to increased hospital admissions and premature death. The Air District continues to exceed the federal 24-hour standard of 35 $\mu g/m^3$ several times per year. On these high concentration days, people, especially vulnerable and susceptible parts of the population, can experience health problems that affect their ability to go about daily activities normally.

Table 3 provides a summary of the number of times and locations the $PM_{2.5}$ standards have been exceeded in each of the last 5 years.

Table 3: $PM_{2.5}$ Standards, and Exceedances[4]

Standard	Year	# of Times Exceeded	Locations or number of locations
Annual = 12 $\mu g/m^3$	2013	1	Oakland
	2013	1	San Jose
Federal 24 hour standard* = 35 $\mu g/m^3$	2010	11	6
	2011	15	8
	2012	3	2
	2013	21	9
	2014	7	6

* The Federal $PM_{2.5}$ standard is included here because California does not have a 24-hour $PM_{2.5}$ standard. The federal $PM_{2.5}$ air quality standard is 35 micrograms per cubic meter ($\mu g/m^3$) measured on a 24-hour basis. Ambient measurements are used to calculate a statistic that is compared to these standards called a design value. The Air District's most recent 24-hour design value was 32 $\mu g/m^3$. While the design values have been below the federal standards since 2010, 35 $\mu g/m^3$ represents the daily limit beyond which significant health impacts may occur.

The Air District must continue to implement regulations to attain and maintain the California and/or federal clean air standards for ozone, PM_{10} and $PM_{2.5}$.

B. Regulatory Context

The Air District is currently engaged in developing regulatory measures to reduce emissions of air pollutants from a wide variety of stationary and area sources. As part of the ongoing development of the Air District's 2016 Clean Air Plan, staff evaluated many of these sources and determined that due to

[4] http://www.arb.ca.gov/adam/select8/sc8display.php

their high relative contribution to emissions, refineries and associated facilities should be a high priority for additional pollution control.

The 2012 Bay Area Emissions Inventory indicates that refineries are the largest individual stationary source emitters of anthropogenic ROG, NO_X and SO_2. And they are the largest individual source category for $PM_{2.5}$ emissions. (See Table 4a) Their impact is even more significant in the counties where they are located. In Contra Costa and Solano counties, the refineries and their associated facilities emit 22 percent $PM_{2.5}$, 26 percent of anthropogenic ROG and over 90 percent of SO_2 (See Table 4b).

Table 4a: Bay Area Emissions of Relevant Pollutants by Source Category[1]

Source Category	Emissions (tons/yr)							
	$PM_{2.5}$	%	Anthropogenic ROG	%	NO_X	%	SO_2	%
Refineries	1,330	8%	5,178	5%	4,137	4%	3,009	42%
Coke Calcining	29	0.2%	0.2	0%	239	0.2%	1,242	17%
Cement Plant	23	0.1%	40	0.04%	2,170	2%	912	13%
Other Major Industrial	1,839	11%	17,640	18%	5,772	5%	581	8%
Residential/Commercial	5,519	34%	27,862	29%	5,531	5%	326	5%
Agricultural	471	3%	2,049	2%	0	0%	0	0%
Miscellaneous	986	6%	116	0.1%	10	0%	0	0%
Mobile Sources	5,945	37%	44,659	46%	91,473	83.7%	1,168	16%
Total Emissions	**16,142**	**100%**	**97,543**	**100%**	**109,332**	**100%**	**7,237**	**100%**

Table 4b: Emissions of Relevant Pollutants by Source Category for Contra Costa and Solano Counties[1]

Source Category	Emissions (tons/yr)							
	$PM_{2.5}$	%	Anthropogenic ROG	%	NO_X	%	SO_2	%
Refineries	1,066	22%	6,439	26%	4,232	17%	2,889	63%
Coke Calcining	28	1%	0	0%	239	1%	1,242	27%
Cement Plant	0	0%	0	0%	0	0%	0	0%
Other Major Industrial	569	12%	3,383	14%	2,139	8%	85	2%
Residential/Commercial	1,548	32%	5,649	23%	1,122	4.4%	49	1.1%
Agricultural	97	2%	369	1%	0	0%	0	0%
Miscellaneous	294	6%	20	0%	2	0%	0	0.0%
Mobile Sources	1,212	25%	9,041	36%	17,703	69.6%	296	6%
Total	**4,814**	**100%**	**24,900**	**100%**	**25,437**	**100%**	**4,561**	**100%**

1. Emissions from biogenic sources and accidental fires are not included in this inventory. Mobile emissions include shipping emissions within 3 nautical miles of the Bay Area coastline.
2. $PM_{2.5}$ emissions for the Refineries category include condensable and filterable PM. Condensable PM data are not available for other source categories at this time.

Further, the five Bay Area refineries rank among the top ten facilities in the Bay Area for risk-weighted emissions of TACs, based on an evaluation of emissions from stationary sources in 2012 and using risk factors for cancer and chronic hazard indices.

Based on assessments of emissions of criteria pollutants and TACs from refineries, and to ensure the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standard (CAAQS)[5] and ensure protection of the public from toxic air contaminants, the Air District has made emissions reductions from these facilities a high priority and intends to reduce refinery emissions by 20 percent by 2020, if feasible. To this end, staff has engaged in several rulemaking efforts to further reduce emissions of all air pollutants (including criteria and toxic pollutants) from the five Bay Area refineries, plus five associated facilities that either support refinery operation (two sulfuric acid plants and two hydrogen plants, and a coke calcining plant), which processes a refinery by-product. These emissions reduction efforts are part of an overall refinery strategy to address refineries and their impact on neighboring communities.

C. Air District Board Direction

On October 15, 2014, the Air District Board of Directors adopted Resolution Number 2014-07, instructing staff to develop a strategy based on an evaluation of approaches that would further reduce emissions from petroleum refineries, including:

- The "community-worker" approach outlined in a September 26, 2014 letter;
- Approach(es) proposed by industry;
- Approach(es) to require each refinery to develop a refinery emissions improvement plan. The plan would implement a suite of measures to demonstrate compliance with all applicable requirements to reduce emissions from petroleum refineries and to identify any additional feasible measures to utilize best practices to minimize emission and to assure continuous emission reductions; and
- Other approaches deemed appropriate by Air District staff.

The resolution also instructed Air District staff to prepare and present to the Board of Directors by December 2014, a strategy to achieve further emissions reductions from petroleum refineries that would include as a target a 20 percent reduction in refinery emissions, or as much as feasible. The resolution also provided that the strategy must include a schedule to implement regulations or other enforceable mechanisms as expeditiously as possible.

On December 17, 2014, the Board of Directors approved the staff-proposed approach that would blend the best of the evaluated approaches. This approach has the following components:

- Identify specific source categories with opportunities for cost-effective controls (this is also known as a Best Available Retrofit Control Technology review, or BARCT review);
- Adopt requirements identified in the EPA Refinery Risk and Technology Review;
- Include the quantitative goals from the Community-Worker proposal;
- Include continuous improvement as a goal for regulations;
- Retain compliance with the Health and Safety Code and the process transparency advocated by industry.

[5] The Bay Area is designated as a non-attainment area for the State 8-hour and 1-hour standards and the National 8-hour standard for ozone; the State annual and 24-hour standards for PM10; and the State annual standard and National 24-hour for fine particulate matter ($PM_{2.5}$). [http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status]

The Board of Directors also approved the following overall goals for the Petroleum Refinery Emissions Reduction Strategy:

1. Strive to achieve a 20 percent reduction in criteria pollutants and precursors within the next five years; and
2. Strive to achieve an additional 20 percent reduction in health risk from toxics.

D. Targeted Pollutants

The Petroleum Refinery Emission Reduction Strategy is intended to reduce emissions from the five Bay Area refineries and the five associated facilities of the following pollutants:

- Particulate matter (PM), including directly emitted filterable PM and condensable PM, as well as precursor compounds that form $PM_{2.5}$ as a result of chemical reactions in the atmosphere. Condensable PM is particulate matter that forms after the hot emissions from the stack cool to ambient temperatures. These emissions are not quantified by traditional particulate testing methodologies because the sampling system does not operate at atmospheric temperatures and the condensable PM is a vapor at higher temperatures.
- ROG, a precursor in the formation of ground-level ozone.[6]
- NO_x, an ozone precursor and a contributor to fine PM formation.
- SO_2, a precursor to $PM_{2.5}$ formation.
- Ammonia (NH_3), also a precursor to $PM_{2.5}$ formation.

E. Phased Approach

Air District staff recommends a two-phase approach to complete the rulemaking for the Petroleum Refinery Emission Reduction Strategy:

1. Phase 1 is scheduled to be considered for adoption by the Air District Board of Directors at a public hearing on December 16, 2015; and
2. Phase 2 is scheduled to be completed in the third quarter 2016.

The first set of proposed regulations, Phase 1, is the culmination of over a year's effort developing information—such as emissions inventory, emissions reductions, control technology evaluation and cost estimates, cost effectiveness, and preliminary environmental impact review. Phase 1 includes the following three regulatory actions:

- New proposed rule, Rule 6-5: Fluidized Catalytic Cracking Unit (FCCU), to minimize condensable PM formation;
- Proposed amendments to Rule 8-18: Equipment Leaks, to address fugitive emissions of ROG and toxic compounds from refinery equipment; and
- Proposed amendments to Rule 11-10: Toxic and ROG emissions from Cooling Towers, to address ROG and toxic compounds from cooling towers.

[6] Methane is not part of ROG because it has a low reactivity for ozone formation, although it is a potent greenhouse gas (GHG). The Air District expects some methane reductions as a co-benefit of ROG reductions. However, methane is not currently a targeted pollutant in this Petroleum Refinery Emission Reduction Strategy. It will be addressed through other measures in the Clean Air Plan.

The second set of regulatory actions, Phase 2, would focus on regulatory development for which staff has developed initial information, such as emissions inventory and cost estimates, but for which staff is currently in the process of gathering additional information needed for the regulatory development process, including environmental and socioeconomic information. Phase 2 would cover the following regulatory actions:

- New proposed rule, Rule 9-14: Petroleum Coke Calcining, to address emissions of SO_2 and the formation of $PM_{2.5}$;
- Draft amendments to new Rule 6-5: FCCU to address emissions of SO_2 and condensable PM (if needed);
- Draft amendments to Regulation 9, Rule 1: Sulfur Dioxide, to further reduce emissions of SO_2 and the formation of $PM_{2.5}$ from refinery fuel gas combustion and from sulfuric acid plants, and to address emissions of SO_2 from sulfur plants; and
- Draft amendments to Rule 9-9: Stationary Gas Turbines, to address emissions of NO_X.

F. Affected Facilities

There are five petroleum refineries in the Bay Area that may be affected by the emission reduction strategy:

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

There are also five associated support facilities that may be affected:

1. Chemtrade West (sulfuric acid plant that supports Chevron);
2. Eco Services (formerly called Solvay; sulfuric acid plant that supports Shell and Valero regularly, and Tesoro as needed when its acid plant is down for maintenance);
3. Air Products (hydrogen plant that supports Tesoro);[7]
4. Phillips 66 Carbon Plant; and
5. Air Liquide (hydrogen plant that supports Phillips 66).

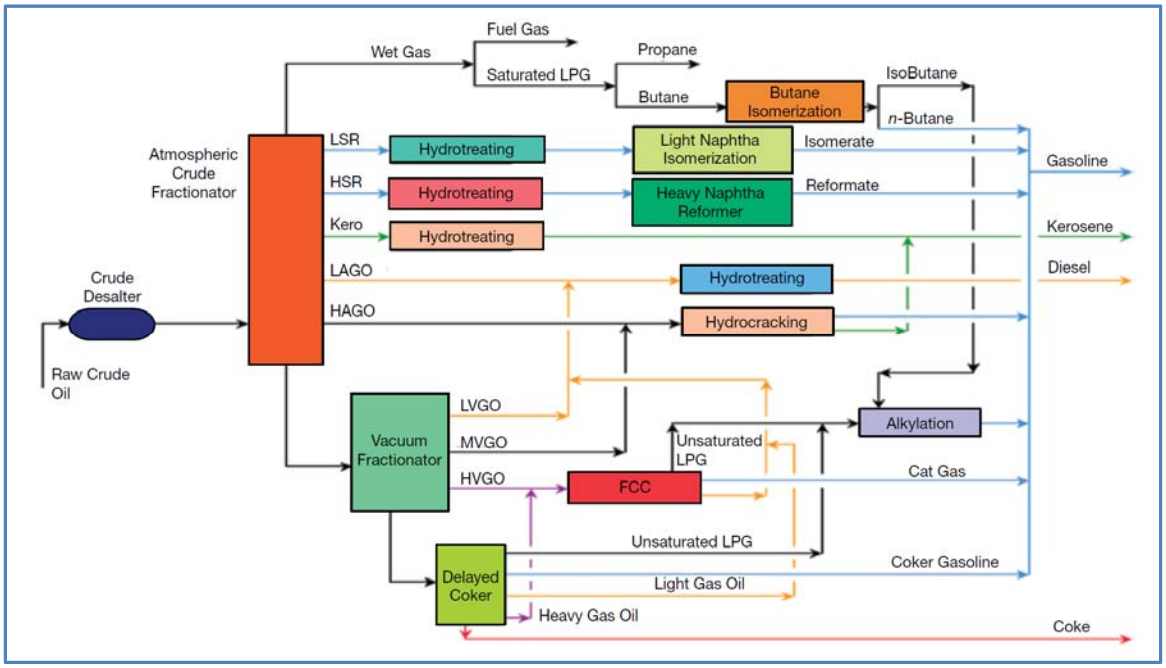
In addition, some other facilities will be impacted by the changes to Regulation 8, Rule 18: Equipment Leaks.

G. Petroleum Refining Processes

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 1 illustrates how various process units at petroleum refineries convert raw crude oil (petroleum) into fuels and other products.

[7] There is also an Air Products plant that supports only the Shell Refinery. The emissions from that plant were included in the baseline inventory.

Figure 1: 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: Isobutene (a lighter hydrocarbon) is combined with olefins (heavier hydrocarbons) to form larger molecules known as alkylates, which 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.

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 air contaminants, and 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.

III. PROPOSED RULES AND RULE AMENDMENTS

Air District staff is working on the following control measures that would comprise the Petroleum Refinery Emissions Reduction Strategy. The Phase 1 measures are covered in this staff report. Technical analysis has begun on the Phase 2 measures. Table 5 lists these individual control measures and rule development efforts.

Table 5: Description of Rule Changes

Title	Proposal Description
PHASE 1	
Rule 6-5: FCCU (Part 1)	Establish emission limits on fluid catalytic cracking units in oil refineries for ammonia, which expected to reduce emissions of condensable PM.
Rule 8-18: Equipment Leaks	Reduce fugitive emission of organic gases and toxic compounds through the following: • Include identification and monitoring of heavy liquid service equipment; • Amend the non-repairable equipment standard to reduce the allowable amount of equipment placed on non-repairable list; • Require quantification of leaks for all equipment placed on the non-repairable list; • Add a maximum leak concentration (10,000 ppm) that would apply to all equipment placed on the non-repairable list; and • Add a maximum mass emissions rate (five pounds per day) that would apply to any individual piece of equipment subject to monitoring by Rule 8-18. Administrative changes to rule language will be drafted to clarify and enhance enforceability of the rule.
Rule 11-10: Toxic and ROG Emissions from Cooling Towers	Reduce emissions of toxic organic gases and ROG from cooling towers by testing for and repairing heat exchanger leaks.
PHASE 2	
Rule 6-5: FCCU (Part 2)	Reduce SO_2 and condensable PM emissions (if needed).
Rule 9-1: Sulfur Dioxide (Part 1)	Reduce SO_2 emissions by the following: 1. Limit the sulfur content of refinery fuel gas to no more than 40 ppm; 2. Limit SO_2 emissions from sulfuric acid plants to no more than 0.20 lb. SO_2 per

Title	Proposal Description
	ton of acid produced; and 3. Reduce SO_2 emissions from refinery sulfur plants to the extent that it is feasible.
Rule 9-14: Petroleum Coke Calcining	Reduce SO_2 emissions and associated $PM_{2.5}$ formation from the coke calcining facility through improvements to the emission control system.
9-9: Stationary Gas Turbines	Require the installation of selective catalytic reduction control on turbines with heat input greater than 100 MM BTU/hr. (The scope of this change may be expanded to include smaller turbines, if staff finds that there may be cost-effective opportunities for emission reductions on these smaller turbines.)
FURTHER STUDY MEASURES	
Rule 8-8: Industrial Wastewater	Review industrial wastewater collection, separation, and treatment system operations to develop an overall strategy to reduce air toxics and TOCs.
8-44: Marine Vessel Operations	Reduce organic gas emissions from marine loading operations that are within the Air District's authority in consideration of overlapping authority of the Coast Guard and other agencies.
9-10: Refinery Boilers, Steam Generators and Process Heaters	The majority of NO_X emissions at the refineries come from these sources. Recent updates to Rule 9-10 have tightened standards, but those reductions have not yet been reflected in the emissions inventory. Substantial work will be required to determine whether there are opportunities for additional controls.

Phase 1 items listed in the above table are the rules and amended rules that are being proposed for adoption at the December 16, 2015 Board of Directors meeting.

A. Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units

Staff proposes the major provisions in new proposed Rule 6-5 listed in Table 6.

Table 6: Major Provisions in Proposed Rule 6-5

Rule Section	Description
§ 6-5-301	Establish a new 10 ppmvd (at 3% oxygen concentration, daily average basis) ammonia emission limit from FCCUs effective January 1, 2018.
§ 6-5-401	Require submission of a control plan to comply with Section 6-5-301 and permit applications to perform required equipment modifications by January 1, 2017.
§ 6-5-402	Require submission of a monitoring plan to ensure compliance monitoring for Section 6-5-301 by January 1, 2017.
§ 6-5-403	As an alternative to compliance with Section 6-5-301, an FCCU operator may perform an optimization study leading to a new ammonia emission limit (presumably higher than the limit in Section 6-5-301) that is demonstrated to result in the greatest reduction in $PM_{2.5}$ emissions from the FCCU that is achievable given other existing requirements on the FCCU.

B. Regulation 8, Rule 18, Equipment Leaks

Staff proposes the general changes to Rule 8-18 (Table 7), which would become effective January 1, 2018.

Table 7: Major Amendments in Proposed Rule 8-18

Rule Section	Description
§ 8-18-113	Require identification and monitoring of heavy liquid service equipment and subject heavy liquid service equipment to leak minimization and repair requirements.
§ 8-18-200	Additions to and clarification of definitions
§ 8-18-306	Reduce the allowable amount of equipment placed on non-repairable list.
§ 8-18-306.1	Add a maximum leak concentration (10,000 ppm) and require mass emission monitoring for all equipment placed on the non-repairable equipment list.
§§ 8-18-306.1 & 311	Establish a maximum mass emissions limit for fugitive equipment subject to the rule.
§ 8-18-401.11	Require the identification of the cause of any background reading greater than 50 ppmv.
8-18-502.6	Require submission of Piping and Instrumentation Diagrams (P&IDs) for equipment in heavy liquid service.

In addition, proposed administrative changes to rule language have been included to improve clarification and enforceability of the rule.

C. Regulation 11, Rule 10: Cooling Towers

Staff proposes the general provisions in new Rule 11-10 listed in Table 9.

Table 9: Major Provisions in Proposed Rule 11-10

Rule Section	Description
§ 11-10-200	Addition of new definitions for the new THC leak monitoring and leak repair provisions.
§ 11-10-304	THC leak monitoring requirements provide refineries three options.
§ 11-10-305	Progressive steps for leak action repair requirements.
§ 11-10-400	Leak reporting requirements and "Best Modern Practices" requirements.

In addition, proposed administrative changes to rule language have been included to improve clarification and enforceability of the rule.

IV. EMISSIONS AND EMISSION REDUCTIONS

The Air District has established a baseline emissions inventory for estimating emissions reductions from the new rules and proposed amendments to current rules in the Petroleum Refinery Emission Reduction Strategy. This inventory shows baseline emissions for pollutants targeted by the proposed regulations: PM (including directly-emitted filterable PM and condensable PM), TOG,[8] NO_x, and SO_2. It includes emissions from petroleum refinery processes (e.g., feedstock and product handling, petroleum separation, and conversion and treating processes) as well as from auxiliary facilities such as hydrogen production, sulfur recovery, and power plants. Reporting year 2013[9] was chosen as the baseline year because it is the most recent year for which the Air District has complete emissions data. However, equipment leak and cooling tower TOG emissions are based on reporting year 2014 because the calculation methodology for these source categories have been significantly improved in this reporting cycle.

[8] The Air District's emissions reporting system does not consistently differentiate between TOG and ROG emissions. Because TOG is the more inclusive category, it is being used for the development of the baseline.
[9] The 2013 reporting year emissions correspond to emissions from calendar year 2012.

Table 10: Baseline Emissions from the Refineries and Associated Facilities

Facility Name	Average Annual Emissions (tons/year)				
	PM (filterable)	PM (cond.)[10]	TOG	NO_X	SO_2
Chevron	173	255	2,187	910	339
Phillips 66	53	—	337	266	409
Shell	409	98	1,749	971	1,084
Tesoro	80	91	1,200	763	572
Valero	123	—	494	1,205	111
Chemtrade West	4	—	55	3	127
Eco Services	18	—	1	13	362
Air Products	10	—	9	3	2
Phillips 66 (Carbon Plant)	29	—	0	239	1,242
Air Liquide	16	—	29	2	2
Total Emissions	**915**	**444**	**6,061**	**4,375**	**4,250**

The Air District has estimated the following emission reductions and costs for the regulatory actions under consideration (Table 11). More details may be found in the appendices to this document.

Table 11: Estimated Emissions Reductions and Costs for Rule Changes in Phase One

Title	PM (tons/year)	TOG (tons/year)	NO_X (tons/year)	SO_2 (tons/year)	Costs (million $/yr)
Rule 6-5: FCCU (Part 1)[11]	222	n/a	n/a	n/a	$0.3
Rule 8-18: Equipment Leaks	n/a	1,227	n/a	n/a	$6.8
Rule 11-10: Cooling Towers	n/a	861	n/a	n/a	$2.2[12]
Totals for Phase 1	**222**	**2,088**	**0**	**0**	**$9.3**

Table 11 shows that the Air District has identified significant opportunities for TOG reductions in this first phase of regulatory actions. As sources of filterable PM at the refineries are already cost-effectively controlled, the key opportunity for emissions reductions is from condensable PM. The Air District plans to address condensable PM by regulating emissions from FCCUs.

The total combined baseline emissions from the refineries are 16,045 tons per year. The emissions reductions from Phase 1 of the Petroleum Refinery Emission Reduction Strategy are estimated to be 2,310 tons per year, which means this initial phase is projected to reduce emissions from these sources

[10] Condensable PM emissions are estimated based on a very small number of non-standard tests on FCCUs. These numbers will change as more testing is completed at the refineries.

[11] Air District staff is estimating a 50 percent reduction in condensable PM emissions from the FCCUs. But, since the baseline emissions are uncertain and the impact of the ammonia optimization is uncertain, the actual reductions are likely to be different. If insufficient condensable PM reductions are realized, more expensive add-on controls may be proposed in future rulemaking.

[12] Estimated costs range from $1.1 million/yr to $2.2 million/yr depending on the method selected by the refineries. The highest cost is shown here for consistency with the socioeconomic report.

by 14 percent.[13] Air District staff is still developing emissions reductions estimates for Phase 2, but expects the combined emission reductions to meet or exceed the 20 percent goal set by the Board.

Twenty Percent Reduction in Risk from Toxic Emissions
Another of the goal of the Petroleum Refinery Emission Reduction Strategy is to reduce the risk from emissions of toxic compounds by at least 20 percent. Several of the rule development efforts undertaken in the strategy would reduce toxic emissions and risk. Specifically, amendments to Rule 8-18 would reduce VOCs, including toxic compounds, from leaking components, and amendments to Rule 11-10 would expand the scope of this airborne toxic control measure to included toxic organic gases from refinery cooling towers.

The key to addressing the impact of toxic pollutants from refineries is to determine which sources and pollutants are most responsible for increased health risk. To this end, staff will either develop a refinery-specific rule or general rule that would revise the requirements for the development and execution of Health Risk Assessments (HRAs) and the AB 2588 Air Toxics "Hot Spots" Act Action Levels for risk management that would significantly reduce the health impacts the from toxic emissions. Staff is considering proposing a reduction of the risk management action level from 100 in a million (100/M) cancer risk to 25 in a million (25/M). Further, the Office of Environmental Health Hazard Assessment (OEHHA) has updated the risk assessment guidelines and risk factors for TACs. The overall effect of the OEHHA Guideline revisions is an increase in cancer risk estimates. Although concentrations of pollutants may be the same for a given source, estimating cancer risk using the revised OEHHA guidelines will result in higher risk numbers. For most toxic air contaminants, the cancer risk will increase by about 40 percent for the same emission level compared to the cancer risk calculated using the previous HRA Guidelines. For a dozen TACs, the cancer risk could increase by up to a factor of five. These changes may result in many facilities, including refineries, triggering the public notification requirements under AB 2588. Once the impact of these changes are fully understood, Air District staff will determine the degree to which sources of toxic emissions would be impacted by the HRA guideline changes and a reduction in the risk management trigger level.

V. ECONOMIC IMPACTS

Pursuant to the California Health & Safety Code (H&SC), the Air District is required to perform two different types of economic analysis for rule development activities. The two required analyses are (1) a socioeconomic analysis under Health and Safety Code section 40728.5, and (2) an incremental cost analysis under H&SC section 40920.6. The California Health & Safety Code states, in part, that air districts shall endeavor to achieve and maintain state ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide by the earliest practicable date. In developing regulations to achieve these objectives, air districts shall consider the cost effectiveness of their air quality programs, rules, regulations, and enforcement practices in addition to other relevant factors, and shall strive to achieve the most efficient methods of air pollution control. However, priority shall be placed upon expeditious progress toward the goal of healthful air.

Since these economic analyses are specific to the particular rules, they are not addressed in the main body of this document. They may be found in the appendices specific to those rules.

[13] Including, the reductions of condensable PM projected from rule 6-5, which are uncertain at this time.

VI. SOCIOECONOMIC IMPACTS

Section 40728.5 of the California Health and Safety Code requires an air district to assess the socioeconomic impacts of the adoption, amendment or repeal of a rule if the rule is one that "will significantly affect air quality or emissions limitations." Applied Development Economics of Walnut Creek, California has prepared a socioeconomic analysis of proposed new Regulation 6, Rule 5 and amendments to Regulation 8, Rule 18 and Regulation 11, Rule 10. This analysis is based on the costs of compliance with the proposed regulations, and is attached to this report as Appendix E. The analysis concludes that the socio-economic impacts of compliance with the requirements of these rules are less than significant. Moreover, because affected sources are not small businesses, small businesses are not disproportionately impacted by the proposed rule changes.

VII. ENVIRONMENTAL IMPACTS

Pursuant to the California Environmental Quality Act, the District has had an initial study prepared by Environmental Audit, Inc. of Placentia, California for the proposed new Regulation 6, Rule 5, and amendments to Regulation 8, Rule 18 and Regulation 11, Rule 10. The initial study concludes that there are no potential significant adverse environmental impacts associated with these proposed amendments and proposed rule. A negative declaration is proposed for approval by the District Board of Directors. The negative declaration and initial study are provided in Appendix D.

VIII. REGULATORY IMPACTS

Section 40727.2 of the California Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and air 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. The regulatory impacts analysis may be found in the appendices specific to those rules.

IX. RULE DEVELOPMENT AND PUBLIC CONSULTATION PROCESS

During this multi-phased rule development effort staff endeavored to engage all interested stakeholders, including affected industry, nearby community members, environmental organizations, other governmental agencies, the media, and other interested parties. There are several aspects to this public engagement, including:

- Development of conceptual versions of draft rules with discussions of those concepts;
- An advanced Call for Comments, released May 26, 2015, which included:
    - Petroleum Refinery Emissions Reduction Strategy: Initial Report
    - Concept Papers addressing each of the draft rules and rule amendments
    - Draft rule and rule amendment language
- Hosting a series of Refinery Rules Open House Workshops to solicit public input / comment on the Petroleum Refinery Emissions Reduction Strategy: Workshop Report, and revised concept papers for each of the draft new rules and draft rule and rule amendments. The Open Houses were held in the following locations:

    - Martinez on September 15, 2015,
    - Benicia on September 17, 2015, and
    - Richmond on September 28, 2015;
- Meetings and consultations (community meetings, phone conversations, emails, letters) with interested stakeholders in less formal settings to discuss concerns and issues;
- Preparation of a regulatory package for the consideration of the Air District Board of Directors, including:
    - Proposed regulatory language;
    - A Staff Report presenting the staff's findings, such as descriptions of the refining industry, regulatory history, summary and explanation of the proposal, emissions and emission reductions estimates, costs, cost effectiveness and incremental cost effectiveness, environmental and socioeconomic impacts, a schedule of implementation (when the provisions of the rule become effective if adopted), and staff recommendations to the Board of Directors;
    - An environmental analysis report;
    - A socioeconomic analysis report;
    - A discussion of and responses to comments received on the proposed rule, staff report, and environmental and socioeconomic analyses; and
- An informational Board meeting held on November 30, 2015 where presentations were made by Communities for a Better Environment and the Western States Petroleum Association and public testimony was provided by 43 individuals.
- Public Hearing, where the staff's presentation is made and stakeholders may provide testimony to the Board of Directors on the staff proposal and at which the Board would consider the adoption of the proposal.

X. PRELIMINARY SCHEDULE OF THE PETROLEUM REFINERY EMISSION REDUCTION STRATEGY REGULATORY DEVELOPMENT

Table 12 provides a preliminary schedule for the development of each of the two phases of the regulatory effort. It should be noted that these are only rough estimates of the schedule and the dates may change as the effort proceeds.

Table 12:
Schedule of the Petroleum Refinery Emission Reduction Strategy Regulatory Development

Milestone	Phase 1	Phase 2
Concepts	April 2015	April 2015
Workshops	3rd Quarter 2015	2ND Quarter 2016
Public Hearing	4th Quarter 2015	3RD Quarter 2016

XI. COST RECOVERY

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

In accordance with the adopted Cost Recovery Policy, Air District staff is developing a new fee schedule to be included in Regulation 3, Fees.

XII. CONCLUSION

Pursuant to Section 40727 of the California Health and Safety Code, the proposed new rules must meet findings of necessity, authority, clarity, consistency, non-duplication, and reference. Proposed new Regulation 6, Rule 5 and amendments to Regulation 8, Rule 18 and Regulation 11, Rule 10 are:

- Necessary to ensure the attainment and maintenance of the NAAQS and California Ambient Air Quality Standard (CAAQS)[14] and ensure protection of the public from toxic air contaminants given the size and impact of the refineries;
- Authorized under Sections 40000, 40001, 40702, 40725 through 40728, and 44391 of the California Health and Safety Code;
- Written or displayed so that their meaning can be easily understood by the persons directly affected by them;
- Consistent with other Air District rules, and not in conflict with state or federal law;
- Non-duplicative of other statutes, rules or regulations; and
- Implementing, interpreting or making specific the provisions of the California Health and Safety Code Sections 40000, 40702, and 44391.

The proposed new rules have met all legal noticing requirements, have been discussed with the regulated community, and reflect consideration of the input and comments of many affected and interested parties. Air District staff recommends adoption of proposed new Regulation 6, Rule 5 and proposed amendments to Regulation 8, Rule 18 and Regulation 11, Rule 10.

[14] The Bay Area is designated as a non-attainment area for the State 8-hour and 1-hour standard and the National 8-hour standard for ozone; and the State standards for fine particulate matter ($PM_{2.5}$). [http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status]

APPENDICES

Appendix A: Rule 6-5: Fluidized Catalytic Cracking Units (FCCU)
Appendix B: Changes to Rule 8-18: Equipment Leaks
Appendix C: Changes to Rule 11-10: Toxic and ROG emissions from Cooling Towers
Appendix D: California Environmental Quality Act, Negative Declaration
Appendix E: Socio-Economic Analysis

Appendix A:
Rule 6-5: Fluidized Catalytic Cracking Units (FCCU)

Rule/Rule Amendment Description

New Regulation 6, Rule 5, *Particulate Emissions from Refinery Fluidized Catalytic Cracking Units* (Rule 6-5) reduces emissions of particulate matter (PM) 2.5 microns or less ($PM_{2.5}$ or fine PM) from fluidized catalytic cracking units (FCCUs) at petroleum refineries.

Goals

The goal of this rulemaking is to achieve emission reductions of $PM_{2.5}$ and $PM_{2.5}$ precursors from FCCUs at Bay Area refineries. The Air District plans to do this in two actions as described in the staff report.

1. The first action will be a new ammonia emission limit at FCCUs. Ammonia is primarily a concern because of its role as a precursor to the formation of condensable $PM_{2.5}$ at the FCCU exhaust. Condensable $PM_{2.5}$ occurs when ammonia in the FCCU exhaust reacts with compounds such as NOx and SOx, and the resulting compounds condense into $PM_{2.5}$ once emitted from the FCCU exhaust. Thus, the proposed ammonia emission limit is an indirect limit on the emission of condensable $PM_{2.5}$.

   Although the Bay Area currently has a "clean data finding" from EPA for the $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS), it has not been designated as being in attainment with $PM_{2.5}$ requirements. More urgently, the Bay Area continues to be a nonattainment area for the state $PM_{2.5}$ standard. Further, Air District staff has long held that ambient $PM_{2.5}$ concentrations remain the driver for air pollution-based health impacts in the Bay Area. For these reasons, the Air District is obligated to take action to further reduce emissions of $PM_{2.5}$ and its precursors in order to attain and maintain compliance with both state and federal $PM_{2.5}$ standards.

   The Air District is currently working with refineries that operate FCCUs to perform source testing of condensable $PM_{2.5}$ emissions using the most recently developed and accurate testing methods. Although this testing will not be complete until 2016, testing at the Chevron FCCU using earlier versions of these methods suggests that FCCUs may be the largest source of condensable $PM_{2.5}$ in the Bay Area.

2. The second action will be a later amendment to Rule 6-5 to directly address emissions of condensable $PM_{2.5}$ (if additional cost effective emissions reductions can be realized) and in addition to address another fine PM precursor: SO_x. The specific measures to be proposed in the second action depend on the emission reductions achieved by the first action.

Background

FCCUs are complex processing units at refineries that convert heavy components of crude oil into light, high-octane products that are required in the production of gasoline. This conversion reaction is promoted with the use of a fine, powdered catalyst in the FCCU reactor vessel. During the reaction phase, the catalyst becomes coated with petroleum coke, which reduces the catalysts effectiveness. As a result, the petroleum coke must be burned off in the FCCU regenerator vessel so that the catalyst can be reused. This process and equipment are shown in Figure 1.

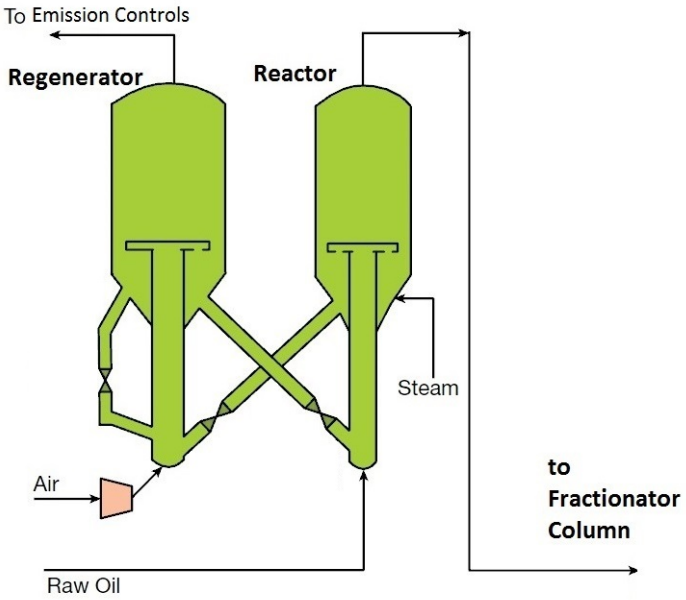


Figure 1 – FCCU Process

The emission stream from the FCCU results from the combustion gas created in the regeneration vessel exhaust. In addition to the pollutants that originate in the regeneration process—particulate matter (PM), sulfur dioxide (SO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), and volatile organic compounds (VOC)—other pollutants, such as ammonia and additional NO_x, are introduced or created downstream of the regeneration vessel. Most of the ammonia that is ultimately emitted from the FCCU exhaust is introduced downstream of the regenerator either to suppress NO_x formation or to increase the effectiveness of electrostatic precipitators (ESPs) in removing PM from the FCCU exhaust.

The Bay Area has five petroleum refineries. Four of these, Chevron, Shell, Tesoro and Valero, operate FCCUs. The Valero refinery has recently retrofitted its FCCU with a wet scrubber and therefore has lower $PM_{2.5}$ and SO_2 emissions than the other refineries. The Chevron and Tesoro FCCUs use ammonia to control filterable particulate matter emissions in ESPs, resulting in unreacted ammonia being emitted to the atmosphere (*ammonia slip)*. The Shell FCCU uses ammonia or urea injection to control NO_x emissions, as well as to improve ESP operation. Valero would be exempt from the proposed rule because the rule includes an exemption for FCCUs that are controlled by wet scrubbers that have been determined to be "best available control technology" (BACT).

Regulatory History and Context

There are currently no Air District regulations that apply to ammonia emissions from FCCUs. There are two federal standards in part 60 that may apply to FCCUs, depending on the year of construction, reconstruction, or modification, but neither one applies limits to ammonia emissions.[1]

[1] 40 CFR part 60, subpart J, *Standards of Performance for Petroleum Refineries* and 40 CFR part 60, subpart Ja, *Standards of Performance for Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced after May 14, 2007*

Emissions

Based on recent source tests, ammonia concentrations at the FCCU catalyst regeneration outlet (post-control) are 29 parts per million by volume (ppmv) at the Chevron refinery and 23 ppmv at the Shell refinery. Source test data are not available for the Tesoro refinery, but emissions at Tesoro are estimated based on permitted use of ammonia. Based on these source test data and assumptions, District staff estimates the following condensable $PM_{2.5}$ emissions from FCCUs:

Facility	2013 Condensable $PM_{2.5}$ FCCU Emissions (tpy)
Chevron	255
Shell	98
Tesoro	91

Regulatory Concepts and Proposed Regulations

In 2003, South Coast AQMD adopted an ammonia emission limit of 10 ppmv, corrected to 3 percent oxygen, for FCCUs in their Rule 1105.1. Air District staff is proposing the same limit in Rule 6, Rule 5. Staff is also proposing the use of continuous emission monitoring (CEMs) to measure ammonia, whereas the South Coast AQMD requires annual source tests. An emission limit of 10 ppmv, also corrected to 3% oxygen, was recently imposed at the Bay Area Valero refinery FCCU in an Air District permit. The South Coast limit in Rule 1105.1 and Valero's FCCU limit appear to be the most stringent ammonia emission limits imposed on refinery FCCUs.

Although District staff is proposing a stringent ammonia emission limit, they recognize that ammonia and urea injection are used to promote total PM control at FCCUs by improving the efficiency of electrostatic precipitators (ESPs) and that these ESPs are subject to Air District and federal PM emission limits. Staff also recognizes that fine PM, rather than ammonia itself, is the FCCU emission of greater concern. Therefore, and as suggested by WSPA in response to an earlier draft of Rule 6-5, the proposed rule includes an exception to the 10 ppmv ammonia limit for a refinery that successfully performs an ammonia optimization to establish the level of ammonia and/or urea injection that will minimize overall $PM_{2.5}$ emissions at the FCCU while still complying with other, existing FCCU emission limits. Any refinery utilizing this optimization limit would also be required to accept an enforceable ammonia emission limit at this optimized injection rate.

Control Mechanisms

Staff believes that the three refineries that operate FCCUs subject to the 10 ppmv ammonia emission limit will all elect to perform an ammonia optimization because this approach has the potential to achieve significant reductions in ammonia, and in associated emissions of condensable $PM_{2.5}$, with minimal capital expenses and minimal new operating costs.

Costs and Emissions Reductions

Although there will be one-time optimization costs and a new ammonia monitoring system, reduced use of ammonia and urea could result in overall long-term cost savings.

Emission reductions are based on current emission rates of 29 ppmv (Chevron) and 23 ppmv (Shell) being reduced to 10 ppmv, then applying the resulting percentage reduction to the associated mass emissions of ammonia at each refinery. Because of a lack of test data, the Tesoro emission reduction is assumed to be the same as at Shell. For the ammonia optimization option, reductions are assumed to be half of those

that would result from compliance with the 10 ppmv limit. For condensable $PM_{2.5}$, the goal of either a simple reduction in ammonia injection to achieve 10 ppmv ammonia slip, or an optimization of ammonia use is a 50% reduction in total condensable $PM_{2.5}$ emissions.

Facility	Ammonia Reduction (tpy)		Condensable $PM_{2.5}$ Reduction (tpy)	Capital Cost ($ M)*	Annual Cost ($ M)*	Total Annualized Cost ($ M)*
	10 ppmv limit	Optimization				
Chevron	58	29	128	0.5*	0.025	0.093*
Shell	15	7.5	49	0.5*	0.025	0.093*
Tesoro	15**	7.5	46	0.5*	0.025	0.093*

*The optimization option in Rule 6-5 should not require capital investment or significant additional operating costs; capital, annual and annualized costs are for ammonia emissions monitoring with CEMs. Annualized costs are calculated using the capital recovery factor (CRF) method described in the "Policy and Implementation Procedure" of the Air District's "BACT-TBACT Workbook", assuming a 10-year equipment lifetime, 6% interest and default assumptions for a CRF of 0.136, which is applied to the capital costs to determine the annualized capital cost. Total annualized cost is the sum of the annualized capital cost and annual costs.

**Assumed to be the same as Shell refinery from reduced use of ammonia injection.

Regulatory Impacts

Section 40727.2 of the California Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and air 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. The attached table shows that there are no other ammonia emission limits applicable to refinery FCCUs in the Air District, state or federal requirements. Although compliance with federal NSPS and NESHAP standards for particulate emissions and opacity might be affected by a reduction in ammonia and/or urea use at a particular FCCU, the rule provides an alternative standard to allow refineries to avoid interfering with compliance with these particulate emission and opacity limits.

Economic Impacts

The California Health and Safety Code generally requires two different economic analyses for proposed regulations by an air district. The first (H&S Code §40728.5) is a socioeconomic analysis of the adverse impacts of compliance with the proposed regulation on affected industries and business. The second analysis (H&S Code §40920.6) is an incremental cost effectiveness analysis when multiple compliance approaches that have been identified by an air district. These analyses are discussed below:

Socio-Economic Analysis (H&S Code §40728.5)

Section 40728.5 of the California Health and Safety Code requires an air district to assess the socioeconomic impacts of the adoption, amendment or repeal of a rule if the rule is one that "will significantly affect air quality or emissions limitations." Applied Development Economics of Walnut Creek, California has prepared a socioeconomic analysis of draft Rule 6-5. This analysis is based on the costs of compliance with the draft regulation discussed above, and is attached to the staff report. The analysis concludes that the socio-economic impact of compliance with the requirements of Rule 6-5 is less than significant.

Incremental Cost Evaluation (H&S Code §40920.6)

Section 40920.6 of the California Health and Safety Code requires an air district to perform an incremental cost analysis for any proposed Best Available Retrofit Control Technology rule or "feasible measures" rule when the air district has identified more than one potential control option to achieve the emission reduction objectives of the rule. In the proposed rule, Air District staff has identified only one potential control option to achieve an ammonia emission rate of no more than 10 ppmv: a reduction in ammonia or urea use. The ammonia optimization option in Section 6-5-403 is expected to achieve a lesser level of ammonia emission reduction than simple compliance with the 10 ppmv limit. Therefore, no incremental cost analysis is necessary and none has been performed.

Because Air District staff believes that the three affected refineries will elect to perform an ammonia optimization, cost-effectiveness for the rule is conservatively based on the expected condensable $PM_{2.5}$ emission reductions for optimization (50% of the reductions shown above which correspond to compliance with the 10 ppmv ammonia emission limit) divided by the total annualized cost of compliance (for ammonia emissions monitoring):

Facility	Total Annualized Cost ($)	Condensable $PM_{2.5}$ Annual Reduction (ton)	Cost-Effectiveness ($/ton of PM reduction)
Chevron	93,000	64	1,500
Shell	93,000	24	3,900
Tesoro	93,000	23	4,000

Minor Changes from the Proposed Rule

The Air District posted a proposed version of Regulation 6, Rule 5 on October 23, 2015. The final version of the rule includes a few minor changes intended to either make the rule more readable or to clarify the intent of the rule.

1. Editorial: Renaming two definitions and renumbering to maintain alphabetical order in Table of Contents.
2. Editorial: Corrected title of Section 112 in Table of Contents.
3. Clarification: In response to e-mailed comment from Shell refinery, Staff made explicit the provision that non-FCCU sources with emissions that are subject to Section 301 AND that have startup or shutdown provisions in a District permit are eligible for the limited exemption in Section 112 under the terms of their own permit conditions, rather than under the terms of the FCCU startup and shutdown provisions that are defined in this rule. Therefore, the limited exemption in Section 301 applies to all sources subject to this section whenever ANY source is in a startup or shutdown condition. This treatment is necessary because non-FCCU sources subject to Section 301 have a commingled emission stream with an FCCU and there is no way to differentiate emissions by source. This clarification is in Section 112.

Regulation 6, Rule 5, Section 40727.2 Analysis

Section	**Description** (paraphrased)	**Comparable State/District Rules**	**Comparable Federal Rules**	**Discussion**
101	Description	NA	NA	No applicable requirements
111 - 115	Exemptions and Limited Exemptions	NA	NA	No applicable requirements
201 - 211	Definitions	NA	NA	No applicable requirements
301	Ammonia slip emission concentration limit	None	40 CFR 60 Subpart J (NSPS)	Subpart J does not include ammonia emission limits from FCCUs. Subpart J does include particulate emission limits and opacity limits, and compliance with these limits is potentially affected by a reduction in ammonia use. If this is an issue for a particular refinery, Section 403 provides an alternative standard to minimize condensable $PM_{2.5}$ emissions while remaining in compliance with other applicable limits, such as those in Subpart J.
	Ammonia slip emission concentration limit	None	40 CFR 60 Subpart Ja (NSPS)	Subpart Ja does not include ammonia emission limits from FCCUs. Subpart J does include particulate emission limits, and compliance with these limits is potentially affected by a reduction in ammonia use. If this is an issue for a particular refinery, Section 403 provides an alternative standard to minimize condensable $PM_{2.5}$ emissions while remaining in compliance with other applicable limits, such as those in Subpart Ja.
	Ammonia slip emission concentration limit	None	40 CFR 63 Subpart UUU (NESHAP)	Subpart UUU does not include ammonia emission limits from FCCUs. Subpart UUU requires compliance with the particulate emission limits in NSPS Subpart J – see discussion for NSPS Subpart J.
401	Ammonia Control Plan and Permit Applications	NA	NA	Administrative requirement
402	Ammonia Monitoring Plan	NA	NA	Administrative requirement
403	Ammonia Optimization (alternative to 301)	None	None	This is an alternative to Section 301.

Section	**Description** (paraphrased)	**Comparable State/District Rules**	**Comparable Federal Rules**	**Discussion**
501	Ammonia Monitoring	None	40 CFR 60 Subpart J (NSPS)	Subpart J does not include ammonia monitoring for FCCUs.
	Ammonia Monitoring	None	40 CFR 60 Subpart Ja (NSPS)	Subpart Ja does not include ammonia monitoring for FCCUs.
	Ammonia Monitoring	None	40 CFR 63 Subpart UUU (NESHAP)	Subpart UUU does not include ammonia monitoring for FCCUs.
502	Ammonia Records	NA	NA	Administrative requirement
601	Compliance Determination	NA	NA	Administrative requirement
602	Determination of Ammonia and Oxygen	NA	NA	Administrative requirement

Appendix B:
Changes to Rule 8-18: Equipment Leaks

Rule/Rule Amendment Description

Regulation of equipment leaks at oil refineries requires amendments to Regulation 8, Rule 18, *Equipment Leaks* (Rule 8-18).

Goals

The goal of this rulemaking is to achieve further reductions in fugitive emissions of volatile organic compounds (including toxic organics) at refineries.

Background

Facilities that store, transport, and use volatile organic liquids lose some organic material as fugitive emissions wherever there is a leaking connection between two pieces of equipment. Valves, pumps, and compressors at these facilities can also leak organic material past internal seals.

To address emissions from the large facilities responsible for most of these emissions, Rule 8-18 requires oil refineries, chemical plants, bulk plants, and bulk terminals to maintain a leak detection and repair (LDAR) program. These programs are carried out by periodically checking components for leaks using leak detection equipment that measures leak concentrations, which are generally expressed in parts per million volume (ppmv).

Equipment subject to the monitoring requirements (initial boiling point of 302 degrees Fahrenheit or less) is inspected at specified intervals and, if a leak is found to exceed the leak concentration limit in the rule, the equipment must be repaired, replaced, or placed on limited list of non-repairable equipment. Currently, equipment in heavy liquid service (initial boiling point of greater than 302 degrees Fahrenheit) is subject to the applicable leak standards in Section 8-18-300. However, these components are not subject to the requirements in Section 8-18-400 for inspections using leak detection equipment. They are, however, subject to federal inspection requirements that do not rely on instrument measurements. But without routine inspections of equipment in heavy liquid service using leak detection equipment, leaks may not be found and repaired.

LDAR programs have been found to reduce ("control") emissions from equipment leaks by over 98 percent (e.g. leaks from components in gas or light liquid service would be 50 times greater than current estimates). A similar reduction is expected for monitoring equipment in heavy liquid service. Emissions from equipment leaks come from a small portion (one to five percent) of all components with 95 to 99 percent of all components not leaking, regardless of service type (gas, light liquid or heavy liquid). Therefore, hundreds of components have to be monitored to find one that is leaking.

Process and Source Description

Component leaks commonly occur at the joints or connections between sections of piping, at valves, at pumps or from barrier fluid contained between seals, and at the seat of pressure relief devices (PRDs).

Regulatory History and Context

The Air District originally adopted Rule 8-18 in 1980 and has amended it twice, first in 1992 and again in 2004. In addition, some minor changes were made to the rule in 1998 and 2002. The original intent of the rule was to control fugitive organic gas leaks from valves and connectors at refineries, chemical

plants, bulk plants, and bulk terminals. Rule amendments adopted in 1992 significantly lowered the allowable leak concentration limits to the lowest levels in the country and required more effective inspection and repair programs in order to reduce emissions and promote self-compliance. The 1992 amendments reduced emissions by an estimated 1.2 tons per day (tpd).

The allowable leak standard is 500 ppmv for pumps, compressors, and PRDs.[1] For valves and other equipment, the allowable leak standard is 100 ppmv. Leaks are detected and the leak concentration is measured using a portable combustible gas indicator.
The U.S. Environmental Protection Agency (EPA) has promulgated LDAR standards for facilities in the synthetic organic chemical manufacturing industry and petroleum refineries. The EPA's standards in 40 CFR parts 60 and 63 include LDAR provisions for monitoring and repairing equipment in heavy liquid service that do not rely on instrumental monitoring, but instead rely on "visual, audible, olfactory, or any other detection method."

Emissions

The Air District maintains an inventory that includes emissions from all stationary sources within its jurisdiction. For complex facilities like refineries, emissions from each type of source are calculated. For fugitive emissions subject to Rule 8-18, emissions are calculated using component counts and emission factors that represent average emissions for a particular component type in a particular type of service (e.g., valves in light liquid service). Emissions must be calculated because leak measurements give the concentration of leaking gases but not the mass emissions (which would require knowledge of the flow rate in addition to the concentration).

There are five large refineries operating within the jurisdiction of the Bay Area Air Quality Management District (Air District). Table B-1 summarizes the total equipment inventory currently regulated under Air District Rule 8-18 at the five major refineries in the Bay Area for the calendar year 2013.

Table B-1: Fugitive Equipment Component Counts[1]

Valves	Pumps & Compressors	Pressure Relief Devices[2]	Connectors[3]	Total TOG (TPY)[4]
273,239	2,705	1,142	1,016,636	1,791

[1]Counts do not include components in heavy liquid service.

[2]The count includes atmospheric PRDs only.

[3]Connector counts are not required to be identified per Section 8-18-402.1 or monitored per Section 8-18-401 unless refineries desire the repair period allowance of Section 8-18-304.2. Only two Bay Area refineries record all connector measurements, while three refineries record only connectors with leaks that exceed the standard. An average multiplier (3.5 x total valve inventory) was used to determine the total connector count for facilities that did not record all connector counts.

[4]Total organic emissions from the 2013 BAAQMD Emissions Inventory.

The emission factors used by the Air District for calculating refinery fugitive emissions come from a series of refinery studies by EPA in the late 1970's and early 1980's. EPA developed average emission factors for various types of equipment in various types of service. EPA later combined the refinery fugitive emission factors with factors for petroleum terminals and for gas and oil production in a 1995 guidance document ("EPA Protocol")[2]. The California Air Resources Board (ARB) and the California Air

[1] PRDs are also subject to the requirements of Air District Regulation 8, Rule 28, *Episodic Releases from Pressure Relief Devices at Petroleum Refineries and Chemical Plants*.

[2] Environmental Protection Agency, "*1995 Protocol for Equipment Leak Emission Estimates*" (EPA453/R-95-017

Pollution Control Officers' Association (CAPCOA) relied upon the EPA document in developing fugitive emission guidelines for refineries ("ARB Guidelines")[3]. The ARB Guidelines generally incorporate refinery fugitive emission factors from the EPA Protocol.

Regulatory Concepts and Proposed Regulations

The Air District is proposing the following changes to Regulation 8, Rule 18 that would:

- Require identification of all equipment in heavy liquid service; monitoring of heavy liquid service valves, pumps and PRDs; and leak minimization and repair for these components, effective January 1, 2018;
- Amend the non-repairable equipment standard to reduce the allowable amount of equipment placed on non-repairable list;
- Identify the cause of any background reading greater than 50 ppmv;
- Require mass emission monitoring for all equipment placed on the non-repairable equipment list; and
- Add a maximum leak concentration and/or mass emissions limit for fugitive equipment subject to the rule.

In addition, administrative changes to rule language will be made to improve clarification and enforceability of the rule. The proposed changes are discussed in more detail below.

Additional Requirements to Monitor Equipment in Heavy Liquid Service

Equipment in heavy liquid service is not currently subject to routine inspection and repair under Rule 8-18. Effective January 1, 2018, the proposed amendments would require all facilities subject to the rule to include in their LDAR program identification and routine monitoring of heavy liquid equipment. Table B-2 summarizes equipment in heavy liquid service at the five major refineries that would become subject to new inspection and repair requirements.

Table B-2: Heavy Liquid Service Equipment Fugitive Component Counts

Facility	Valves	Pumps	Pressure Relief Devices[1]	Connectors[2]
Chevron	32,228	1,859	62	127,977
Phillips 66	6,655	293	6	27,350
Shell	12,734	337	20	37,361
Tesoro	10,976	250	70	38,416
Valero	15,570	193	0	56,596
Total	**78,163**	**2,932**	**158**	**287,700**

[1] The count includes atmospheric PRDs only.

[2] An average multiplier (3.5 x total valve inventory) was used to determine the total connector count for facilities that did not provide an accurate connector count.

Based on the Air District's 2013 emissions inventory, fugitive emissions from the heavy liquid equipment listed above are estimated at 1,476 tons per year (excluding methane). The Air District used EPA's

[3] California Air Resources Board, "*California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*". February 1999. Appendix A. Documentation of Guidelines Development. Appendix A-1, p. 2.

emission factors[4] to estimate baseline emissions for equipment in heavy liquid service. Both the Air District and the refineries have used the emission factors for decades to estimate and report emissions from heavy liquid service components in permit applications[5] and in annual inventory data submitted by the refineries.

The Western States Petroleum Association (WSPA) and the Bay Area petroleum refineries contend, however, that the average emission factors used to calculate emissions before controls do not represent actual emissions and that actual emission factors at the five refineries are lower. They collected data on components in heavy liquid service that suggests lower emissions. However, this effort represented less than 0.2 percent of heavy liquid service components, which was not a large enough sample size to identify potential leaks, did not include mass emissions sampling, and was not collected in such a way that the Air District could verify that it accurately represented the emissions from components in heavy liquid service. Because the data is inadequate, Air District staff have relied upon the EPA emission factors and the ARB Guidelines to estimate emissions. However, the Air District and WSPA are currently working on a mass emissions sampling study in an attempt to obtain the most accurate data. This study is expected to be finished before the end of 2016, well before proposed changes in heavy liquid monitoring are scheduled to take effect.

If the study shows actual emissions from components in heavy liquid service to be significantly lower than the EPA emission factors would suggest, the requirements for monitoring these components may not be cost effective. If District staff determine the requirements are not cost effective, staff will propose amendments to the rule.

Reducing the Amount of Equipment on Non-Repairable List

The Air District established the non-repairable list to allow sources to delay repairs of essential equipment for five years or until the next scheduled turnaround, whichever comes first.[6] Essential equipment is defined as any equipment that cannot be removed from service unless the process unit is shut down and the component is isolated. This activity would likely create more emissions than the actual fugitive leaks.

The five refineries in the Bay Area currently have an average of 24 pieces of equipment, mostly valves and connectors, on their non-repairable equipment lists.[7] The average percentage of valves and connectors on a non-repairable list is 0.04 percent (allowable percentage of valves including connectors is 0.30 percent), which indicates the LDAR programs implemented at the five refineries can achieve a much lower fraction of equipment placed on a non-repairable list than the fraction currently allowable by the rule. The inclusion of heavy liquid service components will increase the overall number of pieces of equipment allowed on the non-repairable list. It is expected that this increase will more than offset the reduction in percentage of overall allowable equipment on the non-repair list given the historical trends (0.04 on current lists versus current allowable of 0.30%).

[4] As listed in the ARB Guidelines, Table IV-1a.

[5] E.g., 1981 Chevron Richmond Lube Oil Project (RLOP) application, 1992 Shell Clean Fuels Project application.

[6] BAAQMD Regulation 8, Rule 18, Section 306.1.

[7] Average non-repairable equipment count calculated with each connector counted as two valves pursuant to Section 8-18-306.3.

Further efforts in eliminating equipment from the non-repairable list may enable LDAR programs to approach the point where non-repairable equipment lists would no longer be necessary and the issue of non-repairable equipment could be addressed by other means.

Mass Emissions Determination for Equipment on Non-Repairable List
Because all equipment placed on the non-repairable list is allowed to leak above the applicable leak standard for up to five years, the mass emission rate of any equipment placed on the non-repairable equipment list should be determined and should not exceed a mass emissions limit. A mass emissions limit on non-repairable equipment provides an incentive to replace or repair the high emitting equipment as soon as possible, which is better than allowing equipment to remain on the non-repairable list up to five years, regardless of its emission rate.

Addition of a Fugitive Mass Emission Limit
Leak standards are expressed as concentration-based limits rather than mass-based limits to better allow field staff to quickly determine compliance. Mass emissions are determined by quantifying both the concentration and the flow rate of a leak. It is possible that low concentration leaks may have a high flow rate resulting in significant emissions. Currently, monitoring of mass emissions is only required for those valves that leak organic compounds greater than 10,000 ppm (a “major leak”) for more than 45 days. No Bay Area refinery has triggered this requirement to date, and therefore, no mass emissions monitoring has been done.

Clarification of the Leak Repair Definition
The current rule requires any leak discovered by the operator and not repaired within 24 hours to be minimized within the first 24 hours following leak discovery. The minimization must be done using best modern practices to reduce the leak to the lowest achievable level, regardless of whether the leak is ultimately repaired within the allowed seven days or placed on the non-repairable equipment list.

Many facility owner/operators incorrectly believe cleaning leaking equipment with soap and/or water complies with the best modern practice requirement. As stated in the Air District’s September 2013 Compliance Advisory, leak minimization should include some type of repair attempt, which may include tightening bolts, replacing bolts, tightening packing gland nuts, and injecting lubricant into packing. The rule amendments to clarify what is required for leak minimization by amending the definition language to identify specific types of minimization methods. Also, the definition will state that cleaning, scrubbing, or washing equipment alone is not considered best modern practice.

Identification of High Background Readings
Leak limits are expressed as “above background” where *background* is defined as, “The ambient concentration of total organic compounds determined at least three meters (10 feet) upwind from the equipment to be inspected and not influenced by any specific emission point as indicated by a hydrocarbon analyzer specified by Section 8-18-501.” A review of 2013 monitoring data from the five refineries identified numerous instances of high background concentrations, including a case with a background of 500 ppmv (five times the existing leak standard for equipment other than a pump or pressure relief device and equal to the limit for pumps and pressure relief devices). To address high background concentrations, the Air District is considering a new requirement that would require identification of the cause of any background reading greater than 50 ppmv (half the existing leak standard). Identification of a cause for elevated background concentrations may identify other equipment in need of repair or replacement.

Control Mechanisms

The Air District proposes no new control mechanisms, only expansion and improvement of the existing LDAR program.

Costs and Emissions Reductions

Table B-3 shows VOC emission reductions and costs associated with improvements to the LDAR program.

Table B-3: Emissions Reductions and Costs

Facility	Emission Reduction (tpy)	Capital Cost ($ M)	Total Annualized Cost ($ M)
Chevron	641	$0.11	$2.6
Phillips 66	117	$0.02	$0.70
Shell	156	$0.04	$0.90
Tesoro	143	$0.03	$1.4
Valero	170	$0.05	$1.2
Total	**1,227**	**$0.25**	**$6.8**

The Air District has only calculated emission reductions that would come from the proposed inspection requirements for components in heavy liquid service. The Air District has estimated the effect of these controls by relying upon a correlation equation method included in the EPA Protocol and the ARB Guidelines. The correlation equation method generally relies on measured leak concentration data. Instead of using actual measurements, the Air District conservatively assumed that with the new inspection requirements for heavy liquid components, all would leak at the highest concentration allowed by Regulation 8-18 leak limits.

Incremental Cost

Under Health and Safety Code section 40920.6, the Air District is required to perform an incremental analysis when adopting a Best Available Retrofit Control Technology (BARCT) rule or feasible measure required by the California Clean Air Act. To perform this analysis, the District must (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness of each option.

Option 1

The Air District considered the option of monitoring piping connectors quarterly, rather than annually. Monitoring costs increase by $12.00 per connector, or $3.45 M annually. Expected emission reductions from this increased monitoring frequency is estimated to be approximately 40 tons per year, so the incremental cost effectiveness of this option is more than $86,000 per ton.

Option 2

The Air District considered the option of continuing to allow each refinery to monitor heavy liquid equipment using the "visual, audible, olfactory, or any other detection method" approach. This option was not considered adequate because the emission factor studies done to quantify emissions from heavy liquid equipment were conducted in facilities where equipment with significant leaks were found undetected using the visual, audible, olfactory methods.

Other Impacts

Regulatory Impacts

California Health and Safety Code section 40727.2 requires the Air District to identify existing federal air pollution control requirements for the equipment or source type affected by the proposed rule or regulation. The District must then note any differences between these existing requirements and the requirements imposed by the proposal.

Regulation 8, Rule 18: Equipment Leaks applies to fugitive emissions from valves, pumps, compressors, pressure relief devices, connection and any other component that may have fugitive leaks. The proposal expands the applicability or the current rule to equipment in heavy liquid service.

Numerous federal requirements apply to fugitive emissions at the facilities subject to Regulation 8, Rule 18. New sources are subject to New Source Performance Standards found in 40 CFR Part 60, Subpart VV/VVa (Equipment Leaks of VOC in the Synthetic Organic Chemicals Industry) and Subpart GGG/GGGa (Equipment Leaks of VOC in Petroleum Refineries). Other sources are subject to National Emission Standards for Hazardous Air Pollutants (NESHAPS) found in 40 CFR Part 61, Subpart V (National Emission Standards for Equipment Leaks (Fugitive Emission Sources)), and to 40 CFR Part 63, Subpart CC (National Emission Standards for Petroleum Refineries). Table B-4 below is a simplified comparison between BAAQMD and federal requirements.

Table B-4 - **Comparison of the Basic Provisions of the Fugitive Emissions Rules of Federal and BAAQMD**

BAAQMD Regulation 8 Rule 18	40 CFR 60 VV/VVa & GGG/GGGa 40 CFR 63 CC
Applicability	
Components at petroleum refineries, chemical plants, bulk plants and bulk terminals.	Affected equipment in petroleum refineries, synthetic organic chemicals manufacturing facilities, and onshore natural gas processing plants.
Requirements	
LDAR program including quarterly inspection of equipment in light liquid/gas/vapor. Connectors in light liquid/gas/vapor service and inaccessible equipment inspected annually.	Pumps and valves inspected monthly. Valves in light liquid/gas/vapor service inspected monthly. After two monthly inspections without leaks, equipment may be inspected quarterly until a leak is detected.
Leak threshold at 100 ppm for any general equipment, valves and connectors. Leak threshold	Leak threshold at 10,000 ppm for pumps and valves in heavy liquid service.

BAAQMD Regulation 8 Rule 18	40 CFR 60 VV/VVa & GGG/GGGa 40 CFR 63 CC
of 500 ppm for any pumps, compressors and PRDs.	
Leaks detected by operator minimized within 24 hours and repaired within 7 days Leaks detected by BAAQMD repaired within 24 hours A percent of non-repairable equipment may delay repair until unit turnaround.	Pump, valves, PRDs and connectors in light liquid service/gas/vapor service leak threshold at 10,000 ppm. Compressors required to have a seal system with barrier fluid. PRDs in gas/vapor service leak threshold at 500 ppm
	Leaks > 10,000 ppm 15 days repair maximum, first attempt at repair with 5 days.
Recordkeeping and Reporting	
Submit quarterly reports of non-repairable equipment and their leak rates. Submit equipment inventory report annually	Submit semiannual reports containing the number of equipment by type that were repaired and for which repair was delayed and the reason for delay
Test Methods	
U.S. EPA Method 21 for leak screening, ASTM Method D-86 for VOC content of liquids and EPA Protocol for Equipment Leak Emissions Estimates, Chapter 4 or monitoring for mass emission sampling.	U.S. EPA Method 21 for leak screening, ASTM E-260, E-168, E-169 for the VOC content, ASTM Method D-2879 for vapor pressure.
Exemptions	
Pressure vacuum valves on storage tanks not exempt from District Regulation 8 Rule 5	Components operating under negative pressure, pumps with closed vent system, PRDs vented to a control device.
Controlled seal systems and PRDs vented to a vapor recovery system or disposal system which reduces emissions of organic compounds by 95% or greater.	
Equipment in vacuum service	

This proposal is not duplicative of any current requirements for equipment in heavy liquid service.

Minor Changes from the Proposed Rule

The Air District posted a proposed version of Regulation 8, Rule 18 on October 23, 2015. The final version of the rule includes a few minor changes intended to either make the rule more readable or to clarify the intent of the rule.

1. Clarification: In response to a comment made by the Western States Petroleum Association (WSPA), the Air District has added a limited exemption 8-18-119 to the rule which addresses open-ended valves or lines in an emergency shutdown system designed to open automatically in the event of a process upset, and open-ended valves or lines containing materials which would

autocatalytically polymerize or would present an explosion, serious overpressure, or other safety hazard if capped or equipped with a double block and bleed system

2. Clarification: In response to a comment made by WSPA, the Air District has added limited exemption 8-18-120 which includes an effective date in which the new standards will not apply to the equipment currently on the non-repairable list.
3. Editorial: In response to a comment made by WSPA, the Air District has correct a formatting issue and removed the new proposed language and keep the definition as written in the current version of the rule.
4. Editorial: In response to a comment made by WSPA, the Air District has made a correction to the formatting in section 401. Subsection 8-18-401.3 now references section 403 and not 403.2.
5. Editorial: In response to a comment made by WSPA and Valero, the Air District is not deleting Section 8-18-308, Alternate Compliance. The Air District will assign a new section number (407) to the Recurrent Leak Standard and the existing 405 Section (Alternative Emission Reduction Plan) and 406 Section (Interim Compliance) will remain in the rule to comply with H&S Code Section 40001(d).
6. Editorial: In response to a comment made by WSPA, the Air District corrected the repeat section 404.2 and 404.3 formatting error to 407.2 and 407.3 so it follows sequentially after the preceding Section (407.1).

Appendix C:
Changes to Rule 11-10: Cooling Towers

Rule/Rule Amendment Description

Regulation of organic gases and toxic air contaminants from cooling towers at refineries requires amendment to Air District Regulation 11, Rule 10, *Hexavalent Chromium Emissions from Cooling Towers* which will be renamed *Hexavalent Chromium from All Cooling Towers and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers*.

Goals

The goal of this rulemaking is to achieve technically feasible and cost-effective total hydrocarbon (THC) and Toxic Air Contaminant (TAC) emission reductions from cooling towers at Bay Area refineries by requiring more rapid detection of heat exchanger leaks.

BACKGROUND

The Bay Area has five petroleum refineries which operate a total of 32 cooling towers that would be impacted by this amendment. These cooling towers are large, industrial heat exchangers that are used to dissipate significant heat loads to the atmosphere through the evaporation of water. When heat exchanger leaks go undetected for long periods of time, significant quantities of organic compounds can be stripped from the cooling tower water and emitted to the atmosphere. Many of these cooling towers are subject to EPA testing and repair requirements, but the Air District staff believes that more frequent and rigorous testing and repair requirements are needed to ensure protection of public health. These more rigorous requirements will not pose undue cost burdens on the refineries.

The following table (Table C1) provides the distribution of cooling towers throughout the five refineries.

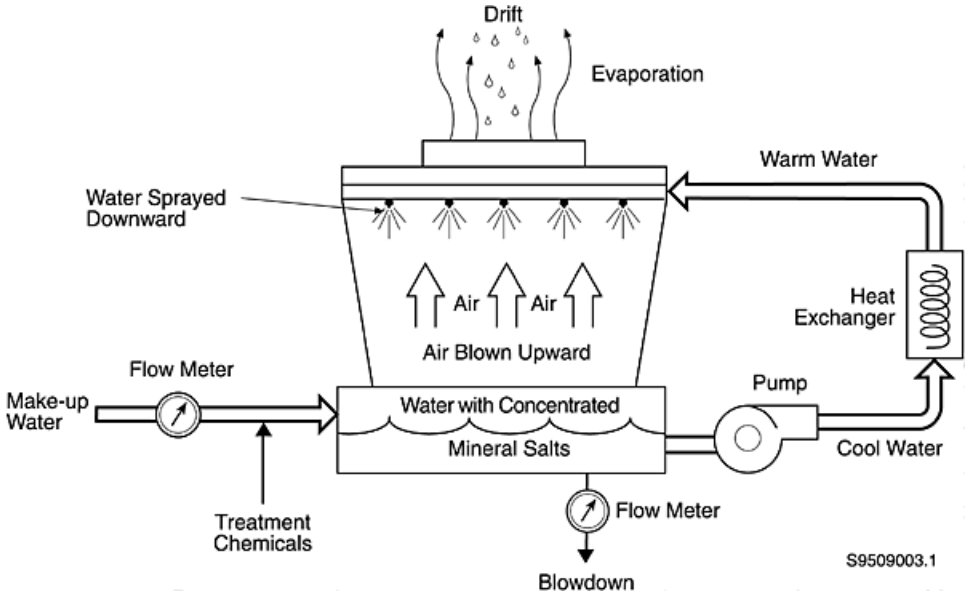
Table C1
Number of Affected Cooling Towers at Each Refinery

Facility	Number of Cooling Towers
Chevron	8
Shell	3
Tesoro	13
Phillips 66	7
Valero	1
TOTAL	**32**

Process and Source Description

Cooling towers are part of a heat exchange system consisting of a device or a collection of devices used to transfer heat from process fluids to water without intentional direct contact of the process fluid with the water and to transport and/or cool the water in a closed-loop system (cooling tower system). Figure C1 (below) depicts a basic cooling tower structure.

Figure C1 – Cooling Tower



Cooling towers can be designed as either natural draft or mechanical draft devices. Natural draft cooling towers are large hyperbolic structures that look similar to those found at nuclear power plants. They use natural convection of warmed air to create air to cool the water. Mechanical draft cooling towers use large fans to force air either through or across the water to cool it.

Regardless of the design, a small proportion of the cooling water is entrained in the updraft as mist, commonly called *drift*. When the water in the droplets evaporates, any dissolved solids in the cooling water form particulate matter.[1]

When heat exchanger leaks occur (from process fluids leaking into cooling water), the volatilization of hydrocarbons and/or TACs in the contaminated cooling water lead to emissions. Such leaks tend to occur when heat exchanger tube sheets fail or when tubes rupture as a result of corrosion or the use of inferior materials during the exchanger construction process.

Heat exchangers usually do not leak, but when there are mechanical failures in the sheets or tubes, the emissions can be very high. In 2010 a heat exchanger leak at a Bay Area refinery resulted in emissions of at least 52 tons of THC over a recorded period of 16 days. The total magnitude of emissions from the leak event was probably much greater; emissions from the event were only estimated once the leak was detected, which was likely at least several weeks after the leak began.

Regulatory History and Context

District Regulation 11, Rule 10 was developed in 1989 to reduce hexavalent chromium emissions from cooling towers.

In 2009, The U.S. Environmental Protection Agency (EPA) promulgated, and in 2013 amended, 40 CFR part 63, subpart CC, *National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries*

[1] Cooling tower water frequently contains additives such as biocides, anti-foaming agents and anti-scaling agents, any of which could be emitted as particulate matter

(MACT[2] CC). Section 63.654 in MACT CC requires periodic monitoring (monthly or quarterly) of heat exchangers in organic hazardous air pollutant (HAP) service.[3]

MACT CC requires leaks to be repaired as soon as practicable after they are discovered but no later than 45 days after detecting the leak, unless the repair is not feasible. Not all cooling towers are subject to the monitoring, leak, and repair requirements of MACT CC.[4]

Cooling Tower Emissions have also been addressed by the Texas Commission on Environmental Quality (TCEQ). The TCEQ developed Chapter 115 – Control of Air Pollution from Volatile Organic Compounds, SUBCHAPTER H: HIGHLY-REACTIVE VOLATILE ORGANIC COMPOUNDS to address Highly Reactive Volatile Organic Compound (HRVOCs) emissions from industrial cooling towers. This was part of an overall strategy to address spikes in ozone concentrations around the Houston Ship Channel. This rule requires the continuous monitoring of cooling towers that may leak HRVOCs. The monitors must meet a detection limit of 50 parts per billion by weight (ppbw).

PROPOSED AMENDMENTS

Elements to be added to Regulation 11, Rule 10 are as follows:

1. THC leak monitoring, repair and minimization requirements for petroleum refinery cooling towers will be incorporated into an existing regulation that was adopted in 1989 to limit hexavalent chromium emissions from all Bay Area cooling towers that were subject to the provisions of the rule. The regulation's description will be modified to include THC emissions from petroleum refinery cooling towers.
2. Regulation 8, Organic Compounds, Rule 2: *Miscellaneous Operations* exempts cooling tower emissions provided "best modern practices" are used. Regulation 11, Rule 10 will define "best modern practices" and will require refinery staff to take steps to ensure heat exchanger equipment is kept corrosion free and in good working order; to make visual and odor inspections on a regular basis; to perform surrogate testing, such as residual chlorine measurements every shift, and to track the amount of biocide added to cooling tower water on a daily basis to maintain water chemistry. Refinery cooling towers that comply with best modern practice requirements in Regulation 11-10-4-2 will qualify for the exemption in Regulation 8-2-114 and, therefore, will qualify for the 15 lb/day requirement in Regulation 8-2-301.
3. The regulation will require each cooling tower to use one of three options to monitor cooling tower water hydrocarbon concentrations on a daily basis. Cooling towers that circulate less than 2,500 gallons per minute of cooling water will be allowed to monitor weekly, and any cooling towers that circulate less than 500 gallons per minute of cooling water will be allowed to monitor once every 14 days.
4. The regulation will include a THC concentration standard of 84 ppb (by weight) when cooling tower water is sampled for lab analysis. The THC concentration standard will be 6 ppm (by volume) when cooling tower water is monitored by a continuous analyzer or the use of an APCO approved alternative monitoring method. When the THC standard for any of the three allowable monitoring methods is exceeded, a leak action response will be required.

[2] "MACT" stands for Maximum Achievable Control Technology, which is the level of control that the emission standards regulation is intended to achieve.

[3] The EPA rule exempts heat exchangers that are designed to make leaks nearly impossible due to pressure differences or intervening fluids.

[4] Applicability criteria can be found in Section 63.654.

5. The refinery shall be required to minimize the leak within 5 calendar days and shall repair the leak within 21 days.
6. For leaks that cannot be repaired within 21 calendar days, the refinery would have to speciate and quantify THCs associated with the leak in order to ensure mass emissions are below 15 pounds per calendar day and the hourly and annual (if applicable) TAC emissions are below their corresponding acute and/or chronic trigger levels in Table 2-5-1 of Regulation 2, Rule 5.
7. Regulation 11, Rule 10 would also include detailed recordkeeping requirements.

Staff proposes that the new requirements in Regulation 11, Rule 10 go into effect on July 1, 2016

The refinery operators have been monitoring most of these cooling towers using a test method called the Modified El Paso Method (MEPM), as required under the EPA rules. The Air District will allow the MEMP sampling method to be used as an APCO approved method, one of three possible THC detection methods, provided the petroleum refineries follow the Air District's Manual of Procedures methodology that will update the MEPM in May of 2016 prior to the July 1, 2016 the effective date for these amendments to Regulation 11, Rule 10. A second method of THC detection Regulation 11, Rule 10 will allow is the use of water sampling with appropriate laboratory analysis. It is a very accurate THC detection method providing water samples are taken properly to protect the integrity of the sample and providing the correct lab analysis methodologies are used. The third method that petroleum refineries may use to detect THC in cooling tower water is the use of a continuous hydrocarbon analyzer.

Regulation 8, Rule 2, Section 114 states that "Emissions from cooling towers, railroad tank cars, marine vessels and crude oil production operations are exempt from this Rule, provided best modern practices are used." Regulation 1, Section 207 defines *best modern practices* in general as **"**The minimization of emissions from equipment and operations by the employment of modern maintenance and operating practices used by superior operators of like equipment and which may be reasonably applied under the circumstances."

Regulation 11, Rule 10 is now proposing a cooling tower-specific definition. In the draft rule, staff has compiled examples of best practices from several sources.

Control Mechanisms

No add-on controls are proposed; only frequent monitoring and rapid leak detection, minimization, and repair.

AREAS OF CONTROVERSY

In their written comments and presentations to the Board, refinery operators state that the cooling towers are well controlled and do not pollute enough to justify this rule amendment. The refinery operators have been monitoring most of these cooling towers using the MEPM. Some refiners have been using older continuous monitors and Phillips uses monthly water sampling. Based on those test results, the refineries comment that their cooling towers do not appear to be leaking significantly. The refinery operators contend that the costs of the more rigorous and frequent testing in this proposed amendment are not justified by the potential emission reductions. Furthermore, the refinery operators contend that it is not reasonable to expect them to repair leaks more quickly than required by the EPA rules.

Air District staff have concerns about the accuracy and reliability of the MEPM and the existing continuous monitors. In our technical opinion, the information provided by these methods is not sufficiently complete or reliable to detect all of the types of leaks that may be occurring and that this rule amendment is intended to address. In addition, Air District staff believe that leaks should be detected and fixed more quickly. Under the EPA requirements, a leak could go undetected for 30 days and then take 45 days to repair. Extending the example of the 2010 Bay Area refinery cooling tower leak, a 75 day leak could result in over 240 tons of emissions. Under this amendment, leaks will be detected in one day and repaired within 21 days.

The MEPM was developed by the TCEQ and adopted by EPA in their MACT rules. In both cases, it was designed to concentrate on the measurement of strippable hydrocarbons, compounds with lower molecular weights and boiling points. When the MEPM is utilized, a continuous stream of cooling water is sampled directly into an air stripping column apparatus. Air flowing countercurrent to the cooling water strips HRVOCs from the water for analysis.

The Air District's staff is concerned about the MEPM sampling method's ability to provide representative, accurate, precise and repeatable hydrocarbon emissions data on a consistent basis. There are three main concerns about the method. First, the specifications for appropriate sampling equipment and requirements for zero and span performance are incomplete or lack specificity, which could lead to the test not being accurate enough to measure at the levels required to detect leaks. Second, the method does not perform well for all compounds of concern. It is well suited to the principal compounds of concern to the TCEQ and the EPA but does not provide adequate response for all of the toxic and reactive compounds of concern to the Air District. Third, the method is not sufficiently specified, meaning that it could be performed in a way that gave a result that cannot be repeatedly obtained by others utilizing the same set of instructions.

Given all these concerns, Air District staff does not believe that the MEPM provides sufficient evidence that the cooling towers are well controlled and is therefore preparing a revised MEPM for inclusion in the District's Method of Procedures.

The MEPM was designed to address issues with direct water analysis where improper sampling techniques can severely impact leak detection or the use of an inappropriate analytical method can affect the type of compounds identified. The Air District addresses these issues with direct water analysis by requiring specific methods for sample collection and analysis.

Similarly, the continuous monitors in use at some of the refineries are not sufficiently precise and/or accurate for a wide enough range of compounds to provide results that demonstrate the cooling towers are well controlled.

With the exception of Phillips, Air District staff finds that the refineries do not have sufficient information to demonstrate that the cooling towers are not leaking in excess of the concentrations specified in this rule amendment. It is important to note that while Phillips does have sufficient information regarding compound concentration, the monitoring schedule they utilize would allow leaks to occur for a far greater time period than what staff believes would provide adequate control of potential emissions. Therefore, staff are using an EPA emission factor appropriate for cooling towers that are not well controlled when estimating the emission reductions associated with this rule, as discussed below.

The principal benefit of the rule will be to ensure that leaks, even small ones, are detected and repaired as quickly as possible. The Air District staff are recommending a regulatory regime that is most protective air quality. The socioeconomic analysis has demonstrated that the costs are not significant when compared to the potential emissions reductions and refinery profits.

EMISSIONS AND EMISSIONS REDUCTIONS

Emissions

There are five petroleum refineries within the Air District's jurisdiction that operate a total of 32 permitted cooling towers. The number of cooling towers per facility varies. One refinery has only one cooling tower while another has 13 permitted cooling towers. Based on the 2015 Air District emissions inventory, the cooling towers collectively emitted approximately 2.7 tons per day (TPD) of organic gases (978 tons per year), estimated using AP-42 emission factors for four of the refineries and emissions from water analysis data from the fifth refinery.[5]

As described above, there are many issues involved with current emissions measurement techniques used at the cooling towers. While many facilities are utilizing the MEPM, there are concerns regarding the accuracy and repeatability of the method as currently applied. Other facilities are using water sampling methods where proper sample collection techniques are critical to ensure accurate and repeatable analytic results and analysis methods for those samples is critical to ensure all relevant compounds are identified. In some instances, facilities may only be testing for easily strippable hydrocarbon compounds.

In absence of reliable data on current emissions from refinery cooling towers, it is common practice for the Air District to look to EPA emission factors. There are two EPA emission factors that could be applied: one is for well controlled cooling towers and one is for uncontrolled cooling towers. While current emissions may be lower than those calculated using the uncontrolled AP-42 emission factor, they are likely higher than the controlled factor due to the deficiencies in the current monitoring techniques discussed above. In order to take a more conservative approach, staff has used the higher emission factor in the above calculation.

The Air Districts' 2015 emissions inventory provides the Air District's best estimate of the rate at which refinery cooling towers are currently leaking. The refiners developed their own estimates when developing information for the EPA's Information Collection Request (ICR) as the EPA was preparing to update MACT rules applicable to the refineries. Some of the refiners submitted information to the Air District during this rulemaking process stating that their emissions are lower than they recently reported to EPA. These emissions estimates submitted in comments on the rulemaking are based on methods that are not reliable for the reasons listed above. These estimates assume that the cooling towers are well controlled, which cannot be justified by the available data and which conflict with information submitted to the EPA for the ICR by the refineries themselves.

Table C:2 compares the 2015 Air District emissions inventory to the data provided to EPA by the refineries.

[5] AP-42, *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources*, Fifth Edition, April 2015, Table 5.1-3

Table C2
Estimated Current Emissions

Facility	BAAQMD Estimate (tpy)	ICR Data (tpy)
Chevron	279	353
Shell	258	183
Tesoro	354	21
Phillips 66	3	0.43
Valero	84	91
TOTAL	**978**	**648**

Air District staff do not believe that the ICR data for Phillips is accurate, given that the 3 tpy estimate in the BAAQMD inventory is based on water sampling.

Emissions Reductions

The amended rule will require that the refineries ensure that total hydrocarbons in the cooling tower water do not exceed 84 ppbw. This 84 ppbw limit translates into an emission rate of 0.7 lbs of hydrocarbons emitted for every million gallons of recirculated water. Through this calculation, staff estimated that the overall THC emissions would be reduced by approximately 88 percent by these rule amendments.

Table C3 lists the estimated emissions reductions from the implementation of the proposed amendments to Rule 11-10. It provides estimates based on staff's estimated baseline emissions and similar data provided by the refineries to EPA as part of the ICR.

Table C3
Estimated Emissions Reductions

Facility	BAAQMD Estimate (tpy)	ICR Data (tpy)
Chevron	245	311
Shell	227	161
Tesoro	312	18
Phillips 66	3	n/a
Valero	74	80
TOTAL	**861**	**570**

Given the likely inaccuracy of the ICR data for Phillips, staff are not confident providing an estimated emission reduction for that refinery, based on the ICR data.

COST EFFECTIVENESS

Rule 11-10 specifies three options for hydrocarbon monitoring: daily water sampling (currently used by one refinery for all cooling towers), use of continuous analyzers (currently used only at two individual cooling towers in the Bay Area), or use an improved version of the MEPM. Air District staff has estimated that the most costly option is for a refinery to perform daily water sampling and analysis using

contractors because of the high per-sample cost. The next most-expensive option is installation of dedicated analyzers at each cooling tower because of the high capital cost. The least expensive option is use of refinery staff to perform the MEPM with required sampling and analytical equipment. The MEPM option is the least expensive because the sampling and analysis systems have a low capital cost and the use of refinery staff limits labor costs.

Since costs can vary by refinery depending on the number of cooling towers and the pre-existing monitors, this report provides detailed costs on all three options. Refinery operators are free to select the option that best fits their unique situation.

Table C:4a – Fixed Continuous Analyzers

Refinery	Capital Cost ($)	Operating Cost ($/year)	Total Annual Cost ($/year)	BAAQMD Cost Effectiveness ($/ton reduced)	ICR Cost Effectiveness ($/ton reduced)
Chevron	1,875,000	50,000	305,000	1,243	982
Phillips 66	2,100,000	50,000	335,000	122,625	n/a
Shell	375,000	25,000	76,000	335	472
Tesoro	3,900,000	50,000	580,400	1,861	31,407
Valero	300,000	25,000	65,800	889	822
Total Cost	**8,550,000**	**200,000**	**1,362,800**		
Average Cost Effectiveness				**1,393**	**2,388**

Table C:4a addresses the continuous monitoring option and assumes that each new analyzer and shelter costs $300,00 to acquire and install. This cost estimate addresses the potential use of intrinsically safe shelters that may be required in some cases. The refinery operators estimated the costs of such shelters to be between $500,000 and $1,000,000. The Air District does not believe that every monitor will require an intrinsically safe shelter. The $300,000 estimate is intended to be a mix of normal shelters and intrinsically safe ones. For refineries that already have a monitor installed. This cost estimate assumes that a modern monitor will be required for a capital cost of $75,000 installed. This is consistent with information provided by vendors of monitors that meet the requirement of the rule. Capital costs are recovered at a rate of 13.6 percent a year. This is consistent with a 10-year life span and 6 percent cost of capital, as per usual Air District cost calculations. The cost estimate also assumes $25,000/yr labor cost for up to 5 cooling towers, with an additional $25,000/yr for facilities with more than 5 cooling towers.

Table C:4b – In House Modified El Paso Method

Refinery	Capital Cost ($)	Operating Cost ($/year)	Total Annual Cost ($/year)	BAAQMD Cost Effectiveness ($/ton reduced)	ICR Cost Effectiveness ($/ton reduced)
Chevron	50,000	200,000	206,800	742	666
Phillips 66	50,000	200,000	206,800	66,495	n/a
Shell	50,000	200,000	206,800	802	1,284
Tesoro	75,000	300,000	310,200	875	16,786
Valero	50,000	200,000	206,800	2,459	2,582

Total Cost	**275,000**	**1,100,000**	**1,137,400**		
Average Cost Effectiveness				**1,163**	**1,993**

Table C:4b provides information on the use of the MEPM and assumes one sampling system for up to 5 cooling towers, two systems for up to 10 towers and 3 for more than 10. It also assumes $25,000 capital cost for each system. Capital costs are recovered at a rate of 13.6 percent a year. The cost estimate also assumes $100,000/yr for labor and lab analysis costs.

Table C:4c – Outside Contractor Daily Sampling and Analysis

Refinery	Capital Cost ($)	Operating Cost ($/year)	Total Annual Cost ($/year)	BAAQMD Cost Effectiveness ($/ton reduced)	ICR Cost Effectiveness ($/ton reduced)
Chevron	0	518,800	518,800	1,861	1,670
Phillips 66	0	401,500	401,500	129,100	n/a
Shell	0	245,050	245,050	950	1,522
Tesoro	0	839,500	839,500	2,369	45,427
Valero	0	182,500	182,500	2,170	2,279
Total Cost	0	2,187,350	2,187,350		
Average Cost Effectiveness				**2,236**	**3,833**

Table C:4c addresses the water sample collection and laboratory analysis option and reflects an assumption that the first daily sample will cost $500 and subsequent samples that same day will cost $150. This is consistent with recent Air District use of private laboratories. The cost estimate also accounts for the fact that not all towers will require daily sampling. There are no capital costs associated with this option.

The Air District finds that the average cost effectiveness is reasonable for each option. This is true whether one uses the Air District's estimate or the estimate based on the data submitted by the refineries to the ICR. For refineries with low baseline emissions, the costs appear high. This is a particular issue with the Phillips 66 refinery, given their low baseline emissions estimate. But, there is no guarantee that the Phillips 66 cooling towers will continue to leak at the low rate shown in this inventory. Given that the Phillips cooling towers are currently sampled monthly, the early detection requirements in this rule amendment could avoid 29 days of leaks. If the leak were as large as the 2010 Bay Area refinery cooling tower leak, that would prevent 94 tons of emissions. If one such leak was avoided per year at Phillips, the cost effectiveness would be $4,271/ton.

Incremental Cost Effectiveness

Under Health and Safety Code section 40920.6, the Air District is required to perform an incremental analysis when adopting a Best Available Retrofit Control Technology (BARCT) rule or feasible measure required by the California Clean Air Act. To perform this analysis, the Air District must (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness of each option.

Three options were considered for the cost analysis, and incremental cost effectiveness analysis. Option 1 is for daily water sampling and testing, and is the highest cost. Option 2 is for installation and use of continuous monitoring and was considered with two sensitivity cases – one where a typical analyzer shelter is required, and a second where the shelter is twice the cost because of a unique location and/or utilities not being readily accessible. Option 3 is the lowest cost – using the Air District's improved version of the MEPM to monitor for total hydrocarbons.

All three options are found to be cost effective. The cost effectiveness of the highest cost daily sampling and testing is well within typical cost effectiveness guidelines. The other two options are equally will within typical cost effectiveness guidelines. However, incremental cost effectiveness analysis of either daily sampling or continuous analyzers for small cooling towers were found to not be cost effective. This analysis resulted in a requirement for weekly sampling for cooling towers with less than 2,500 gallons per minute circulation rates, and sampling every 14 days for cooling towers with less than 500 gallons per minute circulation rates.

Socioeconomic Impacts

As required by the California Health and Safety Code, a thorough socioeconomic analysis of the impacts of the proposed amendments to Rule 11-10 is presented in Appendix E.

REGULATORY IMPACTS

Section 40727.2 of the California Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and air 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. The following table (Table C5) provides a comparison of the proposed amendments to related provisions from other air quality regulations affected cooling towers at refineries.

Table C5
Regulation 11, Rule 10, Section 40727.2 Analysis

Section	**Description** (paraphrased)	Comparable State/District Rules	Comparable Federal Rules	Discussion
101	Description	NA	NA	No applicable requirements
103 - 107	Exemptions for certain pieces of equipment	NA	NA	No applicable requirements
201 – 211	Definitions	NA	NA	No applicable requirements
301	Standards: Effective March 1, 1990, prevents the use of Cr6 chemicals		40 CFR 63, Subpart Q	Prevents the use of chromium-based water treatment chemicals in Industrial Process Cooling Towers
304	Standards: Effective July 1, 2016, provides Bay Area refinery owner/operators with the following three monitoring options to check for total hydrocarbon (THC) leaks in cooling towers (closed-loop recirculation systems): • Continuous THC analyzer monitoring; or • Direct grab sampling and lab analysis of THC in cooling water; or • APCO approved alternative THC monitoring method		40 CFR 63, Subpart CC (MACT CC) - 63.654 Provides owners/operators of heat exchange systems (closed-loop recirculation and once-through) the option of monitoring for total strippable volatile organic compounds (VOC) concentration via the Modified El Paso Method(MEPM) on a monthly or quarterly basis. Heat exchange (HEX) systems constructed/reconstructed after August 18, 1995and before September 4, 2007 are considered “existing” sources and are required to come into compliance with applicable requirements on/before October 29, 2012. HEX systems constructed on/after September 4, 2007 are considered “new” sources and are required to come into compliance upon initial startup or October 28, 2009 whichever is later.	Reg. 11-10 vs. MACT CC: • Reg. 11-10 addresses THC leaks from all cooling towers regardless of if they are in organic HAP service or not. • Reg. 11-10 has more frequent monitoring: Continuous/daily/weekly vs. monthly/quarterly • In Reg. 11-10, concentration of THC in cooling water determined via Method 8260/8270 vs. Concentration of total strippable VOC in stripped air determined via MEPM. • Delay of repair action level: None in Reg. 11-10 vs. 62 ppmv in MACT CC.

Section	**Description** (paraphrased)	Comparable State/District Rules	Comparable Federal Rules	Discussion
305	Standards: Effective July 1, 2016, Bay Area refinery cooling tower owners/operators that exceed the THC leak action levels of 84 ppbw (existing) or 42 ppbw (new/modified) in water, or 6 ppmv in stripped air, will have to minimize the leak within 5-calendar days and repair/remove the defective piece of equipment from service within 21-calendar days.		MACT CC – 63.654: Requires the leak to be repaired within 45-days if technically feasible; if technically infeasible allows repair to be delayed until next scheduled heat exchange system (HEX) shutdown; if technically feasible but parts/personnel not available, allows repair to be delayed for 120-days.	Reg. 11-10 vs. MACT CC: • Unlike MACT CC, Reg. 11-10 does not contain a delay of repair action level. Therefore, the leak has to be minimized/repaired ASAP. • Though not explicitly stated in the rule, Bay Area refinery cooling tower owners/operators can request reprieve (variance, Compliance & Enforcement Agreement, etc.) if leaks cannot be fixed due to technically infeasibility and/or if parts/personnel are unavailable.
401	Reporting: Requires Bay Area refinery cooling tower owners/operators to follow notification procedures if continuous/daily/alternative monitoring determines the THC leak action of 84 ppbw (existing) or 42 ppbw (new/modified) is exceeded as discussed below.		MACT CC – 63.655	See more detailed sections below
401.1	Requires Bay Area refinery cooling tower owners/operators to notify the APCO within 1-calendar day if THC leak action levels of 84 ppbw (existing) or 42 ppbw (new/modified) is exceeded	NA	MACT CC – 63.655	Reg. 11-10 requires notification to be substantiated with info on: • pH, iron, and chlorine concentration in cooling water associated with leak; • date and time when leak was discovered; • list of all HEXs served by the cooling tower.
401.2	Requires Bay Area refinery cooling tower owners/operators to provide additional information if an identified leak is not repaired within 21 days	NA	MACT CC – 63.655	Reg. 11-10 requires notification to be substantiated with info on: • Leak specifics (extent, repairs, re-inspection, further actions/potential delays in repairs)
402	Best Modern Practices (BMP): Requires Bay Area refinery cooling tower owners/operators to minimize THC leaks from cooling towers by employing BMP. Records of collected data ae to be maintained for at least 5 years and analyzed in a weekly report.		NA	No similar existing requirement
402.1	Visual examination or non-destructive examination of heat exchangers upstream of each cooling tower.	NA	NA	No similar existing requirement
402.2	Re-passivate steel within HEX's during turnaround.	None	None	No similar existing requirement
402.3	Seal tubes within HEX's if pitted/corroded.	None	None	No similar existing requirement
402.4	Perform visual observations once per shift to detect changes in cooling water appearance and algae growth.	None	None	No similar existing requirement

Section	**Description** (paraphrased)	Comparable State/District Rules	Comparable Federal Rules	Discussion
402.5	Monitor cooling tower decks once per shift for odors.	None	None	No similar existing requirement
402.6	Measure residual chlorine in cooling water once per shift.	None	None	No similar existing requirement
402.7	Monitor the air above cooling water once per shift with District approved hand-held monitors (~FIDs, etc.).	None	None	No similar existing requirement
402.8	Measure ORP in cooling tower water once per shift.	None	None	No similar existing requirement
402.9	Track and record the quantities of chlorine/biocide added every day.	None	None	No similar existing requirement
504	Monitoring and Records: Requires Bay Area refinery owners/operators to retain cooling tower operating records collected per Sections 301, 304, 305, 401, 402, and 602 for at least five years from the date of entry.	Regulation 2-6-501, 503	40 CFR 70.6(a)(3)(ii)	This requirement is similar to the recordkeeping requirement in the Air District's Major Facility Review (~Title V permit) Reg. 2, Rule 6 which is based on 40 CFR Part 70 "State Operating Permit Programs".
601	Analytic method for hexavalent chromium.	NA	NA	Administrative requirement
602	Installation locations of THC analyzers..	NA	NA	Administrative requirement
603	Specifies EPA methods to be used if Bay Area refinery cooling tower owners/operators choose to monitor for THC in cooling water by direct grab sampling followed by lab analysis to demo compliance with the THC leak action level.	NA	NA	Administrative requirement
604	Specifies sampling location (cooling water return line) to be used if Bay Area refinery cooling tower owners/operators choose to monitor for THC in cooling water by direct grab sampling followed by lab analysis to demo compliance with the THC leak action level.	NA	NA	Administrative requirement

Review of this information concludes that the proposed regulation is necessary to achieve the emission reductions anticipated, and is not duplicative of existing requirements.

ENVIRONMENTAL IMPACTS

As required by the California Environmental Quality Act (CEQA), a thorough analysis of the environmental impacts of the proposed amendments to Rule 11-10 is present in Appendix D. No environmental impacts beyond reduction of hydrocarbon emissions from cooling towers is expected, so a Negative Declaration is recommended.

MINOR CHANGES FROM THE PROPOSED RULE

The Air District posted a proposed version of Regulation 11, Rule 10 on October 23, 2015. The final version of the rule includes a few minor changes intended to clarify the intent of the rule.

1. Clarification: A short phrase was added to Section 11-10-305 to make it clear that the chemical speciation requirement is a daily requirement upon the discovery of a leak.
2. Clarification: To make it clear that it was never the Air District's intent to subject cooling towers that service heat exchangers with process fluids that do not contain hydrocarbons to the rule, an exemption (Section 11-10-107) was incorporated.
3. Clarification: In the introductory sentence in Section 11-10-205, the word "shall" was changed to "may" to make it clear that actions in either 205.1 or 205.2 are allowable as methods to repair leaks.

CONCLUSION

The proposed amendments to Regulation 11, Rule 10 will result in significant reduction of THC emissions. The CEQA analysis found there to be no additional significant environmental impacts expected from these requirements, and the Socio-Economic analysis found no significant impact on refineries or other processing plants with cooling towers in hydrocarbon service.

Air District Response to Comments

The Air district received 25 separate written comments from Industry, environmental and community groups, regulatory agencies and individual citizens. Six individual citizens provided comments. Representatives provided comments from Air Liquide US, As You Sow, Bragg Crane Service, Brain Science International, Eichleay Engineers of California, Leiba & Bowers CPAs, Metal Supply Inc., Phillips 66, PTS Staffing Solutions, Shell Chemical LP, Shell Oil Products, Siemens Process Industries and Drives, Tesoro Refining and Marketing Company LLC, Valero Refining Company, and WSPA. US EPA, Region IX also provided comment to the Air District. These written comments have been posted and may be viewed at the following location: www.baaqmd.gov/rulehearings.

Contents

General Comments

Comment:

Use common sense when considering proposed regulation for refineries.

R Warnock, P1, p4; C Virga, P1, p1 & 3

Response:

The Air District always strives to balance between a healthy environment and a robust economy. The Air District is also bound by statutory requirements set forth in the California Health and Safety Code (H&SC). The H&SC section 40727 requires the Air District to make certain finding before adopting, amending, or repealing Air Districts rule; these findings fall under the general headings of: “Necessity,” “Authority,” “Clarity,” “Consistency,” “Non-duplication,” and “Reference.” These requirements along with requirements to consider cost-effectiveness, socioeconomic and environmental impacts ensure the Air District proposals are developed in deliberate manner with input from a wide variety of stakeholders.

Comment:

As a person with asthma, I support strong regulation of particulate matter from refineries and associated facilities in the Bay Area.

S Freedkin, P1, p1

Response:

The Air Districts appreciates the comment and strives to ensure the right of everyone in the Bay Area to breathe clean air.

Comment:

I support strong regulation of greenhouse gases and other pollutants that contribute to human-caused climate change.

S Freedkin, P1, p2

Response:

The Air District appreciates the comment and aims to create a healthy breathing environment for every Bay Area resident while protecting and improving public health, air quality, and the global climate.

Comment:

Refineries must do more to reverse decline in air pollution.

S Freedkin, P1, p3

Response:

The Air District appreciates and supports the sentiment of this comment. Staff believes all sources of air pollution, including refineries, should strive to reduce their emissions as much as is technically and economically feasible.

Comment:

I encourage the BAAQMD to adopt the strongest rules to control emissions at refineries and associated facilities.

S Freedkin, P1, p5

Response:

The Air District appreciates this commenter's support.

Comment:

The proposals do not consider environment justice issues.

JB MacDonald, P1, p1

Response:

All of the proposals were crafted to reduce emissions from refineries, some of the largest sources of criteria, toxic and climate pollutants. These refineries are located in close proximity to citizens that could be impacted by these pollutants. These proposals were not only crafted to reduce pollutants that have basin-wide impacts, but also pollutants that have localized impacts, such as fine particulate matter and toxic air contaminants, specifically, Rule 6-5, Rule 8-18, and Rule 11-10.

Comment:

Open houses do not meet CEQA's requirement for meaningful participation.

JB MacDonald, P1, p1

Response:

The requirements referenced by the commenter do not apply because no such participation is required for a Negative Declaration. Staff has withdrawn Rules 12-15 and 12-16 from Board consideration along with the associated Draft Environmental Impact Report.

Comment:

Overly burdensome rules negatively impact jobs and the economy.

R Frazier, P2, p1; Eichleay, P1, p7;, J Benaquisto, P1, p6; MSI, P1, p6; PTS, P1, p6.

Response:

The Air District is very concerned about the impact air quality regulation has on the job market and economy and strives to ensure those impacts are minimized. Further, H&SC Section 40728.5 requires the Air District to conduct a socioeconomic analysis that would characterize the impact any proposed rule or amendments would have on the economy. The socioeconomic analysis for the three proposed rulemakings (Rule 11-10, Rule 8-18, and Rule 6-5) resulted in the following findings:

> "As a result, the combined impacts stemming from Rule 11-10, Rule 8-18, and Draft Rule 6-5 are less than significant. Moreover, because affected sources are not small businesses, small businesses are not disproportionately impacted by the proposed rule changes."

Comment:

In response to public comment concerning the Air District's rush to adopt the refinery rules, the Air District has stated that the rulemaking has been going on for over three years and there has not been a rush. In fact only one of the rules has been in development for three years (Rule 12-15). The first public draft of Rule 12-16 was released in January 2015 and after hearing concerns in public workshops, the Air District said the rule would be significantly revised. The next draft of Rule 12-16 was not issued until September 2015 (2.5 months ago) and this draft had brand new concepts that had never been publically discussed before. Four additional refinery rules were only first proposed at the end of May 2015 (less than six month ago). These rules were all revised and reissued in October 2015. All four of these rules will impose significant new requirements on refineries. None of these have had the time to be properly reviewed and revised as needed.

Shell-03, P2, p3.

Comment:

Air District has rushed unnecessary rulemaking that would have deleterious effects on the refinery industry.

Valero-RERS, P2, p3

Comment:

Abbreviated time period is insufficient. Requests an extension and a continuation of the hearing.

Phillips 66-01, P2, p3.

Response:

Staff recognizes that the schedule for the development of these rules has been both ambitious and more expeditious than is typical for other rule development efforts. Because of the concerns expressed both by internal and external stakeholders (about not only the timing of the rule development effort, but also issues raised concerning the rule themselves), staff will not move forward with presenting three of the six proposals to the Board of Directors for their

consideration: Rules 9-14, 12-15, and 12-16. The remaining three rules will be presented at the December 16 public hearing for the Board's consideration. Staff believes that there has been adequate time and outreach to stakeholders to sufficiently vet these proposals in preparation for the public hearing. Page 17 of the staff report for the Refinery Emissions Reduction Strategy summarized the significant outreach efforts in which staff has engaged, including numerous meetings, workshops, committee and board hearings held to present and discuss concepts and draft proposal and receive stakeholder input. Further, staff released concept papers on each of the rules to inform the public on the initial direction and concepts that were under development. Staff also has had dozens of individual interactions with both affected industry and other members of the public via phone conversations, meetings, and various correspondences. In light of the considerable outreach efforts discussed above, staff believes that all of the statutory requirements of the H&SC regarding air district rule making and the Air District's public engagement policy have been met.

Comment:

There are serious flaw in all of the rules – both in the basic requirements and in the implementation. We have pointed these flaws out to the Air District in meeting, at Workshops, by email and through extensive written comments submitted by WSPA. Most of the problems have not been addressed and we have been told by staff that they understand there are problems, but they don't have time to address them. Their plan is to re-open the rules after adoption to try to fix them. This does not make sense and provides the regulated community with no certainty. The rule should not be adopted until they are right.

Shell-03, P2, p3.

Response:

Staff disagrees that the proposals are all flawed. As mentioned in the response above, staff will not present Rules 9-14, 12-15, and 12-16 to the Board of Directors at the December 16 public hearing. However, staff will move forward with the three remaining rules. It is staff's belief that these rules are sufficiently developed and are important to meeting the Air District goals set forth in Resolution 2014-17, adopted by the Board of Directors in October 2014, and attaining and maintaining State and federal ambient air quality standards. Further, staff has demonstrated that these proposals fulfill the requirements of the H&SC and the California Code of Regulation (CCR); staff has conducted cost effectiveness analyses [H&SC §40922], incremental cost analyses [H&SC §40920.6], a socioeconomic analysis [H&SC §40728.5], and CEQA environmental analysis [Title 14 CCR §15000 et seq.]. Staff discussed these subjects in detail in the responses to specific comments addressing these statutory requirements.

Comment:

This rush to regulation is exacerbated by the Air District's piecemeal approach to regulation. As the Air District has made clear, the six proposed rules are part of an Air District-wide initiative to decrease emissions from refineries by at least 20 percent within no more than five years. In fact, the six currently-proposed rules represent only the first steps of this process; the Staff Report makes clear that additional rules are currently in development to obtain even greater reductions.

Response:

Staff disagrees with this comment. Based on the commenter's logic, any and all control measures listed in the Air District air quality plans would be subject to the same consideration simply because they were envisioned and presented in a single document. Staff has often developed and proposed multiple refinery rules during a single hearing. Examples include the presentation of the proposed amendment to Marine Vessel Loading Operations and Episodic Releases from Pressure Relief Devices at Petroleum Refineries and Chemical Plants which were proposed to the Board at the December 7, 2005 Public Hearing as independent projects, with separate socioeconomic and environmental analyses.

While the aspirational goal of the Board's Resolution (2014-17) is the reduction of refinery emissions, the question of piece mealing boils down to whether any of the projects identified in achieving that goal is contingent upon the others. Considering this criterion, there are two that could be considered contingent upon each other – rulemaking efforts directed at emissions from the FCCUs. Staff intends to review the total impacts from the two FCCUs regulatory efforts if and when the second phase of the Refinery Strategy is finalized and presented to the Board of Directors. It should be noted that development of the second FCCU regulation is not a certainty, and will depend on various factual analysis yet to be conducted. Aside from these FCCU rules, other sources currently planned for regulatory review are very disparate. Staff therefore believes it is neither necessary nor appropriate to analyze the overall economic or environmental impact of each proposal en masse.

WSPA, Attachment E "Memo/Comments on Socioeconomic Report"

The comment in Attachment E address the socioeconomic analysis report prepared for draft rules 12-15 and 12-16, which are no longer scheduled for an adoption hearing. However, because the comments are about the methodology generally used by the Air District's consultants in preparing socioeconomic analyses, the Air District consultant – Applied Development Economics (ADE) – was asked by the Air District to review and respond to these comments. Detailed responses are included in the memo from ADE dated December 9, 2015 which is attached as Appendix 1 to this document.

Comment Summary:

The comment has two parts: 1) Inadequate content to satisfy the requirements of H&S Code §40728.5, and 2) inadequate application of a methodology ("the 10% rule") to determine the significance of economic impacts.

1) Inadequate Content to Satisfy H&S Code §40728.5:

Response: The comments in this section are specific to the analysis performed for draft Rule 12-15 and 12-16, and which are no longer scheduled for an adoption hearing, except for the comment about "regional employment" analysis by ADE which also appears in the

socioeconomic analysis for Rules 6-5, 8-18 and 10-11, and also the comment about “necessity” of the rules. The comment on “regional employment” is addressed in ADE’s memo on pages 2 and 3, and District Staff concurs with this response. Necessity (for Rules 6-5, 8-18 and 10-11) are addressed in the body of the staff report for these rules. The staff report, socioeconomic analysis report and other attachments legally comprise a single document that is considered by the District Board.

2) Inadequate application of “the 10% rule” to determine the significance of economic impacts:

Response: This comment is highly technical and is addressed in detail in ADE’s memo (Attached as Appendix 1 to this response to comments) beginning on page 7, and District staff concurs with this response.

Comments on Regulation 6-5: FCCUs

1. US EPA

Comment: US EPA made two comments, the first is that the limited exemption in Section 6-5-112 does not conform to EPA's June 12, 2015 rulemaking regarding excess emissions during start-up, shutdown and malfunctions, and the second is a recommendation to use a 60-minute averaging time for the ammonia limit in 6-5-301.1 instead of the proposed daily average.

Response: District Staff believes that the two provisions in question best achieve the goals of this rule, and that incorporating either EPA comment would significantly increase the cost and difficulty of compliance. While District Staff generally attempts to conform to EPA guidance in its rules, this conformance is necessary only if the rule is to be submitted into the state SIP. However, with regard to Regulation 6-5, staff does not currently anticipate including Regulation 6-5 in the SIP. It may be required if the Air District were to pursue a maintenance plan for $PM_{2.5}$. Staff also understands that If Regulation 6-5 is adopted as proposed, it may have to be amended to conform to EPA guidance in order to be included in the SIP.

2. Valero RERS (pages 3 and 4)

Comments: Valero made a number of comments related to the proposed rule and potential future amendments of the rule. Specifically, comments on comingling of fluidized catalytic cracking units (FCCU) and non-FCCU exhaust emissions.

1. *Description*: Non-FCCU particulate matter emissions and precursors could be considered FCCU emissions if the units share the same stack.
2. *(In)applicability of Technology*: The regulation may require additional controls with future standard for condensable PM and SO_2, which are proposed in future rulemaking.
3. *Inappropriate Emission Limit [Citation 6-5-301]*: Valero's wet scrubber was designed to reduce SO_2 from the fluid coker and oversized to scrub the FCCU gas as well; however, the scrubber was not designed explicitly for FCCU abatement alone. The combined gases from both process units present a different pollutant loading than either unit would alone. Therefore, applying new emissions standards for an FCCU-only situation would be inappropriate for a combined fluid coker/FCCU stack.
4. *Commingled Emissions*: Because the exhaust of both the fluid coke and the FCCU are comingled, the application of this rule to a combined stack is effectively a rulemaking on the fluid coker without due process of examining the underlying data and regulatory requirements.
5. Wet Scrubber Exemption [Citation 6-5-111]:The Wet Scrubber Exemption (Section 6-5-111), which states "The emission limits in Section 6-5-301 shall not apply to emissions that are abated by a wet scrubber that is required to be operated by a District permit and that constitutes best available control technology (BACT) for any pollutant." This exemption would remove from consideration as FCCU pollutants those that come from the coker and are directed to a stack shared with the FCCU and treated through the scrubber, which has been permitted by the District.
6. *Analytical Methods [Citations 6-5-301 and 6-5-501]*: Enforcement of emissions limits that are proposed in current or future rulemakings must be accomplished by methods that have been federally approved, are repeatable within prescribed confidence intervals, achieve accurate analyses within a reasonable run time, and have been demonstrated in practice for the sampling conditions (temperature, pressure, and moisture content) for

which testing will be conducted. Emissions limits based on methods other than direct analysis (such as 'indirect particulate matter', which may form later in the atmosphere and is not measurable) cannot be enforceable.

a. *Ammonia [Citations 6-5-201 and 6-5-403]*: It is unknown whether an ammonia slip analyzer can be made to work in a saturated 'wet' environment of the scrubber stack. Typical Continuous Operational Monitors (COMs) do not work for opacity, so an Alternative Monitoring Plan (AMP) was prepared for parametric monitoring at the Belco scrubber to provide equivalent compliance assurance. There is no corresponding AMP opportunity in this rule for ammonia.

b. *Condensable Particulate Matter [Citation 6-5-203]:* Particulate matter is measured by source test (the "front-half", meaning those particles which exist at stack conditions). The "back half," or condensables, can be assessed with certain test methods; however, it cannot be concluded that all of the condensable material created by the cooling of stack gases required by the test method would necessarily be created in the atmosphere. The facility cannot control, or be responsible for, atmospheric chemistry.

c. *Emission Limits [Citation 6-5-301]*: The emission limits for condensable PM and SO_2 are to be determined in the future. Valero and the rest of industry cannot possibly comment on emission limits that have not yet been proposed. This is a clear indication that the agency is rushing this rulemaking process.

Response: Valero would be exempt from the currently proposed ammonia limit and associated monitoring requirements in accordance with the limited exemption in Section 6-5-111. Valero's comments regarding future emission limits are speculative at this point, but will be considered before additional emission limits are proposed for this rule.

3. Tesoro (page 2)

Comment: A CEMS will be required to comply with the monitoring requirements of the rule at significant expense.

Response: The rule would require continuous monitoring of ammonia emissions. A CEMS to directly measure ammonia emissions is one monitoring option, although District staff has concerns about the accuracy of currently-available ammonia CEMS. Therefore, Section 6-5-501 also allows the use of parametric monitoring systems (PEMS) that would provide equivalent monitoring, as well as a NO_X CEMS-based system that would calculate the amount of ammonia used to react and reduce NO_X and subtract this from a known ammonia feed rate.

Comment: Monitoring costs were not included in the socio-economic analysis.

Response: The omission of monitoring costs for this rule was an oversight. District Staff is familiar with the costs for such systems and will include the cost of a CEMS in the final socio-economic report that is provided to the District Board at the public hearing for this rule.

Comment: The use of a wet gas scrubber (WGS), as discussed in the staff report – does not ensure a reduction in condensable PM emissions.

Response: The draft rule does not include a requirement for a WGS. Before such a requirement is added to the rule, or additional assumptions are made about the condensable PM removal-efficiency of a WGS, the data provided by Tesoro, as well as any other available data, will be considered.

4. WSPA

Comment (page 3): Reductions of ammonia are unnecessary.

Response: Although the Bay Area currently has a "clean data finding" from US EPA for the $PM_{2.5}$ NAAQS, it has not been designated as being in attainment status for $PM_{2.5}$. More urgently, the Bay Area continues to be a nonattainment area for the state $PM_{2.5}$ standard. Further, District staff has long held that ambient $PM_{2.5}$ concentrations remain the driver for air pollution-based health impacts in the Bay Area. EPA has established that ammonia emissions contribute to the formation of $PM_{2.5}$ in the form of ammonium sulfate and ammonium nitrate. For these reasons, the Air District is obligated to reduce emissions of ammonia where possible.

Comment (page 30-31, Comment V.A - "Necessity"): Further reductions of $PM_{2.5}$ are unnecessary based on information recently submitted by BAAQMD to US EPA.

Response: Although the Bay Area currently has a "clean data finding" from US EPA for the $PM_{2.5}$ NAAQS, it has not been designated as being in attainment status for $PM_{2.5}$. More urgently, the Bay Area continues to be a nonattainment area for the state $PM_{2.5}$ standard. Further, District staff has long held that ambient $PM_{2.5}$ concentrations remain the driver for air pollution-based health impacts in the Bay Area. For these reasons, the Air District is obligated to take action to further reduce emissions of $PM_{2.5}$ and its precursors in order to attain and maintain compliance with both state and federal $PM_{2.5}$ standards.

WSPA notes that the Air District petitioned EPA to exclude ammonia as a PM 2.5 precursor requiring regulation through the EPA-approved New Source Review program. It is true that the Air District demonstrated to EPA's satisfaction that ammonia emissions were not a significant contributor to exceedances of the PM 2.5 NAAQS. However, it does not follow, as WSPA asserts, that a "necessity" finding cannot be made to support rulemaking to control ammonia. Whether a pollutant contributes significantly to exceedances of the NAAQS, while relevant, is not the only, or even the primary, criterion for supporting a finding of "necessity" to adopt a rule. Attainment of State standards is sufficient reason to support rule adoption regardless of the status of attainment with the NAAQS. Moreover, although the Bay Areas is in attainment with the PM 2.5 NAAQS, the margin of compliance is not large and is subject to variation, indicating that progress in reducing PM 2.5 is still prudent and necessary. Finally, as noted in the Staff Report, PM 2.5 is a public health concern on days where levels are high, regardless of the status of attainment with federal and state standards.

The Air District's authority to make a finding that "a need exists for [a] regulation" is not limited to situations where there is a demonstrated close correlation between the emissions addressed by the rule and exceedance of an ambient standard. The Air District believes a finding of "necessity" can be supported where the record shows that the rule will help alleviate a legitimate air pollution concern. In demonstrating that FCCU's emit ammonia in significant quantities, that ammonia is a precursor to PM 2.5 formation, and that reductions in PM 2.5 will be needed to attain and maintain the State ambient air standard and to reduce the number of days on which PM 2.5 exceeds healthy air standards, the Air District has adequately supported a finding of "necessity" for Rule 6-5.

The Air District is currently working with refineries that operate FCCUs to perform source testing of condensable PM emissions using EPA's amended Method 202. Although this testing will not be complete until 2016, testing at the Chevron FCCU using an earlier version of Method 202 suggests that FCCUs may be the largest source of condensable PM in the Bay Area.

Comment (page 31 and 53, Comment B): Section 6-5-301 imposes an unachievable timeframe for compliance.

Response: While the timeframes in this rule are not as long as the refineries would like, District staff believes that they are reasonable and achievable. It is important to reduce the condensable PM emissions as quickly as possible and to determine if this rule will be adequate in that regard or whether additional controls are needed. In the event that affected refineries make a good-faith effort to comply, but are unable to do so on time because of reasons beyond their reasonable control, District staff may apply enforcement discretion on a case-by-case basis.

Also, the Air District appreciates that the value of a refinery-proposed ammonia limit, if it will result in significant ammonia emissions while maintaining compliance margin for all future operating conditions, must consider and possibly test at those conditions. However, WSPA has not established that their proposed timeframe is necessarily related to any specific set of scenarios. Therefore, the Air District will proceed with what appears to be reasonable and achievable.

Comment (page 31, Comment B): The rule should allow refineries to propose appropriate monitoring sufficient to demonstrate compliance with the ammonia limit.

Response: Monitoring requirements in Section 6-5-501 have been amended to allow refineries to propose alternative methods for ammonia monitoring.

Comment (page 53): The proposed ammonia limit is unnecessary because the Air District intends to adopt a limit on condensable emissions at a later date.

Response: Although District Staff have contemplated further actions to limit $PM_{2.5}$ emissions from FCCUs, including direct limits on condensable PM, no such limit has been proposed, much less adopted. The possibility of such a future limit does not render the current proposal unnecessary. It is possible, although unlikely, that compliance with the proposed ammonia limits will render further action unnecessary.

Comment (page 53): Air District staff has not expanded permitting rules to address ammonia in recent correspondence with US EPA.

Response: This comment ignores the Air District's obligations to address ammonia to address the requirements of the California Clean Air Act. See the response to WSPA's comment on page 3.

Comment (page 53): The values of the limits for Condensable PM and sulfur dioxide are not specified.

Response: There are no limits for Condensable PM or sulfur dioxide at this time. The placeholders for these limits were included in the rule to make transparent the Air District's strong belief that such limits will be necessary sometime in the future.

Comment (page 53 and 54): The proposed monitoring provisions violate H&S Code §40001(d)(3).

Response: In part to address this comment, the draft rule has been amended to allow a refinery to propose monitoring.

Comment (page 54): The proposed compliance timelines are onerous and unreasonable.

Response: While the timeframes in this rule are not as long as the refineries would like, District staff believes that they are reasonable and achievable. It is important to reduce the condensable PM emissions as quickly as possible and to determine if this rule will be adequate in that regard or whether additional controls are needed. In the event that affected refineries make a good-

faith effort to comply, but are unable to do so on time because of reasons beyond their reasonable control, District staff may apply enforcement discretion on a case-by-case basis.

Comment (page 54): The Air District may not adopt a rule that identifies the possibility of additional future requirements, such as future emission limits on Condensable PM and sulfur dioxide.

Response: WSPA offers this as their opinion, but provides no support for this assertion. District Staff disagrees.

Comment (page 55): The definition of FCCU represents regulatory overreach by the District because it includes “ancillary equipment including blowers, and all equipment for controlling air pollutant emissions and recovering heat.”

Response: This definition is functionally equivalent to that in South Coast AQMD’s Rule 1105.1. The reason that the definition of an FCCU includes these other devices is because the exhaust stream from an FCCU typically includes other sources of pollutants, including heat-recovery devices such as CO boilers, and also including emission control devices such as SCR, SNCR and electrostatic precipitators (ESPs), all of which may be regulated by the Air District. This broad definition is necessary to prevent a refinery from asserting that because non-FCCU emissions are co-mingled with the FCCU emissions, and because they cannot be differentiated, that the Air District may not enforce the FCCU emission limit at all.

Comment (page 68): The costs for wet gas scrubbers far exceed the District’s estimate.

Response: The rule does not require installation of wet gas scrubbers and such devices are not believed to be necessary to comply with the proposed rule. If, in the future, the District either requires wet gas scrubbers explicitly, or proposes emission limits that would likely require the use of wet gas scrubbers for compliance, the Air District will consider refinery-specific factors in estimating associated compliance costs.

Comments on Regulation 8-18: Equipment Leaks

Response to Comments

General Comments

Comment 1:

"Although the rule requirements apply to chemical plants, bulk plants, and bulk terminals in the Bay Area, neither the District's staff report or its contractor's socioeconomic analysis included any evaluation of the impacts of these requirements on sources other than refineries, nor was there any assessment of contractor availability issues associated with all of these facilities needing contractors on the same timeframe" WSPA, P5, p58

Response 1:

Other facilities applicable to this rule operate Leak Detection and Repair (LDAR) programs that are similar to those operated at the Bay Area refineries. In addition, many of these facilities utilize the same LDAR contractors used by the Bay Area refineries. Therefore the Air District anticipates similar impacts and costs as a result of the proposed rule changes. As for contractor availability issues, the five refineries each have their own dedicated LDAR program team as does each of the other applicable facilities.

Comment 2:

"Outreach information that exclusively mentions the 4 Refinery rule and targets just those stakeholders. However, our small Chemical Plant and maybe others are affected by 8-18 and without any outreach and associated engagement. For example, I received no notice from the Air District regarding public meetings (despite one Permit Engineer's representation of a one-off email to the contrary) and the update below only came to my attention via a forwarding email from Kathy Wheeler at the Martinez Refinery. Also noted is that the associated Staff report continues to address only Refineries and contains no information regarding the potential effects of this rule chemical plants and other applicable non-Refinery assets."Shell-01, P1, p1

Response 2:

The Air District staff has attempted to identify and notice all potentially affected stakeholders. The Air District has an email list that is used to announce all proposed changes to regulations. Information about this rulemaking was sent out to that list on May 26th (Call for Comments), September 3rd (Open House) and October 23rd (Public Hearing Notice) of 2015. In addition, several workshops and public meetings were held to discuss this rule during its development. These are outlined in the main body of the staff report.

Comment 3:

"Health Risk Assessment: Given the long delay in data collection from heavy liquids monitoring programs in relation to the development of the 2015 revised Office of Environmental Health

Hazard Assessment (OEHHA) Health Risk Assessment (HRA) Guidance Manual, the conduct of any future health risk assessments should use the most representative emissions factors and actual emissions data. The proposed regulation does not provide an off-ramp for the refining industry if the data collection study on emission factors for heavy liquid components were to reveal that the refining industry emits much lower amounts of volatile organic compounds (VOCs) from heavy liquid components than those assumed and relied upon by the agency for the writing of this rule. This rule is proceeding on the BAAQMD's erroneous assumption that refineries emit high amounts of VOCs from heavy liquids, even though the individual Bay Area refineries have submitted data to the Air District that contradicts that assumption." Valero-RERS, P5, p4

Response 3:

The Air District agrees that the most representative data should be used in Health Risk Assessments (HRAs). We are confident that data will be available when the HRAs are conducted. Moreover, the Air District is confident that current estimates are as accurate as possible utilizing available data. This is explained in more detail in Appendix B of the Staff Report.

Comment 4:

"With respect to Rule 8-18, I disagree with the removal of the low-level leakage repair provision. This rule goes too far and could lead to refinery unit shutdowns, which would disrupt fuel supplies and impact fuel prices at the pump. The repair provision should be reinstated." Bragg, P1, p3; Eichleay,P3,p1,J Benaquisto,P3,p1,MSI,P3,p1,PTS,P4,p1 and R Frazier,P3,p1

Response 4:

The Air District has not proposed removal of a "low-level leakage repair provision." The repair provisions for equipment subject to the rule will remain under the applicable standards sections (Sections 8-18-300). If this response has not addressed the concerns of these parties, see the Air District's responses to comments that address specific sections of the rule below.

8-18-113

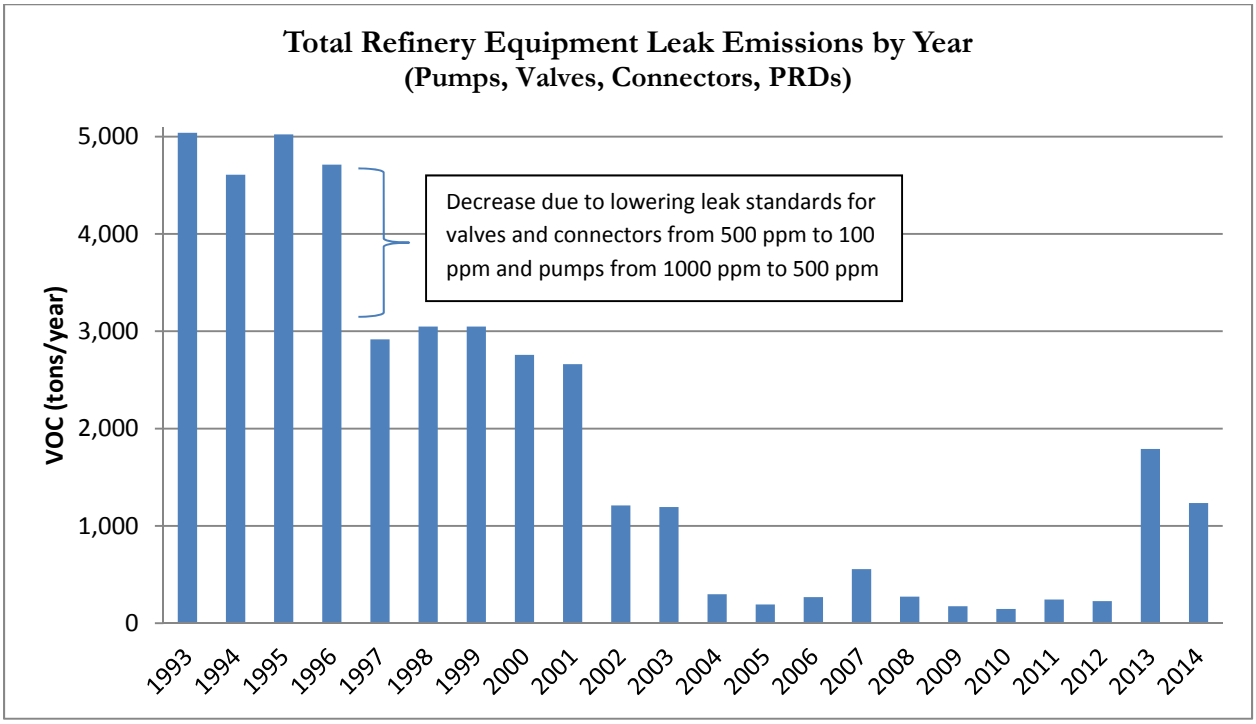
Comment 5:

"The District has not provided a reasonable basis for the extremely elevated emissions that the District assumes are attributable to leaking components in heavy liquid service. The proposed removal of the limited exemption is inconsistent with the 1999 statewide guidelines (CAPCOA/ARB, "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities", February 1999) which include a list of "components not counted" that includes "components handling exclusively liquids which evaporate 10% or less at 150 °C".WSPA,P3,p32 & P1 p69

Response 5:

The Air District understands there are concerns from industry regarding the emissions determined for equipment in heavy liquid service. The Air District provides the basis for determining heavy liquid equipment emissions, in detail, in the main body of Appendix B of the Staff Report; see Additional Requirements to Monitor Equipment in Heavy Liquid Service.

In annual inventories, the Air District has historically not asked for individual estimates of fugitive emissions by service type but rather requested a single mass value representing all equipment leak emissions. The refineries did not provide detailed enough supporting data for the Air District to verify the accuracy of these estimates. Several years ago, the Air District determined that the refineries were no longer reporting emissions for components in heavy liquid service. This can be seen in a graph of emissions from equipment leaks over time. Leak emissions increased in 2013 and 2014 after the refineries started reported emissions from components in heavy liquid service again.



In addition, the Air District and Western States Petroleum Association (WSPA) agreed to a joint mass emissions sampling study to determine the appropriate emission factors. The Air District has amended the effective date for heavy liquid equipment monitoring to January 1, 2018 to allow the study to be completed in 2016. Upon completion of the study, the Air District will review the findings with WSPA to determine if the proposed regulatory requirements for equipment in heavy liquid service continue to be cost effective. If the requirements do not appear to be cost effective, Air District staff will propose amendments to the Board.

Comment 6:

“Heavy liquid fugitive components generate low VOC emissions and should not be subject to onerous tagging and monitoring requirements.” Phillips 66-01, P2, p12

Response 6:

This is now addressed in Appendix B of the Staff Report; see *Additional Requirements to Monitor Equipment in Heavy Liquid Service.* Also, See Air District Response 5.

Comment 7

"The limited exemption for equipment which handles organic liquids having an initial boiling point greater than 302^{o}F should not be revised as proposed. This proposed addition of "Until January 1, 2018" should not be added." Tesoro, P4, p2

Response 7:

The Air District does not agree with Tesoro's comment. See the Air District's basis for including monitoring of heavy liquid equipment in Appendix B of the Staff Report, see *Additional Requirements to Monitor Equipment in Heavy Liquid Service.* Also, see Air District Response 5.

Comment 8:

"By deleting the Limited Exemption – Initial Boiling Point, any organic liquid would be in scope and beyond the target of Heavy Liquid Service in Refineries. For us this adds pure Lube Oil and a non-Volatile C-20 Olefin (raw material) and a non-volatile liquid catalyst product to the mix. I'm not sure I see the point of having to measure something that's probably not there and isn't really a "Heavy Oil" to begin with."Shell-01, P2, p1

Response 8:

The current rule does not exempt heavy liquid equipment from the applicable emission standards in the rule which implies the potential of this equipment to emit. The Air District believes the facility should be held responsible to inspect and maintain all equipment with a potential to emit pollutants subject to the standards of the rule. There are other Air District regulations which regulate heavy liquids, for example Air District regulations regarding mineral spirits.

8-18-115

Comment 9:

"Regulation 8 Rule 5 only includes requirements for appurtenances on storage tanks when the liquid being stored has a vapor pressure of > 0.5 psia (8- 5-117) or is under pressure or blanketed (8-5-307.3). If this rule were to now apply to storage tanks having a vapor pressure of ≤ 0.5 psia that are neither under pressure nor blanketed, the District's analysis of the rule needs to incorporate the fact that capital investment would be needed to reinforce the structural integrity of some tanks to support the weight of a person for periodic monitoring, since an articulating boom lift will not be able to reach the pressure vacuum valve of many fixed roof tanks." WSPA Table of Detailed Comments of Specific Rules, P70, r2

Response 9:

The Air District does not plan to change this limited exemption. In general, fixed roof tanks and pressure/vacuum (PV) valves would remain subject to the standards of Regulation 8, Rule 5. However, PVs on tanks exempt from Regulation 8 Rule 5 would be subject to Regulation 8, Rule 18.

8-18-204

Comment 10:

"The proposed revised language is inconsistent with the 1999 statewide guidelines (CAPCOA/ARB, "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities", February 1999) which clearly identifies that "'each valve is counted once regardless of the number of body flanges, bonnet flanges or plugs that are part of a valve (see section on component identification and screening illustrations)' (p. 23) and the associated illustrations on pages 24 and 25 also show that valve bonnet flanges should not be counted as separate flanges" WSPA Table of Detailed Comments of Specific Rules, p70

Response 10:

For the purposes of complying with Regulation 8 Rule 18, the Air District has identified valve bonnet flanges as connections since the 1990's. In addition, a compliance advisory regarding bonnet flanges on valves was issued in September 2013 to provide additional clarification.

Comment 11:

"The revision to the definition of a 'connection' includes the example of a 'valve bonnet flange.' This example should instead identify the two flanges on the sides of the valve and not the valve 'bonnet flange.' Tesoro P6, p4

Response 11:

The Air District does not agree with Tesoro's comment. See Air District Response 10 above for further clarification.

8-18-209

Comment 12:

"The District has not made a finding of necessity for this proposed revision. It does not make sense to require tightening when (a) oftentimes what counts as a 'leak' can be due to liquid dripped from somewhere else, the presence of liquid in a weephole, a moving piece of equipment that didn't seat properly due to material that is in the way, or solid particles that work

their way into crevices, lubricating material, etc. and (b) overtightening can cause leaks as well." WSPA Table of Detailed Comments of Specific Rules, p70-71

Response 12:

The Air District leak minimization definition is intended to mirror what is required by both the Federal regulation 40 CFR VV and the EPA Guidance document as a first attempt at repair. Examples from the Federal regulations (§ 60.482-2, § 60.482-7) specifically include: tightening of bonnet bolts, replacement of bonnet bolts; tightening of packing gland nuts; injection of lubricant into lubricated packing and ensuring that the seal flush is operating at design pressure and temperature. The Air District does not believe scrubbing, cleaning and/or washing equipment is a best modern practice for minimization of leaks.

Comment 13:

"Leak Minimization: Citation 8-18-209 requires leak minimization techniques beyond the traditional cleaning, scrubbing, or washing of equipment to other best modern practices such as tightening nuts and bolts, injecting lubricants, and installing plugs/caps into open-ended lines or valves. The rule should give flexibility for technicians to determine what is necessary or beneficial to minimize the leak below a leak standard or a mass emissions rate. If a traditional method works, then good professional engineering judgment should not require more work to be done on the piece of equipment. The BAAQMD's concern that traditional leak minimization techniques (such as cleaning scrubbing and washing) may be ineffective and potentially cause recurrent leaking has already been addressed through the proposed recurrent leaker concept in Citations 8-18-310 and 8-18-405.

In addition, adjustments to control valves or motor-operated valves may involve very sensitive instrumentation, meters, or safety critical items. Pumps cannot be tightened, and shutdown and clearing is not always immediately feasible. Leaks from these pieces of equipment may be more appropriately addressed with techniques, such as cleaning, that have been demonstrated to be sufficient and effective. Also, the proposed rule does not have any provisions for sampling or monitoring unsafe equipment. This indicates the District's lack of understanding of equipment conditions and configurations. The federal EPA recognizes real world constraints, which led it to adopt provisions that would allow for the use of good professional engineering judgment to determine the best timing and method of repairing leaks; hence, the DOR list and allowance for repairing non-major leaks during the next scheduled turnaround.

Furthermore, Valero would also argue that the best modern practices proposed by the agency would be duplicative of, not only the recurrent leaker provisions, but also the California Process Safety Management rule's concepts of preventing accidental releases, which allow similar practices in accordance with good professional engineering judgement on the part of refinery operators." Valero-RERS,P2,p6

Response 13:

See Air District Response 12 above

Comment 14:

"The District only identifies that cleaning/scrubbing/washing is not considered best modern practice, and almost all of the things that are identified as 'best modern practice' include tightening, which is not always a good idea. The current language is too unclear as to what other activities do or do not qualify as 'best modern practices'. WSPA Table of Detailed Comments of Specific Rules, p71

Response 14:

Air District Regulation 1-116.2 states, "a definition contained in Regulation 1 shall apply to all Air District Regulations." Air District Regulation 1 defines Best Modern Practices (1-207) as "the minimization of emissions from equipment and operations by the employment of modern maintenance and operating practices used by superior operators of like equipment and which may be reasonably applied under the circumstances." Therefore, the Air District does not need to define best modern practices in Regulation 8 Rule 18.

8-18-210

Comment 15:

"The District has not made a finding of necessity for this proposed revision." WSPA Table of Detailed Comments of Specific Rules, p71

Response 15:

The addition of the "best modern practices" language was meant to clarify the definition. H&SC Section 40272(b)(1) defines it as follows: "'Necessity' means that a need exists for the regulation, or for its amendment or repeal, as demonstrated by…" This requirement refers to demonstration of the necessity of the action – the need for its fundamental purpose (e.g., reduce emissions or improve compliance) whether it be the adoption of a new rule, the amending of an existing rule or the repeal of a rule. While the Air District strives to ensure the provisions of each serve an essential purpose, the requirement for this demonstration should not be misconstrued to apply to each and every individual provision that collectively comprise the rulemaking action.

Comment 16:

"Inclusion of this language begs the need for a definition of what constitutes 'best modern practices.' WSPA Table of Detailed Comments of Specific Rules, p71

Response 16:

See the Air District's Response 14 above.

8-18-214

Comment 17:

“Confusion as to what is struck – the language struck was only in previous drafts, not in current rule to be eligible for removal.” WSPA Table of Detailed Comments of Specific Rules, p71

Response 17:

The Air District will remove the new proposed language and keep the definition as is. This has been corrected in the latest draft.

8-18-226

Comment 18:

“Essential Equipment: Citation 8-18-226 adds a new concept to the rule by defining as ‘essential equipment’ those pieces of equipment that cannot be taken out of service without shutting down the process unit that is served by the equipment. This language is too restrictive in that some equipment is custom-made and cannot be replaced until the replacement is manufactured and/or received. The language is also counterproductive with respect to controlling emissions, because it is often better to allow an item to be put on the Delay of Repair (DOR) list than to shut down an entire process unit to repair a small emissions leak; the shut down often causes much higher emissions than the original leak. The reporting of the reason for the designation of equipment as essential is not necessary on a repeat basis. Furthermore, the definition of essential equipment would seem to be subject to future redefinition by the BAAQMD based upon comparisons among refineries, thereby leading to re-interpretation through future BAAQMD compliance advisories or rulemaking.” Valero-RERS,P5,p2

Response 18:

The Air District agrees that a total unit shutdown can generate more emissions than a single piece of leaking equipment. However, the Air District expects a facility to repair all leaking equipment within the timelines specified in the regulation if they are able to do so. The Air District established the non-repairable list to allow a facility to delay repairs of equipment that could not be repaired without requiring shutdown of the unit containing that equipment.

The concept of “essential equipment” is not new. In fact, this definition was in earlier versions of Regulation 8-18. The Air District has proposed the return of this language to the rule in order to clarify the intent of the non-repairable section. In the case of custom made equipment, a facility would be able to include this equipment on the non-repairable list if a unit shutdown is required to repair that equipment. However, delayed shipment of replacement equipment is not adequate reasoning for placing equipment on the non-repairable list. In regards to reporting of equipment to be placed on the non-repairable list, the Air District believes any equipment placed on the list (including repeat equipment) is required to establish an adequate leak history of equipment on the non-repairable list.

8-18-306.1

Comment 19:

“There is no justification for why this is required. This means that if the leak is > 10,000 ppm as methane – even if the mass emissions are less than 5 lb/day – the District is requiring the process to shut down in order to fix it, rather than allowing the repair period to be delayed or extended.” WSPA Table of Detailed Comments of Specific Rules, p72

Response 19:

The refineries use fugitive mass emissions guidelines published by CAPCOA that include three methods for determining mass emissions. Method 3 (Correlation Equations) is to be used whenever monitoring is conducted. These equations have maximum emissions at 5 pounds per day (lbs./day), corresponding to leaks greater than 10,000 ppm.

In communication with Air District permit engineers during the permit application process and in annual updates, the refineries have stated the 5 pounds per day is too high and that maximum emissions are much lower.

In a search of Air District records over the past five years, the refineries have minimized leaks to less than 10,000 ppm. Therefore, compliance with a five pound per day limit is expected.

For equipment that has a concentration greater than 10,000 ppm but less than 5 lbs./day, the Air District is willing to allow that equipment on the non-repairable list provided the facility measures for mass emissions each quarter to confirm the emissions are still below 5 lbs./day."

Comment 20:

“The rule does not specify how equipment that is already on a delay of repair list on the date the rule becomes final must comply. In addition, it is not clear what the District is requiring when bagging is not possible or unsafe. Many conditions are foreseeable that will prevent bagging a leaking component. For example, equipment that is not repaired in 7 days but is shutdown and in turnaround (TA) in the 8-30 day window is not possible to bag for mass emissions. Equipment that is not repaired in 7 days, but can be repaired in less than 30 should not require bagging.” WSPA Table of Detailed Comments of Specific Rules, p73

Response 20:

The Air District has added limited exemption 8-18-120 which includes an effective date in which the new standards will not apply to the equipment currently on the non-repairable list.

Only essential equipment is allowed on the non-repairable list. If the facility is able to repair a piece of equipment, the Air District believes that equipment is not essential by definition and should not be on the non-repairable list. However, the rule allows 30 days to determine mass emissions. If equipment is repaired (below the standard) or shutdown for repair within 30 days, that equipment would be off the non-repairable list and would not require bagging."

Comment 21:

"Non-Repairable Equipment: Citation 8-18-306 requires the determination of the emissions from a leak on essential equipment within 30 days of the equipment being placed on the non-repairable equipment list. Once the rule becomes effective, a refinery would have only 30 days to conduct leak testing on all equipment that is on the non-repairable list. Another interpretation is that any piece of essential equipment that has been on the non-repairable equipment list for more than 30 days at the time of effective date of the rule would automatically be considered noncompliant. These conflicting interpretations reveal a problem: the rule is not written with the clarity required by the California Health & Safety Code § 40727." Valero-RERS,P3,p5

Response 21:

See Air District Response 20 above.

Comment 22:

"The revision excludes all components that are leaking at 10,000 ppm and above from being placed on the delay of repair list. Although we understand the desire to eliminate components that are leaking at higher leak rates, this desire should be balanced with the desire to reduce the emissions associated with shutdowns and turnarounds that may be required to repair these components. Also, there are additional safety concerns associated with shutdowns and turnarounds that should be considered. Shutting down units to make repairs could reduce refinery output putting further strain on the California fuel supplies.

Furthermore, mass emissions determinations are infeasible or unsafe in certain situations. For example, for components that are very hot it could be unsafe to attempt to bag them for a mass emissions determination. Other components could be elevated and require extraordinary efforts to reach for bagging purposes." Tesoro, P1, p6

Response 22:

The Air District does not anticipate significant shutdown and startup emissions as a result of the proposed changes to this section of the rule. As stated in the Air District staff report, historical review of non-repairable equipment reported to the Air District by the five refineries showed the average percentage of valves and connectors on a non-reparable list is 0.04 percent (allowable percentage of valves including connectors is 0.30 percent), which indicates the LDAR programs implemented at the five refineries can achieve a much lower fraction of equipment place on a non-repairable list than the fraction currently allowable by the rule.

The South Coast Air Quality Management District (SCAQMD) current fugitive rule (Rule 1173) only allows operators to extend repair period at most three to seven days for certain equipment provided "a total number of leaking components, not to exceed 0.05 percent of the number of components inspected during the previous quarter, by type, rounded upward to the nearest integer where required." The Air District is not aware of numerous refinery unit shutdowns as a result of the SCAQMD limited repair requirement.

8-18-306.2

Comment 23:

"There is no justification of the necessity of this. The sole sentence in the staff report (p. B:3) which addresses this states that "The average percentage of valves and connectors on a non-reparable list is 0.04 percent (allowable percentage of valves including connectors is 0.30 percent), which indicates the LDAR programs implemented at the five refineries can achieve a much lower fraction of equipment place on a nonrepairable list than the fraction currently allowable by the rule." This makes no sense; i.e., the District seems to be stating that on average the refineries are able to do much better than required under the current regulation, so lowering the percentages will not have an impact." WSPA Table of Detailed Comments of Specific Rules, p73-74

Response 23

Equipment placed on the non-repairable list is potentially allowed to leak above the standard for up to five years before it needs to be repaired. These are uncontrolled emissions. Minimizing the equipment that can be placed on the non-repairable list will help to decrease overall fugitive emissions. As the Air District has stated in the staff report, historical non-repairable data shows the five refineries in the Bay Area can achieve a much lower fraction of equipment placed on a non-repairable list than the fraction currently allowable by the rule.

Comment 24:

The percentage of components allowed on the delay of repair list has been sharply reduced. As this reduction can also result in significant shutdown and startup emissions, we recommend not revising the percentages. Tesoro, P1,p7

Response 24:

See Air District Response 22 above.

Comment 25:

"We have just over 1000 valves which at 0.15% is 1.6, rounded up to 2 valves for non-repairables. Under the proposal of 1 connector counts as 2 valves, we're basically 'One and Done.' I'm not sure Refinery Math with a huge number of components works for smaller Chemical Plant facilities. A number of our connectors are also not easily reached either through height or being insulated. I'm not sure how I should approach these, especially the insulated ones." Shell-01, P1,p3

Response 25:

According to Air District records, facilities subject to the rule have not routinely needed to place equipment on the non-repairable list. Review of the past 5 years of quarterly non-repairable

reports for the small facilities shows an ability to maintain equipment and immediately repair fugitive leaks.

In regards to the difficult to reach connectors, Regulation 8 Rule 18 currently defines inaccessible equipment (8-18-206) and the rule only requires inaccessible valves and pressure relief devices to be monitored annually (Section 401.3). This standard will not change.

8-18-309

Comment 26:

"There is no need for these requirements to be more restrictive and less safe than the similar Federal requirements identified at 40 CFR 60 Subpart VV, §60.482-6." WSPA Table of Detailed Comments of Specific Rules, p75, r2

Response 26:

The federal standard for open ended valves or lines only applies to NSPS units. However, the Air District would like the standard to be consistent for all applicable open-ended valves or lines. This is why the Air District has included this language in Regulation 8-18.

Comment 27:

"The proposed revised language conflicts with similar but different Federal requirements at 40 CFR 60 Subpart VV, §60.482-6; these identify that the following do not need to be capped/flanged/plugged/equipped with a second valve…" WSPA Table of Detailed Comments of Specific Rules, p75, r2

Response 27

For consistency, the Air District has added a limited exemption 8-18-119 to the rule which addresses these types of open-ended valves or lines.

8-18-310

Comment 28:

"There is no Section 8-18-407 in the proposed rule." WSPA Table of Detailed Comments of Specific Rules, p76, r2

Response 28

The Air District agrees and has corrected the format error in the rule.

8-18-311

Comment 29:

"There is no need for this requirement, given the limited number of equipment that is allowed to be placed on the Delay of Repair list. The omission of mentioning Section 306 means that any leak that is more than five pounds per day cannot be placed on the Delay of Repair list, even if the concentration is less than 10,000 ppm. Shutting down and restarting a process unit because component leaks results in much more emissions than the leaking component." WSPA Table of Detailed Comments of Specific Rules, p76, r3

Response 29:

The purpose of this section is to set a mass emissions standard by which the facility must comply. Even with a minimal amount of equipment on the non-repairable (Delay of Repair) list, there is still potential for one piece of equipment to have low concentrations but very high mass emissions.

Comment 30:

"The District did not identify this language as a change, but is a significant change from the existing language in 8-18. For Title V facilities that need to certify compliance with all requirements, it is unclear how they could possibly certify compliance with this requirement for all of the equipment where concentrations are below the leak thresholds in 8-18-300 (given that there is no guarantee that just because the concentration is below 100 ppm that mass emissions are below 5 lb/day)." WSPA Table of Detailed Comments of Specific Rules, p76, r3

Response 30:

Both the Air District Staff Report (Table 4) and latest draft rule (Section 311) identify this section as new language added to the rule. As for certifying compliance with this standard, a facility is not specifically required to routinely determine compliance of this standard on all fugitive equipment. The standard only applies when required to determine mass emissions.

Comment 31:

"Leak Limits, Mass Emissions, and Delay of Repair: Citation 8-18-225 was struck to remove the definition of a major leak as one that cannot be minimized below 10,000 ppm TOC as methane. In combination with setting leak standards at 500 ppm for compressors, pumps, and pressure relief devices, and at 100 ppm for valves and all other equipment (too stringent, as South Coast has 500 ppm), the rule has precluded the use of good professional engineering judgment by the refinery to determine the best course of action regarding repair time for equipment. For example, the existing version of the rule had allowed in Citation 8-18-306.4 for a valve with a major leak to be placed on the non-repairable equipment list if the mass emissions rate had been measured as being < 15 lb/day. Equipment with leaks that were not considered major did not have to be measured for mass emission rates. The scheduling of equipment repair or replacement was achievable within the allowed 5 years and most turnaround (TA) planning. The combination of this change with Citations 8-18-301 and 8-18-401 would not allow any equipment to leak with a concentration greater than 10,000 ppm, regardless of the flow rate. It

would create immediate unavoidable non-compliance because the mass emissions quantification usually requires more than 7 days. In the event a component leaks more than 5 lb/day, the determination achieved after day 8 would imply an immediate violation with no compliance schedule to shut equipment down. While it is commendable to desire that all equipment leaks be eliminated or minimized to near zero emission rates, the practical point is that some equipment simply cannot be removed from service until the next planned shutdown of the unit or the refinery (turnaround)." Valero-RERS,P5,p4

Response 31:

If a facility has essential equipment that is unable to achieve the concentration and mass emission standards required for the non-repairable list, the facility can choose to apply for a Variance from the District rather than shutting down the unit.

Comment 32:

"Determining mass emissions from certain components is, in some situations, either not feasible or unsafe. As mentioned previously, an example of this is for components that are very hot where it could be unsafe to attempt to bag them for a mass emissions determination. Other components could be elevated and require extraordinary efforts to reach for bagging purposes. Furthermore, this new requirement decreases the allowable mass emission rate for components on delay of repair from fifteen pounds per day to five pounds per day. As this reduction can also result in significant shutdown and startup emissions that could be required to repair some of these components, we recommend that this revision be dropped." Tesoro, P1,p8

Response 32:

Existing Section 8-18-604 (Determination of Mass Emissions) requires the use of "EPA Protocol for Equipment Leak Estimates, Chapter 4, Mass Emission Sampling" for determining mass emissions. Chapter 4 lists specific provisions for bagging components at high temperatures:

"When skin temperatures are in excess of 200 °C, a different method of bagging the valve should be utilized. Metal bands, wires, or foil can be wrapped around all hot points that would be in contact with the Mylar® bag material. … At extremely high temperatures, metal foil can be used as the bagging material and metal bands used to form seals."

Therefore, it is expected that temperature alone would not prevent an equipment leak from being bagged.

Comment 33:

"Reduction of Mass Emissions Limit: In the current version of Rule 8-18, Citation 8-18-306.4 states that a piece of equipment with a major leak can be considered non-repairable equipment if the mass emission rate is less than 15 pounds per day, and this is consistent with the limit in Rule 8-2. However, in the proposed rule revision, Citation 8-18-311 states that "a person shall not use any equipment that emits total organic compounds in excess of five pounds per day

except during any repair periods allowed by Sections…" There is no apparent basis for this lowering of the mass emission limit. The District needs to provide worked out calculations to justify the need for this reduction." Valero-RERS,P4,p6

Response 33:

In communication with Air District permit engineers during the permit application process and in annual updates, the refineries have stated the 5 pounds per day is too high and that maximum emissions are much lower.

8-18-401.2

Comment 34:

"Given the proposed removal of the exemption at 8-18-113 and recent District interpretations of the 1999 statewide guidelines (CAPCOA/ARB, "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities", February 1999), there needs to be additional clarity of the term "subject to this Rule". In past years, it was the understanding of both the refineries (and several District engineers that estimated emissions for the refineries) that the list of "Components Not Counted" on page 23 of that Guidance meant that the components "were not to be included in component counts used for the quantification of fugitive emissions" (as stated on that page)." WSPA Table of Detailed Comments of Specific Rules, p77

Response 34:

The equipment tagging protocol is approved by the APCO with the understanding that the rule currently does not require tagging and inspection of the non-volatile fluids. However, the non-volatile equipment is still subject to the applicable leak standards. It is the responsibility of the regulated facility to provide the Air District with a list of tagged equipment for approval.

The CAPCOA guidelines state that the components listed in the section "Components Not Counted" cannot use the Correlation Equations (Method 3, controlled emission factors) when estimating emissions. This is because those components are not included in refinery monitoring programs and therefore are not eligible to use the Correlation Equations.

Section V of the CAPCOA guidelines state:

"This section also provides examples of components which are not included in component counts when using the Correlation Equation Method (general or unit-specific) for the quantification of fugitive emissions."

The guidelines provide a list of components which cannot use the Correlation Equation Method because they were not monitored and not included as part of an LDAR rule. At the time the list was generated, a survey of California air districts was completed to understand what components were required to be monitored and thus could use the Correlation Equations.

An example of components not originally contained on the list but now included is the first item, which are “components handling commercial natural gas”. At the time the guidelines were developed, most air districts exempted components handling natural gas. Regulation 8, Rule 18 originally had such an exemption. However, this exemption was subsequently removed and the refineries now monitor components in natural gas service.

If the comment were correct, then because components in natural gas service are included within the CAPCOA list, then those components must not leak. However, as evidenced by the refineries own data, these components do leak.

Comment 35:

“Requiring tagging and monitoring of heavy liquid components is not cost effective.” Phillips 66-01,P12, p5

Response 35:

As stated in Appendix C, *Additional Requirements to Monitor Equipment in Heavy Liquid Service*, heavy liquid connectors are more than three times the total number of all other equipment in heavy liquid service (valves, pumps and pressure relief devices). It was not the intent of the Air District to have facilities physically tag any connectors. It was the Air District’s intent to have all heavy liquid equipment identified, and documented in the database in the same manner equipment currently subject to the rule is maintained. Therefore, costs of including heavy liquid equipment into a facility’s LDAR program are reduced by excluding physical tagging of connectors.

During the course of developing the proposed rule revisions, the Air District calculated baseline emissions, future emissions, emissions reductions, and the cost to implement the rule to arrive at a cost per ton of emissions reduced.

In its calculations, the Air District used conservative assumptions (those that would lead to the lowest amount of emissions reduced and maximum costs) to arrive at the maximum cost per ton of emissions reduced.

For conservative purposes, emission reductions are lowest when baseline emissions are low and future emissions are high.

Because the refineries do not currently monitor components in heavy liquid service, baseline emissions were calculated using average emission factors. The average emission factors listed within the 1999 CAPCOA guidelines (Method 1) were used with the exception of pressure relief valves.

The CAPCOA guidelines have emission factors for different components by service type (gas, light liquid, heavy liquid, and all). There are listed emission factors for valves and pumps in heavy liquid service but not for connectors and pressure relief valves (a combined “All” factor is listed).

The Air District reviewed the average emission factors and found an emission factor for pressure relief valves in heavy liquid service that was approximately 20 times lower (fewer emissions) and used this factor in calculations. This same emission factor is used in the refineries emission inventories and was given to the refineries in 2014 during the annual update process.

The Air District also utilized an emission factor for connectors in heavy liquid service. However, this emission factor was 40 percent higher (more emissions) than the CAPCOA "connectors – all" emission factor. To be conservative, the lower emission factor (the CAPCOA connectors "All") was used.

By following this approach, baseline emissions were conservatively estimated.

To estimate future emissions, the Air District assumed all components to leak at the allowable leak standard (100 ppm for connectors and valves, 500 ppm for pumps and pressure relief valves), a 100 percent leak rate. By doing so, the highest future emissions were estimated (giving the lowest amount of emission reduced). Refinery leak monitoring data for the past several years indicate the leak rate to vary between one to five percent (nowhere near 100 percent). If the refinery leak rates were used, estimated future emissions would be lower and the expected emission reductions would be greater.

If the conservative approach listed above were not taken, estimated emission reductions would be approximately 500 tons more and the cost per ton of emissions reduced would be lower than current estimated.

Therefore, the District's conservative approach has shown the monitoring of components in heavy liquid service to be cost effective.

8-18-401.3

Comment 36:

"First, inspection even on just an annual frequency is not practical for valves in heavy liquid service, which can add a high level of safety concern for access and also cost and manpower. Inaccessible valves require multiple personnel and a high safety risk. WSPA sees no reason why the District cannot have 'unsafe to monitor' provisions that are similar to those promulgated by US EPA." WSPA Table of Detailed Comments of Specific Rules, P78, r2

Response 36:

The rule currently defines inaccessible equipment (8-18-206) and requires only annual monitoring of inaccessible valves and pressure relief devices (8-18-401.3) which allows for a facility to coordinate safe access to this equipment. Inaccessible connectors are not required to be monitored. Facilities have been completing these inspections without raising concerns to the Air District of equipment being unsafe to monitor. The Air District is not aware of equipment that currently requires shutdown in order to comply with the annual inaccessible monitoring

requirement. The Air District is not clear what new issues will arise with equipment in heavy liquid service that are not already present with equipment that is currently monitored by facilities.

Comment 37:

"There is no "Subsection 403.2." WSPA Table of Detailed Comments of Specific Rules, p78, r2

Response 37:

The Air District agrees and has corrected the format error in the rule.

8-18-401.6

Comment 38:

"Connectors are the most numerous components but have the lowest emissions rates; adding this requirement adds significant cost and complexity for little emissions reduction." WSPA Table of Detailed Comments of Specific Rules, p79, r2

Response 38:

The added language is meant for clarification. The 24-hour repair provision for the connector leaks discovered by the APCO only applies if the facility is monitoring their connectors annually. Currently, a facility should have records of the connectors they inspect on annual basis to be granted the 24 hour repair provision. Documentation of connectors verifies what connectors the facility inspects annually.

In discussions with the Air District during the 2013 annual update process, all five refineries stated they currently monitor all connectors in gas and light liquid service, have unique identifiers for the connectors based off the nearest valve tag, and have records of inspections. Because the refineries have stated that connectors are being monitored, controlled emission factors were used to estimate emissions from them rather than uncontrolled emission factors. The Air District will revise the emission estimates if statements made by the refineries were false.

Comment 39:

"The proposed language does not contain a provision for unsafe to monitor components. Unsafe to monitor connectors can only be monitored safely when associated equipment is shutdown. For example, flare pilot natural gas line connectors are not safe to inspect when process units tied to the flare are operating." WSPA Table of Detailed Comments of Specific Rules, p79, r2

Response 39:

Connections near the tip of operating flares would meet the definition of inaccessible equipment (8-18-206). However, the standard (8-18-401) only requires annual monitoring of inaccessible

valves and pressure relief devices. Inaccessible connections near flare tips would not be required to be monitored.

8-8-401.10

Comment 40:

"Mass emissions monitoring is not feasible for all equipment. What are people supposed to do in those situations? Also, results are not always going to be consistent; for example, what happens if a valve on the Delay Of Repair list is bagged with an emission rate at 4 lbs./day, but the next year the emission rate is 7 lbs./day? Is the component automatically out of compliance?" WSPA Table of Detailed Comments of Specific Rules, p80, r1

Response 40:

The Air District cannot properly respond without specific examples of the types of equipment that would be infeasible to perform mass emissions. Based upon other comments, it appears a primary concern is temperature. See Air District Response 32 which addresses that issue.

In addition, equipment on the non-repairable list is found at any point (initial or annual monitoring) to exceed the 5 lbs./day mass emissions standard, that piece of equipment would be out of compliance.

8-18-402.1

Comment 41

"The rule will require that all components in heavy liquid service be tagged with a unique permanent identification code and identified on piping & instrumentation diagrams (P&IDs), P&IDs be physically submitted to the District, and all connectors in other service (which have been regulated for decades) also be tagged." WSPA P58, p1

Response 41:

To clarify, the rule language in Section 8-18-402.1 for equipment identification is unchanged. The facilities are required to receive approval from the APCO for equipment identification. It was not the intent of the Air District to have facilities physically tag any connectors. Currently, facilities do not physically tag connectors but they must identify the connectors they routinely monitor in their LDAR database to be granted the repair provision for connectors under 8-18-304. Per discussions with the refineries during the 2013 annual update process, all five refineries stated that they identify and monitor all connectors in gas and light liquid service annually and thus are eligible for the exemption and usage of a controlled emission factor (see Response 38). To properly identify and monitor all connectors, the refineries would need to have them identified on P&IDs. Therefore, there would be no additional work for the connectors in gas or light liquid service.

All other equipment is equipped with physical tags. It was the Air District's intent to have all heavy liquid equipment identified, and documented in the database in the same manner equipment currently subject to the rule is maintained.

8-18-403

Comment 42:

"There is no need for these requirements to be unsafe." WSPA Table of Detailed Comments of Specific Rules, P80, r2

Response 42:

The Air District agrees that personal safety should always be first considered when performing any action. This includes, but is not limited to, visual inspections pursuant to Section 403.

Comment 43:

"It is often unsafe for a person to approach equipment when a leak is found visually. Emissions would be minimized if the equipment is shutdown upon the leak's discovery rather than waiting for a trained technician to arrive to monitor the leak rate." WSPA Table of Detailed Comments of Specific Rules, p80, r2

Response 43:

The new language recommended by the Air District was meant to clarify the current requirement of the visual inspection section. The current rule language requires facilities to measure concentration within 24 hours of discovery. The Air District understands there will be some emergency situations where it is unsafe for employee to approach the leaking pump or compressor and this section of the rule does not impede a facility from taking immediate action to shutdown equipment. However, a concentration measurement still must be taken following shutdown of the equipment and within 24 hours of discovery. Once the equipment is returned to service, the facility would need to confirm no leaks greater than the standard are present.

8-18-404

Comment 44:

"The District has not identified a need for each component to have a different skip period; doing this will increase confusion and the likelihood of noncompliance." WSPA Table of Detailed Comments of Specific Rules, P80, r3

Response 44:

The Alternative Inspection Schedule section is currently in Regulation 8-18. The only change being made is to now include pumps. The alternative monitoring schedule is already in existence and is currently employed by one refinery. The facility has been able to comply with their Alternative Compliance Schedule for valves.

Comment 45:

"The proposed language is inconsistent with what is identified in EPA's LDAR rule (40 CFR 60 Subpart VV), which identifies an alternate inspection schedule on a process unit basis." WSPA Table of Detailed Comments of Specific Rules, P80, r3

Response 45:

Aside from the addition of pumps to the Section, the Air District does not intend to amend this language for the current requirements. The Air District's current rule is more stringent than the EPA regulation.

8-18-405

Comment 46:

"Proposed Rule 8-18 deletes the existing alternative compliance options set forth at 8-18-308 and 8-18-405. This deletion directly contravenes Section 40001(d), which specifically requires the District to allow facilities to implement alternative emissions reductions and monitoring plans." WSPA P34, p3

Response 46:

The Air District will assign a new section number (407) to the Recurrent Leak Standard and the existing 405 Section (Alternative Emission Reduction Plan) will remain in the rule to comply with H&S Code Section 40001(d).

Comment 47:

"Inserting a new Section 405 is going to conflict with existing permit requirements that reference the existing Section 405. Completely changing out a rule Section, rather than giving new sections a new number and marking deleted sections as [Deleted], is going to cause inconsistency with current requirements/permit conditions." WSPA Table of Detailed Comments of Specific Rules, p80, r4

Response 47:

See Air District Response 46 above.

Comment 48:

"Alternate Compliance and Emission Reductions: Citations 8-18-308 and 8-18-405 removed all alternate options for compliance and for effecting emission reductions. The agency should show justification and explain the reasoning behind removing these provisions. The agency is required by CEQA to evaluate alternative compliance methods. See discussion in attached comments from WSPA." Valero-RERS,P7,p1

Response 48:

See Air District Response 46 above.

8-18-407.1

Comment 49:

"The number of this section should follow Section 407, not Section 405." WSPA Table of Detailed Comments of Specific Rules, P81, r2

Response 49:

The Air District agrees and has corrected the format error in the rule.

8-18-404.2

Comment 50:

"There are now two Sections 404.2. The number of this section should follow sequentially after that of the preceding section." WSPA Table of Detailed Comments of Specific Rules, P81, r3

Response 50:

The Air District corrected the section formatting error so it follows sequentially after the preceding Section (407.1).

8-18-404.3

Comment 51

"The District has not identified why it is now necessary for the APCO to approve reverting back to quarterly monitoring for recurrent leaks. What is there to approve? And why wouldn't the APCO approve more frequent monitoring?" WSPA Table of Detailed Comments of Specific Rules, P81, r3

Response 51:

APCO approval is required when the facility is requesting to return to less frequent monitoring, from monthly to quarterly, following four consecutive leak free months.

Comment 52:

"There are now two Sections 404.3. The number of this section should follow sequentially after that of the preceding section. The criteria for approval are not identified. The draft rule language allows that if two refineries request approval of an alternative inspection schedule on the same

basis, one refinery may be denied and one refinery may receive approval because the reviewers are different and there are no clear criteria for approval. Also, the way the language currently reads, if the APCO approval is not obtained, then the facility is not required to (and should not) revert back to quarterly monitoring, which doesn't make any sense." WSPA Table of Detailed Comments of Specific Rules, P81, r4

Response 52:

The Air District corrected the section formatting error so it follows sequentially after the preceding Section (407.1). The comment from WSPA seems to be addressing alternative inspection schedules. However, this standard is for recurrent leaks.

8-18-401.11

Comment 53:

"Identifiable causes of this are likely to be maintenance events. A maintenance event exclusion would help address this issue." WSPA Table of Detailed Comments of Specific Rules, P82, r2

Response 53:

This standard only requires the facility to identify the source (e.g. maintenance event, nearby leaking component, open drain, etc.) of the elevated background concentration. Once the source is determined, it is the responsibility of the facility to ensure compliance of that source.

Comment 54:

"Background Concentrations: Citations 8-18-401.11 and 8-18-502.5 require the owner/operator to identify and report all equipment and/or sources that contribute to any background concentration reading greater than 50 ppm. Not only is this limit low, it may not be possible to track the source, especially if it is offsite. Additional equipment and software, as well as extra personnel resources, would be required to comply with these provisions of the rule." Valero-RERS,P6,p5

Response 54:

As stated in Appendix B of the Air District staff report, leak limits are expressed as "above background" where background is defined as, "The ambient concentration of total organic compounds determined at least three meters (10 feet) upwind from the equipment to be inspected and not influenced by any specific emission point as indicated by a hydrocarbon analyzer specified by Section 8-18-501." As part of a facility's current fugitive inspection program, a background reading must be determined. A review of 2013 monitoring data from the five refineries identified numerous instances of high background concentrations, including a case with a background of 500 ppmv (five times the existing leak standard for equipment other than a pump or pressure relief device and equal to the limit for pumps and pressure relief devices). Identification of a cause for elevated background concentrations may identify other equipment in need of repair or replacement. As stated in Air District Response 53, the new standard only requires a facility to identify the source of the elevated emissions. If, that source is

onsite, then it is the responsibility of the facility to ensure the source is in compliance. If the elevated reading is traced to an offsite source, then the facility should identify it as such.

8-18-501

Comment 55:

"Method 21 Section 8.1.1.2 requires that 'instrument response factors for each of the individual VOC to be measured shall be less than 10....When no instrument is available that meets this specification when calibrated with the reference VOC...the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.' Has the Air District identified whether any commercially available portable instrument is able to meet this criteria for heavy liquids, and if not, whether there is any availability of heavy liquid calibration gases for calibrating the instrument?" WSPA Table of Detailed Comments of Specific Rules, P82, r3

Response 55:

Method 21 Section 8.1.1.1 requires the instrument to be calibrated to the reference compound specified in the applicable regulations. Regulation 8-18 defines a "Leak" as…"concentration of total organic compounds above background, expressed as methane". So the reference compound used to calibrate monitoring equipment for the rule would be methane. The instruments currently used by facilities are calibrated using methane calibration gas. The inclusion of heavy liquid equipment to the rule will not require any additional calibration gas. So, additional costs do not need to be addressed.

8-18-502.6

Comment 56:

"The District has not identified why it is necessary for P&IDs in heavy liquid service to be submitted. WSPA does not agree that it is necessary. The heavy liquid components will be tagged in the field and monitored……This requirement was not in either the May or September versions of the draft rule. If this requirement is kept the District has not made 'a good faith effort to minimize adverse socioeconomic impacts' as required by H&SC 40728.5." WSPA Table of Detailed Comments of Specific Rules, P82, r4

Response 56:

The Air District has identified discrepancies in facility historical equipment inventory data. This is addressed in further detail within the main body of the Appendix, see *Additional Requirements to Monitor Equipment in Heavy Liquid Service.* For future emissions inventory evaluations, the Air District believes a more accurate equipment inventory is needed so a baseline can be established. Therefore, the best way to identify accurate equipment counts is through P&IDs.

Any future amendments to the heavy equipment inventory can then be quickly identified by the facility and the Air District through the P&IDs.

The Air District does not anticipate additional socioeconomic impacts as a result of this requirement. This cost of the P&ID included in the cost estimate for addition of heavy liquid in an LDAR program. This is further reinforced in a document provided to the Air District by WSPA that outlines the implementation timeframe to identify and add new equipment to their LDAR programs. According to the document, it is understood that "an operator or process engineer familiar with the materials in the pipes manually highlights lines on the P&IDs" prior to tagging equipment. In addition, the South Coast Air Quality Management District currently requires facilities subject to their fugitive rule (Rule 1173 e) to submit P&IDs for equipment is heavy liquid service.

Comment 57:

"This revision requires all components, regardless of component type, to be included on the submitted P&IDs. A component-by-component identification on the P&IDs is impractical, especially for connections." Tesoro, P8,p2

Response 57:

See Air District Response 56 above.

Comment 58:

"Piping and Instrumentation Diagrams. Citation 8-18-502.6 requires that a refiner maintain records, beginning on January 1, 2018, of '(P&IDs) with all components in heavy liquid service identified.' This exercise does not produce any emission reductions but causes an onerous increase in the refinery workload. Citation 8-18-503.5 requires that the refiner submit these P&IDs to the District by January 1, 2018, and 'annually thereafter for information that has changed since last submittal.' This requirement is unnecessary, creates a burden on the regulated community, and could present a security issue for the refining industry.

Pursuant to the requirements of the California Process Safety Management (PSM) regulations, a refiner has to produce P&IDs that it has on file for any inspector onsite. However, that requirement does not extend to providing records at the inspector's office. The requirement by the proposed Rule 8-18 to submit P&IDs would do nothing to increase the stringency of the rule or even reduce any emissions. Valero suggests that, like a PSM auditor, an inspector for Rule 8-18 could request and have access onsite to all P&IDs but would not be able to take electronic or hard copies. This would allow the refinery to control Confidential Business Information, which is critical to ensuring the stability and honesty of the market, and it would ensure the physical safety of the refinery against the risk of attack by terrorists or radical activists. If the District were to keep track of multiple annual copies of the P&IDs for a refinery, it would sooner or later start discarding thousands of pages of P&IDs for a single refinery, thereby increasing the chance of compromising data as well as the physical security of the refinery and its employees." Valero-RERS,P7,p27

Response 58:

See Air District Response 56 above.

An independent record of P&IDs serves three purposes:

- Provide for compliance verification
- Prevent falsification of drawings after the fact, and
- Save time and money

Submittal of P&IDs allow for the Air District to have a record of components that would be used to verify component counts at the time of submittal as well as serve as a future reference for the Air District. Copies of P&IDs maintained at the Air District office would minimize falsification of documentation (i.e. P&IDs falsified after a violation). By requiring annual submittals, refineries can submit accurate P&IDs while minimizing the chance that a drawing could be falsified.

Air District copies of P&IDs would also allow for faster investigations since some refineries have refused to submit P&IDs in the past. Such delays have lengthened the investigation times to over a year, resulting in higher costs to the refineries and the Air District. In these cases, having copies of P&IDs on file would save both time and money.

In the course of its duties, the Air District routinely receives, maintains, and discards confidential business information including design drawings (e.g. P&IDs), throughput data, and other information. The Air District has a records retention and destruction policy that includes storage and destruction of confidential business information.

Comment 59:

“There is no definition of “heavy liquid” WSPA Table of Detailed Comments of Specific Rules, pP83, r1.

Response 59:

The Air District does not believe a specific heavy liquid definition is needed. The equipment identification protocol is approved by the APCO with the understanding that the rule currently does not require physical tagging and inspection of the high boiling point fluids. However, the non-volatile equipment is still subject to the applicable leak standards. It is the responsibility of the regulated facility to provide the Air District with a list of identified equipment for approval.

8-18-503.2

Comment 60:

“The District has not identified why it is necessary for them to ‘approve‘ the inventory.” WSPA Table of Detailed Comments of Specific Rules, P84, r2

Response 60:

See Air District Response 56. The Air District believes the same is true for requiring approval of the inventory.

Comment 61:

“The District has not identified on what basis they will or will not approve the inventory.” WSPA Table of Detailed Comments of Specific Rules, pP84, r2.

Response 61:

The Air District believes Section 8-18-503.2 provides adequate detail of the criteria a facility needs to provide in order to comply with section. The APCO will review and approve the inventory records based upon that criteria.

8-18-503.5

Comment 62:

“The District has not identified why it is necessary for P&IDs to be submitted.” WSPA Table of Detailed Comments of Specific Rules, P84, r3.

Response 62:

See Air District Response 56 and Response 58 above.

8-18-602

Comment 63:

“Method 21 Section 8.1.1.2 requires that ‘instrument response factors for each of the individual VOC to be measured shall be less than 10....When no instrument is available that meets this specification when calibrated with the reference VOC...the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.’ Has the District identified whether any commercially available portable instrument is able to meet this criteria for heavy liquids, and if not, whether there is any availability of heavy liquid calibration gases for calibrating the instrument?” WSPA Table of Detailed Comments of Specific Rules, P85, r2

Response 63:

See Air District Response 56 above.

Comments on Regulation 11-10: Cooling Towers

Comment 1:

Regulation 11, Rule 10 is unnecessary because cooling tower emissions are already subject to monitoring requirements under existing EPA rules. The Air District ignores the incremental costs and benefits of imposing Rule 10 technical issues with the analyzers on the many cooling towers already subject to the MACT CC. Regulation 11, Rule 10 would impose millions of dollars in unnecessary compliance costs when merely incorporating the US EPA requirements into Regulation 11, Rule 10 would be sufficient to control organic emissions.

The staff report ignores the impact of the existing regulatory language on heat exchange systems. The staff report ignores the significant improvements to emissions, dismissing the EPA's MACT CC rules by noting that they don't apply to all refinery cooling towers. The Staff Report ignores the obvious solution of extending Subpart CC requirements to currently exempt cooling towers.

In the concept paper and staff reports that the District has written on this proposed rule, the agency expresses concern about the Modified El Paso Method's (MEPM) sampling method's "ability [to] provide representative hydrocarbon emissions data on a consistent basis." The method is sensitive but does require following procedures to attain the precision and accuracy requirements. The MEPM is very sensitive between 0.1 to 0.5 ppm, by volume methane, in the stripped air when using the Flame Ionization Detector (FID) analyzer. Valero uses methane at different concentrations for generating calibration curves and checks. The Leak Detection and Repair (LDAR) contractor conducts the sampling with a dedicated FID. In the May concept paper, the agency stated that "Air District staff will consider MEPM and other methods if the refineries are able to demonstrate that they provide comparable data and consistent results."

The MEPM is required by US EPA for compliance with Federal MACT standards. Staff have failed to justify why the MEPM is not satisfactory for the proposed Rule, yet the US EPA has gone through a Rulemaking process and required the use of MEPM for MACT compliance.

WSPA P38, p1 and p2; WSPA P61, p3: Eichleay p4; Valero-RERS P7, p4; Bragg; PTS; MSI; WSPA P62, p5.

Response:

The Air District understands that the EPA MACT CC requirements for refinery cooling towers have resulted in HAP emission reductions as well as the reductions of hydrocarbons that are easily strippable. However, Regulation 11, Rule 10 (Rule 10-11) is more stringent than the EPA requirements and is being promulgated to further reduce hydrocarbon emissions by monitoring more frequently, by controlling emissions containing a wider range of hydrocarbons and by ensuring that the monitoring for Total Hydrocarbons (THC) concentrations in water are done in a

way that accurately detects all leaks. Additionally, the rule addresses a number of technical concerns with the way cooling tower leaks are detected.

The Federal MACT CC requirements targets only petroleum refinery cooling towers that are in Hazardous Air Pollutant (HAP) service. The EPA list of HAPs is not the same as the Toxic Air Contaminants of concern under California requirements. This means that not all cooling towers are covered, and that some potentially toxic compounds may be excluded. Proposed Regulation 11, Rule 10 targets THC, and thus will require leak monitoring at all cooling towers in hydrocarbon service and will reduce the emissions from a wider range of organic chemicals.

The MACT CC allows petroleum refineries to use the Modified El Paso Method (MEPM) as the means of detecting cooling tower leaks. Air District staff has reviewed this method and has determined that it has several deficiencies as a detection method for THC leaks. Furthermore, Air District staff also has concerns regarding whether local refineries follow the MEPM precisely, which can lead to false or inaccurate testing results. As a result, staff believe an enhanced version of the MEPM is required to ensure more accurate, repeatable results and staff are currently working on such an improved method.

The MEPM specifies a sensitivity of 0.1 ppmv for Flame Ionization Detectors but does not specify accuracy. Use of a TVA would lead to large potential errors on readings. A TVA is an intrinsically safe organic vapor analyzer used to measure VOC concentrations.

Staff observed that a TVA-1000B used during a MEPM test at one site is rated with an accuracy of $\pm$ 25% of reading or $\pm$ 2.5 ppm, whichever is greater. This is significant with the leak action level being 6 ppmv and ambient being 2 ppmv. In addition, staff also witnessed procedural issues, such as the use of Tedlar bags for calibration gases and zero correction of equipment that could also lead to inaccurate results.

Due to the varied nature of petroleum refinery heat exchanger components, the Air District has concerns about the leaks of compounds that are not detected using the MEPM. Several chemicals in petroleum refining processes meeting the definition of THC in the proposed rule may leak into cooling tower water and not be detected via the MEPM as it currently exists. Regulation 11, Rule 10 allows for other detection methods to be used to ensure that all THC present in cooling tower water can be detected early in order to repair heat exchanger leaks in an expeditious manner. The proposed rule provides petroleum refineries flexibility in their approach to detecting THC leaks. Each cooling tower leak detection method allowed by the rule is already in use in at least one Bay Area petroleum refinery. Furthermore, Regulation 11, Rule 10 includes limited exemptions for smaller cooling towers with relatively small cooling water recirculation rates. Such cooling towers will be required to conduct THC detection methods either once every 14 days or once every seven days rather than continuously or daily sampling required for large recirculation rate units in order to be more cost effective.

Comment 2:

The cooling tower rule concept paper identifies that “The Air District’s staff is concerned about the MEPM sampling method’s ability to provide representative hydrocarbon emissions data on a

consistent basis", but provides no detail with regard to why they have these concerns. WSPA would like to understand these concerns, and potentially have the opportunity to identify the situations in which the MEPM (or EPA Method 624) is sufficiently accurate and could be used on a regular basis.

WSPA P62, p4.

Response:

The Air District is concerned that samples collected via the MEPM, as the protocol is currently devised, will not provide representative samples on a consistent basis. In the opinion of the Air District's technical staff, the MEPM requires additional clarity, structure and performance requirements within the method itself. Without these added method clarifications and requirements, there is the potential for inaccuracies and procedural inconsistences when used on a routine basis, and thus, could unduly influence the process being tested. Furthermore, the MEPM procedure itself points out that certain chemicals that meet the definition of THC will not be detected by a MEPM apparatus. This includes chemicals that have an FID response factor of 2 or greater as well as chemicals that have an initial boiling point greater than 140^0F.

The purpose of using the MEPM in MACT CC is to identify and repair heat exchanger leaks in cooling towers that are subject to the MACT rule. Cooling towers not subject to the MACT CC are not required to use the MEPM as a detection method. In contrast, the intent of Rule 11-10 is to establish an enhanced leak detection, repair, and monitoring program for all Bay Area refinery cooling towers that service heat exchangers in hydrocarbon service for petroleum refining processes. Rule 11-10 will address THC emissions from leaking heat exchangers by requiring continuous monitoring, water sampling or an alternative method and will use the monitoring information collected in the Air District's Emissions Inventory.

Finally, based on visual observations, Air District staff also has concerns regarding whether the MEPM is followed precisely when in use at Bay Area refineries, which can lead to false or inaccurate testing results. The Air District's response to comment #7 explains concerns with the MEPM and how it is used in local refineries in more detail.

Comment 3:

"PLEASE" exercise common sense when considering the proposed refinery rules. Rule 11-10 would impose millions of dollars in unnecessary compliance costs on refiners for cooling tower monitoring, when those towers already monitored under existing EPA regulations. Simply conforming BAAQMD rules to the EPA regulations could save refiners millions, save refinery jobs and keep costs down for consumers, without any backsliding in environmental protections. The issue here is not the need for regulations on refineries; the issue is the **need for common sense** and cost - effectiveness when developing those regulations.
C. Virga

Response:

Rule 11-10 has been structured to provide refineries different THC leak detection options. Some detection options are more expensive than others. The EPA MACT CC Standard, as currently promulgated, would not capture all of the organic chemicals that Regulation 11, Rule 10 proposes to control in a cooling tower THC leak standard. The MACT standard allows leaks to persist for up to 75 days, while Rule 11-10 proposes that all leaks be fixed within 21 days of discovery, providing for stronger environmental protection. Furthermore, the draft regulation has incorporated two limited exemptions for refinery cooling towers considered to be smaller operations based on their lesser water recirculating rates compared to most other refinery cooling towers, and thus, have the potential to emit less THC when a leak occurs. Regulation 11, Rule 10 has been determined to be cost effective.

Comment 4:

The rule also does not exclude cooling towers that are not in hydrocarbon service as exempt from the rule.

Our Rodeo hydrogen plant operates one cooling tower at 3500 gpm. It principally cools lube oil and syngas (a mixture of H2, CO, CO2, with ~5% CH4 and no C2 or greater hydrocarbons). Using the methodology and the EPA emission factor cited in the staff report for 11-10 of 0.7 lbs. HC per MMgal, it has the potential to emit 0.64 tons per year with an annualized cost of compliance of $171,000 per ton using option 1. This source is already regulated under condition 23414 of our Title V permit and required to sample monthly for hydrocarbons and thrice weekly for chlorine as an indicator of hydrocarbons. Our Martinez CO2 plant on the Tesoro refinery recovers CO2 from Tesoro's SMR, purifies, cools and compresses it to make liquid CO2 and dry ice. The product goes to food and beverage as well as industrial uses. We own one cooling tower located adjacent to our booster compressor at Tesoro's SMR to cool CO2 and lube oil. The plant has a cooling tower that services heat exchangers containing anhydrous ammonia, CO2, and lube oil. It is our position that these should not be regulated under the proposed Rule 11 Rule 10 merely because they are co-located with refineries since there is little potential for ROG release from them and the cost of compliance would be astronomical as compared to the intended audience. We ask that language be inserted to exclude facilities such as these from the regulation.
WSPA P63, p3; Air Liquide.

Response:

It was not the intent of the Air District to include cooling towers used exclusively in hydrogen plants, CO_2 plants or electricity generation in the hydrocarbon monitoring requirements of Rule 11-10. Since the process fluids being cooled do not contain TACs or Reactive Organic Gases (ROG), it is not possible for these systems to have the leaks this rule was intended to prevent. As long as the cooling towers in question are used exclusively for servicing these types of operations, and are not connected to refining process units, they were not intended to be subject to the THC leak monitoring requirements of the proposed Rule. To clarify this intent, an exemption has been added to Rule 11, Rule 10.

Comment 5:

WSPA and others commented that the Air District's emissions inventory for refinery cooling towers are inflated, erroneous and inconsistent with guidance because the Air District calculated the emissions inventory based on EPA AP-42 emission factors whereas some of the refineries based their emission calculations of direct water sampling from cooling towers which are in theory a superior method for leak detection. WSPA cite a 2013 BAAQMD Refinery Emissions Inventory Guideline document that states MEPM-based data is preferable to AP-42 emission factors.

A closer analysis of data from one refinery that is currently required to take monthly samples of cooling water demonstrates that real-world hydrocarbon concentration is over an order of magnitude smaller: an average well below 0.6 pounds per million gallons, as compared to the 6 pounds per million gallons assumed by the District. *See* attached technical comments. In fact, these real-world data demonstrate that average emissions are *already* at or below the level of hydrocarbons that the District assumes the proposed rule will achieve (0.7 pounds per million gallons). The District has not identified substantial evidence to support the necessity of the proposed rule; to the contrary, the substantial available evidence demonstrates that these rules are *not* necessary to achieve the emissions levels that the District hopes for.

WSPA P3, p2; WSPA P37, p3 and p4; WSPA P60, p3.

Response:

While the Air District may have stated in a 2013 guidance document that the MEPM-based data is preferable to emissions data using AP-42 emission factors, a 2015 in-depth analysis of the MEPM conducted by Air District technical staff indicates concerns with the MEPM which are stated in the Air District's response to Comment #1 and #2 and in Appendix C. As explained in Appendix C, the data collected by the refineries is not sufficient to demonstrate that the cooling towers are currently well controlled. Hence, the Air District determined it was an appropriate, conservative approach to use the uncontrolled emission factor in estimating current emissions.

Importantly, the rule also requires earlier detection of leaks and quicker repairs than the EPA rule. Rule 11-10 will detect leaks earlier and require repairs much more quickly than under the EPA rule.

Comment 6:

WSPA and other entities commented that Rule 11, Rule 10 contained unnecessary, inconsistent and duplicative requirements.
WSPA P38, p4; C Virga; Eichleay P; J Benaquisto; R Fraiser; Valero P8, p4.Response:

The Air District acknowledges the emission benefits from the EPA MACT CC requirements for refinery cooling towers. A full comparison demonstrating that this rule is not duplicative may be found in Appendix C. The Federal MACT CC requirements targets only petroleum refinery cooling towers that are in HAP service. The Air District has the authority to regulate a wide variety of hydrocarbons. The Air District is promulgating Regulation 11, Rule 10 to further reduce hydrocarbon emissions by monitoring for leaks more frequently, by requiring repairs more quickly, by controlling emissions containing a wider range of hydrocarbons and by ensuring water testing is conducted in a manner that results in accurate leak detection.

The MACT CC allows petroleum refineries to use the MEPM as the means of detecting cooling tower leaks. The Air District has described its concerns about the MEPM elsewhere in this document and in Appendix C.

Comment 7:

11-10 should be targeting only easily strippable hydrocarbons and not those with lower volatilities that remain in water. For the monitoring option involving off-site laboratory analysis, the District is proposing the use of both EPA Method 8260 (for 'volatile' organics) and Method 8270 (for "semi-volatile" organics). Since Method 8260 allows for laboratories to use purge-and-trap sample handling, this requirement does not address the very issue that the District acknowledges MEPM was design to address: i.e., 'compounds with lower molecular weights and boiling points that are generally lost when sampled for purge/trap analyses.'"
WSPA P67, p4.

Response:

There are potential drawbacks to both the MEPM and the water sampling hydrocarbon leak detection methodologies. The preferred method is leak detection via a continuous analyzer. While WSPA is correct in pointing out that the integrity of water samples can be compromised if the steps that are taken to collect samples from cooling tower water follow required protocols, and if the sample is taken from an appropriate location in the cooling tower system, the data from such analysis should be valid. The Air District disagrees that as a regulatory agency we should only be targeting easily strippable hydrocarbon compounds. Any hydrocarbon leak into the cooling water should be detected and repaired expeditiously to minimize emissions.

Comment 8:
H&SC 40727 requires that before adopting or amending a rule or regulation, the District needs to make findings of necessity, consistency and non-duplication. H&SC 40727.2 requires a written analysis that identifies all existing Federal requirements, including a review of all of the following:

- Averaging provisions, units, and any other pertinent provisions associated with the
- emission limits
- Operation parameters and work practice requirements
- Monitoring, reporting and recordkeeping requirements, including test methods format

The District's staff report identified that "not all cooling towers are subject to MACT" but omitted the fact that Federal MACT standards apply to the majority of the Bay Area refinery cooling towers (24 of the 32). The staff report also identified that MACT "requires periodic monitoring (monthly or quarterly)" however it did not mention that existing cooling towers subject to monthly hydrocarbon monitoring are required to take corrective action when a monitoring result exceeds 0.084 ppmw = 84 ppbw (the yellow line identified in the figure above), whereas existing cooling towers subject to quarterly hydrocarbon monitoring (and new cooling towers) are required to take corrective action when a monitoring result exceeds 42 ppbw. The District identified 34 cooling towers, but misidentified Shell as having 5 cooling towers instead of 3. The MEPM action level is identified as 6.2 ppmvC1 in the air stripped by the MEPM device, which corresponds to 0.084 ppm = 84 ppbw in the water at typical atmospheric temperature and pressure.
WPSA P63, p4.

Response:

The Air District has met the requirements of H&SC 40727. The promulgation of Regulation 11, Rule 10 is necessary to reduce THC emissions to the maximum extent possible, does not conflict with existing law, and does not duplicate existing requirements. MACT CC for cooling towers targets easily strippable hydrocarbons whereas Rule 11, Rule 10 will target a wider range of hydrocarbons; Rule 11-10 will require more precise and frequent monitoring and quicker repair of leaks that are detected.

Comment 9:
The staff report also failed to mention that if those levels are exceeded, the MACT regulation allows 45 days for the facilities to repair the leak . . . but makes allowances for certain situations where repair is technically infeasible without a shutdown or when necessary equipment, parts, or personnel are not available.
WSPA P64, p1.

Response:

The decision to incorporate a 21-day deadline to repair cooling tower leaks is based on staff's evaluation of timelines for previous cooling tower leaks. Historically, the majority of cooling tower leaks have been repaired within days to a few weeks at most. A massive leak at a Bay Area refinery was repaired in fewer than 21 days and it involved the checking and repair/replacement of all heat exchangers of the cooling tower. Infeasible heat exchanger repairs are a rare occurrence. In the event that a heat exchanger leak cannot be repaired within 21 days, refineries can choose to bypass the leak, such as by blinding off the leaking heat

exchanger or using skid-mounted portable heat exchangers. In the unlikely event that a repair cannot be made and no other alternatives are feasible, refineries can apply for a variance.

Comment 10:
The staff report also failed to mention the fact that the District's identification of "Best Modern Practices" [in 11-10-402] includes a list of several requirements (i.e., -402.1 through 402.3) that are actually OSHA Process Safety Management (PSM) requirements and associated guidance. OSHA's PSM requirements and associated guidance are more specific than what the District is proposing, and PSM is not an area of expertise by District staff. These requirements are duplicative and should be removed; PSM is the focus of agencies other than the District. WSPA P64, p2 and p3.

Response:

The fact that some OSHA PSM requirements are similar to the Air District's proposed "best modern practices" reflects the fact that certain practices have the benefit of both protecting worker safety and controlling air pollution. The "best modern practices" requirements in Regulation 11, Rule 10 are derived from a collaborative input from Compliance and Enforcement as well as Engineering staff, based on their regulatory experience with refinery cooling tower leaks and what is required to detect them early. Air District staff has determined that these practices are necessary to best control emissions.

Comment 11:
The District's proposed rule includes requirements for:

- continuous or daily hydrocarbon monitoring,
- reporting of data exceeding the leak definition to the District "within one calendar day",
- the fixing of leaks "permanently" within 21 days, (11-10-305) with no provisions for if
- the leak is technically infeasible without a shutdown or when necessary equipment, parts, or personnel are not available, and
- additional daily monitoring of process parameters (that are for the most part less sensitive than the requisite hydrocarbon monitoring).

These are unreasonable and overly burdensome. The District's cost-effectiveness analysis reflects emission reductions that have been grossly overestimated and the costs have been grossly underestimated. There is no reason to monitor more frequently than monthly. WSPA P62, p1: WSPA P64, p4 and p5; WSPA P66, p4.

Response:

- Continuous analyzers for leak detection are an option -- not mandatory.
- Refineries are required to report leaks within one day but speciation requirements are submission of the collected sample to a water testing lab within one day. Reporting a leak to the Air District within one calendar day is not burdensome.

- If fixing a leak within 21 days is beyond the reasonable control of the facility it can seek variance protection from the District's Hearing Board
- The additional monitoring parameters are necessary to meet "best modern practices" requirements, as required by Regulation 2, unless a continuous analyzer is used to detect leaks.
- The purpose for daily monitoring requirements is to detect leaks sooner and thus repair them sooner.

Comment 12:
The water sampling option as described in the proposed rule is not something that can be executed by refinery operators; the collection of samples "prior to exposure to air" requires specialized equipment and specialized training. In order to execute the sampling daily on all cooling towers, some refineries would need both additional equipment and additional personnel, which the District's cost analysis did not account for. The daily requirement would likely also necessitate the need for redundancy (in case of equipment malfunction or personnel absence), given that 24-hour timeframes do not necessarily provide sufficient time for repair or replacement.

The District's cost analysis estimated $85,000/year for additional staffing at facilities with four or more cooling towers, however this is not accurate. One refinery estimated that a single operator could not collect water samples on more than seven towers per day. In order to conduct monitoring seven days a week and factoring in the need to manage fatigue, the one facility would need at least four people to address the new daily hydrocarbon monitoring requirements at all of their cooling towers.
WSPA P65, p1, p2, and p3; Tesoro P9, p4.

Response:

Water sampling is only one leak detection option. And, the Air District is working on an improved version of the Modified El Paso Method that will further reduce costs. This new method will be available before the monitoring requirements take effect. The refinery can use a combination of detection methods depending on cooling tower location and so forth. It may turn out that the most cost effective method for a facility to monitor for leaks -- for certain cooling towers in close proximity and not located in a combustible atmosphere -- would be to share a continuous analyzer that doesn't require a costly intrinsically safe shelter. Or, if two cooling towers in close proximity are located in a combustible area of the refinery that already has an intrinsically safe shelter with available space, the towers could share a single analyzer. The additional advantage of using continuous analyzers is such cooling towers are exempt from complying with the "best modern practices" requirements and will thus save on those particular compliance costs.

Not all leak detection options require refineries to hire more staff. For refineries with more than two cooling towers that elect to use the water sampling leak detection method, the most cost efficient way to sample water on a daily basis may be to perform the sampling internally. This

might require the addition of more staff and the purchase of water sampling equipment if a refinery elects not to use contractors for leak detection monitoring. The economic analysis has been revised to include the capital cost for redundant equipment that is necessary in case of primary equipment failure. Even so, the extra cost for the water sampling leak detection option would still be cost effective.

Comment 13:
For refineries that opt for the off-site laboratory analysis, typical laboratory turnaround time is approximately two weeks. Sufficient time is necessary for samples to be transported to laboratories, laboratory analysis, and laboratory QA/QC and reporting. Additionally, it is infeasible to 'speciate and quantify the [TACs] associated with [a] leak' within one calendar day as required by 11-10-305. Moreover, the turnaround time is further evidence that monitoring on a daily basis does not make sense.
WSPA P65, p4.

Response:
See response for Comment #12. The daily basis for the sampling is to ensure that leaks are found and repaired quickly. Air District staff understands that a few days is required to get laboratory analyses results. But, that doesn't mean that the cooling towers should not be tested every day. If the sampling was weekly, then it could take two weeks to detect the leak considering the time between sampling and the laboratory analysis time.

Comment 14:
As WSPA identified previously, two refineries that have continuous monitors for their cooling tower water have found the monitors to be operationally problematic. In one case, calibrating the instrument takes 4-8 hours per week. The membrane technology in the monitors is prone to fouling by algae and other similar materials which will not be volatilized into the air.

The costs to install, maintain and calibrate the analyzers are greater than stated in the Air District's cost analysis and that the specific analyzers used at these particular refineries may not be capable of measuring concentrations as low as 84 ppb by weight.

In addition, some continuous monitors are based on solid state electrochemical detectors, which are not accurate enough to quantify mixtures of hydrocarbons accurately. US EPA and District guidance also does not allow for the use of continuous monitors to quantify emissions for emissions inventories. The District's socioeconomic analysis also identified an assumption of 1 analyzer for 2 towers but this is not a valid assumption because cooling towers are not typically collocated which would require a separate analyzer for each cooling tower.
WSPA P65, p5 and p6.

Response:

Based on information refineries have provided staff, the two analyzers with the algae issues are the same model manufactured by the same company. It would be speculative to assume that every one of these particular analyzers (referenced in the comment above) experience the same problem that the refineries have encountered. Nevertheless, the updated cost effectiveness numbers presume that new analyzers will have to be purchased and installed and also includes operating costs for equipment maintenance and calibration. If refineries are not satisfied with the performance and/or maintenance requirements of this particular make and model analyzer, several other continuous analyzer technologies are available that will require less maintenance and are rated to detect hydrocarbon concentrations as low or lower than 84 ppbw. The Texas Commission on Environmental Quality (TCEQ) cooling tower monitoring rule has been in place for several years and requires monitors that can achieve 50 ppbw (30 TAC RULE §115.764). Furthermore, there are three leak detection methods of measurement that a refinery may choose to meet their needs. If one method proves to be too cumbersome, or expensive, one of the other alternatives may be employed.

In addition, the analytical detection limits are determined by the associated sampling method. If the refinery determines that water analysis testing isn't sensitive enough to detect the 84 ppbw limit, the refinery can elect use one of the other detection methods sensitive enough to measure 6 ppmv hydrocarbon concentrations in the air of. The instrumentation technology to conduct such measurements accurately exists. The Air District is aware of at least one continuous emission analyzer manufacturer used in several Texas facilities with the ability to detect 84 ppbw levels. They are a viable option for refinery cooling towers.

The Air District confirmed that continuous monitors may be used to quantify emissions for emissions inventories, via a phone conversation on December 2, 2015, with Ms. Brenda Shine of the EPA who authored the MACT CC for petroleum refinery cooling towers. Refineries that choose this method of leak detection should seek a formal determination from EPA, if desired. The Air District allows the use of data from CEMs for emissions inventory purposes.

Comment 15:
Applied Development Economics, "Socio-Economic Analysis: Proposed Amendments to Regulation 8, Rule 18 ("Equipment Leaks"), Regulation 11, Rule 10 ("Hexalent [sic] Chromium Emissions and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers", and Draft New Regulation 6, Rule 5 ("Particulate Emissions from Refinery Fluidized Catalytic Cracking Units", p. 13, Table 4, Row 12 item (e2).
of "1 analyzer for 2 towers", but this is not a valid assumption because cooling towers are typically not collocated, requiring a separate analyzer for each cooling tower.
The most cost-effective monitoring option identified in the District's staff report is an "APCO approved alternative monitoring method"; however, there is no detail in the rule language or staff report as to what that method might consist of.

Also, the proposed rule in Citation 11-10-204.2 allows the use of "APCO-approved alternative method" to detect 6 ppmv (as methane) in stripped air. The District should keep that language permanently but not change the MEPM method. The District is allowing the APCO the discretion to approve a method, but the District is requiring that the alternative method be its own modification of the MEPM. That does not really provide flexibility to the refiner to find an alternative and demonstrate its effectiveness and accuracy.

WSPA P66, p1; Valero-RERS P8, p1.

Response:

The Air District is working on an improved version of the Modified El Paso Method that will provide the needed accuracy and repeatability and offer a lower-cost option for detecting leaks. That new method will be available in May of 2016, before the monitoring requirements take effect in July. Section 11-10-204.2 will also allow refineries to use other, APCO-approved leak detections methods should such methods exist and/or be designed to allow for an effective way of detecting the presence of THC in cooling tower water.

Comment 16:
Although the Staff Report identifies that "The Air District will allow the [MEPM] sampling method to be used...provided the petroleum refineries follow the Air District's Manual of Procedures methodology that will update the MEPM by July 1, 2016", there is no time for the refineries to design apparatus and train personnel based on that MOP methodology, given that the rule language specifies that the refineries need to comply by the same date (July 1, 2016). Until the District requests and obtains approval from US EPA that any of their methodologies is equivalent to what US EPA requires, the refineries would also be required to do duplicative monitoring. US EPA does not authorize the District to unilaterally change monitoring methodologies required by Federal rules.
WSPA P66, p3.

Response:
In all probability, the revisions to the Manual of Procedures (MOP) will be completed and adopted by the Air District's Board of Directors by the end of May 2016. Also, refineries can use the water sampling method temporarily to comply with rule requirements until their staff is able to implement the improved version of the MEPM. Refineries will not have to design new apparatuses; however, they will have to follow changes in the procedure and be prepared to follow that procedure precisely.

With regard to having to do duplicative monitoring, the Air District disagrees that the monitoring Rule 11-10 requires is duplicative of what EPA requires, as it is more stringent. The Air District confirmed via a phone call with EPA staff member Ms. Brenda Shine (principal author or the EPA Cooling Tower MACT CC) on December 2, 2015, that an improved version of the MEPM or other options offered in Rule 11-10 could be considered an Alternative Monitoring Protocol for compliance with the MACT CC. The refiners would have to request that formal determination from EPA.

Comment 17:
The District has no basis to require a “permanent” fix or replacement/permanent isolation of a heat exchanger”, as in proposed Section 11-10-205.1. Fixes are typically temporary until such time as the heat exchange in question can be safely taken off-line for a permanent repair. The District’s requirement is contrary to the H&SC 40001(c)(3) requirement that “if a District rule specifies an emission limit...the district shall not set operational or effectiveness requirements for any specific emission control equipment operating...under that limit”.
WSPA P66, p5.

Response:

Thank you for this comment. The Air District did not intend for 11-10-205 to be a requirement. It has been changed to read as follows in order to clarify intent:

11-10-205 Leak Repair: A leak repair shall reduce the concentration of total hydrocarbon in cooling tower water to comply with the applicable leak action level and ~~shall~~ may include ~~but not be limited to~~ the following actions:

Comment 18:
Although some leaks may be repairable in 21 days, others—particularly the smallest leaks, which are often the most time-consuming to find—will not be. Given the District’s proposed language and lack of any consideration for the extent of efforts made or feasibility or safety of repair, the rule would effectively force refineries to shutdown operations. The District gave no consideration to the costs or the extra emissions associated with this type of shutdowns in their analyses and should do so.
WSPA P66, p7; WSPA P144, p3.

Response:

Rather than shutting down, refineries can blind off the leaking heat exchanger or use skid-mounted portable heat exchangers if they cannot repair a leak within 21 days. Refineries can also apply for a variance. Given that there are several methods for avoiding a shutdown to meet the repair schedule, it would be overly speculative for the Air District to evaluate the impact of any shutdowns.

Comment 19:

The Best Management Practices in 11-10-402 should be deleted from the proposed rule. Compliance with the monthly cooling tower water sampling or with MEPM sampling is sufficient to meet the “best modern practices” definition as it is used in Regulation 8 Rule 2. The monitoring proposed in 11-10-402 is unnecessary, burdensome and provides no additional emission reduction benefit.
WSPA P67, p1.

Response:
Regulation 8, Rule 2 references “best modern practices” but does not define what it is for cooling tower refinery cooling towers. The Air District is now defining “best modern practices” in this rule. The Air District believes these practices, in combination with water testing or alternative monitoring, will prevent leaks and/or ensure prompt detection of leaks. Refineries that choose to install continuous hydrocarbon analyzers will meet “best modern practices” without additional monitoring.

Comment 20:
There is no need for the daily monitoring identified in 11-10-402.4 through 402.9; these are redundant, less sensitive, and less directly relevant to emissions than the MEPM monitoring or lab sample of cooling tower water. If these requirements are kept in the rule, there are significant additional costs at some refineries associated with having to conduct monitoring once “per shift” instead of once per day that are not incorporated in the cost estimates.
WSPA P67, p2.

Response:

Performance of these daily best practices and recording of the results will provide other parameters that can be correlated with cooling water monitoring data to provide more insight into how the cooling towers operate during normal conditions, and potentially, during leaks. This “belt and suspenders” approach is necessary to ensure that leaks are detected, even if direct testing methods fail.

Comment 21:

The costs to comply with the requirements in Regulation 11, Rule 10 are understated.

Valero specifically stated the following … In row 11, regarding Option 3 for compliance with Regulation 11-10 for cooling towers, the estimated cost of $50 per tower per day is ludicrously low. The current cost per sample using the Modified El Paso Method (MEPM) is about $400 at regular time rates, versus overtime or double time. If the District modifies the method further, one would expect the cost to increase, depending on the extent of the District’s changes. This would put a realistic cost at about $500 per tower per day, a cost that is an order or magnitude higher than that assumed by BAAQMD.

Valero-RERS, P10, p5.

Response:

The Air District agrees that the cost to contract out the work to perform MEPM tests for cooling tower leaks may cost up $400 to $500 per test, as in the case with the Valero Refinery. Other refineries that have several cooling towers may elect to use their own equipment and their own staff to perform tests for THC leak monitoring requirements, in which case, the leak detection costs would be substantially lower. The daily cost would be closer to $200 per MEPM test per

cooling tower including the annualized cost for MEPM testing equipment. The Air District's revised cost estimates are explained in Appendix C.

Comment 22:

The Air District's stated refinery cooling towers hydrocarbon emissions quantifications for Regulation 11, Rule 10 are erroneous and inconsistent with guidance. EPA stated that the MEPM provides the most representative data for cooling tower emissions and the uncontrolled emission factor provides the lowest quality emission estimate. Therefore, it is clearly inappropriate for the BAAQMD to use the uncontrolled emission factor to justify the proposed rule.
WSPA P62, p2 and p3; Tesoro P9, p3.

Response:

See response to Comment #1.

The Air District continues to believe it is appropriate to rely on the EPA uncontrolled emissions factor for determining the cooling tower emissions inventory especially when given the uncertainty and concerns about MEPM and the accuracy of the existing continuous monitoring equipment. This is addressed in detail in Appendix C.

Comment 23:
The regulation should be targeting only relatively volatile hydrocarbons that would be emitted to the air in a cooling tower, and not those with lower volatilities that would remain in the water. The MEPM method is specifically designed to capture strippable hydrocarbons, but the other methods in the rule are not.
WSPA P67; p3.

Response:
The Air District disagrees that the rule should target only strippable hydrocarbons. A properly functioning cooling tower should not have significant levels of hydrocarbons in the cooling water as that stream is supposed to be physically separated from the hydrocarbons that are being cooled. In addition, it is more protective of public health to presume that all hydrocarbons in the cooling tower water are eventually emitted to the atmosphere. The Air District is targeting a wider range of hydrocarbons to ensure complete coverage of California Toxic Air Contaminants and to address all ozone precursor emissions.

Comment 24:
Rule 11-10-401.2 requires a demonstration that total hydrocarbon emissions from a leak are below 15 pounds per day (lb/d) and that TAC emissions for the leak are below their corresponding acute and chronic trigger levels in Table 2-5-1 of Regulation 2 Rule 5.

The staff report indicates that the requirement to demonstrate total hydrocarbon emissions are below 15 lb/d was included to demonstrate compliance with Regulation 8-2-301. This

requirement is unnecessary because the proposed rule itself qualifies the cooling towers for the 'best modern practices' exemption Regulation 8-2-114 and, therefore, the limit in Regulation 8-2-301 is not applicable.

The trigger levels in Regulation 2, Rule 5 are designed for new and modified sources to determine whether or not the New Source Review requirements for TACs in Regulation 2 Rule 5 applies to that new or modified source. These trigger levels are considered an arbitrary emission limit for unpredictable emissions from leaks in 11-10-401.2.
WSPA P67, p5, p6 and p7.

Response:
The intent of Section 11-10-401.2's requirement to provide information on TAC emissions of a leak that cannot be promptly repaired is to ensure that the Air District has all of the information necessary to determine what further review, if any, is required of the non-compliant operation. The emission levels listed are not arbitrary; rather they represent levels of concern to the Air District. The commenter is correct that compliance with Rule 11-10 demonstrates compliance with Regulation 8-2-301, and the staff report has been corrected.

Comment 25:

WSPA Comment: The District described Shell as having 5 cooling towers when they only have 3.

WSPA P63, p8.

Response:

The Air District has verified this statement and has revised the information in the staff report, the emissions inventory and cost effective analysis.

Comment 26:

The use of a "hydrocarbon analyzer" provides a single hydrocarbon concentration measurement and yields no information of the specific hydrocarbon species present. In contrast, a speciation measurement of the sample could provide the following benefits:

- Provide specific information regarding the hydrocarbon content of the emitted VOC's, thus providing values to be used for calculation of Greenhouse Gas CO2e and pollutant discharge impacts for air and water.
- Assist in troubleshooting sources of leakage
- Identify leakage around emergency dump valves on a hydrogen net gas compressor
- Identify leaking safety relief valves on a crude tower
- Identify over-sized restriction orifices on a nitrogen line

Mr. Combs and Mr. Derango propose that the Air District consider amending Section 304.2 of the draft rule to require speciation of the hydrocarbon content as part of the initial step for THC leak detection.

Siemens p5

Response:

The Air District agrees with the opinions of Mr. Combs and Mr. Derango with respect to the value of speciating chemical constituents in a cooling tower leak from the very beginning of the leak detection process. Early speciation would provide important information for the purposes of determining leak sources as well as quantifying the magnitude of a leak. However, requiring petroleum refineries to use a sparger combined with a gas chromatograph, or some other device capable of speciating chemicals in cooling tower leaks during the primary detection step in Section 304.2, would not be cost effective for several of the refineries. Regulation 11, Rule 10 requires speciation in the step that follows the detection of a cooling tower leak because it is more cost effective. Nevertheless, some refineries might choose to purchase and install a continuous monitoring device that can speciate during the initial detection step.

Comment 27:
In the event hydrocarbon concentrations exceed the 84 ppbw threshold, the rule requires the refinery to file a report with the District “within one day.” The report shall include pH, iron and chlorine concentrations in the cooling water at time and date of leak discovery. That is unreasonable, in part because the focus of the refinery should be on fixing the leak rather than filing reports, and in part because it is unnecessarily burdensome. Regulation 1-522.7 requires notification within 96 hours of an indicated excess. This rule should be consistent with that requirement which is more reasonable, and would account for occasions of holidays, etc.
WSPA P66, p4.

Response:

Due to the large potential for emissions from hydrocarbon leaks at cooling towers, as demonstrated in a 2010 cooing tower leak event at a Bay Area refinery, the Air District believes it is necessary for it to be notified as soon as possible, or within one day when a leak is first detected.

Comment 28:

Valero requested the opportunity to demonstrate the accuracy of the MEPM and followed up with a successful field test. However, the October 2015 Staff Report, on page C:3, states, “The Air District will allow the MEPM sampling method to be used as one of the three possible THC detection methods provided the petroleum refineries follow the Air District’s Manual of Procedures methodology that will update the MEPM by July 1, 2016.” Valero believes that the agency does not need to update the MEPM.
Any refinery that chooses to use that particular method will simply have to prove that the refiner or its contractor can demonstrate the accuracy of the method for its particular operation. Furthermore, updating the MEPM would have to occur earlier if the refinery is supposed to attain compliance by July 1, 2016.
Valero-RERS P7, p5.

Response:

See response to comments #1 and #18.

The Air District does not agree that the 9/8/15 side-by-side filed test was successful. Air District staff observed contractors perform the MEPM at the Valero cooling tower and had concerns which include the following:

1) The analyzer was calibrated with span gases in Tedlar bags. The bags are filled immediately prior to calibration but no studies have been performed to ensure there are no issues use of the bags results in changes to the calibration gas.
2) The analyzer that was used is a TVA-1000B. The TVA-1000B has an accuracy of ± 25% of reading or ± 2.5 ppm, whichever is greater. Valero indicated that they typically see readings of 0-4 ppmv THC with an action trigger level of 6.2 ppmv and a high of 9 ppmv during a leak.
3) Although flow rates followed guidelines in the MEPM, the water level kept increasing in the column and did not remain at just above the packing material.
4) The TVA probe was not screwed into the Swagelok fitting as it should have been but instead was inserted into the hollow of the fitting. The method was designed to prevent the sample from being exposed to ambient air prior to analysis so the sampling system should remain enclosed. The way the apparatus is currently designed, if the analyzer is screwed on the FID creates a vacuum and water from the bubbler is pulled into the analyzer.
5) The MEPM is only a ten minute test with data points taken every two minutes.
6) After testing the contractor was asked if Valero spiked samples. The reply was that there were no spiked samples or controlled variables.

For the reasons stated above, as well as other reasons stated in response to Comment #1, the Air District does not believe the MEPM provides accurate and repeatable monitoring results, as it is currently designed. The Air District is working on an enhanced method that will accurately and consistently detect THC concentrations in cooling tower water. This method will be prepared and submitted for adoption by the Air District's Board of Directors by the end of May 2016.

Comment 29:

Citation 11-10-305 requires that a leak be minimized within five days and repaired within 21 days. This is an aggressive schedule and would be a major impact on environmental and operations staff, because leak identification usually takes time, as each cooling tower services numerous heat exchangers. Tracing back to each heat exchanger to find the leak is time-consuming and cannot always be completed within five days of detection of a leak, especially one that is as small as would generate a concentration in water as low as 84 ppbw. This requirement would require round-the-clock staffing just to detect leaks and minimize them within

five days of detection. The requirement to repair within 21 days also precludes the possibility of placing a unit on the DOR list. The agency should provide more realistic requirements and allow for the placement of equipment on the DOR list.

In addition, the newly proposed requirement to "speciate" and quantify the Toxic Air Contaminants (TACs) associated with the leak within one calendar day of discovering the leak until the leak is fully repaired" would take away time from environmental and operations staff in detecting the leak and attempting repairs to equipment. Particularly, if the cooling tower has a low leak and could place the equipment on the DOR list, it would not serve any purpose to sample daily; weekly would be more appropriate. Valero-RERS P8, p1, p2 and p3.

Response:

See response to Comment #24.

Regarding requirements to speciate water samples, it is reasonable to assume that the refinery staff that has the responsibility to inspect for and repair cooling tower leaks is not responsible for speciating water samples. Thus, the process of speciating samples should not deter them from their responsibilities to inspect for and repair leaks.

The reason for daily detection requirements is to find leaks as soon as possible and repair them as soon as possible.

Comment 30:
Best Modern Practices. *Citation 11-10-402* lists many practices that the District would require refiners to follow, starting July 1, 2016. Valero would argue that the best modern practices proposed by the agency would be duplicative of the California Process Safety Management (PSM) regulations intended to prevent accidental releases, which allow similar practices in accordance with good professional engineering judgement on the part of refinery operators. In particular, the turnaround items in 402.1 through 402.3, "visual examination and/or non-destructive testing of all heat exchangers upstream…", "repassivation of steel contained in heat exchangers," and the sealing of tubes within heat exchangers if there is pitting or corrosion, all are covered by the PSM regulation and would be duplicative in this current proposed rulemaking effort by the District. Other "best modern practices" are tasks directed to be performed every shift. While this requirement might seem reasonable, it could become onerous; a better solution would be to require the tasks on a daily or weekly basis. The District should justify performing these tasks every shift and evaluate other schedule alternatives.
Valero-RERS P8, p4.

Response:

See response to Comment #10.

Regarding the requirement to utilize “best modern practices” every shift, the purpose is to ensure that refineries detect leaks as soon as possible and thus repair them as soon as possible.

Comment 31:
As proposed, any of the three leak detection options proposed in Regulation 11, Rule 10 for the 12 cooling towers operated at the refinery would be costly and would not result in any appreciable emissions. The proposed emission reductions are demonstrated only on paper because the inappropriate “uncontrolled” EAP emission factor is used. District has received cooling tower emissions data from all of the Bay Area refineries based on MACT CC testing as well as lab monitoring results as required for a specific refinery. Such data clearly demonstrates the District’s fugitive emissions inventory from the October 2015 staff report is significantly overestimated. The lab analyses suggested by BAAQMD may not encompass many refinery streams that might be found if a cooling tower leak was detected.

Finally, Tesoro requests that the addition of the highly prescriptive Best Management Practices for operating a cooling tower be removed.
Tesoro P9, p3, p4 and p5; Tesoro P10, p1.

Response:

The Air District has revised the cost analysis for the three available leak detection options. The revised numbers indicate that the proposed Regulation is cost effective.

It is important to recognize that the MEPM targets easily strippable hydrocarbons while the proposed rule for cooling towers targets THC. With the exception of one refinery, the emissions inventories that Bay Area refineries have submitted to the Air District as well as the ICR baseline emissions submitted to the EPA, that are based on MEPM testing, do not reflect THC emissions.

The Air District does not agree that using the uncontrolled emission factor is appropriate. See responses to Comment #1 and Comment #2.

The Air District believes it is important to include “best modern practices” requirements in the rule to ensure that leaks are detected as early as possible and thus repaired as soon as possible. Those refineries that elect to use continuous analyzers to monitor THC leaks are exempted from “best modern practice” requirements.

Comment 32:
In reference to the Phillips 66 Refinery cooling tower emissions, WSPA commented that “The District’s own calculation of refinery’s cooling tower emissions is 3.3 TPY.
Assuming 100% emissions reduction, the District’s costs for that refinery correspond to a cost effectiveness of $64,500-$232,500 per ton of emissions reduction, rather than the $2,533-$9,125 per ton identified in the staff report”.
WSPA P63, p2.

Response:
The Air District has revised cooling tower emissions for the Phillips Refinery as well as the assumed costs and cost effectiveness to comply with Regulation 11, Rule 10. The rule is cost effective for the estimated THC emission reductions as opposed to the easily strippable VOC's that are reflected in the Phillips Refinery emissions inventory.

Comment 33:

The BAAQMD overstates cooling tower emissions from the Phillips 66 refinery by a factor of 25.

The rate of refinery emissions is already below the emission rate the proposed amendments are attempting to achieve. There is no basis for the monitoring requirements proposed in Section 11-10-304 when the Phillips 66 emissions are already lower than the emission reduction goal.

The BAAQMD uses inaccurate cost effectiveness.

The daily continuous monitoring requirement in 11-10-304 should be altered or deleted because the Phillips 66 refinery cooling tower emissions are below the uncontrolled emission rate the rule is attempting to achieve.

The leak action level should be calculated to be the difference between the return line and the sample line. This sampling has been proven to demonstrate that cooling tower emissions are low at the Phillips 66 refinery.

Because the Phillips 66 refinery is already achieving the emission reductions goal of the proposed rule, the Best Modern practices in Section in 11-10-402 should be removed. It is burdensome and provides no additional emission reduction benefit.

The leak action requirement in Section 11-10-305 should include delay-of-repair provision. In cases in which repairs cannot be made within 21 days, the filing for a variance would be a cumbersome and unnecessary solution.

The leak action requirement should specify a subset of TACS.

The leak reporting requirements should delete the requirement to report pH, iron and chlorine concentrations.

Section 11-10-401.2 should be altered or deleted. The requirement to demonstrate that THC emissions from a cooling tower leak are below 15 pounds per day is unnecessary.

The rule should include an exemption for cooling towers that service heat exchangers with process fluids that do not contain hydrocarbons.
Phillips 66-01 P13, p4; Phillips 66-01 P14, p1, p2, p3, p4 and p5; Phillips 66-01 P15, p1, p2, p3, p4 and p5; WSPA P61, p1.

Response:

The Air District has revised the cooling towers emissions inventory for the Phillips 66 refinery.

While the lab analysis method used is the correct one, the Air District does not have evidence that the sampling methodology and/or the sampling locations are performed in a way to ensure the samples are obtained from the optimum locations in the entry lines of the cooling tower system and to ensure the integrity of water samples to prevent loss of hydrocarbons. The Air District is not confident that cooling tower emissions from the Philips 66 refinery are in fact below the proposed rule's detection leak action level.

The Air District has revised the cost effectiveness numbers based on the reported emissions from Phillips 66 and updated costs for the various leak detection options. The rule will be cost effective for the refinery.

The rule will retain the daily continuous monitoring requirement. It is important for refineries to detect leaks as soon as possible and repair leaks as soon as possible. The Air District is not certain the Phillips 66 refinery cooling tower emissions are below the uncontrolled emission rate the rule is attempting to achieve.

While the current permit condition requirement for the Phillips 66 refinery provides that leaks are calculated to be the difference between the return line and the sample line, staff has determined that leaks are more accurately detected via the required method in Regulation 11, Rule 10.

As stated earlier, the Air District is not certain that the Phillips 66 refinery is achieving the emission reduction goals required by the rule.

The Air District does not believe a delay-of-repair provision is necessary. Refineries may apply to the Air District's Hearing Board for a variance if it is beyond their reasonable control to repair a leak within 21 days. Staff have no evidence that cooling tower repairs taking more than 21 days are common.

The laboratory speciation results will determine a subset of TACs based on the method itself.

The requirement to report pH, iron and chlorine concentrations is important to ensure the Air District has complete information on the leak event.

Regarding the suggestion to alter or delete Section 11-10-401.2's requirement to demonstrate that THC emissions from a cooling tower leak are below 15 pounds per day, see the response to Comment #24.

Regarding the suggestion to include an exemption for cooling towers that service heat exchangers with process fluids that do not contain hydrocarbons, Section 11-10-107 has incorporated an exemption to clarify the District's original intent to that such cooling towers are not subject to the rule.

Comment 34:

Accordingly, not only has the District not demonstrated the necessity of proposed Rule 10 by substantial evidence, it would be arbitrary and capricious to promulgate Rule 10 in the face of

actual monitoring data demonstrating that these extreme controls are not necessary to achieve the desired benefits.
WSPA P38, p2

Response:
The Air District believes adoption of the proposed additions to Rule 11-10 are necessary, as described in the Staff Report, in more detail in Appendix C to the Staff Report, and throughout this Response to Comments document.

Comments on CEQA Analysis, Proposed Negative Declaration.

November 23, 2015
Phillips 66: Comments on Regulation 9, Rule 14: Petroleum Coke Calcining Operations

4. The CEQA Analysis inadequately addresses environmental impacts. The CEQA analysis inappropriately concludes that there would be no significant adverse impacts.

a. **Shutting down the Carbon Plant will result in a net global GHG increase.** The quality of the calcined coke produced by the Carbon Plant allows it to be physically incorporated into steel or other products. Essentially sequestering the carbon. If the Carbon Plan shut down, the refinery would sell the green coke where it will likely be burned as fuel, releasing the carbon into the atmosphere as CO_2. Further, the transportation associated with selling the coke elsewhere will result in further CO_2 emissions as well as emissions of other air pollutants.

Operation of the Carbon Plant, as opposed to shutting it down and selling green coke as fuel, reduces an estimated 330,000 metric tons of CO_2 per year by trapping the carbon (this information was provided to BAAQMD staff on September 1, 2015). After only 3 years, this results in more CO_2 reductions than the $300 million that the air district has spent on CO_2 reduction efforts over the past 8 years.[14] The effect of shutting down the facility on global GHG emissions should be evaluated in the CEQA analysis.

b. The Carbon Plan generates low-carbon electricity. The Carbon Plan generates 18 megawatts (NW) of electricity as a co-benefit of current operations using waste heat, where 1 MW supplies about one thousand homes. If the Carbon Plan did not continue operations, that 18 MW would need to be otherwise generated by PG&E likely in the short term by burning fossil fuels and therefore contribute to increased global CO_2 emissions. The increase in electricity generation should be evaluated in the CEQA analysis.

Phillips P5, p4

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Table of comments on 9-14

CEQA report does not align with staff report

CEQA Analysis, pg. 2-12 through 2-13, pg. 3-23: Table 2.5-1 and Table 3-6 of the CEQA Analysis say Rule 9-14 will result in 372 tpy of SO2 reductions.

Staff report, pg. 16: The staff report estimates 710 tpy of SO2 reductions.

Phillips 66 believes the CEQA analysis inadequately addressed impacted based on the wrong expected SO2 reductions.

Phillips Attachment 1, P2, p3

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Typographical error

CEQA Analysis pg. 3-39: Table 3-9, Total CO_2 emissions = 2,436, Total CO_2e emissions = 1,090

There is an error in Table 3-9 that shows CO_2 emissions are higher than CO_2e emissions. This should be corrected.

Phillips Attachment 1, P5, p4

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Inconsistencies in expected usage of sodium bicarbonate in CEQA report:

CEQA Analysis, pg 3-39:
"Upgrading the DSI System is expected to increase the use of sodium bicarbonate by an estimated 4,000 tons per year" (emphasis added)

CEQA Analysis, pg 3-68:
"This is expected to require about 2,600 tons per year of sodium bicarbonate to be delivered to the Plant and about the same amount of spent sodium bicarbonate to be removed" (emphasis added)

Relevant parts of the CEQA analysis should be redone to be based on a consistent number for sodium bicarbonate usage.

Phillips Attachment 1, P10, p2

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

CEQA GHG threshold calculation:
CEQA Analysis, pg 3-39:

"The GHG emissions increases associated with increased SO_2 scrubbing would be required to be offset". Table 3-9 depicts that when the 1,090 MT CO_2e increase from SO_2 scrubbing is disregarded because it will be offset, the expected GHG emissions increase from Rule 9-14 is only 195 MT/yr, which falls below the BAAQMD's Significance Threshold of 1,100 MT/yr.

CO_2 emissions associated with the chemical reaction of sodium bicarbonate with sulfur dioxide to form CO_2 are not reported or covered under the current structure of AB32. Covered emissions sources under AB32 are defined under the Mandatory Reporting Rule (MRR) at Title 17 California Code of Regulations (CCR), Division 3, Chapter 1, Subchapter 10, Article 2, Subarticle 2 ("MRR Subarticle 2"). The applicable elements of MRR Subarticle 2 for the Carbon Plant include §95112 Electricity Generation and Cogenerations Units, §95113 Petroleum Refineries, and §95115 Stationary Fuel Combustion Sources. None of these sections stipulate emissions reporting requirements for the reaction of sodium bicarbonate with carbon in flue gas to form CO_2. Therefore, it cannot be assumed that GHG emissions increases associated with increased SO_2 scrubbing will be offset within AB32.

Phillips Attachment 1, P10, p3

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

CEQA Analysis, Appendix A:

Baseline Green Coke Generation Rate = 399,000 tons/yr. Project Green Coke Generation Rate = 400,000 tons/yr

Green coke throughput in 2011 was 425,000 tpy. The baseline and project green coke generation should use this green coke feed rate to better reflect possible green coke feed rates in a given year. The Carbon Plant's maximum permitted green coke limit is about 680,000 tpy of green coke across both kilns. It is reasonably expected that the facility would run to its permit limits. Using either 425,000 tpy or 680,000 tpy and the calculation method in the CEQA Negative Declaration would trip the significant threshold requiring a full Environmental Impact Report (EIR) to be performed.

Phillips Attachment 1, P11, p1

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Expected fresh delivery trips = 300 trips/year. Expected spend delivery trips = 300 trips/year. Based on 3,893 tons moved in 13 tons per truck.

The District estimates the Carbon Plant will require 3,893 additional tons of sodium bicarbonate. Based on the Carbon Plant's analysis of past usage and emissions control, we estimate the

sodium bicarbonate usage will need to be at least 4,200 tons per year. This should be recalculated in the CEQA analysis.

Phillips Attachment 1, P11, p2

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

November 23, 2015

Phillips 66 Company Comments on Proposed BAAQMD Rules/Amendments and Associated Documents, including CEQA analyses:

- Regulation 12, Rule 15: Petroleum Refinery Emissions Tracking
- Regulation 12, Rule 16: Petroleum Refinery Emissions Limits and Risk Thresholds
- Air Monitoring Guidelines for Petroleum Refineries
- Regulation 9, Rule 14: Petroleum Coke Calcining Operations
- Regulation 8, Rule 18: Equipment Leaks
- Regulation 11, Rule 10: Hexavalent Chromium and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers
- Draft Environmental Impact Report for the Bay Area Air Quality Management District Regulation 12-15: Petroleum Refinery Emissions Tracking Regulation 12, Rule 16: Petroleum Refinery Emissions Limits and Risk Thresholds
- Negative Declaration BAAQMD Petroleum Refinery Emissions Strategy

DEIR and Negative Declaration

1. The DEIR and Negative Declaration "piecemeal" the proposed Regulations listed at the beginning of this letter.

The DEIR is deficient because it does not include the effects of Proposed Rules 12-15 and 12-16 along with Rule 9-14, 8-18, 6-5, and 11-10 in one single EIR. Instead BAAQMD separates these proposed Rules into one DEIR and one Negative Declaration. BAAQMD Board Resolution 2014-07 adopted October 15, 2014 directs BAAQMD staff to do ALL the following[1]

- Continue to prepare Rule 12-15
- Develop Rule 12-16 to see emission thresholds and mitigate potential emission increases
- Prepare a strategy to achieve further emission reductions from refineries which include as a goal a 20% reduction in refinery emissions.

In its October 2015 Petroleum Refinery Emissions Reduction Strategy: Staff Report (PRERS Staff Report), BAAQD states in the Executive summary on page 1 that the emission reduction strategy *"stems from a Board of Directors resolution (2014-07) adopted in October 2014, in which the Board instructed staff to develop a regulatory strategy that would further reduce*

emissions from petroleum refineries, with a goal of overall reduction of 20 percent (or as much as feasible) no later than 2020".

Because proposed Rules 12-15 and 12-16 along with Rules 9-14, 8-18, 6-5, and 11-10 are all part of a Board Resolution 2014-07 and affect the same refineries, they should be included in one single EIR, not piecemealed into separate documents.

Phillips P2, p4

Response: Air District Board Resolution 2014-07 establishes an emission reduction goal. This goal would be achieved through implementation of various rules. CEQA is required when the rules are proposed and not for a general goal. The Air District has deferred further action on proposed Regulations 12-15, 12-16 and 9-14. The only refinery regulations currently being considered are Rules 6-5, 8-18, and 11-10. A revised CEQA analysis will be prepared when Regulations 12-15 and 12-16, 9-14, and other Phase 2 rules are revised for consideration.

2. The CEQA documentation is inadequate because it does not analyze the impacts of a refinery in the region being shutdown.

As discussed above, BAAQMD Board Resolution 2014-07 directs BAAQMD staff to try to reduce emissions from petroleum refineries by 20 percent. Because there are five refineries within the BAAQMD jurisdiction, a shutdown of one refinery would lead to an emission reduction of approximately 20 percent. It is not unreasonable to assume that one outcome of the proposed Rules would be a shutdown of one refinery. The shutdown of one Bay Area Refinery has the potential to result in significant global GHG and other environmental impacts. The CEQA document should analyze the impacts of the Rule causing a shutdown of one of the five Bay Area refineries.

Phillips P3, p3

Response: Air District Board Resolution 2014-07 establishes an emission reduction goal. This goal would be achieved through implementation of various rules. CEQA is required when the rules are proposed and not for a general goal. The proposed rules would limit emissions from refinery operations. The proposed rules do not require the closure of any refinery. Therefore, it would be speculative to analyze the effects of the closure under CEQA. Per CEQA Guidelines §15145, "If, after thorough investigation, a lead agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact."

November 23, 2015
WSPA / Beveridge & Diamond

Comments of the Western States Petroleum Association on Proposed Rules: Regulation 12, Rules 15 and 16, including the CEQA Draft EIR and the IS/ND on Regulation 6, Rule 5; Regulation 8, Rule 18; Regulation 9, Rule 14; and Regulation 11, Rule 10

The District has not considered the combined impacts of these proposals, both as a whole and in conjunction with the additional new rules that the District intends to propose under its Petroleum Refining Emissions Reduction Strategy. The combined suite of regulations is part of a larger plan to reduce purported refinery emissions in the Bay Area by at least 20% within just a few years. It is impossible to understate the magnitude of the impact the proposed changes will have on the regulated industry. And yet the District has done just that: its multiple analyses of the rule, including both the costs and benefits analyses and the analyses required by CEQA, consistently fail to consider the combined impacts of even the six currently-proposed rules – much less the additional impact of the rules that are still under development.
WSPA P1, p3

Response: Air District Board Resolution 2014-07 establishes an emission reduction goal. This goal would be achieved through implementation of various rules. CEQA is required when the rules are proposed and not for a general goal. The Air District has deferred further action on proposed Regulations 12-15, 12-16 and 9-14. The only refinery regulations currently being considered are Rules 6-5, 8-18, and 11-10. A revised CEQA analysis will be prepared when Regulations 12-15 and 12-16, 9-14, and other Phase 2 rules are revised for consideration.

Rule 8-18: Unreasonable Requirements

In addition, several component locations may require a man-lift and other diesel-powered equipment for access. The District did not analyze the extent to which these emissions may be "significant" under CEQA and the extent to which emissions associated with having to monitor inaccessible equipment exceeds the emissions reduction associated with potentially finding and fixing a leak.
WSPA P59, p1

Response: The comment indicates that a man lift and "other diesel-powered equipment" may be required. Man-lifts can operate on propane, electricity or diesel. The emissions associated with one diesel 120 hp manlift using CARB's off-road emission factors and operating four hours per day are calculated below:

Emissions Associated with Operations of a Man-Lift

	ROG	CO	NOx	SOx	PM
Emission Factor (lbs./hr)	0.0413	0.2355	0.3021	0.0004	0.0219
Emissions (lbs./day)	0.17	0.94	1.21	0.00	0.09

Based on the above, the use of one man lift on an occasional basis would result in emissions that would be less than significant. The commenter does not specify the use of any other equipment.

G. Piece-Mealing/Segmentation

Comment 12. The Air District is developing a suite of regulations to reduce emissions of criteria pollutants from Bay Area refineries by 20 percent (or as much as feasible) by 2020. The first phase of these regulations will be considered by the Board in December 2015… In mid- 2016, the second phase of the strategy will further reduce:

- SO2 from FCC units and other refinery sources
- PM2.5 emissions from FCC units
- Nitrogen oxide NOX emissions from turbines

Moreover, the BAAQMD states it will be propose additional rules within the next six months. All rules should be evaluated for their environmental benefit and impacts considering the whole of the action. The analysis should cover the legal and statutory requirements including need, clarity, authority and non-duplication as well as those requirements under CEQA relating to environmental resource impacts, including cumulative impacts. BAAQMD"s decision to conduct the analysis seriatum seems a blatant attempt to subvert the CEQA process by dividing project components into separate pieces in an attempt to fall below the level of significance.
WSPA P120, p1

Response: Air District Board Resolution 2014-07 establishes an emission reduction goal. This goal would be achieved through implementation of various rules. CEQA is required when the rules are proposed and not for a general goal. The Air District has deferred further action on proposed Regulations 12-15, 12-16 and 9-14. The only refinery regulations currently being considered are Rules 6-5, 8-18, and 11-10. A revised CEQA analysis will be prepared when Regulations 12-15 and 12-16, 9-14, and other Phase 2 rules are revised for consideration.

Attachment D
Comments on Initial Study/Negative Declaration (IS/ND) for the Bay Area Air Quality Management District BAAQMD Petroleum Refinery Emissions Reduction Strategy

A. Purpose and Need/objectives are misstated and misleading

Comment 1. The objectives and need are built upon faulty reasoning and information. For example, on page 2-2 of the document, BAAQMD states: *The Bay Area and neighboring regions are not in attainment of State and federal particulate matter standards and further reductions in PM emissions are needed.* However, BAAQMD is formally designated as "attainment/unclassified" with respect to both PM10 NAAQS and the latest [2012] NAAQS for annual PM2.5, and the state PM2.5 standard is the same as the NAAQS for annual PM2.5. In 2013, EPA determined that BAAQMD attained the NAAQS for the 24-hour PM2.5 as well. There are some exceedances of the CAAQS 24-hour PM10 standard at Bethel Island and San Jose (neither of which are near the refineries that are proposed to be regulated by this action) as shown in Table 3-2. BAAQMD should clarify its statement regarding the Bay Area within

BAAQMD's jurisdiction, not being in attainment for State and federal particulate matter standards.
WSPA P140, p2

Response: California Ambient Air Quality Standards (CAAQS) are generally more stringent than National Ambient Air Quality Standards (NAAQS) because the state requirement is to attain and maintain the standards set. Practically, this means that no more than one exceedance is allowed in a given year, or the area is not in attainment. Table 3-2 summarizes Air District compliance status for 2014. However, review of the five year period from 2010 through 2014 shows that the Air District:

- exceeded 1 hour ozone standard (0.090 ppm) 43 times
- exceeded 8 hour ozone standard (0.070 ppm) 141 times
- exceeded annual average PM_{10} standard (20 µg/m^3) in 2011, and 2013
- exceeded 24 hour average PM_{10} standard (50 µg/m^3) 75 times
- exceeded annual average $PM_{2.5}$ standard (12 µg/m^3) in two different locations in 2013
- exceeded National 24 hour average $PM_{2.5}$ standard (35 µg/m^3) 46 times
    - while 46 exceedances is not enough to put the Air District in non-attainment for the National standard, it represents 46 times where $PM_{2.5}$ impacted people's health

The Air District is not yet in compliance with California ozone, PM_{10} and $PM_{2.5}$ clean air standards.

Comment 2. Objectives listed include reducing $S0_2$ and PM emissions, both of which either in attainment or designated "attainment/unclassified". BAAQMD needs to explain the need for these objectives.
WSPA P140, p3

Response: See the response to Comment 1 (above). SO_2 is a precursor for $PM_{2.5}$ formation. Further action on proposed Rule 9-14 has been deferred, so the comments regarding SO_2will be addressed when the rule is re-considered at a future date.

B. CEQA Analysis is Incomplete Because of Segmentation/ Piece-mealing

Comment 3. Under CEQA, a "project" subject to environmental review must be the "whole of an action." (CEQA Guidelines Section 15378(a).) BAAQMD improperly segmented the review of the Emissions Reduction Strategy. Although BAAQMD states that the four proposed rules are being reviewed in this document as a package and are not dependent, BAAQMD then uses the same language for the setting as listed in the EIR for Regulation 12 Rules 15 and 16. "*The 2011 Bay Area Emissions Inventory for stationary sources indicates that refineries are the largest individual stationary source of reactive organic gases (ROG) emissions and are the predominant source of SO2 emissions. Additionally, the five Bay Area refineries rank among the top ten facilities in the Bay Area for risk-weighted emissions of TACs based on an evaluation of emissions from stationary sources in 2012, and using risk factors for cancer and chronic hazard index."* The discussion of S02 emissions and risk-weighted factors as issues the District is concerned in both documents, coupled with the language in paragraph 2.1 that "*The District*

proposes to reduce refinery emissions by amending several District rules affecting petroleum refineries and developing additional rules focusing on specific refinery processes", are clear evidence that these four rules should have been analyzed within the EIR for Regulation 12 Rules 15 and 16.

Additionally, this demonstrates that a cumulative impacts analysis should have been done for all of these rules together and analyzed in the EIR. Especially since the rules only apply to the five identified refineries and a complete analysis of the proposed and foreseeable rules that may impact them should be completed so that the refineries can properly review and comment on the entire Reduction Strategy.

BAAQMD prepared an Initial Study/Negative Declaration (dated October 2015) for their Petroleum Refinery Emissions Reduction Strategy which included Rules 9-14, 6-5, 8-18, and 11- 10, but did not include Rules 12-15 or 12-16. The Emissions Reduction Strategy should be a cumulative review of all rules be considered and those reasonable foreseeable. BAAQMD needs to explain why this was not a cumulative review. Therefore, the October 2015 Initial Study/Negative Declaration unlawfully segments the review.
WSPA P140, p4

Response: The Air District has deferred further action on proposed Regulations 12-15, 12-16 and 9-14. The only refinery regulations currently being considered are Rules 6-5, 8-18, and 11-10. A revised CEQA analysis will be prepared when Regulations 12-15 and 12-16, 9-14, and other Phase 2 rules are revised for consideration.

Comment 4. Although not analyzed in the EIR, a review of the discussion of the treatment of ammonia emissions as a precursor of $PM_{2.5}$ in proposed Regulation 6-5 shows the necessity to review these rules together. BAAQMD imposes new Reg 6-5 simply to minimize ammonia emissions from refineries, even though no refinery is a major source of ammonia emissions; but then doesn't even include source categories that ARE major sources of ammonia emissions in any of its regulatory targets to reduce PM emissions. BAAQMD needs to analyze these six rules together in an EIR to identify, assess and mitigate for environmental impacts.
WSPA P141, p3

Response: See Response to Comment 3 above.

Comment 5. Table 2.5-1 depicts the BAAQMD estimated emission reductions for the regulatory actions associated with the proposed new and amended rules. Table 2.4-2 shows the District has identified significant opportunities for SO_2 and TOG reductions. BAAQMD should have combined these "significant opportunities" cumulatively with Rules 12-15 and 12-16 and the other foreseeable regulations. This also applies to paragraph 2.5.2 TACs. BAAQMD needs to do the cumulative.
WSPA P141, p4

Response: See Response to Comment 3 above.

Comment 6. Flawed Analysis
WSPA identifies and incorporates Attachment D-1 as comments on the inaccuracies in the IS/ND analysis which must be corrected to properly inform the public and the Lead Agency

decision-maker. Providing the correct information will also assist the public to assess the need to submit comments and give the decision-maker information necessary to make a truly informed decision.
WSPA P141, p5

Response: Comment is noted. Please see the Response to Comments in Attachment D-1 below.

Attachment D-1

Technical Data Comments on Initial Study/Negative Declaration on:

- Regulation 6-5: FCCU
- Regulation 8-18: Equipment Leaks
- Regulation 11-10: Cooling Towers

Comment 1. Page 2-2 states that "the Bay Area and neighboring regions are not in attainment of State and federal particulate matter standards". That is inaccurate. BAAQMD is formally designated as "attainment/unclassified" with respect to both the PM_{10} NAAQS and the latest (2012) NAAQS for annual PM2.5 [40 CFR 81.305], and the State $PM_{2.5}$ standard is the same as the NAAQS for annual $PM_{2.5}$ (12 µg/m3). In 2013, EPA determined that BAAQMD attained the NAAQS for 24-hour $PM_{2.5}$ as well [40 CFR 52.247(a)]. The data in Table 3-2 of the IS/ND are consistent with attaining all of these standards. Data in Table 3-2 do show some exceedances of the CAAQS 24-hour PM_{10} standard of 50 µg/m3 for, at Bethel Island and San Jose (neither of which are near the refineries that are proposed to be regulated by this action), but this standard is from the 1980s and the health impacts of not attaining it are questionable; i.e., in 2006, US EPA revoked the Federal 24-hour PM10 standard of 50 µg/m3 because "The long-term exposure studies of mortality and morbidity...continue to suggest that, at current ambient levels in the US, fine particles [$PM_{2.5}$] are associated with health effects and coarse particles [including PM_{10} particles that are not small enough to be categorized as $PM_{2.5}$] are not. The EPA believes that the $PM_{2.5}$ standards...address the major risk suggested in the PM_{10} studies cited by commenters. To the extent that additional concerns may exist with regard to long-term exposures to coarse particles that have not been fully identified by scientific research, the Staff Paper notes that the short-term [PM_{10}] standard...which is generally controlling, has and will continue, as a practical matter, to limit such long-term exposures."[87]
[87] US EPA, Final Rule for National Ambient Air Quality Standards for Particulate Matter, 71 FR 61144 *et seq.*, p. 61198.
WSPA P143, p2

Response: The statement on page 2-2 has been revised.

> "The Bay Area and neighboring regions are not in attainment of State ozone or ~~and federal~~ particulate matter standards. ~~and f~~Further reductions in PM emissions are needed. PM emission reductions can be achieved by abatement from mobile sources, point sources, fugitive capture enhancement, and pollution prevention practices."

California Ambient Air Quality Standards (CAAQS) are generally more stringent than National Ambient Air Quality Standards (NAAQS) because the state requirement is to attain and maintain the standards set. Practically, this means that no more than one exceedance is allowed in a

given year, or the area is not in attainment. Table 3-2 summarizes Air District compliance status for 2014. However, review of the five year period from 2010 through 2014 shows that the Air District:

- exceeded 1 hour ozone standard (0.090 ppm) 43 times
- exceeded 8 hour ozone standard (0.070 ppm) 141 times
- exceeded annual average PM_{10} standard (20 µg/m^3) in 2011, and 2013
- exceeded 24 hour average PM_{10} standard (50 µg/m^3) 75 times
- exceeded annual average $PM_{2.5}$ standard (12 µg/m^3) in two different locations in 2013
- exceeded National 24 hour average $PM_{2.5}$ standard (35 µg/m^3) 46 times
    - while 46 exceedances is not enough to put the Air District in non-attainment for the National standard, it represents 46 times where $PM_{2.5}$ impacted people's health

The Air District is not yet in compliance with California ozone, PM_{10} and $PM_{2.5}$ clean air standards.

Regarding EPA revocation of the Federal 24-hour PM_{10} standard, comments in Table 3-1 Most Relevant Effects column have been amended to incorporate the aspect of $PM_{2.5}$ standards being health protective, and PM_{10} standards addressing additional concerns that may exist with regard to long-term exposures to coarse particles that have not been fully identified by scientific research.

Comment 2. The text on page 2-4 identifies that Ambient Air Quality Standards have been set for NOx and VOC. That is incorrect; AAQS have been set for ozone, for which NOx and VOC are precursors.
WSPA P143, p3

Response: Ambient Air Quality Standards have been set for criteria air pollutants and are shown in Table 3-1 of the Negative Declaration. The text on page 2.4 will be revised as follows:

> "Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been set and include: (1) carbon monoxide (CO); (2) nitrogen dioxide (NO_2) ~~and oxides of nitrogen (NO_x);~~ (3) PM_{10}; and (4) $PM_{2.5}$; (5) ozone; ~~volatile organic compounds (VOC);~~ (6) SO_2; and (7) lead. Each of these criteria pollutants are emitted by petroleum refineries.

Comment 3. With respect to Rule 8-18, text at the bottom of page 2-7 identifies that facilities that "store, transport and use volatile organic liquids lose some organic material as fugitive emissions wherever there is a connection between two pieces of equipment." Not all connections leak, and they certainly do not leak all the time. It would be more accurate to state that they "...*can* lose some organic material..."
WSPA P144, p1

Response: The comment is noted and the sentence will be changed as follows:

> "Oil refineries, chemical plants, bulk plants, bulk terminals, and other facilities that store, transport, and use volatile organic liquids can lose some organic material as fugitive emissions wherever there is a connection between two pieces of equipment."

Comment 4. With respect to Rule 8-18, Section 2.4.3.1 states that the Air District's 2013 emissions inventory identifies that fugitive emissions from equipment in heavy liquid service at the refineries are estimated at 1,476 tons per year (excluding methane). WSPA has identified repeatedly that this is an absurdly high number, and that the District's insistence on using emission factors based primarily on data collected for components in gaseous or light liquid service is grossly inaccurate.[88] In 2014, at the request of District staff, WSPA members submitted their own monitoring data for thousands of components in heavy liquid service which supported our claim.

[88] Meetings held at BAAQMD on September 3, 2014; September 11, 2014; March 9, 2015. WSPA P144, p2

Response: Based on the Air District's 2013 emissions inventory, fugitive emissions from the heavy liquid equipment listed above are estimated at 1,476 tons per year (excluding methane). However, equipment in heavy liquid service is not currently subject to routine inspection and repair under Air District Regulation 8, Rule 18. Through a series of refinery studies, EPA devised average emission factors for non-monitored fugitive equipment including equipment in heavy liquid service. These factors were used to estimate heavy liquid service fugitive emissions.

The petroleum refinery industry association, Western States Petroleum Association (WSPA), and the Bay Area petroleum refineries contend that these average emission factors do not represent actual emissions and that actual emission factors at the five refineries are lower.

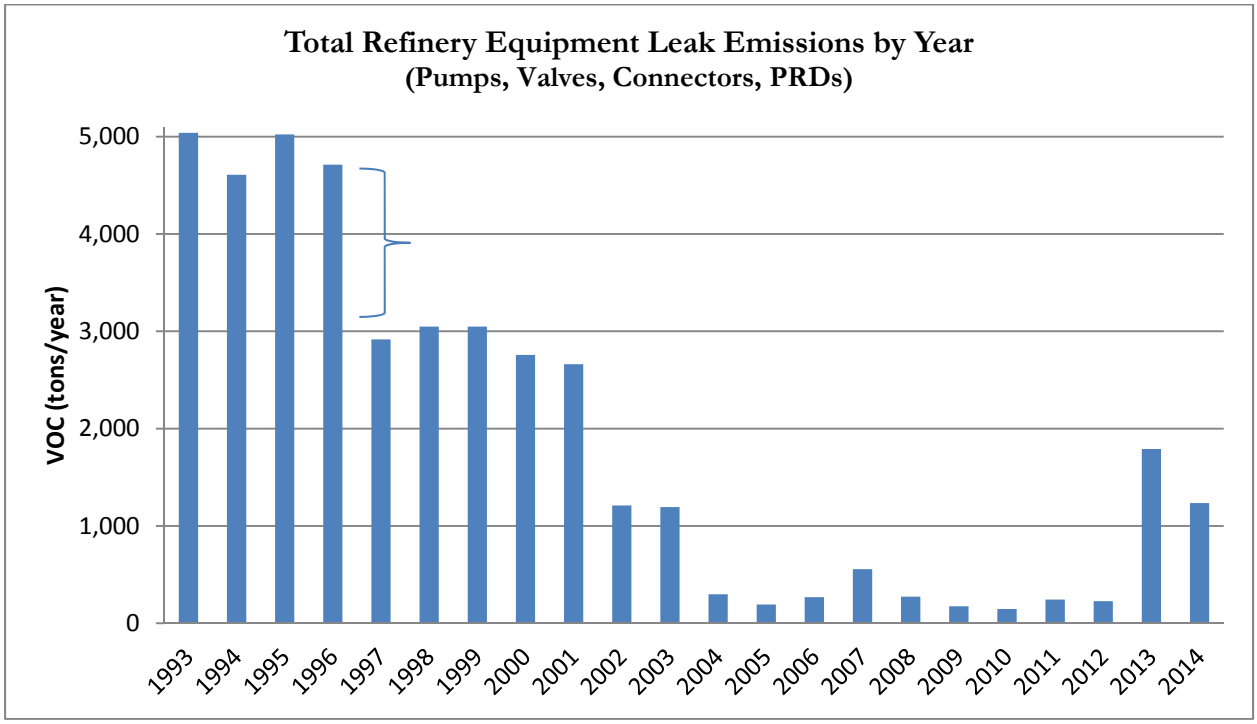
However, when the California Air Pollution Control Officers' Association (CAPCOA) created their fugitive emissions guidelines, CAPCOA stated that "*the application of EPA emission factors to California facilities may **under represent** actual emissions. Some of the facilities surveyed by the EPA to develop their emission factors were controlled and should not be used to develop uncontrolled emission factors*[1]". CAPCOA concluded by proposing that California specific emission factors based on California data be developed.

It is impractical to directly measure all fugitive emissions. To estimate emissions, either a default emission factor is used if leaks are not monitored or a calculated emission factor is used if they are. Because heavy liquid components are not monitored, a default emission factor is used.

Both the Air District and the refineries have estimated and reported emissions from heavy liquid service components for decades as seen in applications for the Chevron Richmond Lube Oil Project (RLOP) in 1981 as well as the Shell Clean Fuels Project in 1992.

[1] California Air Resources Board, "*California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*". February 1999. Appendix A. Documentation of Guidelines Development. Appendix A-1, p. 2.

In annual inventories, the Air District has historically not asked for individual estimates of fugitive emissions by service type but rather requested a single mass value representing all fugitive emissions. The refineries did not provide detailed enough supporting data for the Air District to verify the accuracy of these estimates. Several years ago, the District determined that the refineries were no longer reporting emissions for components in heavy liquid service. This can be seen in a graph of equipment leak emissions over time.



Similarly, in 1994 the South Coast Air Quality Management District (SCAQMD) authorized a change in methodology for calculating fugitive emissions. That change was based on studies showing that the use of specific correlation equations for the calculation of fugitive VOC emissions from components used in light liquid service, subject to an LDAR program, are more accurate than previously accepted default values. As a result, the SCAQMD Air Quality Management Plan (AQMP) inventory for the baseline year 1993 was adjusted to account for this change in calculating fugitive emissions from components in both light liquid and heavy liquid service.

Air District staff finds that it is appropriate to use the standard EPA emission methods in absence of better data. The data collected by the Bay Area Refineries was not collected in such a way that the Air District could verify that it accurately represented the emissions from components in heavy liquid service. As a result the Air District and WSPA are currently working on a mass emissions sampling study in an attempt to obtain the most accurate data. This study is expected to be finished before the end of 2016 and before the changes in heavy liquid monitoring are scheduled to take effect. Depending on the results of the study, the average emission factors may increase or decrease. Any change in these factors directly impacts the expected reductions from the proposed rule amendments.

Comment 5. Page 3-5 does not identify process shutdown as a reasonably foreseeable method of complying with Rules 8-18 and 11-10. It is reasonably foreseeable for 8-18 because the District is proposing a "hard" limit on the percentage of various components that are infeasible to repair within 7 days, and WSPA members believe that available data indicate that it is quite possible to exceed those limits. This comment has been made previously to the District and ignored, so it appears that the District intends for process shutdown to be a reasonably foreseeable consequence. Process shutdown is reasonably foreseeable for 11-10 because the District is proposing a "hard" limit of 21 days for a permanent fix, without any consideration of feasibility; members are aware of instances where it has not been possible to do this. Emissions associated with process shutdown (and restart) can be substantial, and these emissions therefore need to be quantified and evaluated for significance.
WSPA P144, p3

Response: The Air District does not anticipate significant shutdown and startup emissions as a result of the proposed changes to this section of the rule. As stated in the Air District staff report, historical review of non-repairable equipment reported to the Air District by the five refineries showed the average percentage of valves and connectors on a non-reparable list is 0.04 percent (allowable percentage of valves including connectors is 0.30 percent), which indicates the LDAR programs implemented at the five refineries can achieve a much lower fraction of equipment place on a non-repairable list than the fraction currently allowable by the rule.

In comparison, facilities subject to the South Coast Air Quality Management District (SCAQMD) current fugitive rule (Rule 1173) are only allowed to extend the repair period of leaking equipment at most three to seven days provided "a total number of leaking components, not to exceed 0.05 percent of the number of components inspected during the previous quarter, by type, rounded upward to the nearest integer where required." The Air District is not aware of numerous refinery unit shutdowns as a result of the SCAQMD limited repair requirement. However, if a facility has essential equipment that is unable to achieve the concentration and mass emission standards required for the non-repairable list, the facility can choose to apply for a Variance from the Air District rather than shutting down the unit.

Comment 6. Page 3-13 states that "The California standards are more stringent than the federal standards." As shown in Table 3-1, this is not always the case (e.g., for 1-hour NO2 and 1-hour SO2, the Federal standard is set at a lower level, and Federal standards include standards for 24- hour PM2.5, and 3-month average lead that the State standards do not).
WSPA P144, p4

Response: The quoted sentence did not say that all California standards are more stringent than the federal standards. However, for clarity sake this sentence will be removed.

Comment 7. Page 3-14 refers to Table 3-1. Table 3-1 incorrectly identifies the NAAQS for annual PM2.5 as 15 µg/m3 (the NAAQS was changed to 12 µg/m3 in 2012), and the ozone NAAQS has also recently been updated. For PM_{10}, the explanation of health effects in the rightmost column is inconsistent with the fact that in in 2006, US EPA revoked the Federal 24-hour PM_{10} standard of 50 µg/m3 because "The long-term exposure studies of mortality and morbidity...continue to suggest that, at current ambient levels in the US, fine particles [$PM_{2.5}$] are

associated with health effects and coarse particles [including PM_{10} particles that are not small enough to be categorized as $PM_{2.5}$] are not. The EPA believes that the $PM_{2.5}$ standards...address the major risk suggested in the PM_{10} studies cited by commenters. To the extent that additional concerns may exist with regard to long-term exposures to coarse particles that have not been fully identified by scientific research, the Staff Paper notes that the short-term [PM_{10}] standard...which is generally controlling, has and will continue, as a practical matter, to limit such long-term exposures."[89]

[89] US EPA, Final Rule for National Ambient Air Quality Standards for Particulate Matter, 71 FR 61144 et seq., p. 61198.

WSPA P144, p5

Response: The 15 µg/m^3 NAAQS has been corrected to 12 µg/m^3. While the EPA may have revoked the Federal PM_{10} 24-hour standard of 50 µg/m^3, it is currently a state standard. Comments in Table 3-1 Most Relevant Effects column have been amended to incorporate the aspect of $PM_{2.5}$ standards being health protective, and PM_{10} standards addressing additional concerns that may exist with regard to long-term exposures to coarse particles that have not been fully identified by scientific research.

Comment 8. Page 3-14 also mentions that the 2014 air quality data presented in Table 3-2 indicate that the air quality at all monitoring stations were below state and federal standards for CO, NO_2, and SO_2, but neglect to mention that they were also below state and federal standards for annual $PM_{2.5}$. and federal standards for annual PM_{10}. The last paragraph on page 3-14 also identifies that "The Air District is not considered to be in attainment with the...State PM_{10} and State and Federal $PM_{2.5}$ standards." That is inaccurate. BAAQMD is formally designated as "attainment/unclassified" with respect to both the PM10 NAAQS and the latest (2012) NAAQS for annual $PM_{2.5}$ [40 CFR 81.305], and the State $PM_{2.5}$ standard is the same as the NAAQS for annual $PM_{2.5}$ (12 µg/m3). In 2013, EPA determined that BAAQMD attained the NAAQS for 24- hour $PM_{2.5}$ as well [40 CFR 52.247(a)]. The data in Table 3-2 of the IS/ND are consistent with attaining all of these standards.

WSPA P145, p1

Response: Commentary summarizing the information in Table 3-2 has been supplemented with information from the 5-year period from 2010 to 2014 to provide a broader perspective on compliance with state and federal clean air standards.

California Ambient Air Quality Standards (CAAQS) are generally more stringent than National Ambient Air Quality Standards (NAAQS) because the state requirement is to attain and maintain the standards set. Practically, this means that no more than one exceedance is allowed in a given year, or the area is not in attainment. Table 3-2 summarizes Air District compliance status for 2014. However, review of the five year period from 2010 through 2014 shows that the Air District:

- exceeded 1 hour ozone standard (0.090 ppm) 43 times
- exceeded 8 hour ozone standard (0.070 ppm) 141 times
- exceeded annual average PM_{10} standard (20 µg/m^3) in 2011, and 2013
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- exceeded National 24 hour average $PM_{2.5}$ standard (35 µg/m^3) 46 times
    - while 46 exceedances is not enough to put the Air District in non-attainment for the National standard, it represents 46 times where $PM_{2.5}$ impacted people's health

The Air District is not yet in compliance with California ozone, PM_{10} and $PM_{2.5}$ clean air standards.

Comment 9. Table 3-2 shows incorrect units for the PM_{10} and $PM_{2.5}$ data.
WSPA P145, p2

Response: The units for PM_{10} and $PM_{2.5}$ in Table 3-2 have been revised to be micrograms per cubic meter.

Comment 10. The column headers for Table 3-2 on p. 3-6 are unclear. For example, it is assumed that "Max 8-hr" is the maximum 8-hour average concentration and "Nat 8-Hr Days" is the number of days that 8-hour concentrations exceeded the NAAQS level, but that is not clearly explained.
WSPA P145, p3

Response: The headers are abbreviations for the national and state ambient air quality standards and were correctly understood by the commenter.

Comment 11. The IS/ND does not clarify whether the data in Table 3-2 are raw data or quality assured data, whether any "exceptional events" (as defined in the NAAQS regulations) are included or excluded, which if any of the $PM_{2.5}$ monitors don't reflect "area-wide" air quality (and therefore shouldn't be compared to the annual $PM_{2.5}$ NAAQS, as described in Federal regulations), etc.
WSPA P145, p4

Response: The data in Table 3-2 are quality assured data and consist of monitoring data for 2014 in the Bay Area. There were no exceptional events included in the data. The data are appropriate for describing the regional air quality in the Bay Area as required for the preparation of CEQA documents.

Comment 12. The data in Table 3-3 can be misleading since several of the standards changed during the course of 2005-2014. A layperson reading this table will assume that these are days over the standards identified in Table 3-1, but several of those standards changed over the last ten years. When tabulating "Days over Standards", the IS/ND should clearly identify which standards it is referring to for the various years.
WSPA P145, p5

Response: A disclaimer was added to the bottom of Table 3-3 to describe the changes in clean air standards during the time period. The data in Table 3-3 summarizes monitoring data in the Bay Area. The data are appropriate for describing the general trends in regional air quality in the Bay Area.

Comment 13. Page 3-20 of the IS/ND implies that Federal MACT standard promulgation still has not been completed when it states that "Promulgation of those standards has been rescheduled...." EPA announced this spring that all Federal MACT standards were promulgated.[90]

[90] See http://www3.epa.gov/ttn/atw/112c6/112c6WrapupNoticefinal.pdf.

WSPA P146, p1

Response: The third paragraph on page 3-20 will be revised as follows:

> "Title III of the 1990 CAA amendments requires U.S. EPA to promulgate NESHAPs on a specified schedule for certain categories of sources identified by U.S. EPA as emitting one or more of the 189 listed HAPs. Emission standards for major sources must require the maximum achievable control technology (MACT). MACT is defined as the maximum degree of emission reduction achievable considering cost and non-air quality health and environmental impacts and energy requirements. All NESHAPs have been promulgated." ~~were to be promulgated by the year 2000. Specific incremental progress in establishing standards were to be made by the years 1992 (at least 40 source categories), 1994 (25 percent of the listed categories), 1997 (50 percent of remaining listed categories), and 2000 (remaining balance). The 1992 requirement was met; however, many of the four-year standards were not promulgated as scheduled. Promulgation of those standards has been rescheduled based on court ordered deadlines, or the aim to satisfy all Section 112 requirements in a timely manner.~~

Comment 14. Page 3-21 of the IS/ND states that "the proposed projects are not expected to conflict with or obstruct implementation of the applicable air quality plan". What District staff have stated previously is that these rules are obstructing their development of the 2015 Clean Air Plan.

WSPA P146, p2

Response: Development of the proposed projects have delayed preparation of some potential control measures for the 2016 Clean Air Plan. However, as stated in the Negative Declaration (page 3-21, III a.), the proposed rule amendments would reduce PM and ROG emissions and meet the objectives of the 2010 Clean Air Plan. Therefore, the proposed amendments are in compliance with the local air quality plan and are expected to provide beneficial impacts associated with reduced emissions from petroleum refineries.

Comment 15. Table 3-5 identifies that some refineries have many tons per year of condensable PM emissions and others have none. While the footnote does identify that this is based on a small number of source tests, it is an inaccurate depiction of what is likely to be the case, and should be flagged as "speculation" per CEQA guidance at §15145.

WSPA P146, p3

Response: The footnote regarding condensable PM on Table 3-5 accurately describes the entries as estimates based on information currently available, and points out that this information will improve with further source testing using applicable test methods.

Comment 16. Table 3-8 identifies GHG emissions from Bay Area refineries that are not consistent with 3rd-party verified data that was reported to ARB for those years and which are publicly available from http://www.arb.ca.gov/cc/ reporting/ghg-rep/reported-data/ghgreports.htm. Given that the proposed action is relevant to GHG emissions from Bay Area refineries—i.e., proposed Rule 12-15 requires reporting of GHG emissions and explanations for small differences each year—the table should reflect the accurate data. The same table also shows an increasing trend in GHG emissions from Bay Area refineries from 2009 through 2015, which is the opposite of the ARB data. This discrepancy needs to be explained and the basis for the District's projections also needs to be identified. Per CEQA Guidelines [§15144], "While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can".
WSPA P146, p4

Response: GHG emissions shown in Table 3-8 were based on work done during development of the 2010 Clean Air Plan. These emissions estimates are being updated during development of the 2016 Clean Air Plan. A supplemental Table 3-8A has been added to summarize the Verified Annual GHG Facility and Entity Emissions Reports submitted to ARB as required by AB32.
2009 – 2010 Emissions Summary Reports, and 2011 – 2014 GHG Facility and Entity Emissions Reports:

Table 3-8A
Verified GHG Emissions Summary Reports

Year	Total Emissions (Metric Tons CO_2e)
2009	15,899,752
2010	15,253,957
2011	33,941,269
2012	14,843,540
2013	14,826,491
2014	14,411,502

http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm

Comment 17. Page 3-38, which discusses Federal GHG regulations, mentions only the stationary source reporting program. This is a grossly inadequate depiction of the Federal GHG program. The DEIR mentions nothing about the Renewable Fuel Standard (RFS), the new ESPS for electricity generation, GHG permitting requirements, more stringent fuel economy standards for vehicles, proposed regulations for oil and gas activities, building efficiency standards, etc.
WSPA P146, p5

Response: The description of the Federal GHG regulations are focused on stationary sources, because these rule projects apply to stationary sources. A thorough description of the Federal GHG regulations is beyond the scope of, and not applicable to these rule projects.

Comment 18. Page 3-39 is dismissive of District requirements that increase CO_2 emissions because the cap-and-trade program caps those emissions. That is not always true (see comment on Appendix A below), and even when it is, our understanding of the District's GHG significance thresholds is that they have applied only to changes in local emissions, not changes in statewide emissions (or, with the Quebec linkage, combined statewide-and-Quebec-wide emissions). This needs to be more clearly identified. Page 3-40 states that "in general, strategies that promote clean technologies also reduce greenhouse gas emissions"; we also disagree with that statement. Many—we believe most—pollution control technologies require energy usage and have associated GHG emissions. Tuning an internal combustion engine to produce minimal NOx is different from tuning it to produce minimal GHG, meaning that minimizing one of these comes at the expense of the other.
WSPA P146, p6

Response: Regarding GHG emissions from sodium bicarbonate use being covered under AB32, further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

For broader CEQA purposes, GHG emissions include emission sources within California and not just local sources of GHG emissions. While air pollution control technologies require energy usage, the net impact on GHG emissions is analyzed and reported. Use of electricity versus diesel fuels generally result in emission benefits.

Comment 19. With respect to Rule 9-14, in Appendix A, the oxidation-reduction equation for GHG emissions from SO_2 scrubbing is not balanced (two hydrogen atoms on the left side and four on the right). This equation needs to be balance so that CO_2 emissions are calculated correctly. In addition, CO_2 emissions associated with coke calciner SO_2 scrubbing sorbent are not captured by the GHG reporting rule[91] and therefore are not captured by the Cap-and-Trade rule, and therefore the District should not be assuming a credit associated with their capture.
[91] See 40 CFR 98.253(g)(2) Equation Y-13, which is a mass balance equation based on the carbon content of the green coke and petroleum coke and excludes consideration of CO_2 generated by the bicarbonate sorbent. In fact, any increased dust collection (associated with more Na_2SO_3) will cause the regulatory calculation of CO_2 emissions to decrease rather than increase.
WSPA P147, p1

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Comment 20. <u>There is substantial evidence that the CO_2 emissions increase associated with Rule 9-14 may cause a significant effect on the environment, which means that an EIR must be prepared instead of a negative declaration.</u> The District's calculations show 1090 MT CO2e/yr (just under the significance threshold of 1100 MT CO_2e/yr) but there are three key problems with the analysis.

a. The first is that the District bases the CO_2 emissions from the SO_2 scrubbing on green coke generation rates of 399,000-400,000 tons/yr, but this is "based on BAAQMD analysis of recent historical data" and in recent years the generation rate has been as high as 425,000 tons/year (and the allowable air district permitted limit for green coke Is quite a bit higher). There is therefore substantial evidence that the generation rate has been and can be higher than what the District is assuming, and the analysis should be based on a green coke generation rate that is at least as high as 425,000 tons/year.

b. A second issue is that the District appears to be assuming too low a carbon rate for the scrubbing (footnote 3 identifies 3,893 additional tons of sodium bicarbonate, and this may be based on the stoichiometric equation identified in the District's analysis). The equation is incorrect because it is not balanced (and should be corrected accordingly) but it does identify the correct proportions of bicarbonate, SO_2, and CO_2. That being said, the actual quantity of sorbent that needs to be injected in order to maximize the amount of SO_2 control needs to exceed the stoichiometric level by a fair amount. Phillips 66 has identified that based on current experience it is expected that the sodium bicarbonate injection rate will need to be increased by at least 4,200 tons/yr. Therefore the CO_2 associated with the delivery trips needs to be increased accordingly.

c. The most important issue is that the District identifies (erroneously) that CO_2 emissions associated with coke calciner SO_2 scrubbing sorbent are required to be "offset" by the state's Cap-and-Trade rule and there do not count towards the significance threshold. There is a problem with this claim that needs to be corrected. The CO_2 emissions from scrubbing sorbent are not captured by the GHG reporting rule, which means that they are not captured by the Cap-and- Trade rule (which is based on inventories developed using the GHG reporting rule). Specifically, the reporting rule requires the use of 40 CFR 98.253(g)(2) Equation Y-13, which is a mass balance equation based on the carbon content of the green coke and petroleum coke and excludes consideration of CO_2 generated by the bicarbonate sorbent. It therefore is not accurate to assert that there will be any "offset" of these emissions, as the District's analysis claims.

WSPA P147, p2

Response: Further action on proposed Rule 9-14 has been deferred, so these comments will be addressed when the rule is re-considered at a future date.

Appendix 1 : Response to comments on Socio-Economic Impact Report

Response provided on the following pages by ABE, Socio-Economic Impact Report Contractor for the Air District.

MEMO

TO: Gregory H. Nudd and Julian Elliot

FROM: Doug Svensson and Tony Daysog

DATE: December 9, 2015

SUBJECT: Response to "Attachment E" Comments Submitted by Beveridge & Diamond

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INTRODUCTION

We have reviewed the Attachment E comments prepared by Beveridge & Diamond. Below, we present our comments to various concerns raised in Attachment E

AFFECTED INDUSTRIES

Beveridge & Diamond raise a concern that ADE's SIA ignored two sets of industries, namely "cargo carriers" and "intermediate petroleum product users." Below is our response to this concern.

CARGO CARRIERS

With regard to "cargo carriers", Beveridge & Diamond's Attachment E indicates that, "at a minimum, some discussion of the implication of this rule for assembling emissions inventory is necessary and some estimate of the potential cost for controlling health risk contributions from these affected industries needs to be provided." In terms of "potential cost", in preparing the analysis, we assumed that the refineries are responsible for understanding emissions generated by ships, railcars and trucks at the time these cargo carriers reach any one of the five refineries to deliver their product. In part, we based this assumption given the nature of the proposed rule, i.e. to enhance the tracking of refinery emissions and crude oil composition over time, as well as increase air monitoring activities at refinery fence lines and in the nearby community. We also based this assumption on our reading of the proposed regulation ("12-15-401 On-going Annual Petroleum Refinery Emissions Inventory and Monthly Crude Slate Reports: A refinery owner/operator shall obtain and maintain APCO approval of an On-going Annual Petroleum Refinery Emissions Inventory and Monthly Crude Slate Report. . . "). We further assumed that the District, in preparing its costs for proposed new Rule 12-15\12-16, accounted for this particular new cost borne by refineries (i.e. understanding and tracking emissions generated by cargo carriers). We also assumed that the proposed new Rule 12-15\12-16 does not require cargo carriers to alter the physical manner and administrative procedures by which they handle and deliver their respective products to the refineries. Any interaction between cargo carriers and refineries after rule adoption will be the same as before. In other words, we assume that cargo carriers do not bear any new costs if 12-15\12-16 is adopted. However, refineries must track and monitor emissions stemming from the physical manner in which cargo carriers deliver their respective un-refined products.

INTERMEDIATE PETROLEUM PRODUCTS USES

Beveridge & Diamonds Attachment E memo indicates that "a second group of industries not discussed by ADE are the whole group of intermediate petroleum product users affected by the potential price changes resulting from the two rules." Similarly, the Beveridge & Diamond memo questions whether we analyzed the extent to which Bay Area households would be affected.

As indicated in the methodology section to our SIA prepared for 12-15\12-16, when conducting socioeconomic analyses for air quality district rules, we typically evaluate and report impacts to industries indirectly affected by a proposed new rule or amendment only when impacts to directly affected industries are significant. For this reason, we did not include analyses and findings with respect to "intermediate petroleum product users." As for how the proposed rules affect households, in the methodology section to the SIA we qualified when we conduct such an analysis with the phrase, "in some instances", which must be understood within the context of rules whose costs are significant. We also analyze impacts to households in a limited manner in an effort to avoid minimizing impacts of new rules on directly affected industries. In the case of the two new rules, we believe the costs stemming from these rules are too low to pass on to households. For example, annual recurring cost stemming from the proposed new rules range from $3.7 million to $4.1 million; if our analysis assumes that the refineries can pass these costs to the 2,675,537 households in the Bay Area, then not only is there no impact to refineries but that there is also little to no impact to households in the region. $3.7 million a year divided by 2,675,537 households equals $1.38 a year; $4.1 million divided by 2,675,537 households equals $1.53 a year. According to the US Bureau of Labor Statistics, Bay Area household spend, on average, a total of $2,553.70 a year on gas (http://bit.ly/1TziZvc); the impact of the two rules on households would be such that, on average, they would now be spending anywhere between $2,555.09 to $2,555.24 a year on gas, whereas previously they spent $2,553.70. In an effort to generate as conservative an analysis as possible, we assume the refineries cannot pass the costs to households.

REGIONAL EMPLOYMENT

Diamond & Beveridge writes, "As regards employment losses, no cost-related employment loss figures are provided, but are certainly expected in the directly- and indirectly-affected industries." ADE concurs with this observation: our SIA should have included direct jobs impact stemming from the various cost scenarios. Below we present our direct impact job findings.

In the upper-range cost scenario in which one-time and annually-recurring costs are accounted for, at most 4.9 jobs will be directly affected at the five refineries – or roughly one job per refinery. Excluding one-time capital costs, the job impact in the upper-scenario is roughly 3.0 jobs total – or 0.60 FTE per refinery. In the low-range cost scenario in which one-time and annually-recurring costs are accounted for, at most 3.8 jobs will be directly affected at the five refineries – or roughly .76 FTE per refinery. Excluding one-time capital costs, the job impact in the low-range scenario is roughly 2.7 jobs total – or .54 FTE per refinery. Given that these five refineries employ over 4,300 workers, impacted jobs as a percent of total employment is well below one percent.

Table 1 — Direct Job Impacts Stemming from Proposed New Rules 12-15\12-16

Scenarios	Costs	Direct Job Impacts At Affected Refineries	Direct Job Impacts Per Refinery	Percent of Total Employment At Affected Refineries
One-Time Costs and Annual-Recurring Costs: Low-Range	$5,193,750	3.8	0.76	0.09%
One-Time Costs and Annual-Recurring Costs: Upper-Range	$6,625,000	4.9	0.98	0.11%
Annual-Recurring Costs Only: Low-Range	$3,693,750	2.7	0.54	0.06%
Annual-Recurring Costs Only: Upper-Range	$4,125,000	3.0	0.60	0.07%

As indicated in the methodology section to our SIA prepared for 12-15\12-16, when conducting socioeconomic analyses for air quality district rules, we typically evaluate and report impacts to industries indirectly affected by a proposed new rule or amendment only when impacts to directly affected industries are significant, leading to production reductions or price increases from the directly affected facilities. Because our overall conclusion was that refineries are not significantly impacted by the proposed rules, we would not have included jobs impacts in industries indirectly affected by the two measures.

RANGE OF PROBABLE COSTS

Our understanding of BAAQMD's rule development-making is that, BAAQMD holds a series of workshops with affected stakeholders. Through these workshops BAAQMD conveys the intent of each rule, and provides insights as to various aspects to each rule, including how BAAQMD characterizes types and dollar values of costs. BAAQMD receives feedback and suggestions at the workshops. We rely on the BAAQMD to let us know of the range of types of costs and their corresponding dollar-values. If BAAQMD generates ranges of probable costs in addition to what was already analyzed, ADE is prepared to assist BAAQMD further in understanding any SIA impact stemming from the new information.

ALTERNATIVES-AVAILABILITY AND COST EFFECTIVENESS

Similar to above, any discussions regarding "alternatives-availability" and "cost effectiveness" are matters that BAAQMD will have to discuss. ADE does not generate alternative costs scenarios independent of BAAQMD, including an analysis of the cost-effectiveness of these alternative scenarios. As part of its SIA, ADE relies on BAAQMD to generate all approaches, including alternatives, and provide ranges of costs associated with any and all alternatives, for those approaches BAAQMD suggests should be subject to the SIA. If BAAQMD generates alternatives in addition to what has already been analyzed, we are prepared to assist BAAQMD furthering conducting a SIA of these alternatives.

EMISSION REDUCTION POTENTIAL

Beveridge & Diamond indicates that "No discussion of emission reduction potential is given in the socio-economic report apart from the 85 percent reduction in particulate emissions of stationary diesel

engines. The effectiveness of the mandated scrubbers and other control technologies is not discussed." ADE will scrutinize BAAQMD staff report(s) for proposed rules 12-15\12-16, looking particularly for information about emissions reduction potential, and make sure to include relevant information in any revised SIA.

NECESSITY OF THE PROPOSED RULES TO ATTAIN STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Beveridge & Diamond indicates that "there is no discussion of the necessity of the proposed rules to attain air quality standards." ADE will scrutinize BAAQMD staff report(s) for proposed rules 12-15\12-16, looking particularly for information about "necessity", and make sure to include relevant information in any revised SIA.

FINDINGS OF NO SIGNIFICANT IMPACT

According to Beveridge & Diamond, ADE's SIA analysis with respect to whether costs are significant (or not) is based on an "incomplete and inadequate demonstration of the so-called '10 percent rule' derived from Berck's proposed method to assess economic impact." Below are ADE's responses, which are organized in accordance with the four sub-sections to this part of Beveridge & Diamond's Attachment E memo.

COST ANALYSIS

Beveridge & Diamond's Appendix E memo indicates that, of the three tests, the first one has to with how costs are analyzed, particularly with respect to six items ("a" through "f" in the Attachment E [PDF page 152]). It is important to note that ADE's approach to analyzing costs implicitly accounts for these six items. In conducting SIA's, ADE's working assumption is to generate a conservative analysis based on a worst-case scenario where industries affected by new regulatory costs cannot pass costs to others. As a result, our approach is to estimate what reduction in profits or jobs impacted industries may have to absorb, in an effort to address new costs. So, for example, of the six items with regard to Berck's cost analysis approach, two have to do with the effect of new costs on the price of goods sold. In other words, can refineries pass the costs stemming from proposed new rules to, among others, Bay Area households? As we noted earlier, according to the US Bureau of Labor Statistics, Bay Area household spend, on average, a total of $2,553.70 per household a year on gas (http://bit.ly/1TziZvc); if our analysis passes costs stemming from the proposed two rules to consumers and others, the impact of the two rules on households would be such that, on average, they would now be spending anywhere between $2,555.09 to $2,555.24 a year on gas, i.e. an additional $1.38 to $1.53 a year on top of the previous $2,553.70. If ADE conducts its SIA in this manner, one could argue that the two proposed rules – and many other rules – will have little to no effect on industries because they can simply pass costs on to end users. In an effort to generate as conservative an analysis as possible, we assume that refineries cannot pass the costs to households, and therefore must absorb costs by either reducing profits or employment, or a combination of the two.

ESTIMATED EFFECT ON PRODUCTIVITY

We typically assess effects of new regulatory costs on productivity when new costs are significant in the context of the ten-percent rule.

Effect on Business Indicators (the "10 percent" rule)

When conducting the socioeconomic impact analysis, we turn to a variety of sources for estimating an after-tax net profit rate, which we then apply against revenues generated by affected sources and industries, to estimate discrete after-tax net profits. The table below includes raw data on sales and equity generated by economic sectors. Sales and equity data below come from the US IRS. That source also has enough information to calculate industry-specific after-tax net profits. Comparing the after-tax net profit amount against sales results in a net profit rate, particularly a "return on sales" ("ROS") rate. Comparing the after-tax net profit amount against industry equity results in a net profit rate expressed as a "return on equity" ("ROE") rate.

Table 2 — Example of a Baseline SOURCE and DATA for Estimating ROE and ROS Rates: US IRS Statement of Income Tax Stats

US IRS 2012	Sales ('000)	Equity ('000)	After-Tax Net Profits ('000)	ROS	ROE
Agriculture, forestry, fishing and hunting	$180,658,506	$57,214,062	$13,807,862	7.64%	24.13%
Mining	$455,878,980	$521,644,403	$43,419,655	9.52%	8.32%
Construction	$1,194,736,096	$209,532,286	$52,863,697	4.42%	25.23%
Manufacturing	$7,982,719,075	$4,446,151,406	$497,579,788	6.23%	11.19%
Petroleum refineries	*$2,282,715,109*	*$1,116,132,346*	*$143,677,963*	*6.29%*	*12.87%*
Wholesale trade	$4,371,788,696	$948,465,706	$130,937,602	3.00%	13.81%
Retail trade	$3,769,309,740	$565,158,609	$110,573,100	2.93%	19.56%
Transportation and warehousing	$817,585,107	$181,281,207	$32,494,399	3.97%	17.92%
Information	$969,109,652	$833,410,741	$88,427,548	9.12%	10.61%
Finance and insurance	$2,140,231,362	$19,449,771,390	$523,189,092	24.45%	2.69%
Real estate and rental and leasing	$242,441,951	$776,285,354	$60,827,956	25.09%	7.84%
Professional, scientific, and technical svcs.	$1,153,059,710	$317,199,108	$94,142,431	8.16%	29.68%
Health care and social assistance	$691,406,391	$62,774,285	$47,116,134	6.81%	75.06%
Arts, entertainment, and recreation	$110,800,020	$26,522,731	$8,555,212	7.72%	32.26%
Accommodation and food services	$467,982,316	$100,311,878	$33,806,208	7.22%	33.70%
Other services	$207,556,664	$32,792,817	$12,027,250	5.79%	36.68%

When estimating the amount of net profits generated by affected sources and industries in the region, we prefer to use the ROS method because while the US Census publishes equity data for industries at the national level, the Census publishes industry-specific revenue data at all geographic levels, including county and region. While it is possible to estimate local and regional equity using the IRS' national equity data, it is important to note that, relative to revenues, there is greater variability with respect to equity retained by establishments, even those in the same industry, as a number of factors contribute to equity. On the other hand, there is less variability when it comes to revenues, as similarly-sized establishments in similar industries in the same regions and/or across the nation, more or less, generate the same amount of revenues, with respect to firm-wide revenues and revenues on per unit bases (i.e. revenues per worker). Thus, analysts can use national or state level revenue data when local and/or regional industry-specific revenue data are not available from the US Census. In a hypothetical situation, there could be two manufacturing plants in the same industries, both employing 20 workers, who, on average generate $200,000 per worker. Thus, each hypothetical site generates $4 million. However, one plant leases its site and equipment, while the other owns the property on which it operates, as well the

equipment, resulting in the latter having more equity relative to the former even though each generates similar revenues. Thus, while extra caution is warranted when using national-level equity data to estimate local and regional industries' equity, for the most part, such is not the case when using national or state revenue data to estimate local and regional revenues, when such data is not readily available from the US Census. In the end, the discrete amount of net profits generated by an industry or source affected by a rule should be the same whether one multiplies a ROS rate against revenues or a ROE rate against equity.

To further illustrate the point on the utility of the ROS approach, we prepared the table below. In the first scenario, we describe our standard approach to estimating net profits. First, we estimate the amount of revenues – which in the example below is $30.3 billion. Then, we obtain a refinery industry average net profit rate, which, for purposes of illustration is 6.9 percent. Applying that rate to the amount of revenues yields an estimate on the amount of discrete net profits, i.e. $2.1 billion. A ten percent reduction in the $2.1 billion in net profits amounts to $210,000,000 change in net profits, which would go from $2.1 billion to $1.89 billion. So, any new regulatory costs above $210,000,000 would be significant for purposes of the SIA analysis as conducted by ADE, as these costs would mean a change in net profits of ten percent or more.

Table 3 — Comparison of Significance Levels Test: "Reduction in Net Profits By Ten Percent Or More" Approach with "Reduction in ROE Rates By Ten Percent or More" Approach

Scenario One: Ten-Percent Reduction in Net Profits	Revenues (Bay Area)	Profits (Bay Area)	ROS
Scenario 1-1: Bay Area Refineries Assuming $2.1 billion in net profits	$30,300,000,000	$2,100,000,000	6.93%
Scenario 1-2: Bay Area Refineries Assuming 90% of $2.1 billion in net profits	$30,300,000,000	$1,890,000,000	6.24%
Scenario 1-3: Reduction in Profit By Ten Percent		-$210,000,000	-10.00%
Scenario Two: Ten-Percent Reduction in Return on Equity Ratio	**Revenues (Bay Area)**	**Profits (Bay Area)**	**ROE**
Scenario 2-1: Bay Area Refineries Assuming 12.87% ROE	$16,313,412,841	$2,100,000,000	12.87%
Scenario 2-2: Bay Area Refineries Assuming 11.59% ROE	$16,313,412,841	$1,890,000,000	11.59%
Scenario 2-3: Change in Profit Needed to Go From 12.87% ROE to 11.59% ROE		-$210,000,000	-10.00%

In the second scenario in the table above, we analyze significance from a strict reading of the Berck "ten-percent" rule of thumb, which posits that rules have significant costs if these costs change ROE rates by ten percent or more. For argument's sake, let us assume that profits generated in this example are $2.1 billion. While local data on the ROE rate(s) for Bay Area refineries is not readily available, nationally we know refineries' ROE is 12.87 percent. A ten-percent change in this ROE rate means that what was previously 12.87 percent would now be 11.59 percent. The amount of dollars in discrete terms necessary to move an initial 12.87 ROE rate at $2.1 billion to a lower ROE rate of 11.59 percent is $210,000,000. So, any new regulatory costs above $210,000,000 would be significant for purposes of the SIA analysis utilizing a strict reading of Berck, as these costs would mean a change in the ROE rate by ten percent or more.

USE OF A COMPUTABLE EQUILIBRIUM MODEL

While a CGE model would be a potential tool in modeling the effects of price changes, ADE has been able to address this effect by explicitly estimating price changes due to emissions rule compliance costs and modeling the effect of such increases directly on supplier industries or the household population as appropriate. While this approach was not used in the case of these rules due to the low level of cost impact, it has been used for other rule analyses where clear price effects on consumer goods or intermediate inputs could be ascertained.

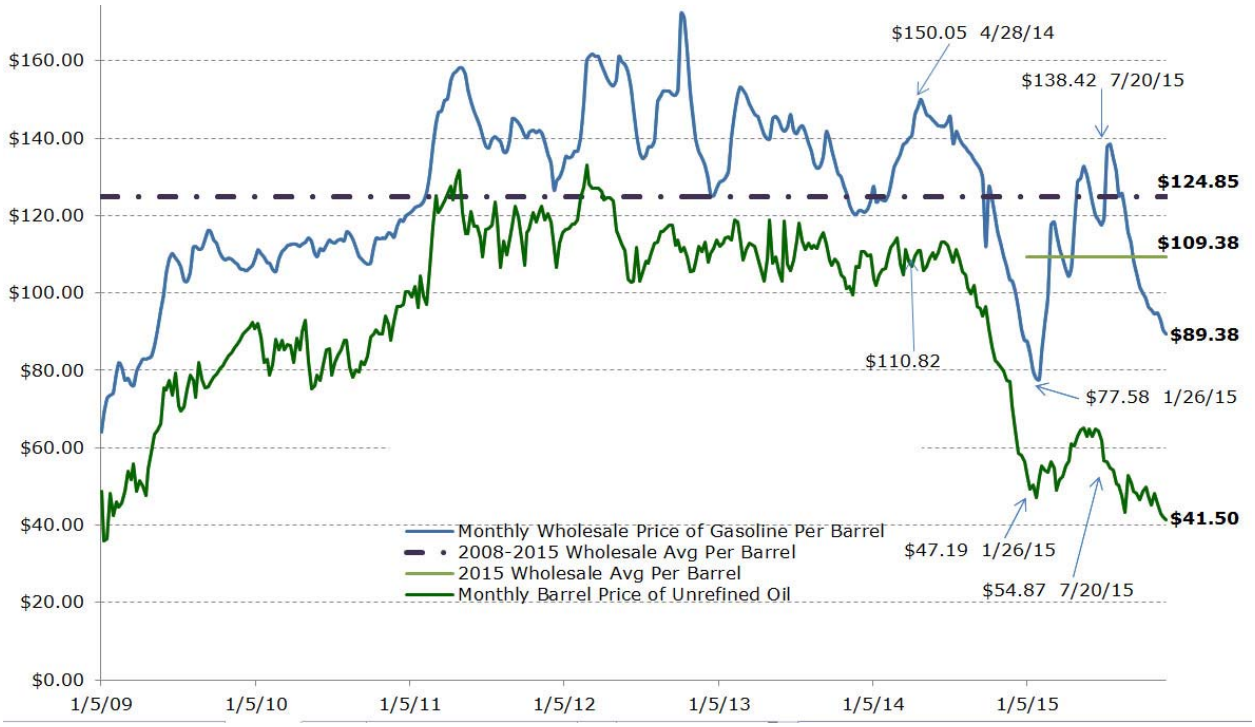
OTHER ISSUES: REVENUES, UTILIZATION RATES, AND NET PROFITS

Beveridge & Diamond commented on a number of matters that are at the heart of ADE's SIA. Namely, how ADE estimates revenues and net profits. With regard to estimating revenues generated by each refinery in the Bay Area, ADE begins its analysis by first obtaining data on throughput capacity for each refinery. This data is available from the California Energy Commission. We adjust the throughput numbers by uniform utilization rates, to account for the fact that on a number of occasions throughout the year refineries go off-line for a variety of reasons. The utilization rate we employed is a national average for the three-year 2012-2014 period, data for which comes from the US Census of Manufacturers' Quarterly Plant Capacity Report. If we use utilization rate data from the Department of Energy EIA – specifically for the West Coast region – the rate would be lower, i.e. 84.5 percent.

We then adjust the throughput numbers even more by applying a processed oil-to-refined product ratio, to account for the fact that the amount of oil that is refined on a per barrel basis is different from the amount of crude oil brought-in for processing by the refinery due to the introduction of additives and other items that alter the "specific gravity" of oil. The ratio we used was 1.027 based on data from the California Energy Commission. The US EIA's ratio is 1.070.

We further divided the throughput numbers into three separate categories – gasoline (63 percent), jet fuel (18 percent), and kerosene (19 percent), to account for the fact that these different types of refined products have different prices. At the time we did the initial Rule 12-15 analysis in late 2014, the per barrel price of refined gasoline over a five-year 2009-2013 was $124 per barrel, with jet fuel at $112.35 and kerosene at $112.07, for an overall weighted average of $119.80. If we update the initial 2009-2013 numbers to include 2014 and 2015, the long-term average per barrel price of refined gasoline over the 2009-2015 period is $125.87 per barrel, with jet fuel at $115.82 and kerosene at $117.85, for an overall weighted average of $122.54. In year 2015 alone, the per barrel price of gasoline averaged $109.38. We estimate a long-term per barrel price of refined product in an effort to balance months and years when the price of refined product is excessively high against those periods when the price is excessively low. Below is a graph of monthly price of refined product – data is for gasoline only, to underscore the fluidity of the price of gasoline on a per barrel basis. Included in the chart for purposes of comparison is data on the per barrel price of crude oil.

Figure 1 — Monthly Trends in Per Barrel Price of Gasoline and Crude Oil: 2009 – 2015



Based on the $119.80 weighted average figure, we estimated that the five refineries generate roughly $30.3 billion in annual revenues. If we include data for 2014 and 2015 on top of the original 2009-2013 data-set, the overall weighted average goes up to $121.90, with the overall revenue estimates going up slightly to $30.8 billion. If we use only data for year 2015 for gasoline ($109.38 per barrel), jet fuel ($94.27 per barrel), and kerosene ($87.47 per barrel), the overall weighted average would amount to $102.49, with the overall revenue estimate at $25.9 billion.

The net profit rate we use for purposes of estimating the discrete amount of net profits generated by the five affected sources come from the US IRS Statistics of Income (SOI) data set. There is a time lag in the data, meaning that at the time we prepared our analysis in late 2014 for new Rules 12-15\12-16, the long-term net profit rate average was based on data for years 2001 through 2011. If we include latest data issued by the US IRS SOI, the long-term (2002-2012) net profit rate would change to 5.6 percent. If we calculate a multi-year average covering the most recent years, such as 2009 through 2012, the average net profit would be 4.9 percent using the IRS SOI data set. As indicated in the Beveridge & Diamond report, we apply the net profit rate across all three general refined product types (gasoline, jet fuel, and kerosene). On a final note, it is worth noting that there has been much recent discussion in what is being referred to as a “boom” in profits generated by refineries based in California (see Ivan Penn and Samantha Masunaga, "California oil refineries' gross profits nearly double in 2015", Los Angeles Times, July 21, 2015 [http://lat.ms/1gNzoz6]).

Below we present our findings using the lower US EIA utilization rate, the lower refined product prices based on 2015 data only (i.e. gasoline at $109.39, jet fuel at $94.27, and kerosene at $87.47, and overall

weighted average at $102.49), and net profit rate for 2009-2012 period (i.e. 4.89 percent). If we adopt these numbers into our model, we still would conclude that impacts stemming from the proposed Rules 12-15\12-16 would be less than significant, as the cost to net profit ratios are well below the 10 percent threshold.

Table 4 — Alternative Socioeconomic Impact Analysis: Proposed New Rule 12-15\12-16

Revenue (est.) (based on lower utilization rate and per barrel price assumptions)	$25,269,431,508
After Tax Net Profits (based on lower net profit rate)	$1,235,159,318
Annual Cost (Reg 12, Rule 15 change): capital equipment: low range	$3,368,750
Annual Cost (Reg 12, Rule 15 change): capital equipment: upper range	$3,675,000
One Time Costs (Reg 12, Rule 15 change): Air Monitoring Plan/HRA Costs: lower range	$1,500,000
One Time Costs (Reg 12, Rule 15 change): Air Monitoring Plan/HRA Costs: upper range	$2,500,000
Ongoing Costs (Reg 12, Rule 15 change): Inventory Costs/PREP: lower range	$325,000
Ongoing Costs (Reg 12, Rule 15 change): Inventory Costs/PREP: upper range	$450,000
Cost to Net Profits, including one-time costs: lower range	0.42%
Cost to Net Profits, including one-time costs: upper range	0.54%
Cost to Net Profits, excluding one-time costs: lower range	0.30%
Cost to Net Profits, excluding one-time costs: upper range	0.33%
Significant	Less than significant

Source: Applied Development Economics, Inc.

Negative Declaration for the Bay Area Air Quality Management District

BAAQMD Petroleum Refinery Emissions Reduction Strategy

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December 2015

Chapter 1

Chapter 2

Chapter 3

FIGURES:

TABLES:

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CHAPTER 1

Introduction

1.1 PURPOSE OF THIS DOCUMENT

This Negative Declaration assesses the environmental impacts of the proposed Petroleum Refinery Emissions Reduction Strategy (proposed project) by the Bay Area Air Quality Management District (BAAQMD or Air District). This assessment is required by the California Environmental Quality Act (CEQA) and in compliance with the state CEQA Guidelines (Title 14 California Code of Regulations §15000 et seq.). A Negative Declaration serves as an informational document to be used in the decision-making process for a public agency that intends to carry out a project, it does not recommend approval or denial of the project analyzed in the document. The Air District is the lead agency under CEQA and must consider the impacts of the proposed new and amendment rules when determining whether to adopt them. The Air District has prepared this Negative Declaration because no significant adverse impacts are expected to result from the Petroleum Refinery Emissions Reduction Strategy.

1.2 SCOPE OF THIS DOCUMENT

This document evaluates the potential impacts of the proposed amendments on the following resource areas:

- aesthetics,
- agriculture and forestry resources,
- air quality,
- biological resources,
- cultural resources,
- geology / soils,
- greenhouse gas emissions,
- hazards & hazardous materials,
- hydrology / water quality,
- land use / planning,

- mineral resources,
- noise,
- population / housing,
- public services,
- recreation,
- transportation / traffic, and
- utilities / service systems.

1.3 IMPACT TERMINOLOGY

The following terminology is used in this Initial Study/Negative Declaration to describe the levels of significance of impacts that would result from the proposed rule amendments:

- An impact is considered *beneficial* when the analysis concludes that the project would have a positive effect on a particular resource.
- A conclusion of *no impact* is appropriate when the analysis concludes that there would be no impact on a particular resource from the proposed project.
- An impact is considered *less than significant* if the analysis concludes that an impact on a particular resource topic would not be significant (i.e., would not exceed certain criteria or guidelines established by Air District). Impacts are frequently considered less than significant when the changes are minor relative to the size of the available resource base or would not change an existing resource.
- An impact is considered *less than significant with mitigation incorporated* if the analysis concludes that an impact on a particular resource topic would be significant (i.e., would exceed certain criteria or guidelines established by Air District), but would be reduced to a less than significant level through the implementation of mitigation measures.

1.4 ORGANIZATION OF THIS DOCUMENT

The content and format of this document, described below, are designed to meet the requirements of CEQA.

- Chapter 1, “Introduction,” identifies the purpose, scope, and terminology of the document.

- Chapter 2, "Description of the Proposed Rule," provides background information of Petroleum Refinery Emissions Reduction Strategy, describes the proposed rule, and describes the area and facilities that would be affected by the rules.

- Chapter 3, "Environmental Checklist," presents the checklist responses for each resource topic. This chapter includes a brief setting description for each resource area and identifies the impact of the proposed rule amendments on the resources topics listed in the checklist.

- Chapter 4, "References Cited," identifies all printed references and personal communications cited in this report.

CHAPTER 2

Description of the Proposed Rules and Amendments

2.1 OVERVIEW

The proposed project consists of three new or amended rules to control criteria emissions and their precursors, including sulfur dioxide (SO_2), oxides of nitrogen (NOx), particulate matter (PM), particulate matter less than 2.5 microns equivalent aerodynamic diameter ($PM_{2.5}$), ammonia, organic gases; and toxic compounds from the five Bay Area refineries and associated facilities. The Air District proposes to reduce refinery emissions by amending several Air District rules affecting petroleum refineries and developing additional rules focusing on specific refinery processes.

The proposed project includes the following new/modified rules:

- New proposed Regulation 6, Rule 5 (Rule 6-5) -Fluidized Catalytic Cracking Units (FCCU), to address emissions of ammonia and condensable PM formation.
- Proposed amendments to existing Regulation 8, Rule 18 (Rule 8-18) – Equipment Leaks, to address fugitive emissions of ROG and toxic compounds from equipment in heavy liquid service; and
- Proposed amendments to existing Regulation 11, Rule 10 (Rule 11-10) – Toxic and ROG Emissions from Cooling Towers, to address ROG emissions and toxic air contaminants (TACs) from cooling towers.

The Air District is moving these individual actions through the rulemaking process as a package and, therefore, address the potential impacts from these actions in a cohesive manner. There should be no inference that this approach creates dependencies between these rule actions. Each rulemaking action is independent from the others and will be individually evaluated according to the requirements of the California Health and Safety Code (H&SC).

The 2011 Bay Area Emissions Inventory for stationary sources indicates that refineries are the largest individual stationary source of reactive organic gases (ROG) emissions and are the predominant source of SO_2 emissions. Additionally, the five Bay Area refineries rank among the top ten facilities in the Bay Area for risk-weighted emissions of TACs based on an evaluation of emissions from stationary sources in 2012 using risk factors for cancer and chronic hazard index.

2.2 OBJECTIVES

The objectives of the proposed new and amended rules are to achieve technically feasible and cost-effective emission reductions from the five Bay Area refineries and five associated facilities. Specific objectives include the following:

- Reduce ammonia and particulate matter formation from FCCUs.
- Reduce fugitive ROG emissions and TACs from equipment in heavy liquid service.
- Reduce ROG and TAC emissions from cooling towers.

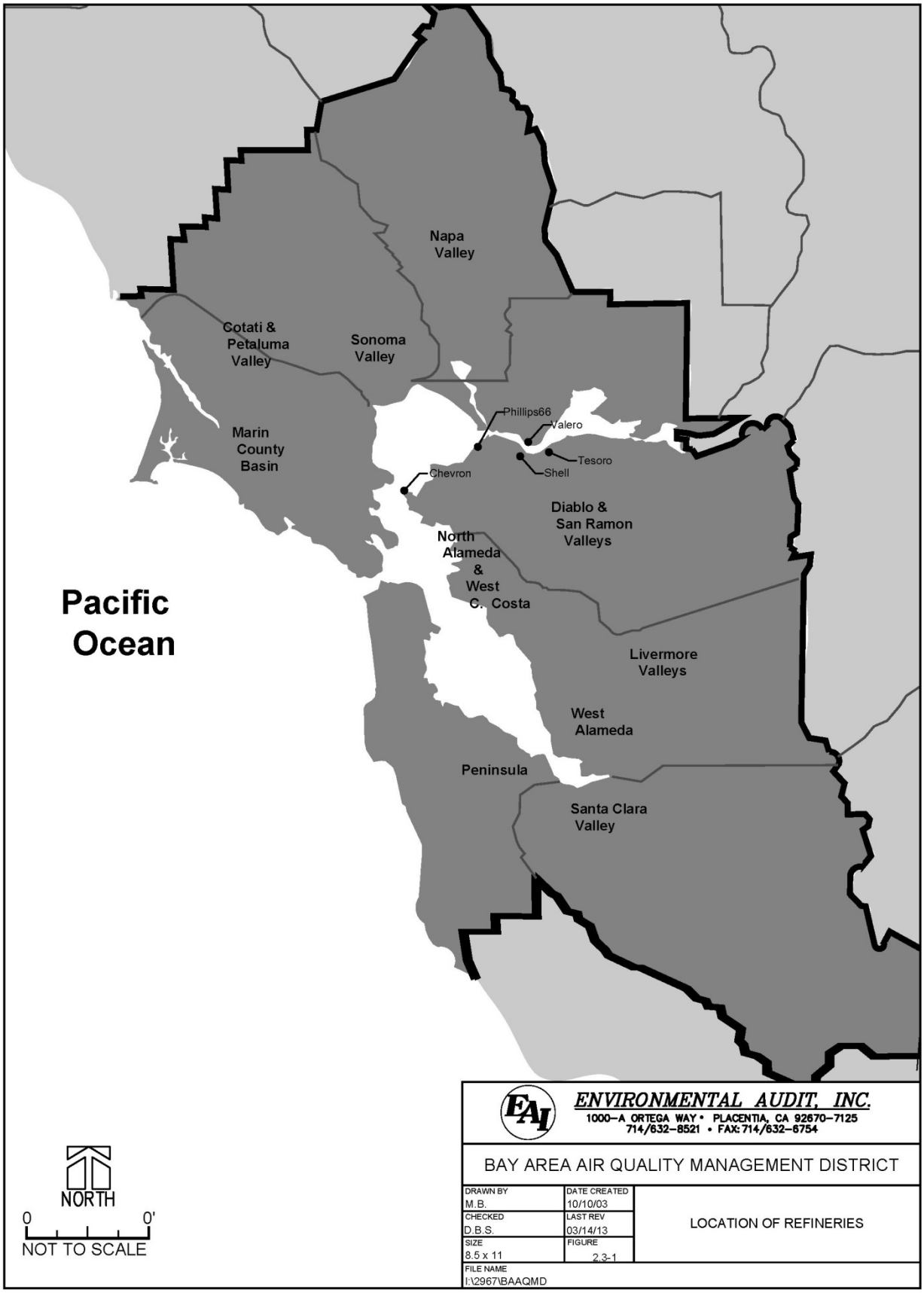
The Bay Area and neighboring regions are not in attainment of State ozone or particulate matter standards. Further reductions in emissions are needed. Emission reductions can be achieved by abatement from mobile sources, point sources, fugitive capture enhancement, and pollution prevention practices.

The U.S. Environmental Protection Agency (EPA) has set primary national ambient air quality standards for air pollutants to define the levels considered safe for human health. The California Air Resources Board (CARB) has also set California ambient air quality standards. The Bay Area is a non-attainment area for particulate matter of 10 microns or less (PM_{10}), $PM_{2.5}$ and for ozone. Under State law, non-attainment areas must prepare plans showing how they will attain the state standards. The Air District has prepared, approved and is currently implementing, the 2010 Clean Air Plan (CAP) which provides a plan to show how the Air District will achieve and maintain applicable air quality standards.

2.3 BACKGROUND

Currently five petroleum refineries are located in the Bay Area within the jurisdiction of the Air District (see Figure 2.2-1):

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


Napa Valley
Cotati & Petaluma Valley
Sonoma Valley
Marin County Basin
Phillips66
Valero
Tesoro
Shell
Chevron
Diablo & San Ramon Valleys
North Alameda & West C. Costa
Pacific Ocean
Livermore Valleys
West Alameda
Peninsula
Santa Clara Valley
NORTH
0 0'
NOT TO SCALE
ENVIRONMENTAL AUDIT, INC.
1000-A ORTEGA WAY • PLACENTIA, CA 92670-7125
714/632-8521 • FAX: 714/632-6754
BAY AREA AIR QUALITY MANAGEMENT DISTRICT
DRAWN BY M.B.
DATE CREATED 10/10/03
CHECKED D.B.S.
LAST REV 03/14/13
SIZE 8.5 x 11
FIGURE 2.3-1
LOCATION OF REFINERIES
FILE NAME I:\2967\BAAQMD

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

- Chemtrade West (sulfuric acid plant that supports Chevron)
- Eco Services (formerly called Sovay; sulfuric acid plant that supports Shell and Valero regularly, and Tesoro as needed it its acid plant is down for maintenance);
- Two Air Products Hydrogen Plants (hydrogen plant that supports Tesoro and a separate plant that supports Shell)
- Air Liquide (hydrogen plant that supports Phillips 66)

Petroleum refineries convert crude oil into a wide variety of refined products, including gasoline, aviation fuel, diesel and other fuel oils, lubricating oils, and feed stocks for the petrochemical industry. Crude oil consists of a complex mixture of hydrocarbon compounds with smaller amounts of impurities including sulfur, nitrogen, oxygen and metals (e.g., iron, copper, nickel, and vanadium).

Air pollutants are categorized and regulated based on their properties and there are three primary categories of regulated air pollutants: (1) criteria pollutants; (2) toxic air contaminants; and (3) climate pollutants. Additional categories of air pollutants include odorous compounds and visible emissions.

Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been set and include: (1) carbon monoxide (CO); (2) nitrogen dioxide (NO_2); (3) PM_{10}; (4) $PM_{2.5}$; (5) ozone; (6) SO_2; and (7) lead. Each of these criteria pollutants are emitted by petroleum refineries.

TACs are emissions for which AAQS have generally not been established, but may result in human health risks. The state list of TACs currently includes approximately 190 separate chemical compounds, and groups of compounds. TACs emitted from petroleum refineries include volatile organic TACs, semi-volatile and non-volatile organic TACs, metallic TACs, and other inorganic TACs.

Climate pollutants (e.g., greenhouse gases, or GHGs) are emissions that include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and three groups of fluorinated compounds (i.e., hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)), and are the major anthropogenic GHGs. GHGs emitted from petroleum refineries include CO_2, CH_4 and N_2O.

2.4 PROPOSED NEW RULES AND AMENDMENTS

The proposed project consists of three new or amended rules to control criteria emissions and their precursors, from the five Bay Area refineries and associated facilities. The Air District proposes to reduce refinery emissions by amending several Air District rules affecting petroleum refineries and developing additional rules focusing on specific

refinery processes. This section discusses the specific requirements of the proposed new and modified rules.

2.4.1 NEW PROPOSED RULE 6-5: FLUIDIZED CATALYTIC CRACKING UNIT

FCCUs are considered major sources of particulate emissions, including condensable PM emissions that are not well controlled by the electrostatic precipitators (ESP) installed at the FCCUs. Other typical emissions from FCCUs are SO_2, sulfur trioxide (SO_3), NO_2, nitric oxide (NO), and ammonia slip (NH_3).

The purpose of an FCCU at a refinery is to convert or "crack" heavy oils (hydrocarbons), with the assistance of a catalyst, into gasoline and lighter petroleum products. Each FCCU consists of three main components: a reaction chamber, a catalyst regenerator and a fractionator. Crude enters the reaction chamber, where it is mixed with a catalyst, typically a fine powder, under high heat. A chemical reaction occurs that converts the heavy oil liquid into a cracked hydrocarbon vapor mixed with catalyst. The cracked hydrocarbon vapor is routed to a distillation column or fractionator for further separation into lighter hydrocarbon components. Eventually, the catalyst becomes inactive or spent and is regenerated, first by removing oil residue using steam stripping. The spent catalyst is then sent to the catalyst regenerator where hot air burns the coke layer off of the surface of each catalyst particle to produce reactivated or regenerated catalyst. Subsequently, the regenerated catalyst is cycled back to the reaction chamber and mixed with more fresh heavy liquid oil feed.

The primary source of $PM_{2.5}$ emissions from the catalytic cracking process is the catalyst regenerator unit. (The waste heat from the regenerator unit also provides much of the heat required by the catalytic cracking process.) During the cracking process, coke is deposited on the surface of the catalyst, deactivating the material. The catalyst is regenerated by burning off the coke at high temperatures. The flue gas from the regenerator unit contains SO_2, $PM_{2.5}$, and catalyst fines (as well NOx). In addition, organic metals in heavy gas oils can be deposited on the coke formed in the FCCU. When the coke is burned in the regenerator unit, these metals then deposit on the catalyst. A portion of this catalyst is emitted from the FCCU as particulates containing these metal compounds.

Because the FCCU exhaust contains a number of pollutant species, a combination of emission control techniques are often used in FCCUs – Typically flue gas additives are used to control NOx and SO_2 and an ESP to control PM. Bay Area refineries also use selective catalytic reduction (SCR) for NOx control and wet gas scrubbers for control of multiple pollutants.

Draft Rule 6-5 would limit ammonia emissions from petroleum refinery FCCUs to 10 parts per million by volume dry (ppmvd), corrected to three percent oxygen. Alternatively, the refineries could use an optimization program to determine the level of ammonia emissions that minimizes overall $PM_{2.5}$ emissions. No later than January 1,

2017, the owner/operator of a Petroleum Refinery subject to these ammonia emission limits shall submit to the APCO a control plan detailing the measures, if any, to be taken in order to meet the emission limit requirements. In addition, refinery owner/operators must submit all applications for Authorities to Construct by this date if additional control equipment is necessary for compliance to meet emission limits. The refineries affected by the proposed project, no later than January 1, 2018, shall operate CEMs or alternate, APCO-approved monitoring to continuously measure the ammonia emissions.

It is expected that the affected FCCUs can comply with the emission limits from the associated ESPs by using significantly lower ammonia emission rates. It is expected that the refineries that use ammonia or urea injection will be able to meet the proposed limits by optimizing injection locations and rates.

2.4.2 PROPOSED AMENDMENTS TO RULE 8-18: EQUIPMENT LEAKS

The purpose of the proposed amendments to Rule 8-18 is to limit emissions of total organic compounds from equipment leaks at petroleum refineries, chemical plants, bulk plants and bulk terminals including, but not limited to, valves, connectors, pumps, compressors, pressure relief devices, diaphragms, hatches, sight-glasses, fittings, sampling ports, meters, pipes, and vessels.

Oil refineries, chemical plants, bulk plants, bulk terminals, and other facilities that store, transport, and use volatile organic liquids can lose some organic material as fugitive emissions wherever there is a connection between two pieces of equipment. Valves, pumps, and compressors can also leak organic material. Rule 8-18 requires such facilities to maintain a leak detection and repair (LDAR) program. The purpose of the LDAR program is to ensure that all equipment is inspected regularly and, if a leak is found to exceed the leak threshold, the equipment must be repaired, replaced, or placed on a limited list of non-repairable equipment. Currently, the Air District inspection requirements do not apply to equipment in heavy liquid service, however, these components are subject to the leak standards contained in Rule 8-18.

The allowable leak standard is 500 parts per million volume (ppmv) for pumps, compressors, and pressure relief devices (PRDs). For valves and other equipment, the allowable leak standard is 100 ppmv. Leaks are detected using a portable combustible gas indicator.

The proposed amendments to Rule 8-18 would:

- Become effective January 1, 2018;
    - Include identification and monitoring of heavy liquid service equipment, and,
    - Subject heavy liquid service equipment to leak minimization and repair requirements;

- Amend the non-repairable equipment standard to reduce the allowable amount of equipment placed on non-repairable list;
- Identify the cause of any background reading greater than 50 ppmv;
- Require mass emission monitoring for all equipment placed on the non-repairable equipment list; and
- Add a maximum leak concentration and/or mass emissions limit for fugitive equipment subject to the rule.

In addition, administrative changes to rule language are proposed to improve clarification and enforceability of the rule.

2.4.2.1 Monitoring of Equipment in Heavy Liquid Service

Based on the Air District's 2013 emissions inventory, fugitive emissions from the heavy liquid equipment are estimated at 1,476 tons per year (excluding methane). However, equipment in heavy liquid service is not currently subject to routine inspection and repair under Rule 8-18. Table 2.3-1 summarizes the equipment in heavy liquid service at the five major refineries. It should be noted that the proposed amendments to Rule 8-18 would also include fugitive components in heavy liquid service at chemical plants, bulk plants, bulk terminals, and other facilities that store, transport and use organic liquids.

TABLE 2.4-1

Heavy Liquid Service Equipment Fugitive Component Counts

Facility	Valves	Pumps	PRDs	Connectors
Chevron	32,228	1,859	62	127,977
Phillips 66	6,655	293	6	27,350
Shell	12,734	337	20	37,361
Tesoro	10,976	250	70	38,416
Valero	15,570	193	0	56,596
Total	**78,163**	**2,932**	**158**	**287,700**

Notes: [1] The count includes atmospheric PRSs only
[2] An average multiplier (3.5 X total valve inventory) was used to determine the total connector count for facilities that did not provide and accurate connector count.

2.4.2.2 Reducing the Amount of Equipment on Non-Repairable List

The Air District established the non-repairable list to allow sources to delay repairs of essential equipment for five years or until the next scheduled turnaround, whichever comes first. Essential equipment is defined as any equipment that cannot be removed from service unless the process unit is shut down and the component is isolated. This activity would likely create more emissions than the actual fugitive leaks.

The five refineries in the Bay Area currently have an average of 24 pieces of equipment, mostly valves and connectors, on their non-repairable equipment lists. The average percentage of valves and connectors on a non-repairable list is 0.04 percent (allowable percentage of valves including connectors is 0.30 percent), which indicates the LDAR programs implemented at the five refineries can achieve a much lower fraction of equipment placed on a non-repairable list than the fraction currently allowable by the rule. Further efforts in eliminating equipment from the non-repairable list may enable LDAR programs to approach the point where non-repairable equipment lists would no longer be necessary and the issue of non-repairable equipment could be addressed by other means.

2.4.2.3 Mass Emissions Determination for Equipment on Non-Repairable List

Because all equipment placed on the non-repairable list is allowed to leak above the applicable leak standard for up to five years, the mass emission rate of any equipment placed on the non-repairable equipment list should be determined and should not exceed a mass emissions limit. A mass emissions limit on non-repairable equipment provides an incentive to replace or repair the high emitting equipment as soon as possible, which is better than allowing equipment to remain on the non-repairable list up to five years, regardless of its emission rate.

2.4.2.4 Addition of a Fugitive Mass Emission Limit

Leak standards are expressed as concentration-based limits rather than mass-based limits to better allow field staff to quickly determine compliance. Mass emissions are determined by quantifying both the concentration and the flow rate of a leak. It is possible that low concentration leaks may have a high flow rate resulting in significant emissions. Currently, monitoring of mass emissions is only required for those valves that leak organic compounds greater than 10,000 ppm (a “major leak”) for more than 45 days. No Bay Area refinery has triggered this requirement to date, and therefore, no mass emissions monitoring has been done.

2.4.2.5 Clarification of the Leak Repair Definition

The current rule requires any leak discovered by the operator and not repaired within 24 hours to be minimized within the first 24 hours following leak discovery. The minimization must be done using best modern practices to reduce the leak to the lowest achievable level, regardless of whether the leak is ultimately repaired within the allowed seven days or placed on the non-repairable equipment list.

Many facility owner/operators incorrectly believe cleaning leaking equipment with soap and/or water complies with the best modern practice requirement. As stated in the Air District’s September 2013 Compliance Advisory, leak minimization should include some type of repair attempt, which may include tightening bolts, replacing bolts, tightening packing gland nuts, and injecting lubricant into packing. The Air District intends to

clarify what is required for leak minimization by amending the definition language to identify specific types of minimization methods. Also, the definition will state that cleaning, scrubbing, or washing equipment alone is not considered best modern practice.

2.4.2.6 Identification of High Background Readings

Leak limits are expressed as "above background" where background is defined as, "the ambient concentration of total organic compounds determined at least three meters (10 feet) upwind from the equipment to be inspected and not influenced by any specific emission point as indicated by a hydrocarbon analyzer specified by Section 8-18-501." A review of 2013 monitoring data from the five refineries identified numerous instances of high background concentrations, including a case with a background of 500 ppmv (five times the existing leak standard for equipment other than a pump or pressure relief device and equal to the limit for pumps and pressure relief devices). To address high background concentrations, the Air District is proposing a new requirement that would require identification of the cause of any background reading greater than 50 ppmv (half the existing leak standard). Identification of a cause for elevated background concentrations may identify other equipment in need of repair or replacement.

Compliance with the amendments to Rule 8-18 is expected to be through improved and more stringent leak detection and repair programs that will require monitoring of additional components, more frequent monitoring of some components, and potentially more repair of leaking components. Regulation 8-18 is not expected to require installation of any of air pollution control equipment.

2.4.3 PROPOSED AMENDMENTS TO RULE 11-10: TOXIC AND ROG EMISSIONS FROM COOLING TOWERS

The five petroleum refiners in the Bay Area operate a total of 34 cooling towers. These cooling towers are large, industrial heat exchangers that are used to dissipate significant heat loads to the atmosphere through the evaporation of water. Leaks from heat exchangers can result in organic compounds being stripped from the cooling tower water and emitted to the atmosphere. Based on the 2015 Air District emissions inventory, the cooling towers collectively emitted approximately 2.7 tons per day of organic gases.

Rule 11-10 currently prohibits hexavalent chromium from cooling towers at petroleum refineries. The purpose of amendments to Rule 11-10 is to reduce hydrocarbon emissions from cooling towers at petroleum refineries. A petroleum refinery owner/operator would be required to take action when a total hydrocarbon concentration (THC) of greater than 84 parts per billion by weight (ppbw), or 6 parts per million by volume (ppmv) as measured in stripped air are measured. A total hydrocarbon is any compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate. Monitoring of total hydrocarbon levels shall be measured by an Air District-approved continuous total hydrocarbon, daily water sampling or an alternative daily method approved by the Air District that conforms to the Air District's Manual of Procedures.

Effective July 1, 2016, if cooling tower water contains hydrocarbon concentrations greater than the applicable leak action level, the owner/operator shall minimize the leak as soon as practicable or within five calendar days, and repair the leak and/or remove the defective piece of equipment from service within 21 calendar days of first detecting the leak. If a leak action level is reached, a leak repair shall reduce the concentration of hydrocarbon in cooling tower water to comply with the applicable leak action level and may include but is not limited to the following actions:

- Permanent physical repair of leaking equipment, replacement of equipment, and/or blocking or plugging equipment.
- Replacing the heat exchanger or heat exchanger bundle; or permanently isolating, bypassing, or otherwise removing the leaking heat exchanger from service until it is otherwise repaired.

When the sampling of cooling tower water triggers a leak action level the owner/operator shall:

- Within one calendar day, notify the APCO of the hydrocarbon, pH, iron and chlorine concentration in the cooling water at time and date of leak discovery. List all of the heat exchangers that are served by this cooling tower.
- Within five calendar days, notify the APCO how and where the repair was made, cause of the leak, hydrocarbon speciation and if further repair or replacement is required at next turnaround.

Effective July 1, 2016, the owner/operator shall minimize THC emissions from cooling tower equipment and operations by employing best modern practices that shall include but is not limited to:

- Visual examination and/or non-destructive testing of all heat exchangers upstream of the cooling tower during turnaround for corrosion/damage and back flushing;
- Repassivation of the steel contained in the heat exchangers during turnaround;
- Seal tubes within the heat exchangers if there is evidence of corrosion or pitting during turnaround;
- Perform visual observations, at least once every shift, of the cooling water to detect any changes in the appearance of the water that could indicate hydrocarbon contamination and confirm presence of microbial growth such as turbidity or algae growth below the water line;
- Monitor cooling tower decks at least once every shift, if access to the decks is possible, to detect any unexpected odors from the water via the human olfactory system;
- Measure the residual chlorine in the cooling tower water once every shift;
- Use hand-held monitors, such as or flame ionization detectors (FIDs), once every shift, to detect the presence of total hydrocarbons in the air above the cooling tower water;

- Measure the oxidation reduction potential in the cooling tower water with hand-held monitors a least once every shift; and,
- At least once every shift, track and record the amount of chlorine (or biocide) added to the cooling tower water.

Compliance with the amendments to Rule 11-10 is expected to be through improved and more stringent monitoring and more frequent repair. Amendments to Rule 11-10 are not expected to require installation of any air pollution control equipment.

2.5 ESTIMATED REDUCTIONS

2.5.1 CRITERIA POLLUTANTS

Table 2.5-1 provides the Air District's estimated emission reductions for the regulatory actions associated with the proposed new and amended rules. The Air District has identified significant opportunities for PM and ROG reductions. As sources of filterable PM at the refineries are already cost-effectively controlled, the key opportunity for emissions reductions is from condensable PM. The Air District plans to address condensable PM by regulating emissions from FCCUs.

TABLE 2.5-1

Estimated Emission Reductions (tons per year)

Rule	PM	ROG
Rule 6-5: FCCU[1]	222	--
Rule 8-18: Equipment Leaks	--	1,227
Rule 11-10: Toxic and VOC Emissions from Cooling Towers	--	861
Total	**222**	**2,088**

Notes: [1] Air District staff is estimating a 50 percent reduction in condensable PM emissions from the FCCUs as a result of Rule 6-5. But, since the baseline emissions are uncertain and the impact of the ammonia optimization is uncertain, the actual reductions are likely to be different. If insufficient condensable PM reductions are realized, more expensive add-on controls may be proposed in future rulemaking.

2.5.2 TACs

Several of the rule development efforts undertaken in the strategy would reduce toxic emissions and risk as a co-benefit. Specifically, amendments to Rule 8-18 would reduce VOCs, including toxic compounds, from leaking components, and amendments to Rule 11-10 would reduce TOGs from refinery cooling towers, some of which are also TACs.

2.6 AFFECTED AREA

The proposed project would apply to petroleum refineries under Air District jurisdiction. The jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San

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

The Air District proposes to regulate criteria pollutants, SO_2, organic gases, and TAC from the five Bay Area refineries and associated facilities. The equipment affected by the proposed project are located within the jurisdiction of the Bay Area Air Quality Management District (see Figure 2.3-1).

CHAPTER 3

Environmental Checklist

INTRODUCTION

The environmental checklist provides a standard evaluation tool to identify projects' adverse environmental impacts. This checklist identifies and evaluates potential adverse environmental impacts that may be created by the proposed projects.

GENERAL INFORMATION

Projects Title:	Petroleum Refinery Emissions Reduction Strategy
Lead Agency Name: Lead Agency Address:	Bay Area Air Quality Management District 939 Ellis Street San Francisco, California 94109
Contact Person:	Greg Nudd
Contact Phone Number:	415-749-4786
Projects Location:	The proposed project applies to the area within the jurisdiction of the Bay Area Air Quality Management District, which encompasses all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties.
Projects Sponsor's Name: Projects Sponsor's Address:	Bay Area Air Quality Management District 939 Ellis Street San Francisco, California 94109
General Plan Designation:	The proposed project relates to refineries and ancillary facilities located within the Air District which are primarily located in land use areas designated as industrial.
Zoning:	The proposed project applies to five petroleum refineries and ancillary facilities within the District, which are primarily located in industrially zoned areas.
Description of Projects:	See “Background” in Chapter 2.
Surrounding Land Uses and Setting:	See “Affected Area” in Chapter 2.
Other Public Agencies Whose Approval is Required:	None

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The following environmental impact areas have been assessed to determine their potential to be affected by the proposed projects. As indicated by the checklist on the following pages, environmental topics marked with an "✓" may be adversely affected by the proposed projects. An explanation relative to the determination of impacts can be found following the checklist for each area.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology / Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation / Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION

On the basis of this initial evaluation:

☒ I find the proposed projects COULD NOT have a significant effect on the environment, and that a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed projects could have a significant effect on the environment, there will not be significant effects in this case because revisions in the projects have been made by or agreed to by the projects proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed projects MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed projects MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed projects could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed projects, nothing further is required.

Signature: Date:

Printed Name: Date:

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the projects falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the projects will not expose sensitive receptors to pollutants, based on a project-specific screening analysis.

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, Program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063 (c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.

   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures that were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the projects.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This checklist is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

   a) the significance criteria or threshold, if any, used to evaluate each question; and

   b) the mitigation measure identified, if any, to reduce the impact to less than significance.

SUMMARY OF PROPOSED PROJECTS AND POTENTIAL IMPACTS

Chapter 2 provides a summary of the main components of proposed new Rule 6-5 and amendments to Rules 8-18 and 11-10. A summary of the expected methods of compliance is provided below.

- **New Proposed Rule 6-5: Fluidized Catalytic Cracking Unit:** It is expected that the affected FCCUs can comply with the emission limits from the associated ESPs by using significantly lower ammonia emission rates. It is expected that the refineries that use ammonia or urea injection will be able to meet the proposed limits by optimizing injection locations and rates.

- **Proposed Amendments To Rule 8-18: Equipment Leaks:** Compliance with the amendments to Rule 8-18 is expected to be through improved and more stringent leak detection and repair (LDAR) programs that will require monitoring of additional components, more frequent monitoring of some components, and potentially more repair of components. The amendments to Rule 8-18 is not expected to require installation of any additional air pollution control equipment.

- **Proposed Amendments To Rule 11-10: Toxic And ROG Emissions From Cooling Towers:** Compliance with the amendments to Rule 11-10 is expected to be through improved and more stringent monitoring and more frequent repair of VOC leaks in the cooling towers. Amendments to Rule 11-10 are not expected to require installation of any additional air pollution control equipment.

The impacts of these expected methods of compliance are evaluated in this Negative Declaration. CEQA recognizes that regulatory requirements consisting of monitoring and inspections do not typically generate environmental impacts (see for example, CEQA Guidelines §15309). The proposed amendments to Rules 8-18 and 11-10 have been thoroughly evaluated and it has been concluded that they have no potential to generate any other potentially significant adverse environmental impacts and, therefore, will not be evaluated further in the remaining environmental impact discussions.

Proposed Rule 6-5, however, could require modifications at existing refineries or ancillary facilities to reduce ammonia emissions. Chapter 2 and the summary above identify types of refinery equipment/modifications that are expected due to the implementation of Rule 6-5. The analysis of potential secondary adverse environmental impacts from control strategies identified in Chapter 2 that may be installed as a result of implementing Rule 6-5 have been further analyzed in the subsections below.

ENVIRONMENTAL CHECKLIST AND DISCUSSION

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less-than-Significant Impact	No Impact
I.	**AESTHETICS.**				
	Would the project:				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
b)	Substantially damage to scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?	☐	☐	☐	☑
c)	Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☑
d)	Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles), so that land uses vary greatly and include commercial, industrial, residential, agricultural, and open space uses. Scenic highways or corridors are located throughout the Bay Area.

The proposed projects focus on reducing PM, $PM_{2.5}$, ROG, and NH_3 emissions from FCCUs, cooling towers and equipment leaks. The new and amended rules will affect the five refineries and five associated facilities located within the Bay Area. Petroleum refineries and associated facilities are generally located in industrial areas.

Regulatory Background

Visual resources are generally protected by the City and/or County General Plans through land use and zoning requirements.

Discussion of Impacts

I a-d. The proposed projects are part of the Air District's Petroleum Refinery Emissions Reduction Strategy and are designed to limit emissions of $PM_{2.5}$, ROG, NOx, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks by 20 percent no later than year 2020. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

The proposed projects are not expected to require any new substantial construction or development. Any construction activities to replace or install control equipment at refineries or associated facilities would occur within existing industrial facilities. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Construction activities would be limited to the confines of existing industrial facilities (refineries) and none of the modifications are expected to result in visual changes to the facilities. Therefore, obstruction of scenic resources or degrading the visual character of a site, including but not limited to: trees, rock outcroppings, or historic buildings, is not expected.

The proposed projects are not expected to require any new equipment or any new light generating equipment for compliance. The existing facilities are current lighted for nighttime work and no additional light or glare would be added to impact day or nighttime views in the Bay Area.

Conclusion

Based upon these considerations, no significant adverse aesthetic impacts are expected from adoption of the proposed new and amended rules that comprise the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact

II. AGRICULTURE and FOREST RESOURCES.

In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.--Would the projects:

a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☑
b)	Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?	☐	☐	☐	☑
c)	Conflict with existing zoning for, or cause rezoning of, forest land as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				
d)	Result in the loss of forest land or conversion of forest land to non-forest use?				
e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses vary greatly and include commercial, industrial, residential, agricultural, and open space uses. Some of these agricultural lands are under Williamson Act contracts.

The proposed projects focus on reducing PM, $PM_{2.5}$, ROG, and NH_3 emissions from FCCUs, cooling towers, and equipment leaks. The new and amended rules will affect the five refineries and five associated facilities located within the Bay Area. Petroleum refineries and associated facilities are generally located in industrial areas. Agricultural or forest resources are typically not located within these industrial areas within the Bay Area.

Regulatory Background

Agricultural and forest resources are generally protected by the City and/or County General Plans, Community Plans through land use and zoning requirements, as well as any applicable specific plans, ordinances, local coastal plans, and redevelopment plans.

Discussion of Impacts

II a-e. The proposed projects are part of the Air District's Petroleum Refinery Emissions Reduction Strategy and are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks with a goal of 20 percent emission reductions from refineries no later than year 2020. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The proposed new and amended rules would not require conversion of existing agricultural land to other uses. The proposed projects are not expected to conflict with existing agriculture related zoning designations or Williamson Act contracts. Williamson Act lands within the boundaries of the Air District would not be affected. No effects on agricultural or forestland resources are expected because the proposed projects would not require any new development, but would require monitoring, repair, replacement, or installation of control equipment at affected facilities. All of these activities would be expected to occur within the confines of the existing industrial facilities. Therefore, there is no potential for conversion of farmland to non-agricultural use or conflicts related to agricultural uses or land under a Williamson Act contract, or impacts to forestland resources.

Conclusion

Based upon these considerations, no significant adverse impacts to agricultural and forest resources are expected from the adoption of the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY				
When available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the projects:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☑
b) Violate any air quality standard or contribute to an existing or projected air quality violation?	☐	☐	☑	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the projects region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☑	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☑	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☑	☐

Setting

Meteorological Conditions

The summer climate of the West Coast is dominated by a semi-permanent high centered over the northeastern Pacific Ocean. Because this high pressure cell is quite persistent, storms rarely affect the California coast during the summer. Thus the conditions that persist along the coast of California during summer are a northwest air flow and negligible precipitation. A thermal low pressure area from the Sonoran-Mojave Desert also causes air to flow onshore over the San Francisco Bay Area much of the summer.

In winter, the Pacific High weakens and shifts southward, upwelling ceases, and winter storms become frequent. Almost all of the Bay Area's annual precipitation takes place during the November through April period. During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate and air pollution potential is very low. During winter periods when the Pacific high becomes dominant, inversions become strong and often are surface

based; winds are light and pollution potential is high. These periods are characterized by winds that flow out of the Central Valley into the Bay Area and often include tule fog.

Topography

The San Francisco Bay Area is characterized by complex terrain consisting of coastal mountain ranges, inland valleys, and bays. Elevations of 1,500 feet are common in the higher terrain of this area. Normal wind flow over the area becomes distorted in the lower elevations, especially when the wind velocity is not strong. This distortion is reduced when stronger winds and unstable air masses move over the areas. The distortion is greatest when low level inversions are present with the surface air, beneath the inversion, flowing independently of the air above the inversion.

Winds

In summer, the northwest winds to the west of the Pacific coastline are drawn into the interior through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately to the south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more nearly from the west as they stream through the Golden Gate. This channeling of the flow through the Golden Gate produces a jet that sweeps eastward but widens downstream producing southwest winds at Berkeley and northwest winds at San Jose; a branch curves eastward through the Carquinez Straits and into the Central Valley. Wind speeds may be locally strong in regions where air is channeled through a narrow opening such as the Carquinez Strait, the Golden Gate, or San Bruno Gap.

In winter, the Bay Area experiences periods of storminess and moderate-to-strong winds and periods of stagnation with very light winds. Winter stagnation episodes are characterized by outflow from the Central Valley, nighttime drainage flows in coastal valleys, weak onshore flows in the afternoon and otherwise light and variable winds.

Temperature

In summer, the distribution of temperature near the surface over the Bay Area is determined in large part by the effect of the differential heating between land and water surfaces. This process produces a large-scale gradient between the coast and the Central Valley as well as small-scale local gradients along the shorelines of the ocean and bays. The winter mean temperature high and lows reverse the summer relationship; daytime variations are small while mean minimum nighttime temperatures show large differences and strong gradients. The moderating effect of the ocean influences warmer minimums along the coast and penetrating the Bay. The coldest temperatures are in the sheltered valleys, implying strong radiation inversions and very limited vertical diffusion.

Inversions

A primary factor in air quality is the mixing depth, i.e., the vertical dimension available for dilution of contaminant sources near the ground. Over the Bay Area, the frequent occurrence of

temperature inversions limits this mixing depth and consequently limits the availability of air for dilution. A temperature inversion may be described as a layer or layers of warmer air over cooler air.

Precipitation

The San Francisco Bay Area climate is characterized by moderately wet winters and dry summers. Winter rains (December through March) account for about 75 percent of the average annual rainfall; about 90 percent of the annual total rainfall is received in November to April period; and between June and September, normal rainfall is typically less than 0.10 inches. Annual precipitation amounts show greater differences in short distances. Annual totals exceed 40 inches in the mountains and are less than 15 inches in the sheltered valleys.

Pollution Potential

The Bay Area is subject to a combination of physiographic and climatic factors that result in a low potential for pollutant buildups near the coast and a high potential in sheltered inland valleys. In summer, areas with high average maximum temperatures tend to be sheltered inland valleys with abundant sunshine and light winds. Areas with low average maximum temperatures are exposed to the prevailing ocean breeze and experience frequent fog or stratus. Locations with warm summer days have a higher pollution potential than the cooler locations along the coast and bays.

In winter, pollution potential is related to the nighttime minimum temperature. Low minimum temperatures are associated with strong radiation inversions in inland valleys that are protected from the moderating influences of the ocean and bays. Conversely, coastal locations experience higher average nighttime temperatures, weaker inversions, stronger breezes and consequently less air pollution potential.

Air Quality

Criteria Pollutants

It is the responsibility of the Air District to ensure that State and federal ambient air quality standards are achieved and maintained in its geographical jurisdiction. Health-based air quality standards have been established by California and the federal government for the following criteria air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), PM_{10}, $PM_{2.5}$, sulfur dioxide (SO_2) and lead. These standards were established to protect sensitive receptors with a margin of safety from adverse health impacts due to exposure to air pollution. California has also established standards for sulfate, visibility, hydrogen sulfide, and vinyl chloride.

The State and federal ambient air quality standards for each of these pollutants and their effects on health are summarized in Table 3-1. The Air District monitored levels of various criteria pollutants at 25 monitoring stations in 2014.

The 2014 air quality data from the Air District monitoring stations are presented in Table 3-2. The data indicate that the air quality at all monitoring stations were below the State standard and federal ambient air quality standards for CO, NO_2, and SO_2. The federal 8-hour ozone standard was exceeded on eight days in the Air District in 2014, while the State 8-hour standard was exceeded on ten days. The State 1-hour ozone standard was exceeded on three days in 2014 in the District. The ozone standards are most frequently exceeded in the Eastern District (Livermore (seven days for the State 8-hour standard and four days for the federal 8-hour standard), following by San Ramon (four days for the State 8-hour standard and three days for the federal 8-hour standard) and San Martin (three days for the State 8-hour standard and five days for the federal 8-hour standard) (see Table 3-2).

The Air District meets the federal PM_{10} standards, but failed to meet the California annual mean standard of 20 $\mu g/m^3$ in 2011 and 2013. The Air District failed to meet the federal and California $PM_{2.5}$ annual mean standard of 12 $\mu g/m^3$ at two locations in 2013. The Air District has not exceeded the federal $PM_{2.5}$ 24-hour standard of 35 $\mu g/m^3$ often enough to be in non-attainment, but did exceed the standard 46 times in the most recent five year period.

Air quality conditions in the San Francisco Bay Area have improved since the Air District was created in 1955. Ambient concentrations of air pollutants and the number of days on which the region exceeds air quality standards have fallen dramatically (see Table 3-3). The Air District is in attainment of the State and federal ambient air quality standards for CO, NOx, and SO_2. The Air District is not considered to be in attainment with the ozone standards and State PM_{10} and $PM_{2.5}$ standards.

TABLE 3-1

Federal and State Ambient Air Quality Standards

	STATE STANDARD	FEDERAL PRIMARY STANDARD	MOST RELEVANT EFFECTS
AIR POLLUTANT	CONCENTRATION/ AVERAGING TIME	CONCENTRATION/ AVERAGING TIME	
Ozone	0.09 ppm, 1-hr. avg. > 0.070 ppm, 8-hr	0.075 ppm, 8-hr avg. >	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. > 20 ppm, 1-hr avg. >	9 ppm, 8-hr avg.> 35 ppm, 1-hr avg.>	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.03 ppm, annual avg.> 0.18 ppm, 1-hr avg. >	0.053 ppm, ann. avg.> 0.10 ppm, 1-hr avg.>	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg.> 0.25 ppm, 1-hr. avg. >	0.5 ppm, 3-hr. avg.> 0.075 ppm, 1-hr avg.>	(a) Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM_{10})	20 µg/m3, annual arithmetic mean > 50 µg/m3, 24-hr average>	150 µg/m3, 24-hr avg.>	$PM_{2.5}$ standards effectively address: (a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children. PM10 standards address additional concerns may exist with regard to long-term exposures to coarse particles that have not been fully identified by scientific research.
Suspended Particulate Matter ($PM_{2.5}$)	12 µg/m3, annual arithmetic mean>	12 µg/m3, annual arithmetic mean> 35 µg/m3, 24-hour average>	Decreased lung function from exposures and exacerbation of symptoms in sensitive patients with respiratory disease; elderly; children.
Sulfates	25 µg/m3, 24-hr avg. >=		(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	1.5 µg/m3, 30-day avg. >=	1.5 µg/m3, calendar quarter> 0.15 µg/m3, 3-mo. avg. >	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount to give an extinction coefficient >0.23 inverse kilometers (visual range to less than 10 miles) with relative humidity less than 70%, 8-hour average (10am – 6pm PST)		Nephelometry and AISI Tape Sampler; instrumental measurement on days when relative humidity is less than 70 percent

TABLE 3-2
Bay Area Air Pollution Summary - 2014

MONITORING STATIONS	OZONE						CARBON MONOXIDE			NITROGEN DIOXIDE			SULFUR DIOXIDE			PM 10				PM 2.5				
	Max 1-hr	Cal 1-hr Days	Max 8-hr	Nat 8-Hr Days	Cal 8-hr Days	3-Yr Avg	Max 1-hr	Max 8-hr	Nat/ Cal Days	Max 1-Hr	Ann Avg	Nat/ Cal 1-hr	Max 1-hr	Max 24-hr	Nat/ Cal 1-hr	Ann Avg	Max 24-hr	Nat Days	Cal Days	Max 24-hr	Nat 24-hr Days	3-Yr Avg	Ann Avg	3-Yr Avg
North Counties	(ppb)						(ppm)			(ppb)			(ppb)			($\mu g/m^3$)				($\mu g/m^3$)				
Napa*	74	0	66	0	0	58	2.2	1.4	0	46	8	0	-	-	-	15.8	39	0	0	29.9	0	*	12.0	*
San Rafael	88	0	68	0	0	56	1.9	1.1	0	62	11	0	-	-	-	14.1	41	0	0	38.1	1	22	10.8	9.8
Sebastopol*	67	0	62	0	0	*	1.4	0.9	0	44	4	0	-	-	-	-	-	-	-	26.2	0	*	7.7	*
Vallejo	77	0	68	0	0	58	2.5	2.1	0	50	8	0	23.9	2.4	0	-	-	-	-	39.6	1	26	9.9	9.6
Coast/Central Bay																								
Laney College Fwy*	-	-	-	-	-	-	2.0	1.1	0	65	17	0	-	-	-	-	-	-	-	26.0	0	*	8.4	*
Oakland	83	0	69	0	0	47	2.8	1.7	0	82	12	0	-	-	-	-	-	-	-	37.6	1	24	8.5	9.4
Oakland-West*	72	0	59	0	0	47	3.0	2.6	0	56	14	0	16.5	3.3	0	-	-	-	-	38.8	1	*	9.5	*
Richmond	-	-	-	-	-	-	-	-	-	-	-	-	19.2	5.0	0	-	-	-	-	-	-	-	-	-
San Francisco	79	0	69	0	0	47	1.6	1.2	0	84	12	0	-	-	-	17.0	36	0	0	33.2	0	23	7.7	8.6
San Pablo*	75	0	61	0	0	52	1.8	1.0	0	52	9	0	15.3	5.8	0	16.4	46	0	0	38.2	1	*	10.5	*
Eastern District																								
Bethel Island	92	0	71	0	1	67	0.9	0.7	0	33	5	0	10.5	3.4	0	16.7	61	0	1	-	-	-	-	-
Concord	95	1	81	2	2	64	1.4	1.1	0	48	8	0	29.1	4.5	0	14.2	43	0	0	30.6	0	22	6.6	7.0
Crockett	-	-	-	-	-	-	-	-	-	-	-	-	25.7	5.4	0	-	-	-	-	-	-	-	-	-
Fairfield	81	0	70	0	0	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livermore	93	0	80	4	7	72	-	-	-	49	10	0	-	-	-	-	-	-	-	42.9	1	27	7.6	7.5
Martinez	-	-	-	-	-	-	-	-	-	-	-	-	21.2	4.6	0	-	-	-	-	-	-	-	-	-
Patterson Pass	-	-	-	-	-	-	-	-	-	21	3	0	-	-	-	-	-	-	-	-	-	-	-	-
San Ramon	86	0	77	3	4	67	-	-	-	37	6	0	-	-	-	-	-	-	-	-	-	-	-	-
South Central Bay																								
Hayward	96	1	76	0	4	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redwood City	86	0	66	0	0	56	3.2	1.6	0	55	11	0	-	-	-	-	-	-	-	35.0	0	23	7.1	8.8
Santa Clara Valley																								
Gilroy	84	0	74	0	4	66	-	-	-	-	-	-	-	-	-	-	-	-	-	25.7	0	18	6.8	7.6
Los Gatos	90	0	78	1	3	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
San Jose	89	0	66	0	0	60	2.4	1.9	0	58	13	0	3.0	0.9	0	19.9	55	0	2	60.4	2	30	8.4	10.0
San Jose Freeway*	-	-	-	-	-	-	2.2	1.9	0	65	*	0	-	-	-	-	-	-	-	24.3	0	*	*	*
San Martin	97	1	79	3	5	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Days over Standard		**3**		**5**	**10**				**0**			**0**			**0**			**0**	**2**		**3**			

* PM2.5 monitoring using the federally accepted method began at Napa, Oakland West, and San Pablo in December 2012. Therefore, 3-year average PM2.5 statistics are not available. Air monitoring at Sebastopol began in January 2014. Therefore, 3-year average statistics for ozone and PM2.5 are not available. In addition, the Sebastopol site replaced the Santa Rosa site which closed on December 13, 2013. Therefore, statistics for Santa Rosa are not provided in the 2014 summary. Near-road air monitoring at Laney College Freeway began in February 2014. Therefore, 3-year average PM2.5 statistics are not available. Near-road air monitoring at San Jose Freeway began in September 2014. Therefore, annual average NO_2 and 3-year average PM 2.5 statistics are not available.

(ppb) = parts per billion (ppm) = parts per million, ($\mu g/m^3$) = micrograms per cubic meter. (ppb) = parts per billion (ppm) = parts per million, ($\mu g/m^3$) = micrograms per cubic meter.

TABLE 3-3

Bay Area Air Quality Summary
Days over Standards

YEAR	OZONE			CARBON MONOXIDE				NOx		SULFUR DIOXIDE		PM_{10}		$PM_{2.5}$
	8-Hr	1-Hr	8-Hr	1-Hr		8-Hr		1-Hr		1-Hr	24-Hr	24-Hr*		24-Hr
	Nat	Cal	Cal	Nat	Cal	Nat	Cal	Nat	Cal	Nat	Cal	Nat	Cal	Nat
2005	5	9	9	0	0	0	0	0	0	0	0	0	6	21
2006	17	18	22	0	0	0	0	1	0	0	0	0	15	10
2007	2	4	9	0	0	0	0	0	0	0	0	0	4	14
2008	12	9	20	0	0	0	0	0	0	2	0	0	5	12
2009	8	11	13	0	0	0	0	0	0	0	0	0	1	11
2010	9	8	00	0	0	0	0	0	0	0	0	0	2	6
2011	4	5	10	0	0	0	0	0	0	0	0	0	3	8
2012	4	3	8	0	0	0	0	1	0	0	0	0	2	3
2013	3	3	3	0	0	0	0	0	0	0	0	0	6	13
2014	5	3	10	0	0	0	0	0	0	0	0	0	2	3

Some changes in clean air standards occurred over the period from 2005 – 2004. However, the trends continue to improve.

Toxic Air Pollutants

The Air District maintains a database that contains information concerning emissions of toxic air contaminants (TACs) from permitted stationary sources in the Bay Area. This inventory, and a similar inventory for mobile and area sources compiled by California Air Resources Board (CARB), is used to plan strategies to reduce public exposure to TACs. The detailed concentrations of various TACs are reported in the Air District's, Toxic Air Contaminant Control Program, 2010 Annual Report (BAAQMD, 2010) and summarized in Table 3-4. The 2010 TAC data show decreasing concentrations of many TACs in the Bay Area. The most dramatic emission reductions in recent years have been for certain chlorinated compounds that are used as solvents including 1,1,1-trichloroethane, methylene chloride, and perchloroethylene. Table 3-4 contains a summary of ambient air toxics listed by compound.

TABLE 3-4

Summary of BAAQMD Ambient Air Toxics Monitoring Data[1]

Pollutant	Units	Average MDL [1]	% less than MDL	Max Sample Value	Min Sample Value	Average Sample Value [2] [3]
1,3-Butadiene	ppb	5.73E-02	87%	3.30E-01	0.00E+00	3.84E-02
Acetaldehyde	ppb	5.86E-02	0%	3.10E+00	1.97E-01	6.84E-01
Acetone	ppb	1.27E-01	1%	3.50E+01	0.00E+00	2.25E+00
Acetonitrile	ppb	2.55E-01	26%	2.34E+00	0.00E+00	5.09E-01
Antimony	µg/m^3	1.50E-03	78%	5.02E-02	00.0E+00	2.36E-03
Arsenic	µg/m^3	7.81E-04	92%	2.92E-03	0.00E+00	4.32E-04
Benzene	ppb	2.41E-02	1%	1.26E+00	0.00E+00	2.17E-01
Bromomethane	ppb	3.00E-02	95%	7.30E-02	1.50E-02	1.65E-02
Cadmium	µg/m^3	7.81E-04	85%	1.92E-02	0.00E+00	8.67E-04
Carbon Tetrachloride	ppb	1.14E-02	0%	1.70E-01	7.00E-02	1.03E-01
Chlorine	µg/m^3	0.00E+00	5%	3.64E+00	0.00E+00	3.43E-01
Chloroform	ppb	1.14E-02	46%	8.00E-02	0.00E+00	1.95E-02
Chromium	µg/m^3	1.02E-03	25%	1.00E-01	0.00E+00	2.48E-03
Cis-1,3-Dichloropropylene	ppb	1.00E-01	100%	5.00E-02	5.00E-02	5.00E-02
Cobalt	µg/m^3	7.81E-04	76%	3.26E-03	0.00E+00	5.25E-04
Copper	µg/m^3	4.00E-04	31%	4.90E-02	0.00E+00	5.74E-03
Dichloromethane	ppb	1.00E-01	37%	4.40E+00	0.00E+00	1.80E-01
Ethyl Alcohol	ppb	3.00E-01	0%	2.27E+01	4.00E+00	1.16E+01
Ethylbenzene	ppb	6.18E-02	53%	1.20E+00	0.00E+00	8.25E-02
Ethylene Dibromide	ppb	1.00E-02	100%	0.00E+00	0.00E+00	5.00E-03
Ethylene Dichloride	ppb	1.00E-01	100%	0.00E+00	0.00E+00	5.00E-02
Formaldehyde	ppb	6.76E-02	0%	6.30E+00	2.00E-01	1.46E+00
Lead	µg/m^3	7.81E-04	40%	2.40E-01	0.00E+00	4.85E-03
M/P Xylene	ppb	6.18E-02	9%	5.27E+00	0.00E+00	3.18E-01
Magnesium	µg/m^3	0.00E+00	36%	4.88E-01	0.00E+00	5.54E-02
Manganese	µg/m^3	7.81E-04	25%	2.00E-01	0.00E+00	7.06E-03
Mercury	µg/m^3	0.00E+00	98%	1.70E-03	0.00E+00	2.24E-05
Methyl Chloroform	ppb	2.73E-02	88%	4.30E+00	0.00E+00	3.22E-02
Methyl Ethyl Ketone	ppb	1.00E-01	28%	1.78E+00	0.00E+00	1.89E-01
Nickel	µg/m^3	4.50E-03	57%	6.00E-02	0.00E+00	3.39E-03
O-Xylene	ppb	4.82E-02	30%	5.12E+00	0.00E+00	1.21E-01

TABLE 3-4 (Concluded)

Pollutant[4]	Units	Average MDL [2]	% less than MDL	Max Sample Value	Min Sample Value	Average Sample Value [1] [3]
PAHs[4]	ng/m^3					1.90E-01
Selenium	µg/m^3	7.81E-04	76%	8.60E-03	0.00E+00	8.04E-04
Styrene	ppb	1.00E-01	96%	1.20E-01	5.00E-02	5.22E-02
Sulfur	µg/m^3	0.00E+00	0%	1.73E+00	3.74E-02	3.56E-01
Tetrachloroethylene	ppb	5.68E-03	21%	2.80E-01	0.00E+00	1.88E-02
Toluene	ppb	6.18E-02	2%	4.33E+00	0.00E+00	6.22E-01
Trans-1,3-Dichloropropylene	ppb	1.00E-01	100%	5.00E-02	5.00E-02	5.00E-02
Trichloroethylene	ppb	1.14E-02	84%	5.20E-01	0.00E+00	1.42E-02
Trichlorofluoromethane	ppb	1.00E-02	0%	6.90E-01	1.00E-02	1.96E-01
Vanadium	µg/m^3	4.00E-04	72%	5.10E-03	0.00E+00	5.34E-04
Vinyl Chloride	ppb	1.00E-01	100%	0.00E+00	0.00E+00	5.00E-02
Zinc	ng/m^3	1.80E-03	0%	1.90E-01	0.00E+00	1.38E-02

Source: BAAQMD 2010 Toxic Air Contaminant Monitoring Data. Data are a summary of data from all monitoring stations within the District.

1. If an individual sample value was less than the MDL (Minimum Detection Limit), then 1/2 MDL was used to determine the Average Sample Value.
2. Some samples (especially metals) have individual MDLs for each sample. An average of these MDLs was used to determine 1/2 MDL for the Average Sample Value.
3. Data for these two substances was collected but not presented because the sampling procedure is not sanctioned for use by EPA or ARB.
4. For compounds with 100% of sample values less than MDL, please use caution using the assumed Average Sample Values.

Regulatory Background

Criteria Pollutants

At the federal level, the Clean Air Act (CAA) Amendments of 1990 give the United States Environmental Protection Agency (EPA) additional authority to require states to reduce emissions of ozone precursors and particulate matter in non-attainment areas. The amendments set attainment deadlines based on the severity of problems. At the state level, CARB has traditionally established state ambient air quality standards, maintained oversight authority in air quality planning, developed programs for reducing emissions from motor vehicles, developed air emission inventories, collected air quality and meteorological data, and approved state implementation plans. At a local level, California's air districts, including the Bay Area Air Quality Management District, are responsible for overseeing stationary source emissions, approving permits, maintaining emission inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by CEQA.

The Air District is governed by a 22-member Board of Directors composed of publicly-elected officials apportioned according to the population of the represented counties. The Board has the authority to develop and enforce regulations for the control of air pollution within its jurisdiction. The Air District is responsible for implementing emissions standards and other requirements of federal and state laws. It is also responsible for developing air quality planning documents required by both federal and state laws.

Toxic Air Contaminants

TACs are regulated in the Air District through federal, state, and local programs. At the federal level, TACs are regulated primarily under the authority of the CAA. Prior to the amendment of the CAA in 1990, source-specific National Emission Standards for Hazardous Air Pollutants (NESHAPs) were promulgated under Section 112 of the CAA for certain sources of radionuclides and Hazardous Air Pollutants (HAPs).

Title III of the 1990 CAA amendments requires EPA to promulgate NESHAPs on a specified schedule for certain categories of sources identified by EPA as emitting one or more of the 189 listed HAPs. Emission standards for major sources must require the maximum achievable control technology (MACT). MACT is defined as the maximum degree of emission reduction achievable considering cost and non-air quality health and environmental impacts and energy requirements. All NESHAPs have been promulgated.

Many of the sources of TACs that have been identified under the CAA are also subject to the California TAC regulatory programs. CARB developed three regulatory programs for the control of TACs. Each of the programs is discussed in the following subsections.

Control of TACs Under the TAC Identification and Control Program: California's TAC identification and control program, adopted in 1983 as Assembly Bill 1807 (AB 1807) (California Health and Safety Code §39662), is a two-step program in which substances are identified as TACs, and airborne toxic control measures (ATCMs) are adopted to control emissions from specific sources. Since adoption of the program, CARB has identified 18 TACs, and CARB adopted a regulation designating all 189 federal HAPs as TACs.

Control of TACs Under the Air Toxics "Hot Spots" Act: The Air Toxics “Hot Spot” Information and Assessment Act of 1987 (AB 2588) (California Health and Safety Code §39656) establishes a state-wide program to inventory and assess the risks from facilities that emit TACs and to notify the public about significant health risks associated with those emissions. Inventory reports must be updated every four years under current state law. The Air District uses a maximum individual cancer risk of 10 in one million, or an ambient concentration above a non-cancer reference exposure level, as the threshold for notification.

Senate Bill (SB) 1731, enacted in 1992 (California Health and Safety Code §44390 et seq.), amended AB 2588 to include a requirement for facilities with significant risks to prepare and implement a risk reduction plan which will reduce the risk below a defined significant risk level within specified time limits. At a minimum, such facilities must, as quickly as feasible, reduce cancer risk levels that exceed 100 per one million. The BAAQMD adopted

risk reduction requirements for perchloroethylene dry cleaners to fulfill the requirements of SB 1731.

Targeted Control of TACs Under the Community Air Risk Evaluation Program: In 2004, the Air District established the Community Air Risk Evaluation (CARE) program to identify locations with high emissions of toxic air contaminants (TAC) and high exposures of sensitive populations to TAC and to use this information to help establish policies to guide mitigation strategies that obtain the greatest health benefit from TAC emission reductions. For example, the Air District will use information derived from the CARE program to develop and implement targeted risk reduction programs, including grant and incentive programs, community outreach efforts, collaboration with other governmental agencies, model ordinances, new regulations for stationary sources and indirect sources, and advocacy for additional legislation.

Discussion of Impacts

III a. The proposed projects are not expected to conflict with or obstruct implementation of the applicable air quality plan. Development of the proposed projects have delayed preparation of some potential control measures for the 2016 Clean Air Plan. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The 2010 Clean Air Plan is the most recently adopted air quality plan for the Bay Area. The proposed new and amended rules would contribute directly to meeting the objectives of the 2010 Clean Air Plan by reducing particulate emissions and contributing towards attaining the state and federal ambient air quality standards for ozone and $PM_{2.5}$.

Because the proposed rule amendments would reduce PM, ROG, emissions and meet the objectives of the 2010 Clean Air Plan, the proposed amendments are in compliance with the local air quality plan and are expected to provide beneficial impacts associated with reduced emissions from petroleum refineries in the Bay Area.

III b and d. The proposed new and amended rules would further reduce emissions from petroleum refineries and associated facilities by monitoring, repairing, or replacing existing equipment. As discussed below, implementation of these amendments are expected to reduce emissions of PM and ROG.

The Air District has established a baseline emissions inventory for estimating emissions reductions from the proposed projects which is provided in Table 3-5. This inventory shows baseline emissions for pollutants targeted by the proposed rules: PM (including directly-emitted filterable PM and condensable PM), ROG, NOx, and SO_2.

TABLE 3-5

Baseline Emissions from the Refineries and Associated Facilities

Facility	Average Annual Emissions (tons/year)				
	PM (filterable)	PM (condensable)[1]	ROG	NOx	SO_2
Chevron	173	255	2,187	910	339
Phillips 66	53	—	337	266	409
Shell	409	98	1,749	971	1,084
Tesoro	80	91	1,200	763	572
Valero	123	—	494	1,205	111
Chemtrade West	4	—	55	3	127
Eco Services	18	—	1	13	362
Air Products	10	—	9	3	2
Phillips 66 (Carbon Plant)	29	—	0	239	1,242
Air Liquide	16	—	29	2	2
Total Emissions	**915**	**444**	**6,061**	**4,375**	**4,250**

[1] Condensable PM emissions are estimated based on a very small number of non-standard tests on FCCUs. These numbers will change as more testing is completed at the refineries.

Construction Air Quality Impacts

Construction activities associated with the proposed projects are expected to be minor. Some minor construction may be necessary to optimize the ammonia injection systems on FCCUs. Construction would likely require a couple of medium-duty truck trips to deliver equipment, a construction crew of three to ten workers, and a few pieces of construction equipment (e.g., forklift, welders, and hand tools). No grading is expected to be required so that construction emissions are expected to be minor.

Operational Air Quality Impacts

The proposed projects is designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. Table 3-6 provides the Air District's estimated emission reductions for the regulatory actions associated with the proposed projects.

TABLE 3-6

Estimated Emission Reductions Associated with the Proposed Projects (tons per year)

Rule	PM	ROG
Rule 6-5: FCCU[1]	222	--
Rule 8-18: Equipment Leaks	--	1,227
Rule 11-10: Toxic and VOC Emissions from Cooling Towers	--	861
Total	**222**	**2,088**

[1] This rule change would reduce ammonia emissions. There is reason to believe that this would also reduce emissions of condensable PM, but it is not possible to quantify condensable PM reductions at this time. Therefore, the estimated PM reduction is listed as "to be determined" or TBD.

Table 3-6 shows potential PM and ROG reductions. As sources of filterable PM at the refineries are already cost-effectively controlled, the key opportunity for emissions reductions is from condensable PM. The Air District plans to address condensable PM by regulating emissions from FCCUs.

Compliance with proposed Rule 6-5 is expected to be accomplished by optimizing the injection of ammonia or urea at FCCUs and is not expected to result in any indirect emission increase. Compliance with the amendments to Rule 8-18 and Rule 11-10 is expected to be accomplished through increased monitoring and more frequent repair of sources and would not involve the installation of any additional air pollution control equipment.

The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The emission decreases associated with implementation of the proposed new rules and rule amendments is expected to be greater than the indirect emission increases.

III c. CEQA Guidelines indicate that cumulative impacts of a project shall be discussed when the project's incremental effect is cumulatively considerable, as defined in CEQA Guidelines §15065(c). While the proposed projects may result in an increase in transport emissions, the overall impact of the proposed projects is a decrease in PM, $PM_{2.5}$, ROG, and NH_3 emissions from FCCUs, cooling towers and equipment leaks. Therefore, the cumulative air quality impacts of the proposed projects are expected to be beneficial, resulting in a decrease in emissions.

III e. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The proposed new rules are not expected to result in an increase in odorous emissions at the refineries. Odorous emissions are not

specifically proposed to be covered by the proposed new and amended rules. Ammonia can be odorous and proposed Rule 6-5 is expected to reduce ammonia emissions from FCCUs. Therefore, the proposed new rules are not expected to result in an increase in the emissions that could generate odors. The Air District will continue to enforce odor nuisance complaints through its Regulation 7, Odorous Substances.

Conclusion

Based upon these considerations, no significant adverse air quality impacts are expected from the adoption of new Rule 6-5 and the proposed amendments to Rules 8-18 and 11-10. In fact, the proposed amendments are expected to provide beneficial air quality impacts by reducing emissions of PM, $PM_{2.5}$, ROG, and NH_3 and related health benefits associated with reduce exposure to these compounds.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV.	**BIOLOGICAL RESOURCES.** Would the projects:				
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☑
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☑
c)	Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☑
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☑
e)	Conflicting with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f)	Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses vary greatly and include commercial, industrial, residential, agricultural, and open space uses. A wide variety of biological resources are located within the Bay Area.

The areas affected by the proposed projects are located in the Bay Area-Delta Bioregion (as defined by the State's Natural Communities Conservation Program). This Bioregion is comprised of a variety of natural communities, which range from salt marshes to chaparral to oak woodland. The areas affected by the proposed projects are primarily located within industrial areas within the Bay Area. The affected areas have largely been graded for industrial development. Native vegetation, other than landscape vegetation, has generally been removed from industrial areas to accommodate development. Any new development would fall under compliance with the City or County General Plans, although no new development is anticipated as a result of the proposed new and amended rules.

Regulatory Background

Biological resources are generally protected by the City and/or County General Plans through land use and zoning requirements that minimize or prohibit development in biologically sensitive areas. Biological resources are also protected by the California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service. The U.S Fish and Wildlife Service and National Marine Fisheries Service oversee the federal Endangered Species Act. Development permits may be required from one or both of these agencies if development would impact rare or endangered species. The California Department of Fish and Wildlife administers the California Endangered Species Act which prohibits impacting endangered and threatened species. The U.S. Army Corps of Engineers and the U.S. EPA regulate the discharge of dredge or fill material into waters of the United States, including wetlands.

Discussion of Impacts

IV a – f. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

The proposed projects are not expected to require any new substantial development. Any construction activities to replace or install control equipment at refineries or associated facilities would occur within existing industrial facilities. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Monitoring, repairing or replacing existing equipment is not expected to result in impacts outside of the existing units. Construction activities would be limited to the confines of existing

industrial facilities (refineries) and adjacent to existing operating units. Therefore, the proposed new and amended rules are not expected to result in impacts to biological resources and would not directly or indirectly affect riparian habitat, federally protected wetlands, or migratory corridors.

The proposed new and amended rules would not conflict with local policies or ordinances protecting biological resources, nor would they conflict with local, regional, or state conservation plans because as the proposed projects apply to equipment in existing developed facilities. The proposed projects would also not conflict with any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or any other relevant habitat conservation plan.

Conclusion

The proposed projects neither require nor are likely to result in activities that would affect sensitive biological resources. Therefore, no impacts on biological resources are expected.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
V.	**CULTURAL RESOURCES.** Would the projects:				
a)	Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☑
b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☑
c)	Directly of indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☑
d)	Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses vary greatly and include commercial, industrial, residential, agricultural and open space uses. Cultural resources are defined as buildings, sites, structures, or objects which might have historical architectural, archaeological, cultural, or scientific importance.

The Carquinez Strait represents the entry point for the Sacramento and San Joaquin Rivers into the San Francisco Bay. This locality lies within the San Francisco Bay and the west end of the Central Valley archaeological regions, both of which contain a rich array of prehistoric and historical cultural resources. The areas surrounding the Carquinez Strait and Suisun Bay have been occupied for millennia given their abundant combination of littoral and oak woodland resources.

The petroleum refineries and associated facilities, as well as chemical plants, bulk plants or bulk terminals affected by the proposed projects are primarily located within industrial areas in the Bay Area. These areas have generally already been graded to accommodate development. Cultural resources would not be expected to be impacted by modifications to existing structures.

Regulatory Background

The State CEQA Guidelines define a significant cultural resource as a "resource listed or eligible for listing on the California Register of Historical Resources" (Public Resources Code Section 5024.1). A project would have a significant impact if it would cause a substantial adverse change in the significance of a historical resource (State CEQA Guidelines Section 15064.5(b)). A substantial adverse change in the significance of a historical resource would result from an action that would demolish or adversely alter the physical characteristics of the historical resource that convey its historical significance and that qualify the resource for inclusion in the California Register of Historical Resources or a local register or survey that meets the requirements of Public Resources Code §§50020.1(k) and 5024.1(g).

Discussion of Impacts

V a – d. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

The proposed projects are not expected to require any new substantial development. Any construction activities to replace or install control equipment at refineries or associated facilities would occur within existing industrial facilities. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Monitoring, repairing or replacing existing equipment is not expected to result in impacts outside of the existing units. Construction activities would be limited to the confines of existing industrial facilities (refineries) and adjacent to existing operating units. Therefore, the proposed new and amended rules are not expected to require the use of heavy construction equipment or require grading activities that could uncover cultural resources. Further, refinery structures are typically not considered to be historic resources. Therefore, no impacts to historical resources are expected as a result of the proposed projects. Physical changes are expected to be limited to existing development and no major construction activities are expected to be required. Therefore, no impacts to cultural resources are anticipated to occur as a result of the proposed projects as no major construction activities are required.

Conclusion

Based upon these considerations, no significant adverse impacts to cultural resources are expected from the adoption of the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. GEOLOGY AND SOILS.				
Would the projects:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a know fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☑
ii) Strong seismic ground shaking?	☐	☐	☑	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☑	☐
iv) Landslides?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☑
c) Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the projects, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☑
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses vary greatly and include commercial, industrial, residential, agricultural, and open space uses. The petroleum refineries and associated facilities associated with the proposed projects are located within industrial areas in the Bay Area.

The Bay Area is located in the natural region of California known as the Coast Ranges geomorphic province. The region is characterized by a series of northwest trending ridges and valleys controlled by tectonic folding and faulting, examples of which include the Suisun Bay, East Bay Hills, Briones Hills, Vaca Mountains, Napa Valley, and Diablo Ranges.

Regional basement rocks consist of the highly deformed Great Valley Sequence, which include massive beds of sandstone inter-fingered with siltstone and shale. Unconsolidated alluvial deposits, artificial fill, and estuarine deposits, (including Bay Mud) underlie the low-lying region along the margins of the Carquinez Straight and Suisun Bay. The estuarine sediments found along the shorelines of Solano County are soft, water-saturated mud, peat and loose sands. The organic, soft, clay-rich sediments along the San Francisco and San Pablo Bays are referred to locally as Bay Mud and can present a variety of engineering challenges due to inherent low strength, compressibility and saturated conditions. Landslides in the region occur in weak, easily weathered bedrock on relatively steep slopes.

The San Francisco Bay Area is a seismically active region, which is situated on a plate boundary marked by the San Andreas Fault System. Several northwest trending active and potentially active faults are included with this fault system. Under the Alquist-Priolo Earthquake Fault Zoning Act, Earthquake Fault Zones were established by the California Division of Mines and Geology along “active” faults, or faults along which surface rupture occurred in Holocene time (the last 11,000 years). In the Bay Area, these faults include the San Andreas, Hayward, Rodgers Creek-Healdsburg, Concord-Green Valley, Greenville-Marsh Creek, Seal Cove/San Gregorio and West Napa faults. Other smaller faults in the region classified as potentially active include the Southampton and Franklin faults.

A summary of the existing geological hazards in the vicinity of the existing five refineries is summarized below. The data is from the Contra Costa Internet GIS Map.

1. Chevron Richmond: The portions of the refinery immediately adjacent to the Bay are identified as areas subject to liquefaction. A landslide area is noted in the upper portions of the hill. No faults are identified in the immediate area of the refinery.

2. Shell Martinez: The portions of the refinery immediately adjacent to the Bay are identified as areas subject to liquefaction. Generally areas southwest of Highway 680 are not subject to liquefaction, which is where the operating portion of the refinery is located. A portion of the Concord fault is located east of Highway 680 and east of the Shell

Refinery. A portion of the Southhampton fault is located west of the refinery. No landslide areas have been identified in the vicinity of the refinery.

3. Tesoro Martinez: The portions of the refinery immediately adjacent to the Bay are identified as areas subject to liquefaction. The operating refinery is generally located outside of the areas subject to liquefaction. A portion of the Concord fault is located east of Highway 680 and west of the Tesoro Refinery. A portion of the Southhampton fault is located west of the refinery. No landslide areas have been identified in the vicinity of the refinery.

4. Valero Benicia: The operating portions of the refinery are not subject to liquefaction. The refinery is located west of the Concord fault and east of the Southhampton fault. No landslide areas have been identified in the vicinity of the refinery.

5. Phillips 66 Rodeo: Areas along the northeastern and southwestern boundaries of the refinery may be subject to liquefaction. The Franklin fault is located east of the refinery. No landslide areas have been identified in the vicinity of the refinery

While there are existing geological hazards in the vicinity of the refineries, there is extensive development within and surrounding the refineries and the areas have been urbanized. Development within geologically active areas is protected by developing structures in compliance with the California Building Codes.

Ground movement intensity during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geological material. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill. Earthquake ground shaking may have secondary effects on certain foundation materials, including liquefaction, seismically induced settlement, and lateral spreading.

Regulatory Background

Construction is regulated by the local City or County building codes that provide requirements for construction, grading, excavations, use of fill, and foundation work including type of materials, design, procedures, etc. which are intended to limit the probability of occurrence and the severity of consequences from geological hazards. Necessary permits, plan checks, and inspections are generally required.

The City or County General Plan includes the Seismic Safety Element. The Element serves primarily to identify seismic hazards and their location in order that they may be taken into account in the planning of future development. The California Building Code is the principle mechanism for protection against and relief from the danger of earthquakes and related events.

In addition, the Seismic Hazard Zone Mapping Act (Public Resources Code §§2690 – 2699.6) was passed by the California legislature in 1990 following the Loma Prieta earthquake. The Act

required that the California Division of Mines and Geology (DMG)[1] develop maps that identify the areas of the state that require site specific investigation for earthquake-triggered landslides and/or potential liquefaction prior to permitting most urban developments. The Act directs cities, counties, and state agencies to use the maps in their land use planning and permitting processes.

Local governments are responsible for implementing the requirements of the Seismic Hazards Mapping Act. The maps and guidelines are tools for local governments to use in establishing their land use management policies and in developing ordinances and review procedures that will reduce losses from ground failure during future earthquakes.

Discussion of Impacts

VI a. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. No significant impacts on geology and soils are anticipated from the proposed projects which would apply to existing industrial operations.

The proposed projects are not expected to require any new substantial construction or development. Any construction activities to replace or install control equipment at refineries or associated facilities would occur within existing industrial facilities. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Construction activities would be limited to the confines of existing industrial facilities (refineries).

Any new or remodeled structures in the area must be designed to comply with the California Building Code requirements since the Bay Area is located in a seismically active area. The local cities or counties are responsible for assuring that any new or remodeled structures comply with the California Building Code as part of the issuance of the building permits and can conduct inspections to ensure compliance. The California Building Code is considered to be a standard safeguard against major structural failures and loss of life. The goal of the code is to provide structures that will: (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage, but with some non-structural damage; and (3) resist major earthquakes without collapse, but with some structural and non-structural damage.

The California Building Code bases seismic design on minimum lateral seismic forces ("ground shaking"). The California Building Code requirements operate on the principle that providing appropriate foundations, among other aspects, helps to protect buildings from failure during earthquakes. The basic formulas used for the California Building Code seismic design require determination of the seismic zone and site coefficient, which represent the foundation conditions at the site.

[1] Currently, entitled the California Geologic Survey.

Any new equipment at the affected facilities would be required to obtain building permits, as applicable, for all new or remodeled structures. The affected facilities must receive approval of all building plans and building permits to assure compliance with the latest California Building Code prior to commencing construction activities. The issuance of building permits from the local agency will assure compliance with the California Building Code requirements which include requirements for building within seismic hazard zones. No significant impacts from seismic hazards are expected since any new equipment would be required to comply with the California Building Codes. The new and amended rules would not require or promote construction of any land use projects. No major construction activities are expected as a result of the proposed projects. The installation, repair or replacement of equipment would require a building permit. Therefore, it is expected that any equipment would be installed according to all applicable state and local codes. As a result, substantial exposure of people or structures to the risk of loss, injury, or death involving seismic-related activities is not anticipated as a result of compliance with the proposed projects. Therefore, no significant adverse impacts on geology and soils are expected.

VI b. – d. Since the new and amended rules would affect existing refineries and associated facilities in the area, it is expected that the soil types present in the affected facilities would not be further susceptible to expansive soils or liquefaction due to adoption of the proposed projects. Any new structures are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Construction and any new structures would be limited to the vicinity of existing refinery structures. While there are existing geological hazards in the area, the proposed projects are not expected to require substantial grading or development, or generate any additional geological hazards.

VI e. The proposed projects would have no effect on the installation of septic tanks or alternative wastewater disposal systems. Consequently, no impacts from failures of septic systems related to soils incapable of supporting such systems are anticipated.

Conclusion

Based upon these considerations, no significant adverse impacts to geology and soils are expected from the adoption of the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GREENHOUSE GAS EMISSIONS.				
Would the projects:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☑	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☑

Setting

Global climate change refers to changes in average climatic conditions on the earth as a whole, including temperature, wind patterns, precipitation and storms. Global warming, a related concept, is the observed increase in the average temperature of the earth's surface and atmosphere. One identified cause of global warming is an increase of greenhouse gases (GHGs) in the atmosphere. The six major GHGs identified by the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). The GHGs absorb longwave radiant energy reflected by the earth, which warms the atmosphere. GHGs also radiate longwave radiation both upward to space and back down toward the surface of the earth. The downward part of this longwave radiation absorbed by the atmosphere is known as the "greenhouse effect." Some studies indicate that the potential effects of global climate change may include rising surface temperatures, loss in snow pack, sea level rise, more extreme heat days per year, and more drought years.

Human-related events and activities, such as the industrial revolution and the increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.), have heavily contributed to the increase in atmospheric levels of GHGs. Approximately 80 percent of GHG emissions in California are from fossil fuel combustion and over 70 percent of GHG emissions are carbon dioxide emissions. The emission inventory in Table 3-8 focuses on GHG emissions due to human activities only, and compiles estimated emissions from industrial, commercial, transportation, domestic, forestry, and agriculture activities in the San Francisco Bay Area region of California. The GHG emission inventory in Table 3-8 reports direct emissions generated from sources within the Bay Area and estimates future GHG emissions.

TABLE 3-8

Bay Area Greenhouse Gas Emission Inventory Projections

(million metric tons CO_2-Equivalent)

SOURCE CATEGORY Year	2005	2009	2012	2015	2020
INDUSTRIAL/COMMERCIAL					
Oil Refineries					
Refining Processes	3.4	3.5	3.6	3.7	3.9
Refinery Make Gas Combustion	4.7	4.9	5.0	5.2	5.4
Natural Gas and Other Gases Combustion	4.8	5.0	5.1	5.3	5.5
Liquid Fuel Combustion	0.1	0.1	0.1	0.1	0.1
Solid Fuel Combustion	1.0	1.0	1.1	1.1	1.1
Waste Management					
Landfill Combustion Sources	0.0	0.0	0.0	0.0	0.0
Landfill Fugitive Sources	1.2	1.2	1.2	1.2	1.2
Composting/POTWs	0.4	0.4	0.4	0.4	0.4
Other Industrial/ Commercial					
Cement Plants	0.9	0.9	0.9	0.9	1.0
Commercial Cooking	0.1	0.1	0.1	0.1	0.2
ODS Substitutes/Nat. Gas Distrib./Other	3.6	5.2	6.3	7.5	9.4
Reciprocating Engines	0.6	0.6	0.6	0.7	0.7
Turbines	0.4	0.4	0.4	0.4	0.4
Natural Gas - Major Combustion Sources	1.6	2.5	2.6	2.7	2.8
Natural Gas - Minor Combustion Sources	8.8	9.2	9.5	9.9	10.4
Coke Coal	1.0	1.0	1.1	1.1	1.2
Other Fuels Combustion	0.3	0.4	0.4	0.4	0.4
Subtotal	32.8	36.3	38.4	40.6	44.2
RESIDENTIAL FUEL USAGE					
Natural Gas	6.4	6.6	6.8	6.9	7.2
LPgas/Liquid Fuel	0.2	0.2	0.2	0.2	0.2
Solid Fuel	0.1	0.2	0.2	0.2	0.2
Subtotal	6.7	6.9	7.1	7.2	7.5
ELECTRICITY/ CO-GENERATION					
Co-Generation	5.5	5.5	5.7	6.0	6.4
Electricity Generation	2.8	3.1	3.2	3.3	3.5
Electricity Imports	6.8	7.3	7.6	7.9	8.3
Subtotal	15.1	15.8	16.5	17.2	18.3
OFF-ROAD EQUIPMENT					
Lawn and Garden Equipment	0.1	0.1	0.1	0.1	0.1
Construction Equipment	1.7	1.9	1.9	2.0	2.2
Industrial Equipment	0.7	0.8	0.8	0.9	1.0
Light Commercial Equipment	0.2	0.2	0.3	0.3	0.3
Subtotal	2.8	3.0	3.2	3.3	3.6
TRANSPORTATION					
Off-Road					
Locomotives	0.1	0.1	0.1	0.1	0.1
Ships	0.7	0.8	0.8	0.9	1.0
Boats	0.6	0.6	0.5	0.5	0.6

TABLE 3-8 (concluded)

SOURCE CATEGORY	Year	2005	2009	2012	2015	2020
Commercial Aircraft		1.8	2.0	2.1	2.3	2.6
General Aviation		0.2	0.2	0.2	0.3	0.3
Military Aircraft		0.5	0.5	0.5	0.5	0.5
On-Road						
Passenger Cars/Trucks up to 10,000 lbs		26.6	27.1	27.9	29.0	30.9
Medium/Heavy Duty Trucks > 10,000 lbs		3.3	3.3	3.4	3.5	3.7
Urban, School and Other Buses		0.8	0.8	0.8	0.8	0.9
Motor-Homes and Motorcycles		0.2	0.2	0.2	0.2	0.2
Subtotal		34.8	35.6	36.7	38.1	40.7
AGRICULTURE/FARMING						
Agricultural Equipment		0.2	0.2	0.2	0.2	0.2
Animal Waste		0.6	0.6	0.6	0.6	0.6
Soil Management		0.3	0.3	0.3	0.3	0.3
Biomass Burning		0.0	0.0	0.0	0.0	0.0
Subtotal		1.1	1.1	1.1	1.1	1.1
GRAND TOTAL EMISSIONS		**93.4**	**98.7**	**103.0**	**107.5**	**115.4**

Source: BAAQMD, 2009

GHG emissions shown in Table 3-8 were based on work done during development of the 2010 Clean Air Plan and did not reflect all of the ARB regulations designed to reduce GHG emissions. These emissions estimates are being updated during development of the 2016 Clean Air Plan. A supplemental Table 3-8A is shown below to summarize the Verified Annual GHG Facility and Entity Emissions Reports submitted to ARB as required by AB32.

2009 – 2010 Emissions Summary Reports, and 2011 – 2014 GHG Facility and Entity Emissions Reports:

Table 3-8A
Verified GHG Emissions Summary Reports

Year	Total Emissions (Metric Tons CO_2e)
2009	15,899,752
2010	15,253,957
2011	33,941,269
2012	14,843,540
2013	14,826,491
2014	14,411,502

http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm

Regulatory Background

In response to growing scientific and political concern regarding global climate change, California has recently adopted a series of laws over the last decade to reduce both the level of GHGs in the atmosphere and to reduce emissions of GHGs from commercial and private activities within the state.

In September 2006, Governor Schwarzenegger signed California's Global Warming Solutions Act of 2006 (AB32). AB32 required CARB to:

- Establish a statewide GHG emissions cap for 2020, based on 1990 emissions, by January 1, 2008;
- Adopt mandatory reporting rules for significant sources of GHG emissions by January 1, 2008;
- Adopt an emissions reduction plan by January 1, 2009, indicating how emissions reductions will be achieved via regulations, market mechanisms, and other actions; and,
- Adopt regulations to achieve the maximum technologically feasible and cost-effect reductions of GHGs by January 1, 2011

In October 2011, CARB approved the Cap-and-Trade regulation, marking a significant milestone toward reducing California's greenhouse gas emissions under its AB 32 law. The regulation sets a statewide limit on the emissions from sources responsible for 80 percent of California's greenhouse gas emissions. The regulation covers 360 businesses representing 600 facilities and is divided into two broad phases: an initial phase beginning in 2012 that will include all major industrial sources along with utilities; and, a second phase that began in 2015 and brings in distributors of transportation fuels, natural gas and other fuels.

Companies are not given a specific limit on their greenhouse gas emissions but must supply a sufficient number of allowances (each covering the equivalent of one ton of carbon dioxide) to cover their annual emissions. Each year, the total number of allowances issued in the state drops, requiring companies to find the most cost-effective and efficient approaches to reducing their emissions. By the end of the program in 2020 there will be a 15 percent reduction in greenhouse gas emissions compared to today, reaching the same level of emissions as the state experienced in 1990, as required under AB 32.

There has also been activity at the federal level on the regulation of GHGs. On October 30, 2009, the EPA issued the Final Mandatory Report of Greenhouse Gases Rule. The rule requires reporting of GHG emissions from large sources and suppliers (facilities that emit 25,000 metric tons of GHGs per year or more) in the United States, and is intended to collect accurate and timely emissions data to inform policy decision.

Discussion of Impacts

VII a and b. Combustion of conventional hydrocarbon fuel results in the release of energy as bonds between carbon and hydrogen are broken and reformed with oxygen to create water vapor and carbon dioxide (CO_2). CO_2 is a pollutant that occurs in relatively large volumes as a by-product of the combustion process; CO_2 emissions are a resultant combustion product of any fuel containing carbon. Therefore, attempts to reduce emissions of greenhouse gases from combustion focus on increasing energy efficiency – consuming less fuel to provide the same useful energy output.

The analysis of GHG emissions differs from the analysis of criteria pollutants for the following reasons. For criteria pollutant, significance thresholds are based on daily emissions because attainment or non-attainment is typically based on daily exceedances of applicable ambient air quality standards. Further, several ambient air quality standards are based on relatively short-term exposure effects to human health, e.g., one-hour and eight-hour standards. Using the half-life of CO_2, 100 years, for example, the effects of GHGs are longer-term, affecting the global climate over a relatively long time frame. GHGs do not have human health effects like criteria pollutants. Rather, it is the increased accumulation of GHGs in the atmosphere that result in global climate change. Due to the complexity of conditions and interactions affecting global climate change, it is not possible to predict the specific impact, if any, attributable to GHG emissions associated with a single project. Furthermore, the GHG emissions associated with the proposed rules and rule amendments would be small relative to total global or even state-wide GHG emissions. Thus, the significance of potential impacts from GHG emissions related to the proposed projects has been analyzed for long-term operations on a cumulative basis, as discussed below.

Compliance with proposed Rule 6-5 is expected to be accomplished by optimizing the injection of ammonia or urea at FCCUs and is not expected to result in any indirect GHG emission increase. Compliance with the amendments to Rule 8-18 and Rule 11-10 is expected to be accomplished through increased monitoring and more frequent repair of sources and would not involve the installation of any additional air pollution control equipment or generate additional GHG emissions.

Cumulative GHG impacts in the Bay Area are generally evaluated in terms of the air quality management plan that controls overall air emissions within the Air District. Therefore, the cumulative GHG impacts include the proposed projects along with implementing the control measures in the 2010 Clean Air Plan, the most recent air quality plan approved in the Air District.

The proposed projects would generally reduce emissions of PM, PM2.5, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities. In general, strategies that promote clean technologies usually also reduce greenhouse gas emissions. As

shown in Table 3-8, the fuel combustion and the generation of electricity are responsible for a large portion of greenhouse gases produced in the Bay Area.

The 2010 CAP as a whole is expected to promote a net decrease in GHG emissions. The 2010 CAP control measure strategy promotes fuel efficiency and pollution prevention, which also reduces GHG emissions. Measures that reduce fuel use and/or increase use of alternative fuels will also be beneficial. In general, strategies that promote clean technologies usually also reduce GHG emissions.

Conclusion

Based on the above discussion, no significant adverse GHG impacts are expected due to implementation the proposed new and amended rules.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII.	**HAZARDS AND HAZARDOUS MATERIALS.** Would the projects:				
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑	☐
c)	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☑	☐
d)	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☑
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f)	For a project within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
g)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
h)	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☑	☐

Setting

The Air District covers all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and potions of western Solano and southern Sonoma Counties. Because the area of coverage is vast (approximately 5,600 square miles), land uses vary greatly and include commercial, industrial, residential, and agricultural uses. The amendments to proposed new and amended rules would apply to the refineries and related facilities within the Air District's jurisdiction.

Facilities and operations within the Air District handle and process substantial quantities of flammable materials and acutely toxic substances. Accidents involving these substances can result in worker or public exposure to fire, heat, blast from an explosion, or airborne exposure to hazardous substances.

Fires can expose the public or workers to heat. The heat decreases rapidly with distance from the flame and therefore poses a greater risk to workers at specific facilities where flammable materials and toxic substances are handled than to the public. Explosions can generate a shock wave, but the risks from explosion also decrease with distance. Airborne releases of hazardous materials may affect workers or the public, and the risks depend upon the location of the release, the hazards associated with the material, the winds at the time of the release, and the proximity of receptors.

For all facilities and operations handling flammable materials and toxic substances, risks to the public are reduced if there is a buffer zone between process units and residences or if prevailing winds blow away from residences. Thus, the risks posed by operations at a given facility or operation are unique and determined by a variety of factors.

Regulatory Background

There are many federal and state rules and regulations that facilities handling hazardous materials must comply with which serve to minimize the potential impacts associated with hazards at these facilities.

Under the Occupational Safety and Health Administration (OSHA) regulations [29 Code of Federal Regulations (CFR) Part 1910], facilities which use, store, manufacture, handle, process, or move highly hazardous materials must prepare a fire prevention plan. In addition, 29 CFR Part 1910.119, Process Safety Management (PSM) of Highly Hazardous Chemicals, and Title 8 of the California Code of Regulations, General Industry Safety Order §5189, specify required prevention program elements to protect workers at facilities that handle toxic, flammable, reactive, or explosive materials.

Section 112 (r) of the Clean Air Act Amendments of 1990 [42 U.S.C. 7401 et. Seq.] and Article 2, Chapter 6.95 of the California Health and Safety Code require facilities that handle listed regulated substances to develop Risk Management Programs (RMPs) to prevent accidental releases of these substances, U.S. EPA regulations are set forth in 40 CFR Part 68. In California, the California Accidental Release Prevention (CalARP) Program regulation (CCR Title 19, Division 2, Chapter 4.5) was issued by the Governor's Office of Emergency Services (OES).

RMPs consist of three main elements: (1) a hazard assessment that includes off-site consequences analyses and a five-year accident history; (2) a prevention program; and (3) an emergency response program.

Affected facilities that store materials are required to have a Spill Prevention Control and Countermeasures (SPCC) Plan per the requirements of 40 Code of Federal Regulations, Section 112. The SPCC is designed to prevent spills from on-site facilities and includes requirements for secondary containment, provides emergency response procedures, establishes training requirements, and so forth.

The Hazardous Materials Transportation (HMT) Act is the federal legislation that regulates transportation of hazardous materials. The primary regulatory authorities are the U.S. Department of Transportation, the Federal Highway Administration, and the Federal Railroad Administration. The HMT Act requires that carriers report accidental releases of hazardous materials to the Department of Transportation at the earliest practical moment (49 CFR Subchapter C). The California Department of Transportation (Caltrans) sets standards for trucks in California. The regulations are enforced by the California Highway Patrol.

California Assembly Bill 2185 requires local agencies to regulate the storage and handling of hazardous materials and requires development of a business plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and the need for evacuation.

Contra Costa County has adopted an industrial safety ordinance that addresses the human factors that lead to accidents. The ordinance requires stationary sources to develop a written human factors program that considers human factors as part of process hazards analyses, incident investigations, training, operating procedures, among others.

Discussion of Impacts

VII a - b. The potential hazards associated with petroleum refining activities are a function of the materials being processed, processing systems, and procedures used to operate and maintain the refinery. The hazards that are likely to exist are identified by the physical and chemical properties of the materials being handled and their process conditions, including the following events: (1) toxic gas clouds; (2) torch fires, flash fires, pool fires, and vapor cloud explosions; (3) thermal radiation; and (4) explosion/overpressure. The potential for these types of events to occur currently exists at the existing refineries.

The proposed projects are collectively part of the Air District's Petroleum Refinery Emissions Reduction Strategy and are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks by 20 percent no later than year 2020. In addition to petroleum refineries, amendments to Rule 8-18

would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

The proposed projects are not expected to require any new substantial construction or development. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Ammonia is currently used to reduce NOx emissions at existing refineries. Proposed Rule 6-5 is expected to limit ammonia emissions from FCCUs. To comply, refineries are expected to optimize the injection of ammonia or urea. Rule 6-5 is not expected to increase the use of ammonia or urea and would likely result in a decrease in ammonia use. Therefore, no increased hazards are expected from ammonia use at the existing refineries.

VII c. The proposed rule amendments would not generate hazardous emissions, handling of hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school. Proposed Rule 6-5 is expected to limit ammonia emissions from FCCUs and is expected to result in a decrease in ammonia emissions. (Note that ammonia is regulated as a TAC). Proposed amendments to Rules 8-18 and 11-10 are expected to result in reductions in organic emissions and potential reduction in TAC emissions from refineries and associated facilities. Therefore, no increase in TACs are from implementation of the proposed new and amendment rules.

VII d. Government Code §65962.5 requires creation of lists of facilities that may be subject to Resource Conservation and Recovery Act (RCRA) permits or site cleanup activities. The refineries affected by the proposed rules may be located on the hazardous materials sites list pursuant to Government Code §65962.5. The refineries would be required to manage any and all hazardous materials in accordance with federal, state and local regulations. Implementation of the proposed new Rule 6-5 and amendments to Rules 8-18 and 11-10 are not expected to interfere with site cleanup activities or create additional site contamination. As a result, the proposed projects are not expected to affect any facilities included on a list of hazardous material sites and, therefore, would not create a significant hazard to the public or environment.

VII e – f. The proposed new and amended rules are not expected to result in a safety hazard for people residing or working within two miles or a public airport or air strip. No impacts on airports or airport land use plans are anticipated from the proposed new rules and amended rules that would apply to petroleum refineries and related facilities operating in the Bay Area, which are generally not located near public airports or air strips. Any construction activities are expected to be confined to the existing refinery boundaries. Therefore, no significant adverse impacts on an airport land use plan or on a private air strip are expected.

VII g. No impacts on emergency response plans are anticipated from the proposed new and amended rules that would apply to existing petroleum refineries and related facilities. The refineries and facilities affected by the proposed new rules already exist and operate within the confines of existing industrial facilities. The proposed new rules and amended rules neither require, nor are likely to result in, activities that would impact any emergency response plan.

The existing refineries affected by the proposed new rule and amended rules already use, produce, store and transport hazards materials, so emergency response plans already include hazards associated with existing refinery operations. The proposed new rules and amended rules are not expected to require any changes in emergency response planning. Therefore, no significant adverse impacts on emergency response plans are expected.

VII h. No increase in hazards associated with wildfires is anticipated from proposed new and amended rules. The petroleum refineries affected by the proposed new rules and amended rules already exist and operate within the confines of existing industrial facilities. Native vegetation has been removed from the operating portions of the affected facilities to minimize fire hazards. The proposed new and amended rules are not expected to increase the risk of hazards associated with wildland fires in general and specifically in areas with flammable materials. Therefore, the proposed projects would not expose people or structures to significant risk of loss, injury or death involving wildland fires.

Conclusion

Based upon these considerations, no significant adverse hazards and hazardous materials impacts are expected from the implementation of proposed new Rule 6-5 and proposed amendments to Rules 8-18 and 11-10.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HYDROLOGY AND WATER QUALITY.					
Would the projects:					
a)	Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☑
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☑
c)	Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation onsite or offsite?	☐	☐	☐	☑
d)	Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite?	☐	☐	☐	☑
e)	Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
f)	Otherwise substantially degrade water quality?	☐	☐	☐	☑
g)	Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
h)	Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☑
i)	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑

j)	Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and affected environment vary substantially throughout the area and include commercial, industrial, residential, agricultural, and open space uses.

The equipment affected by the proposed new and amended rules is located in industrial facilities in a relatively small portion of the Bay Area. Reservoirs and drainage streams are located throughout the area within the Air District's jurisdiction, and discharge into the Bays. Marshlands incised with numerous winding tidal channels containing brackish water are located throughout the Bay Area.

The affected areas are located within the San Francisco Bay Area Hydrologic Basin. The primary regional groundwater water-bearing formations include the recent and Pleistocene (up to two million years old) alluvial deposits and the Pleistocene Huichica formation. Salinity within the unconfined alluvium appears to increase with depth to at least 300 feet. Water of the Huichica formation tends to be soft and relatively high in bicarbonate, although usable for domestic and irrigation needs.

Regulatory Background

The Federal Clean Water Act of 1972 primarily establishes regulations for pollutant discharges into surface waters in order to protect and maintain the quality and integrity of the nation's waters. This Act requires industries that discharge wastewater to municipal sewer systems to meet pretreatment standards. The regulations authorize the EPA to set the pretreatment standards. The regulations also allow the local treatment plants to set more stringent wastewater discharge requirements, if necessary, to meet local conditions.

The 1987 amendments to the Clean Water Act enabled the U.S. EPA to regulate, under the National Pollutant Discharge Elimination System (NPDES) program, discharges from industries and large municipal sewer systems. The EPA set initial permit application requirements in 1990. The State of California, through the State Water Resources Control Board, has authority to issue NPDES permits, which meet EPA requirements, to specified industries.

The Porter-Cologne Water Quality Act is California's primary water quality control law. It implements the state's responsibilities under the Federal Clean Water Act but also establishes state wastewater discharge requirements. The Regional Water Quality Control Board administers the state requirements as specified under the Porter-Cologne Water Quality Act, which include storm water discharge permits. The water quality in the Bay Area is under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board.

In response to the Federal Act, the State Water Resources Control Board prepared two state-wide plans in 1991 and 1995 that address storm water runoff: the California Inland Surface Waters Plan and the California Enclosed Bays and Estuaries Plan, which have been updated in 2005 as the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Enclosed bays are indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. San Francisco Bay, and its constituent parts, including Carquinez Strait and Suisun Bay, falls under this category.

The San Francisco Bay Basin Plan identifies the: (1) beneficial water uses that need to be protected; (2) the water quality objectives needed to protect the designated beneficial water uses; and (3) strategies and time schedules for achieving the water quality objectives. The beneficial uses of the Carquinez Strait that must be protected which include water contact and non-contact recreation, navigation, ocean commercial and sport fishing, wildlife habitat, estuarine habitat, fish spawning and migration, industrial process and service supply, and preservation of rare and endangered species. The Carquinez Strait and Suisun Bay are included on the 1998 California list as impaired water bodies due to the presence of chlordane, copper, DDT, diazinon, dieldrin, dioxin and furan compounds, mercury, nickel, PCBs, and selenium.

Discussion of Impacts

VIII a. and f. No increase in wastewater discharge is expected from the proposed projects so no impacts on water quality resources are anticipated from the proposed projects. The proposed projects are not expected to require any new substantial construction or development. Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Rule 6-5 is expected to limit ammonia emissions from FCCUs. To comply, refineries are expected to optimize the injection of ammonia or urea. No wastewater would be generated by these activities.

Construction activities associated with the proposed projects are expected to be minor. Some minor construction may be necessary to optimize the ammonia injection systems on FCCUs. Construction would likely require a couple of medium-duty truck trips to deliver equipment, a construction crew of three to 10 workers, and a few pieces of construction equipment (e.g., forklift, welders, and hand tools). No grading is expected to be required so that little to no increase in water use would be expected during construction activities.

VIII b. No increase in water use is expected as a result of the proposed projects. Rule 6-5 is expected to limit ammonia emissions from FCCUs. To comply, refineries are expected to optimize the injection of ammonia or urea. No increase in water would be generated by these activities.

Construction activities associated with the proposed projects are expected to be minor. Some minor construction may be necessary to optimize the ammonia injection systems on FCCUs. Construction would likely require a couple of medium-duty truck trips to deliver equipment, a construction crew of three to 10 workers, and a few pieces of construction equipment (e.g., forklift, welders, and hand tools). No grading is expected to be required so that little to no increase in water use would be expected during construction activities.

VIII c, d, and e. Compliance with proposed Rule 6-5 is expected to be achieved by optimizing injection locations and flow rates of ammonia, urea, etc., while the proposed amendments to Rules 8-18 and 11-10 would require additional monitoring and repair of existing equipment. All activities associated with the proposed projects are expected to occur within the confines of the existing refineries.

The proposed projects do not have the potential to substantially increase the area subject to runoff since the construction activities are expected to be limited in size and would be located within existing refineries that have already been graded. In addition, storm water drainage within refineries has been controlled and construction activities are not expected to alter the storm water drainage within the refineries. Therefore, the proposed new and amended rules are not expected to substantially alter the existing drainage or drainage patterns, result in erosion or siltation, alter the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite. Additionally, the proposed projects are not expected to create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of contaminated runoff. Therefore, no significant adverse impacts to storm water runoff are expected as a result of the proposed projects.

VIII g, h, i, and j. The proposed projects do not include the construction of new or relocation of existing housing or other types of facilities and, as such, would not require the placement of housing or other structures within a 100-year flood hazard area. (See also XIII "Population and Housing"). Any new construction associated with the proposed projects are expected to occur within the confines of existing industrial facilities. As a result, the proposed projects would not be expected to create or substantially increase risks from flooding; expose people or structures to significant risk of loss, injury or death involving flooding; or increase existing risks, if any, of inundation by seiche, tsunami, or mudflow.

Conclusion

Based upon these considerations, no significant adverse impacts to hydrology and water quality are expected from the adoption of the proposed projects.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
X.	**LAND USE AND PLANNING.** Would the projects:				
a)	Physically divide an established community?	☐	☐	☐	☑
b)	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the projects (including, but not limited to a general plan, specific plan, local coastal program or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑
c)	Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses vary greatly and include commercial, industrial, residential, agricultural, and open space uses. The industrial facilities affected by the proposed projects are located in a relatively small portion within the Bay Area.

Regulatory Background

Land uses are generally protected and regulated by the City and/or County General Plans through land use and zoning requirements.

Discussion of Impacts

IX a-c. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. Thus, the proposed new and amended rules do not include any components that would mandate physically dividing an established community or generate additional development.

The proposed projects are not expected to require any new substantial construction or development. Any construction activities to replace or install control equipment at refineries or associated facilities would occur within existing industrial facilities. Refinery modifications are

expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. Construction activities would be limited to the confines of existing industrial facilities (refineries) and the operating portions of the facilities. The land use within the refineries is typically zoned for heavy industrial uses. Land uses surrounding the refineries can vary considerably and include industrial areas, commercial areas, open space, and residential areas. Construction activities would be limited to the confines of the refineries.

All of the General Plan and land use plans for Richmond, Martinez, Benicia and Rodeo (Contra Costa County) allow for and encourage the continued use of industrial areas within their respective communities. Some of the General Plans encourage the modernization of existing industrial areas, including the refineries. A summary of the land use policies that apply to industrial areas is summarized for each community that the five Bay Area refineries are located.

1. Richmond General Plan 2030 includes the following land use policies regarding industrial areas (Richmond, 2015).

    - Action LU3.H Industrial Lands Retention and Consolidation Ensure that industrial uses are consolidated around rail and port facilities and work with existing industrial operators, economists and commercial brokers to remain informed about the future demand for industrial land.
    - Action LU3.I Industrial Modernization Support heavy industry's on-going efforts to modernize and upgrade their plants to reduce energy use, increase efficiency and reduce emissions.

2. City of Martinez General Plan includes the following land use policies regarding industrial areas (Martinez, 2015).

    - 21.51 Expansion of the petroleum refining and related industries must proceed in an orderly fashion and be consistent with protection of the community's air, water, scenic and fiscal resources.
    - 30.351 Adequate land for industrial growth and development should be provided. It is the policy of the City to encourage and assist existing industry to relocate away from the southern perimeter of the waterfront.
    - 30.352 The City should consider further annexation to the east of the current Martinez City Limits to provide space for expansion of industry.
    - 30.353 Industrial expansion accompanied by adverse environmental impact will not be permitted.
    - 30.354 Acceptability of any industry shall be based upon its demonstrated ability to conform to performance standards set by the City.
    - 30.355 Architecture of some merit and landscaping of building sites and parking areas should be required; according to design and landscaping criteria for industrial sites.

3. City of Benicia General Plan includes the following land use policies regarding industrial areas (Benicia, 2015).

- **POLICY 2.6.1:** Preserve industrial land for industrial purposes and certain compatible "service commercial" and ancillary on-site retail uses.
- "Compatible," as defined in the California General Plan Glossary, means "capable of existing together without conflict or detrimental effects." Compatibility will often be decided on a case-by-case basis by the Planning Commission and City Council.
- **POLICY 2.6.2:** Other land uses should not adversely affect existing industrial and commercial land uses.
- Program 2.6.A: Where General Plan amendments propose to convert industrial land to non-industrial or non-commercial uses, require the preparation of a fiscal and economic impact analysis to ensure that the conversion does not adversely affect the city's longterm economic development, or the economic vitality of existing industrial/commercial uses.
- Program 2.6.B: Develop criteria for evaluating whether a proposed non-industrial/non-commercial use would impact the viability of existing industrial/commercial uses. Use the criteria to evaluate non-industrial and non-commercial projects proposed in the Industrial Park.
- **POLICY 2.6.3:** Facilitate continued development of the Industrial Park. Especially encourage general industrial uses to locate in the basin northeast of Downtown (around Industrial Way between East Second and the freeway).
- Program 2.6.C: For lands designated limited industrial, reduce the length of time and number of steps required for development proposals to proceed, consistent with CEQA, community development policies and ordinances, and the design review process for general industrial lands.
- **POLICY 2.6.4:** Link any expansion of Industrial land use to the provision of infrastructure and public services that are to be developed and in place prior to the expansion.
- Program 2.6.D: Continue to update the overall capital improvements program and infrastructure financing plan for the Industrial Park and other major industrial areas.
- Program 2.6.E: Develop Industrial Park infrastructure and public services standards, as approved by the City Council.
- **POLICY 2.6.5:** Establish and maintain a land buffer between industrial/commercial uses and existing and future residential uses for reasons of health, safety, and quality of life.
- Program 2.6.F: Use topography, landscaping, and distance as a buffer between Industrial Park uses and residential uses.
- A buffer is "adequate" to the extent that it physically and psychologically separates uses or properties so as to shield, reduce, or block one set of properties from noise, light, or other nuisances generated on or by the other set of properties. Buffers will be determined on a case by case basis.

4. Rodeo: The Contra Costa General Plan Land Use Element identifies the following land use policies (CCC, 2015).

- 3.163. A buffer of agricultural lands around the eastern Union Oil (currently Phillips 66) property is created in this plan to separate the viewpoint residential area from future industrial development on the property. These open space lands should remain undeveloped.

Based on a review of the applicable land use plans, the construction of equipment within the confines of existing refineries is not expected to conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the projects. The jurisdictions with land use approval recognize and support the continued use of industrial facilities. The minor construction required to comply with the proposed new or amended rules that would be imposed by the proposed projects would not interfere with those policies or objectives.

The proposed projects have no components which would affect land use plans, policies, or regulations. Regulating emissions from petroleum refineries and associated facilities, chemical plants, bulk plants, and bulk terminals will not require local governments to alter land use and other planning considerations due to the proposed projects. Habitat conservation or natural community conservation plans, agricultural resources or operations, would not be affected by the proposed projects, and divisions of existing communities would not occur. Therefore, current or planned land uses with the District will not be significantly affected as a result of the proposed new and amended rules.

Conclusion

Based upon these considerations, no significant adverse impacts to land use and planning are expected from the adoption of the proposed projects.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI.	**MINERAL RESOURCES.** Would the projects:				
a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☑
b)	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and the affected environment vary greatly throughout the area. The industrial facilities affected by the proposed projects are located in a relatively small portion of the Bay Area.

Regulatory Background

Mineral resources are generally protected and regulated by the City and/or County General Plans through land use and zoning requirements.

Discussion of Impacts

X a-b. The proposed new rules and amendments are not associated with any action that would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The proposed new rules are not associated with any action that would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, no impacts on mineral resources are expected.

Conclusion

Based upon these considerations, no significant adverse impacts to mineral resources are expected from the adoption of the new and amended rules.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. NOISE. Would the projects:					
a)	Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☑	☐
b)	Expose persons to or generate of excessive groundborne vibration or groundborne noise levels?	☐	☐	☑	☐
c)	Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
d)	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑
f)	For a project within the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and the affected environment vary greatly throughout the area. The industrial facilities affected by the proposed projects are located in a relatively small portion of the Bay Area.

Regulatory Background

Noise issues related to construction and operation activities are addressed in local General Plan policies and local noise ordinance standards. The General Plans and noise ordinances generally establish allowable noise limits within different land uses including residential areas, other

sensitive use areas (e.g., schools, churches, hospitals, and libraries), commercial areas, and industrial areas.

Discussion of Impacts

XI a, c, and d. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. In addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. No new major industrial equipment is expected to be required to be installed due to the proposed projects so that no noise impacts associated with the operation of the proposed projects are expected. Further, the refineries and other industrial facilities are regulated by local noise ordinances. Therefore, industrial operations affected by the proposed new and amended rules are not expected to have a significant adverse effect on local noise control laws or ordinances.

Construction activities associated with the proposed projects are expected to be minor. Some minor construction may be necessary to optimize the ammonia injection systems on FCCUs. Construction would likely require a couple of medium-duty truck trips to deliver equipment, a construction crew of three to ten workers, and a few pieces of construction equipment (e.g., forklift, welders, and hand tools). All construction activities are expected to occur within industrial areas so that no significant increase in noise during construction activities is expected.

XI b. The proposed projects are not expected to generate or expose people to excessive groundborne vibration or groundborne noise. No major construction equipment that would generate vibration (e.g., backhoes, graders, jackhammers, etc.) is expected to be required. Therefore, the proposed projects are not expected to generate excessive groundborne vibration or noise.

XI. e-f. If applicable, the petroleum refineries and related facilities affected by the proposed new and amended rules would still be expected to comply, and not interfere, with any applicable airport land use plans. The existing refineries are not located within existing airport land use plans. The proposed new and amended rules would not locate residents or commercial buildings or other sensitive noise sources closer to airport operations. As noted in the previous item, there are no components of the proposed projects that would substantially increase ambient noise levels, either intermittently or permanently.

Conclusion

Based upon these considerations, no significant adverse impacts to noise are expected from the adoption of the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. POPULATION AND HOUSING. Would the projects:				
a) Induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g. through extension of roads or other infrastructure)?	☐	☐	☐	☑
b) Displace a substantial number of existing housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
c) Displace a substantial number of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and the affected environment vary greatly throughout the area. The industrial facilities affected by the proposed projects are located in a relatively small portion of the Bay Area.

Regulatory Background

Population and housing growth and resources are generally protected and regulated by the City and/or County General Plans through land use and zoning requirements.

Discussion of Impacts

XIII. a). According to the Association of Bay Area Governments (ABAG), population in the Bay Area is currently about seven million people and is expected to grow to about nine million people by 2035 (ABAG, 2006). The proposed projects are not anticipated to generate any significant effects, either directly or indirectly, on the Bay Area's population or population distribution. The proposed new and amended regulations will affect five refineries and associated facilities in Contra Costa and Solano counties. It is expected that the existing labor pool would accommodate the labor requirements for any modifications at the affect refineries. In addition, it is not expected that the affected refineries would need to hire additional personnel to implement the proposed projects. Additional labor would be required to monitor fugitive equipment under proposed amendments to Rule 8-18 and Rule 11-10. Most refineries used contract labor to handle these requirements which could require an additional one or two people

to implement. In the event that new employees are hired, it is expected that the existing local labor pool in the Bay Area can accommodate any increase in demand for workers that might occur as a result of adopting the proposed new rules and amendments. As such, adopting the proposed new and amended rules are not expected to induce substantial population growth.

XIII. b and c). The proposed new and amended rules would require modifications to existing refineries and industrial facilities so that they are not expected to result in the creation of any industry that would affect population growth, directly or indirectly induce the construction of single- or multiple-family units, or require the displacement of people or housing elsewhere in the Bay Area. Based upon these considerations, significant population and housing impacts are not expected from the implementation of the proposed new rules and amendments.

Conclusion

Based upon these considerations, no significant adverse impacts to population and housing are expected from the adoption of the proposed projects.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. PUBLIC SERVICES. Would the projects:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
Fire protection?	☐	☐	☐	☑
Police protection?	☐	☐	☐	☑
Schools?	☐	☐	☐	☑
Parks?	☐	☐	☐	☑
Other public facilities?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and the affected environment vary greatly throughout the area. The industrial facilities affected by the proposed projects are located in a relatively small portion of the Bay Area.

Given the large area covered by the Air District, public services are provided by a wide variety of local agencies. Fire protection and police protection/law enforcement services within the Air District are provided by various districts, organizations, and agencies. There are several school districts, private schools, and park departments within the Air District. Public facilities within the Air District are managed by different county, city, and special-use districts.

Regulatory Background

City and/or County General Plans usually contain goals and policies to assure adequate public services are maintained within the local jurisdiction.

Discussion of Impacts

XIII a. The proposed new and amended rules would further reduce emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. Further, in addition to petroleum refineries, proposed amendments to Rule 8-

18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. As stated above, all refineries and facilities affected by the proposed new and amended rules, maintain on-site fire-fighting equipment and trained personnel with fire-fighting and emergency response experience. While proposed Rule 6-5 could require minor construction activities and modifications to existing refinery operations, the modifications are not expected to require additional service from local fire departments above current levels.

Refineries and related facilities maintain their own security systems. Refineries are fenced and access is controlled at manned gates. Refinery security would occur within the confines of the existing refineries. Therefore, the proposed projects are not expected to increase the need or demand for additional police services above current levels.

As noted in the "Population and Housing" discussion above, the proposed new and amended rules are not expected to induce population growth because the local labor pool (e.g., workforce) is expected to be sufficient to accommodate any activities that may be necessary at affected facilities. Additionally, modifications to the refineries and related facilities are not expected to require a substantial increase in employees. Therefore, there will be no increase in local population and thus no impacts are expected to local schools or parks.

Besides building permits, there is no other need for government services. The proposed projects would not result in the need for new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives. There will be no increase in population as a result of the adoption of the proposed projects, therefore, no need for physically altered government facilities.

Conclusion

Based upon these considerations, no significant adverse impacts to public services are expected from the adoption of the proposed new and amended rules.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. RECREATION. Would the projects:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that there are numerous areas for recreational activities. The refineries affected by the proposed new and amended rules are located in industrial areas within the Bay Area. Public recreational land can be located adjacent to, or in reasonable proximity to these areas.

Regulatory Background

Recreational areas are generally protected and regulated by the City and/or County General Plans at the local level through land use and zoning requirements. Some parks and recreation areas are designated and protected by state and federal regulations.

Discussion of Impacts

XIV a-b. As discussed under "Land Use" above, there are no provisions in the proposed new and amended rules affecting land use plans, policies, or regulations. and use and other planning considerations are determined by local governments; no land use or planning requirements will be altered by the proposed new and amended rules. The proposed new and amended rules would not increase or redistribute population and, therefore, would not increase the demand for or use of existing neighborhood and regional parks or other recreational facilities or require the construction of new or the expansion of existing recreational facilities. Therefore, adoption of the proposed projects are not expected to have any significant adverse impacts on recreation.

Conclusion

Based upon these considerations, no significant adverse impacts to recreation are expected from the adoption of the proposed new and amended rules.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. TRANSPORTATION/TRAFFIC. Would the projects:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☑	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established b the county congestion management agency for designated roads or highways?	☐	☐	☑	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☑
d) Substantially increase hazards because of a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☐	☑
e) Result in inadequate emergency access?	☐	☐	☐	☑
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☑

Setting

The Air District covers all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and potions of western Solano and southern Sonoma Counties. Because the area of coverage is so vast (approximately 5,600 square miles), land uses vary greatly and include commercial, industrial, residential, and agricultural uses. The proposed projects would apply to stationary sources located in petroleum refineries plus associated facilities that either support refinery operation or process a refinery by-product. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals located within the Air District's jurisdiction.

Transportation infrastructure within the Air District ranges from single-lane roadways to multilane interstate highways. Transportation systems between major hubs are located within and outside the Air District, including railroads, airports, waterways, and highways. Localized modes of travel include personal vehicles, buses, bicycles, and walking.

The region is served by numerous interstate and U.S. freeways. On the west side of San Francisco Bay, Interstate 280 and U.S. 101 run north-south. U.S. 101 continues north of San Francisco into Marin County. Interstates 880 and 680 run north-south on the east side of the Bay. Interstate 80 starts in San Francisco, crosses the Bay Bridge, and runs northeast toward Sacramento. Interstate 80 is a six-lane north-south freeway which connects Contra Costa County to Solano County via the Carquinez Bridge. State Routes 29 and 84, both highways that allow at-grade crossings in certain parts of the region, become freeways that run east-west, and cross the Bay. Interstate 580 starts in San Rafael, crosses the Richmond-San Rafael Bridge, joins with Interstate 80, runs through Oakland, and then runs eastward toward Livermore. From the Benicia-Martinez Bridge, Interstate 680 extends north to Interstate 80 in Cordelia. Interstate 780 is a four lane, east-west freeway extending from the Benicia-Martinez Bridge west to I-80 in Vallejo.

Regulatory Background

Transportation planning is usually conducted at the state and county level. Planning for interstate highways is generally done by the California Department of Transportation.

Most local counties maintain a transportation agency that has the duties of transportation planning and administration of improvement projects within the county and implements the Transportation Improvement and Growth Management Program, and the congestion management plans (CMPs). The CMP identifies a system of state highways and regionally significant principal arterials and specifies level of service standards for those roadways.

Discussion of Impacts

XV a, b, and f. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals.

Refinery modifications are expected to be limited to the refineries to optimize ammonia or urea injection systems on existing FCCUs. The proposed new and amended rules are not expected to affect the performance of mass transit or non-motorized travel to street, highways and freeways, pedestrian or bicycle paths. No conflicts with any congestion management programs, to include level of service and travel demand measures, or other standards established by county congestion management agencies for designated roads or highways are expected. No changes are expected to parking capacity at or in the vicinity of affected facilities as the proposed projects only pertain to equipment located within existing industrial facilities. Therefore, no significant adverse impacts resulting in changes to traffic patterns or levels of service at local intersections are expected.

XV c. The proposed new and amended rules are not expected to involve the delivery of materials via air so no increase in air traffic is expected.

XV d - e. The proposed projects are not expected to increase traffic hazards or create incompatible uses. No effect on emergency access to affected industrial facilities is expected from adopting the proposed new and amended rules. The proposed projects are not expected to have a significant adverse impact on traffic hazards, create incompatible uses or emergency access.

XV f. The proposed new and amended rules affects existing industrial facilities and are not expected to conflict with adopted policies, plans, or programs supporting alternative transportation modes (e.g., bus turnouts, bicycle racks).

Conclusion

Based upon these considerations, no significant adverse impacts to transportation and traffic are expected from the adoption of the proposed projects.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVII. UTILITIES/SERVICE SYSTEMS. Would the projects:					
a)	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑
b)	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
c)	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
d)	Have sufficient water supplies available to serve the project from existing entitlements and resources, or would new or expanded entitlements needed?	☐	☐	☑	☐
e)	Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑
f)	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☑	☐
g)	Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☑	☐

Setting

The Air District covers all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The area of coverage is vast (about 5,600 square miles) so that land uses and the affected environment vary greatly throughout the area.

Given the large area covered by the Air District, public utilities are provided by a wide variety of local agencies. The affected residences and commercial facilities are supported by wastewater

and storm water treatment facilities and treated wastewater is discharged under the requirements of NPDES permits.

Water is supplied to affected residents and commercial facilities by several water purveyors in the Bay Area. Solid waste is handled through a variety of municipalities, through recycling activities, and at disposal sites.

Hazardous waste generated within the Bay Area, which is not reused on-site, or recycled off-site, is disposed of at a licensed in-state hazardous waste disposal facilites. Two such facilities are the Chemical Waste Management Inc. (CWMI) Kettleman Hills facility in King's County, and the Safety-Kleen facility in Buttonwillow (Kern County). Hazardous waste can also be transported to permitted facilities outside of California. The nearest out-of-state landfills are U.S. Ecology, Inc., located in Beatty, Nevada; USPCI, Inc., in Murray, Utah; and Envirosafe Services of Idaho, Inc., in Mountain Home, Idaho. Incineration is provided at the following out-of-state facilities: Aptus, located in Aragonite, Utah and Coffeyville, Kansas; Rollins Environmental Services, Inc., located in Deer Park, Texas and Baton Rouge, Louisiana; Chemical Waste Management, Inc., in Port Arthur, Texas; and Waste Research & Reclamation Co., Eau Claire, Wisconsin.

Regulatory Background

City and/or County General Plans usually contain goals and policies to assure adequate utilities and service systems are maintained within the local jurisdiction.

Discussion of Impacts

XVII a, b, d, and e. The proposed projects are designed to limit emissions of PM, $PM_{2.5}$, ROG, and NH_3 from stationary sources located in petroleum refineries plus five associated facilities that either support refinery operation or process a refinery by-product. The proposed new and amended rules are designed to reduce overall emissions from FCCUs, cooling towers, and equipment leaks. Further, in addition to petroleum refineries, amendments to Rule 8-18 would limit ROG emissions from equipment leaks at chemical plants, bulk plants and bulk terminals. The refineries affected by the proposed new and amended rules already exist and already use water, generate wastewater, treat wastewater, and discharge wastewater under existing wastewater discharge permits. The proposed new and amended rules would require air monitoring and potentially minor modifications to the existing refineries and associated facilities. The potential water use and wastewater impacts associated with implementation of proposed projects were addressed under Hydrology and Water Quality (see Section IX a.) and were determined to be less than significant.

XVII. c). Implementation of the proposed new and amended rules may require minor modifications within the confines of the existing refineries and related industrial facilities. These modifications would not alter the existing drainage system or require the construction of new storm water drainage facilities. Nor would the proposed new rules create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff. Therefore, no significant adverse impacts on storm drainage facilities are expected.

XVII f-g. The proposed projects are not expected to generate any increase in hazardous waste. Therefore, no significant adverse impacts are expected to hazardous waste landfills as a result of the proposed new or amended rules.

The proposed projects are not expected to generate any increase in solid waste. Therefore, no significant adverse impacts are expected to solid waste as a result of the proposed new or amended rules.

Conclusion

Based upon these considerations, no significant adverse impacts to utilities/service systems are expected from the adoption of the proposed projects.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII.	**MANDATORY FINDINGS OF SIGNIFICANCE.**				
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☑
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☐	☐	☐	☑
c)	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☑

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE

Discussion of Impacts

XVII a. The proposed projects do not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory, as discussed in the previous sections of the CEQA checklist. The proposed new and amended rules are expected to result in reductions of PM, $PM_{2.5}$, ROG, NOx, and NH_3 emissions from stationary sources, thus providing a beneficial air quality impact and improvement in air quality. As discussed in Section IV, Biological Resources and Section V, Cultural Resources, no significant adverse impacts are expected to biological or cultural resources.

XVII b-c. The proposed new and amended rules are expected to result in reductions of PM, $PM_{2.5}$, ROG, and NH_3 emissions from stationary sources, thus providing a beneficial air quality impact and improvement in air quality. The proposed projects are part of a long-term plan to

bring the Bay Area into compliance with the state ambient air quality standards, thus reducing the potential health impacts. The proposed projects do not have adverse environmental impacts that are limited individually, but cumulatively considerable when considered in conjunction with other regulatory control projects. The proposed new and amended rules are not expected to have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly. No significant adverse environmental impacts are expected.

CHAPTER 4

References Cited

Association of Bay Area Governments, 2006. Projections 2007, December 2006.

BAAQMD, 2010. Toxic Air Contaminant Control Program, 2010 Annual Report.

City of Benicia (Benicia), 2015. From 1847 Benicia General Plan Into the 21st Century. City of Benicia. Adopted: June 15, 1999. http://www.ci.benicia.ca.us/index.asp?Type=B_BASIC&SEC={4961C62F-22A5-4BB7-B402-D050A5856B00}&DE={8874E99E-FF86-45FF-8F9D-FAC81A3022A5}

Clean Harbors, 2015. Personal communication with Les Ashwood, Clean Harbors 435-884-8967, October 16, 2015.

Contra Costa County (CCC), 2015. Contra Costa County General Plan 2005 - 2020. Contra Coast County Department of Conservation and Development. January 18, 2005 (Reprint July 2010). http://www.co.contra-costa.ca.us/DocumentCenter/View/30922

City of Martinez (Martinez), 2015. Martinez General Plan. City of Martinez. http://www.cityofmartinez.org/civicax/filebank/blobdload.aspx?BlobID=7569

City of Richmond (Richmond), 2015. Land Use and Urban Design, Richmond General Plan 2030. http://www.ci.richmond.ca.us/DocumentCenter/Home/View/8809.

U.S. Ecology, 2015. Personal communication with Dan Church, U.S. Ecology, Inc. 800-590-5220. October 16, 2015.

December 10, 2015

SOCIO-ECONOMIC ANALYSIS:

PROPOSED AMENDMENTS TO REGULATION 8, RULE 18 ("EQUIPMENT LEAKS"), REGULATION 11, RULE 10 ("HEXALENT CHROMIUM EMISSIONS AND TOTAL HYDROCARBON EMISSIONS FROM PETROLEUM REFINERY COOLING TOWERS"), and DRAFT NEW REGULATION 6, RULE 5 ("PARTICULATE EMISSIONS FROM REFINERY FLUIDIZED CATALYTIC CRACKING UNITS")

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APPLIED DEVELOPMENT ECONOMICS

GREEN BUSINESS

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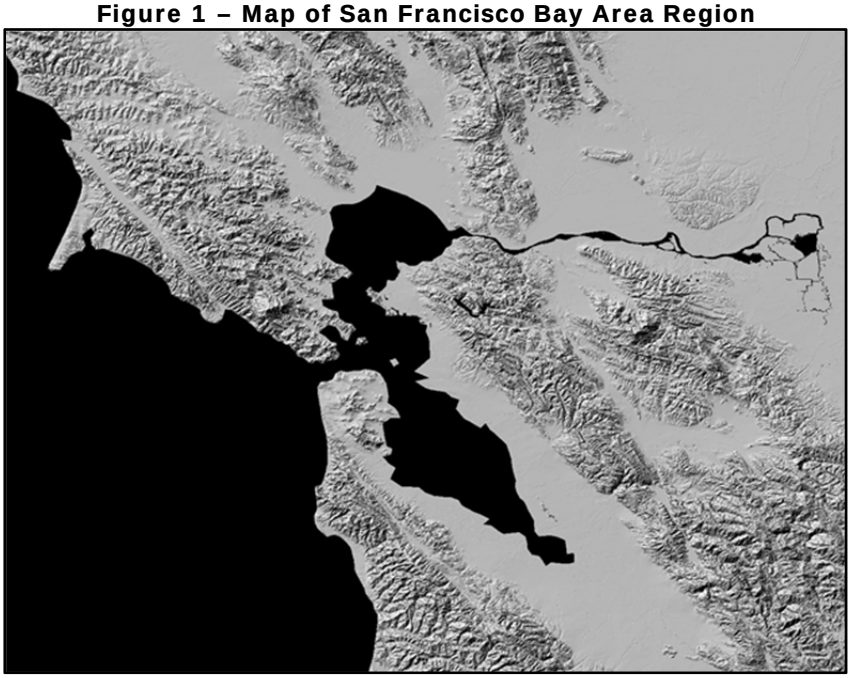
INTRODUCTION

The Bay Area Air Quality Management District ("BAAQMD" or the "Air District") seeks to amend two existing rules to reduce emissions from oil refineries operating in the Bay Area. In addition, the Air District seeks to adopt a new rule with the same effect in mind. The proposed new rule is Draft Regulation 6 Rule 5 ("Particulate Emissions from Refinery Fluidized Catalytic Cracking Units [FCCUs]"). BAAQMD seeks to amend and rename existing Regulation 11 Rule 10 ("Hexavalent Chromium and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers"), the purpose of which is to achieve technically feasible and cost-effective total hydrocarbon (THC) and hazardous air pollutants emission reductions from cooling towers at Bay Area refineries by requiring more rapid detection of heat exchanger leaks. BAAQMD also proposes to amend Regulation 8 Rule 18 ("Equipment Leaks"). After this introduction, this report discusses in greater detail the various rule changes the Air District proposes with regard to Draft Rule 6-5, Rule 8-18, and Rule 11-10 (Section Two). After that discussion, the report describes the socioeconomic impact analysis methodology and data sources (Section Three). The report describes population and economic trends in the nine-county San Francisco Bay Area (Section Four), which serves as a backdrop against which the Air District is contemplating the three sets of rule changes. Finally, the socioeconomic impacts stemming from the proposed rule changes are discussed in Section Five.

The report is prepared pursuant to Section 40728.5 of the California Health and Safety Code, which requires an assessment of socioeconomic impacts of proposed air quality rules. The findings in this report can assist Air District staff in understanding the socioeconomic impacts of the proposed requirements, and can assist staff in preparing a refined version of the rule. Figure 1 is a map of the nine-county region that comprises the San Francisco Bay Area Air Basin.

Figure 1 – Map of San Francisco Bay Area Region



BACKGROUND TO PROPOSED AMENDMENTS TO EXISTING RULE 11-10 AND RULE 8-18, AND PROPOSED NEW RULE 6-5

This part of the report summarizes key changes to existing rules Rule 8-18 and Rule 11-10. In addition, proposed new Rule 6-5 is summarized below.

SUMMARY OF PROPOSED AMENDMENTS TO REGULATION 8, RULE 18

Oil refineries, chemical plants, bulk plants, bulk terminals, and other facilities that store, transport, and use volatile organic liquids lose some organic material as fugitive emissions wherever there is a connection between two pieces of equipment. Valves, pumps, and compressors also leak organic material. Rule 8-18 requires such facilities to maintain a leak detection and repair (LDAR) program. The purpose of the LDAR program is to ensure that all equipment is inspected regularly and, if a leak is found to exceed the leak threshold, the equipment must be repaired, replaced, or placed on a list of non-repairable equipment. Currently, equipment in heavy liquid service is only subject to the applicable leak standards in Section 8-18-300, and not to the LDAR requirements in Section 8-18-400. Without routine inspections of equipment in heavy liquid service, leaks may not be found and repaired. In an effort to strengthen existing rules, the Air District is considering the following changes to Regulation 8, Rule 18, which would:

- Become effective January 1, 2018:
    - Include identification and monitoring of heavy liquid service equipment, and
    - Subject heavy liquid service equipment to leak minimization and repair requirements;
- Amend the non-repairable equipment standard to reduce the allowable amount of equipment placed on non-repairable list;
- Identify the cause of any background reading greater than 50 ppmv;
- Require mass emission monitoring for all equipment placed on the non-repairable equipment list; and
- Add a maximum leak concentration and/or mass emissions limit for fugitive equipment subject to the rule.

In addition, administrative changes to rule language will be made to improve clarification and enforceability of the rule.

SUMMARY OF PROPOSED AMENDMENTS TO REGULATION 11, RULE 10

The Bay Area has five large-scale petroleum refineries which operate a total of 32 cooling towers. These cooling towers are large, industrial heat exchangers that are used to dissipate significant heat loads to the atmosphere from process equipment that contains organic compounds, through the evaporation of cooling water. When a heat exchanger leaks, organic compounds can pass from the process equipment into the cooling water. If a leak is not detected and repaired, significant quantities of organic compounds can be released into the atmosphere when the cooling water is exposed to the atmosphere in the cooling tower.

District Regulation 11, Rule 10 was developed in 1989 to reduce hexavalent chromium emissions from cooling towers. The goal of the proposed amendments to Regulation 11, Rule 10 is to achieve technically feasible and cost-effective total hydrocarbon (THC) and hazardous air pollutants emission reductions from cooling towers at Bay Area refineries by requiring more rapid detection of heat exchanger leaks. A concept paper issued by the Air District underscored the importance of rapid detection: "Emissions resulting from leaks can become significant if heat exchanger leaks go undetected for long periods of time. In 2010 a heat exchanger leak at a Bay Area refinery resulted in emissions of at least 52 tons of VOC over a recorded period of a few weeks. The total magnitude of emissions from the leak event was greater; emissions from the event were only estimated once the leak was detected, which was likely weeks if not months after the leak began."[1]

SUMMARY OF DRAFT NEW REGULATION 6, RULE 5

Fluidized catalytic cracking units (FCCUs) are complex processing units at refineries that convert heavy components of crude oil into lighter compounds used in the production of gasoline and other transportation fuels. The FCCU uses a fine catalyst powder to promote the cracking reaction. During this reaction, the catalyst becomes coated with petroleum coke, which is burned off in the regenerator portion of the FCCU so that the catalyst can be reused. The regenerator vessel exhaust contains particulate matter (PM), sulfur dioxide (SO_2), ammonia, carbon monoxide (CO), oxides of nitrogen (NOx), and volatile organic compounds (VOC).

The goal of this rulemaking is to achieve technically feasible and cost-effective emission reductions of PM less than 2.5 microns in diameter ($PM_{2.5}$) and $PM_{2.5}$ precursors (compounds that form $PM_{2.5}$ by chemical reactions in the atmosphere after being emitted from a given source) from FCCUs at Bay Area refineries. The Air District plans to achieve emission reductions with two actions, as described in the "Workshop Report for the Refinery Emissions Reduction Strategy." The first action, addressed in this report, will propose a new regulation that will address ammonia emissions (a $PM_{2.5}$ precursor) at those FCCUs that use ammonia or urea injection. The second, future action will amend Regulation 6, Rule 5, to further address emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors. The specific elements of this second action will depend in part on the results of the first action.

[1] BAAQMD, "Appendix C: Concept Paper for Changes to Rule 11-10: Colling Towers", page C:2 (2015)

Of the five petroleum refineries operating in the Bay Area, four — Chevron, Shell, Tesoro, and Valero — operate FCCUs. The Valero refinery recently retrofitted its FCCU with a wet scrubber which has significantly reduced the emissions from this FCCU. Valero will be exempt from the proposed ammonia emission limit. The Chevron and Tesoro FCCUs use ammonia to promote the control of filterable particulate matter emissions in electrostatic precipitators (ESPs), which results in unreacted ammonia being emitted to the atmosphere ("ammonia slip"). The Shell FCCU uses ammonia or urea injection to control NOx generation and also to promote ESP operation, which results in unreacted ammonia being emitted to the atmosphere.

METHODOLOGY

Applied Development Economics (ADE) began this analysis by preparing a statistical description of the industry groups of which the affected sources are a part, analyzing data on the number of establishments, jobs, and payroll. We also estimated sales generated by impacted industries, as well as net profits for each affected industry.

This report relies heavily on the most current data available from a variety of sources, particularly the State of California's Employment Development Department (EDD) Labor Market Information Division. In addition, this report relies on data from the US Census County Business Patterns, as well as from the US Internal Revenue Service.

With the above information, ADE was able to estimate net after tax profit ratios for sources affected by the proposed rule. ADE calculated ratios of profit per dollar of revenue for affected industries. The result of the socioeconomic analysis shows what proportion of profits the compliance costs represent. Based on assumed thresholds of significance, ADE discusses in the report whether the affected sources are likely to reduce jobs as a means of recouping the cost of rule compliance or as a result of reducing business operations. To the extent that such job losses appear likely, the indirect multiplier effects of the jobs losses are estimated using a regional IMPLAN input-output model. In some instances, particularly where consumers are the ultimately end-users of goods and services provided by the affected sources, we also analyzed whether costs could be passed to households in the region.

When analyzing the socioeconomic impacts of proposed new rules and amendments, ADE attempts to work closely within the parameters of accepted methodologies discussed in a 1995 California Air Resources Board (ARB) report called "Development of a Methodology to Assess the Economic Impact Required by SB513/AB969" (by Peter Berck, PhD, UC Berkeley Department of Agricultural and Resources Economics, Contract No. 93-314, August, 1995). The author of this report reviewed a methodology to assess the impact that California Environmental Protection Agency proposed regulations would have on the ability of California businesses to compete. The ARB has incorporated the methodologies described in this report in its own assessment of socioeconomic impacts of rules generated by the ARB. One methodology relates to determining a level above or below which a rule and its associated costs is deemed to have significant impacts. When analyzing the degree to which its rules are significant or insignificant, the ARB employs a threshold of significance that ADE follows. Berck reviewed the threshold in his analysis and wrote, "The Air Resources Board's (ARB) use of a 10 percent change in [Return on Equity] ROE (i.e. a change in ROE from 10 percent to a ROE of 9 percent) as a threshold for a finding of no significant, adverse impact on either competitiveness or jobs seems reasonable or even conservative."

REGIONAL DEMOGRAPHIC AND ECONOMIC TRENDS

This section of the report tracks the larger economic and demographic contexts within which the Air District is contemplating amendments and new rules that will affect five refineries in the Bay Area. This section begins with a broad overview of demographic and economic trends, with discussion then narrowing to industries and sources affected by the proposed rule changes.

REGIONAL DEMOGRAPHIC TRENDS

Table 1 tracks population growth in the nine-county San Francisco Bay Area between 2004 and 2014, including data for the year 2009. Between 2004 and 2009, the region grew by approximately 1 percent a year. Between 2009 and 2014, the region grew annually at a much slower rate of 0.1 percent per year. Overall, there are 7,510,942 people in the region. At 1,889,638, Santa Clara County has the most people, while Napa has the least, at 140,362.

Table 1: Regional Demographic Trends: 2004-2014: Population Growth: San Francisco Bay Area

AREAS	2004	2009	2014	04-09 CAGR	09-14 CAGR	04-14 CAGR
California	36,810,358	38,648,090	38,714,725	1.0%	0.03%	0.5%
SF Bay Area	7,096,575	7,459,858	7,510,942	1.0%	0.1%	0.6%
Alameda County	1,507,500	1,574,857	1,594,569	0.9%	0.2%	0.6%
Contra Costa County	1,020,898	1,073,055	1,102,871	1.0%	0.5%	0.8%
Marin County	252,485	260,651	258,972	0.6%	-0.1%	0.3%
Napa County	133,294	138,917	140,362	0.8%	0.2%	0.5%
San Francisco County	799,263	856,095	845,602	1.4%	-0.2%	0.6%
San Mateo County	723,453	754,285	753,123	0.8%	-0.03%	0.4%
Santa Clara County	1,759,585	1,880,876	1,889,638	1.3%	0.1%	0.7%
Solano County	421,657	427,837	429,552	0.3%	0.1%	0.2%
Sonoma County	478,440	493,285	496,253	0.6%	0.1%	0.4%

Source: Applied Development Economics, based on California Department of Finance Population Estimates E-5 Reports (2005, 2010, and 2015)(Note: CAGR = Compound Annual Growth Rate)

REGIONAL ECONOMIC TRENDS

Data in Table 2 describe the larger economic context within which officials are contemplating amendments to Regulations 11-10, 8-18, and new Rule 6-5. Businesses in the region employ over three million workers, or 3,525,910. The number of private and public sector jobs in the region grew annually by 1.8 percent between 2009 and 2014, after having increased somewhat slightly between 2004 and 2009 by 0.2 percent a year. Of the 3,525,910 workers, 429,768, or 12.2 percent, are in the public sector, meaning 87.8 percent of all employment is in the private sector. Economic sectors in the table below are sorted by the share of total employment. The top-five sectors in the Bay Area are Health and Social Assistance (NAICS 62) (427,982 workers), Professional/Technical Services (NAICS 54) (399,834 workers), Retail (NAICS 44-45) (335,791), Manufacturing (NAICS 31-33) (318,909) and Public Sector except Education. Of the top-ten leading sectors in terms of employment, five exhibited

high rates of annual growth from 2009 to 2015, growing annually by more than four percent. These sectors are Health and Social Assistance, Professional/Technical Services, Eating and Drinking Places, Administrative Support (NAICS 561), and Information (NAICS 51). Combined, these five sectors employ 41 percent of total employment, or 1,444,160 out of 3,525,910. In the state, only Healthcare and Social Assistance and Administrative Support grew annually by faster than four percent, and, relative to the Bay Area, employment in these five sectors at the state level represent a lesser share of total employment, i.e. 37 percent, or 5,865,991 out of 15,809,083. In other words, the leading sectors in the Bay Area perform better than comparable sectors in the state as a whole. Moreover, of the top-ten leading sectors in the Bay Area, only one (Public Sector except Education) had less workers in 2014 than in 2009, underscoring the resilience of the regional economy in the aftermath of the Great Recession. By way of comparison, of the top ten leading sectors in the state, three (Manufacturing, Public Sector excluding Education, and Public Sector Education) still have not recovered from the Great Recession, exhibiting less workers now than in 2009.

Table 2: San Francisco Bay Area Employment Trends By Sector and Select Industries: 2004 - 2014

	Bay Area							California						
Sectors	2004	2009	2014	Distribution. 2014	Rank	04-09 CAGR	09-14 CAGR	2004	2009	2014	Distribution 2014	Rank	04-09 CAGR	09-14 CAGR
Private & Public Sectors	3,191,935	3,225,980	3,525,910	100.0%		0.2%	1.8%	17,218,905	16,970,214	15,809,083	100.0%		-0.3%	-1.4%
Private Sector	2,750,092	2,784,163	3,096,142	87.8%		0.2%	2.1%	14,875,824	14,546,383	13,501,711	85.4%		-0.4%	-1.5%
Public Sector	441,843	441,817	429,768	12.2%		0.0%	-0.6%	2,343,081	2,423,831	2,307,372	14.6%		0.7%	-1.0%
62 Health, Social Assist	281,219	311,429	427,982	12.1%	1	2.1%	6.6%	1,284,158	1,435,436	2,000,372	12.7%	1	2.3%	6.9%
54 Professional, Tech.	277,827	321,808	399,834	11.3%	2	3.0%	4.4%	911,684	1,012,533	1,171,165	7.4%	6	2.1%	3.0%
44-45 Retail	332,742	309,241	335,791	9.5%	3	-1.5%	1.7%	1,613,395	1,513,767	1,623,371	10.3%	2	-1.3%	1.4%
31-33 Manufacturing	353,215	314,263	318,909	9.0%	4	-2.3%	0.3%	1,517,533	1,275,752	1,264,114	8.0%	4	-3.4%	-0.2%
Public Sector exc. Educ.	293,586	301,289	285,923	8.1%	5	0.5%	-1.0%	1,279,867	1,331,656	1,280,253	8.1%	3	0.8%	-0.8%
722 Eating, Drinking Pl	209,204	225,123	280,016	7.9%	6	1.5%	4.5%	996,086	1,053,084	1,260,661	8.0%	5	1.1%	3.7%
561 Admin. & Support	170,698	154,174	188,502	5.3%	7	-2.0%	4.1%	899,139	798,632	976,801	6.2%	8	-2.3%	4.1%
23 Construction	182,894	142,030	160,702	4.6%	8	-4.9%	2.5%	845,747	618,068	669,766	4.2%	10	-6.1%	1.6%
51 Information	114,908	111,333	147,826	4.2%	9	-0.6%	5.8%	482,608	438,640	456,992	2.9%	13	-1.9%	0.8%
Public Sector Education	148,257	140,528	143,845	4.1%	10	-1.1%	0.5%	1,063,214	1,092,175	1,027,119	6.5%	7	0.5%	-1.2%
42 Wholesale	121,948	115,992	123,664	3.5%	11	-1.0%	1.3%	650,334	645,959	709,154	4.5%	9	-0.1%	1.9%
81 Other Services	140,657	157,003	120,053	3.4%	12	2.2%	-5.2%	666,102	740,659	504,176	3.2%	12	2.1%	-7.4%
52 Finance & Insurance	147,378	128,158	119,297	3.4%	13	-2.8%	-1.4%	619,396	539,753	515,504	3.3%	11	-2.7%	-0.9%
611 Private Education	63,445	76,295	91,463	2.6%	14	3.8%	3.7%	232,470	279,124	317,066	2.0%	16	3.7%	2.6%
55 Mgt of Companies	63,228	59,185	73,268	2.1%	15	-1.3%	4.4%	233,847	197,752	225,792	1.4%	19	-3.3%	2.7%
48-49 Trnsprt\Warhsng	53,541	49,753	68,367	1.9%	16	-1.5%	6.6%	409,583	399,259	446,430	2.8%	14	-0.5%	2.3%
71 Entertainmnt & Rec	49,505	50,679	59,064	1.7%	17	0.5%	3.1%	236,527	243,203	276,312	1.7%	17	0.6%	2.6%
53 Real Estate, Leasing	60,592	53,776	56,598	1.6%	18	-2.4%	1.0%	276,460	254,863	264,129	1.7%	18	-1.6%	0.7%
721 Accommodations	45,832	45,556	48,669	1.4%	19	-0.1%	1.3%	197,036	197,496	211,139	1.3%	20	0.0%	1.3%
99 Misc	48,243	45,602	43,443	1.2%	20	-1.1%	-1.0%	53,008	64,639	60,738	0.4%	21	4.0%	-1.2%
11 Agriculture	16,005	18,502	14,754	0.4%	21	2.9%	-4.4%	369,951	373,603	415,444	2.6%	15	0.2%	2.1%
562 Waste Managemnt	10,340	10,796	11,606	0.3%	22	0.9%	1.5%	37,679	40,330	46,329	0.3%	23	1.4%	2.8%
22 Utilities	4,710	6,423	4,758	0.1%	23	6.4%	-5.8%	55,960	59,705	57,627	0.4%	22	1.3%	-0.7%
21 Mining	1,961	876	1,576	0.0%	24	-15%	12.5%	21,239	23,865	28,629	0.2%	24	2.4%	3.7%

Source: Applied Development Economics, based on California EDD LMID QCEW 2004, 2009, and 2014 (note: CAGR = Compound Annual Growth Rate)

Of the top ten leading sectors in the Bay Area, four can be categorized as knowledge-based industries that tend to exhibit average higher-pay and have more educated and skilled workforce. These industries (Health and Social Assistance, Professional\Technical Services, Manufacturing, and Information) employ 1,294,551 workers, or 37 percent of total public and private sector workers. Of the top-ten sectors in the state, three are knowledge-based industries (Health and Social Assistance, Manufacturing, and Professional\Technical Services), but their combined workforce represents 28 percent of total employment in the state.

TRENDS FOR INDUSTRIES SUBJECT TO PROPOSED RULE-MAKING

The proposed rule changes affect one particular industry in the Bay Area, namely petroleum refineries. While the California EDD LMID reports that there are 23 refineries in the nine-county region, more than likely, this state agency applied a broader definition for refinery operations in the region. Appendix A identifies a number of "refineries" included in the EDD LMID's database; as this shows, many are not full scale refineries but rather are engaged in a variety of petroleum-related operations. In any event, the proposed new rules will affect five refineries operating in the Bay Area.

Table 3 below identifies the businesses in the Bay Area that are full-scale refineries. The list comes from the CEC, which also included each refinery's throughput capacity. Of the five operating refineries in the region, Chevron is the largest, with the capacity to refine 245,271 42-gallon barrels of crude oil per day. At 78,400, Phillips 66 has the lowest throughput capacity. The five affected sources employ 5,513 workers, who make, on average, $173,700 [2].

Table 3 — Bay Area Refineries (California Energy Commission) and Crude Oil Capacity

Refinery	Barrels Per Day
Chevron U.S.A. Inc., Richmond Refinery	245,271
Tesoro Refining & Marketing Company, Golden Eagle (Avon/Rodeo) Refinery	166,000
Shell Oil Products US, Martinez Refinery	156,400
Valero Benicia Refinery	132,000
Phillips 66, Rodeo Refinery	78,400

Source: Applied Development Economics, Inc., based on California Energy Commission

[2]The 5,513 estimate is based on California EDD LMID and US Census County Business Patterns.

SOCIOECONOMIC IMPACT ANALYSIS

This section of the report analyzes socioeconomic impacts stemming from changes to existing Rule 11-10 and Rule 8-18, as well as impacts stemming from new Draft Rule 6-5. The discussion begins first with a summary of costs associated with each rule. Then, we present our findings with regard to estimated revenues and profits generated by the five affected sources, comparing the combined costs of all three rules against estimated net profits, in an effort to determine if these rules significantly impact the affected industry.

COST OF COMPLIANCE

Below we separately summarize costs associated with the three rule changes.

AMENDMENTS TO EXISTING RULE 11-10

The rule provides three options to perform the new, required hydrocarbon leak monitoring. The first two options are specified (daily manual sampling and analysis; use of a continuous, automated sampler), and the third option is alternative monitoring specified by the refinery and approved by the Air District. Costs are considered only for the two specified options, which may be performed in three ways:

1) Daily, manual sampling and analysis by contract personnel using off-site laboratory facilities. This option entails no capital costs, but has high contractor costs. Twenty-eight cooling towers require daily sampling ($500 for 1st sample at a refinery, $150 for every other cooling tower at the same refinery). Two towers require only weekly sampling because of their low flowrates ($150 for each weekly sample). Two towers require no manual sampling because they are equipped with continuous automated samplers.

2) Daily, manual sampling and analysis by refinery personnel using on-site laboratory facilities. This option entails both capital costs for sampling and analytic equipment and labor costs for staff. Each of the five Bay Area refineries would purchase sampling-analysis systems consisting of an FID analyzer, stripping column and GC analyzer for $25,000. Each refinery would need two complete systems, except for the refinery with the most (13) cooling towers, which would require three complete systems, for a total of 11 complete systems. Each refinery would need two staffers for each system at a cost of $100,000 per year.

3) Continuous, automated sampling. This option entails high capital costs for analyzers and auxiliary equipment such as a shelter. 30 new continuous analyzers would be required (2 cooling towers already have these devices) at an average, installed cost of $300,000 each. The two existing analyzers are assumed to each require $75,000 upgrades). Labor costs associated with maintaining these samplers are assumed to be $25,000 per year for refineries with up to 5 cooling towers, and an additional $25,000 for refineries with more than 5 cooling towers.

With the specified assumptions, the most costly option, which is the basis for the cost impact analysis, is daily manual sampling and analysis by contract personnel with the following annual costs, and no capital costs:

Chevron:	$519,000
Phillips 66:	$402,000
Shell:	$245,000
Tesoro:	$840,000
Valero:	$183,000
Total:	**$2,190,000**

AMENDMENTS TO EXISTING RULE 8-18

District staff has estimated that implementing requirements to Rule 8-18 as amended will result in $6.8 million in total annual costs for the five affected sources. Of the $6.8 million, $250,000 is an annualized amount over 10 years for capital improvements. The balance ($6,550,000) is an annual recurring cost for checking 78,160 valves, 2,930 pumps and 158 pressure relief devices.

DRAFT NEW RULE 6-5

BAAQMD staff believes that, for the Phase 1 part of Rule 6-5 (i.e. the ammonia emission limit), affected refineries, rather than simply reducing ammonia and/or urea injection to reduce ammonia slip emissions to no more than the proposed limit, will instead elect to optimize ammonia and/or urea injection to minimize overall fine particulate emissions, as allowed in the proposed rule. Although optimization will entail sampling and analysis, it will not require permanent sampling equipment or other capital equipment or permanent administrative costs. Monitoring of ammonia emissions will be required, so the costs of compliance are based on the installation and operation of a continuous emission monitoring system (CEMS) at the three non-exempt refineries that operate an FCCU, as described in the staff report.

SOCIOECONOMIC IMPACT ANALYSIS

The five affected sources' combined throughput capacity is approximately 674,582 42-gallon barrels per day, which takes into consideration periods when refineries may be off-line. While the affected sources refine 674,582 barrels of crude oil per day, they generate an estimated 693,044 gallons of refined products a day. Assuming a 87 percent utilization rate, and further estimating the price of refined product at $120 per barrel , we estimate the affected refineries in total generate $30.3 billion in revenues a year, from which is generated $2.1 billion in after-tax net profits. When comparing these figures with the combined annual costs (annual recurring operational costs and annualized capital costs) stemming from Rule 11-10, Rule 8-18, and Draft Rule 6-5 rule changes, we obtain cost-to-net profit ratios of less than one percent (Table 4). For example, with regard to changes to Rule 11-10, in aggregate, affected sources will bear one of three costs. Should all five affected sources pursue Rule 11-10 Option 1 ("daily water sampling"), these sources will be $3.7 million in annual costs. Combining the annual costs of all three rule changes (Rule 11-10 option 1, Rule 8-18, and Draft New Rule 6-5) results in a total cost of $10,523,000, which, when compared against aggregate net profits, amounts to 0.51 percent cost-to-net profit ratio, which is below the 10 percent threshold used for purposes of determining when impacts are significant. As indicated in the table below starting at Row 25, the cost-to-net profit ratios in all cases are below the ten percent threshold. As a result, the combined impacts stemming from Rule 11-10, Rule 8-18, and Draft Rule 6-5 are less than significant. Moreover, because affected sources are not small businesses, small businesses are not disproportionately impacted by the proposed rule changes.

Table 4 — Socioeconomic Impact Analysis: Proposed Amendments to Regulation 11 Rule 10, Regulation 8-18, and New Draft Rule 6-5

Section	Row	Data Attributes	All Refineries	Chevron	Tesoro	Shell	Valero	Phillips 66
Industry Profile	1	Effective Barrels Per Day	674,582	212,648	143,921	135,598	114,443	67,972
	2	Est. Revenues	$30.3 billion	$9.6 billion	$6.5 billion	$6.1 billion	$5.1 billion	$3.1 billion
	3	Est. Net Profits	$2.1 billion	$653 million	$442 million	$416 million	$351 million	$208 million
		Number of Cooling Towers	32	8	13	3	1	7
Cost of Compliance Profile For Each of the Three Rules	4	**Regulation 11 Rule 10 compliance costs**						
	5	Annual Recurring Cost (daily water sampling and analysis by contractors)	$2,190,000	$519,000	$840,000	$245,000	$183,000	$402,000
	6	**Regulation 6 Rule 5 compliance costs**						
	7	Annualized Capital Cost (CEMs for ammonia emission monitoring)	$279,000	$93,000	$93,000	$93,000	$0	$0
	8	**Regulation 8 Rule 18 compliance costs**						
	9	Annualized Capital Cost (data management systems)	$250,000	$110,000	$30,000	$40,000	$50,000	$20,000
	10	Annual Recurring Cost (additional component inspection)	$6,550,000	$2,490,000	$1,370,000	$860,000	$1,150,000	$680,000
	11							
	12							
	13							
	14							
	15							
	16							
	17							
Summary of Total Compliance Cost	18	Total Costs for 3 Rules In First 10 Years (annualized capital + annual recurring costs)	$9,269,000	$3,212,000	$2,333,000	$1,238,000	$1,383,000	$1,102,000
	19	Total Costs for 3 Rules After 10 Years (annual recurring costs only)	$8,740,000	$3,009,000	$2,210,000	$1,105,000	$1,333,000	$1,082,000
	20							
	21							
	22							
	23							
	24							
	25							
Socioeconomic Impact Analysis	26	Total Impact on Estimated Net Profits, all 3 Rules, In First 10 Years	0.44%	0.49%	0.53%	0.30%	0.39%	0.53%
	27	Total Impact on Estimated Net Profits, all 3 Rules, After 10 Years	0.42%	0.46%	0.50%	0.27%	0.38%	0.52%
	28							
	29							
	30							
	31							
	32							
	33							

Source: Applied Development Economics, based on BAAQMD, California Energy Commission, EIA, and US IRS SOI

APPENDIX A: LIST OF EDD LMID BAY AREA "REFINERIES"

County	Name of Establishments	City	Number of Workers
Alameda	DASSEL'S PETROLEUM INC	FREMONT	1-4 employees
Alameda	RCA OIL RECOVERY	NEWARK	1-4 employees
Contra Costa	BAY AREA DIABLO PETROLEUM CO	CONCORD	1-4 employees
Contra Costa	CHEVRON CORP	RICHMOND	1-4 employees
Contra Costa	CHEVRON CORP	PACHECO	20-49 employees
Contra Costa	CHEVRON CORPORATION	SAN RAMON	5,000-9,999 employees
Contra Costa	PHILLIPS 66 RODEO REFINERY	RODEO	500-999 employees
Contra Costa	GENERAL PETROLEUM	RICHMOND	10-19 employees
Contra Costa	GOLDEN GATE PETROLEUM	RICHMOND	1-4 employees
Contra Costa	GOLDEN GATE PETROLEUM	RICHMOND	1-4 employees
Contra Costa	GOLDEN GATE PETROLEUM	CONCORD	1-4 employees
Contra Costa	NU STAR	MARTINEZ	20-49 employees
Contra Costa	PITCOCK PETROLEUM INC	PLEASANT HILL	10-19 employees
Contra Costa	SHELL MARTINEZ REFINERY	MARTINEZ	500-999 employees
Contra Costa	TESORO GOLDEN EAGLE REFINERY	PACHECO	500-999 employees
Contra Costa	UOP	DANVILLE	1-4 employees
Marin	GRAND PETROLEUM	SAN RAFAEL	1-4 employees
Marin	GREENLINE INDUSTRIES LLC	LARKSPUR	20-49 employees
San Francisco	DOUBLE AA CORP	SAN FRANCISCO	1-4 employees
San Francisco	R B PETROLEUM SVC	SAN FRANCISCO	5-9 employees
San Francisco	SEAYU ENTERPRISES INC	SAN FRANCISCO	5-9 employees
San Mateo	DOUBLE AA CORP	SOUTH SAN FRANCISCO	5-9 employees
San Mateo	SABEK INC	SOUTH SAN FRANCISCO	5-9 employees
San Mateo	SEAPORT REFINING & ENVRNMNTL	REDWOOD CITY	5-9 employees
Santa Clara	COAST OIL CO LLC	SAN JOSE	20-49 employees
Santa Clara	SHELL OIL PRODUCTS US	SAN JOSE	1-4 employees
Solano	BAY AREA DIABLO PETROLEUM CO	BENICIA	1-4 employees
Solano	CAT TECH INC	DIXON	1-4 employees
Solano	DANVILLE PETROLEUM	VALLEJO	5-9 employees
Solano	GOLDEN GATE PETROLEUM	BENICIA	1-4 employees
Solano	RUBICON OIL	BENICIA	1-4 employees
Solano	TIMEC CO INC	VALLEJO	20-49 employees
Solano	VALERO BENICIA REFINERY	BENICIA	250-499 employees
Solano	VALERO REFINING CO	BENICIA	1-4 employees
Solano	VALERO REFINING CO	BENICIA	1-4 employees
Sonoma	BAY AREA DIABLO PETROLEUM CO	CLOVERDALE	1-4 employees
Sonoma	ROYAL PETROLEUM CO INC	PETALUMA	5-9 employees

Source: ADE, Inc., based on California EDD LMID "Employers By Industry" Database