BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PRELIMINARY STAFF REPORT
Draft Amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks

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ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

I. INTRODUCTION

The Bay Area Air Quality Management District (Air District) is developing amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks (Rule 8-18). The purpose of these amendments is to further address emissions of volatile organic compounds and methane (together referred to as "total organic compounds" or TOC) from equipment leaks at refineries, chemical plants, and facilities loading and storing gasoline in bulk quantities in the Bay Area. Further emissions reductions of total organic compounds are needed to ensure progress towards attainment of the ambient air quality standards, reduce climate pollutant emissions, and reduce public health impacts from toxic compounds and ozone exposure.

The Air District Board of Directors adopted amendments to Rule 8-18 in December 2015 to include equipment servicing heavy liquids (liquid with an initial boiling point greater than 302 ºF) at these facilities. However, due to questions regarding emissions reductions and cost-effectiveness related to the requirements for monitoring of components in heavy liquid service, Resolution No. 2015-12 directed staff to examine these issues further and recommend modifying this rule if appropriate. In addition, the Air District was sued in January 2016 by three petroleum refineries, which resulted in a Board adopted settlement agreement between the Air District and the petroleum refineries issued in March 2017. To determine appropriate emission factors for heavy liquid leaks, a Heavy Liquids Study was conducted and a report detailing this effort was issued in April 2022. Using the findings from this study, the Air District is currently proceeding with rule amendments to limit emissions associated with a subset of equipment that service heavy liquids. These rule amendments include the provisions agreed upon in the settlement agreement along with other modifications to strengthen, update, and clarify rule provisions.

California Assembly Bill 617 (AB 617) requires each air district that is in nonattainment for one or more air pollutants to adopt an expedited schedule for implementation of Best Available Retrofit Control Technology (BARCT) by the earliest feasible date, but not later than December 31, 2023. In 2018, the Air District adopted the Expedited BARCT Implementation Schedule, which identified potential rule development projects to evaluate and implement BARCT at industrial sector facilities subject to California's Greenhouse Gas Cap-and-Trade requirements. Due to the uncertainty surrounding the emissions reductions from the 2015 amendments, emissions from equipment leaks were identified as a potential source of substantial reductions and included in the Expedited BARCT Implementation Schedule.

The main components of the draft amendments to Air District Rule 8-18 include the following:

- Amend the rule to include a subset of components in heavy liquid service to Leak Detection and Repair (LDAR) program requirements
    - Valves and pumps handling material with initial boiling points between 302 and 372 ºF
    - Components handling material in a gas or vapor phase
- Increase stringency of TOC leak standards for components
    - 50 ppm TOC for valves and connections (previously 100 ppm)
    - 100 ppm TOC for pumps and compressors (previously 500 ppm)
- Add operating requirements and standards for selected components
- Enhance inspection procedures and reporting requirements
- Other administrative updates and clarifications
- Additional definitions for clarity and completeness

This Preliminary Staff Report provides background information, regulatory context, a brief discussion of emissions and costs, and a detailed description of the draft amendments to Rule 8-18. Air District staff is soliciting comments on these materials and will consider all input received during the comment period toward further development of these amendments.

II. BACKGROUND

A. Industry Description

Facilities subject to Rule 8-18 requirements include refineries, chemical plants, bulk plants, bulk loading terminals and other facilities that store, transport, or process organic liquids. There are five major refineries operating in the bay area (Chevron Richmond Refinery, Marathon Martinez Refinery, Martinez Refining Company, Philips 66 Rodeo, and Valero Benicia Refinery). These facilities process feedstocks (including crude oil and alternative feedstocks) into a variety of products, such as gasoline, aviation fuel, diesel and other fuel oils, lubricating oils, and feedstocks for petrochemical and chemical industries. Chemical plants produce organic or inorganic chemicals and may manufacture products by chemical processes, including industrial chemicals, plastic and synthetic resins, paints, agricultural chemicals, detergents, perfumes, oil extracts, along with others. Bulk plants and terminals are facilities that receive organic liquids where they are stored or blended prior to loading for delivery to distributors, marketers, or product end users. Rule 8-18 also applies to any other facility that processes, stores, or transports organic liquids through 100 or more valves.

B. Pollutants and process

Fugitive leaks occur at facilities that store, transport, or process organic liquids, resulting in emissions of total organic compounds (methane and volatile organic compounds) to the atmosphere. These fugitive leaks may occur at joints or connections between two pieces of equipment or from barrier fluid at interfaces between solid material within a piece of equipment such as valves, pressure relief devices, and around rotating shafts of pumps and compressors. At larger scale facilities, these potential sources of fugitive emissions can number in the thousands.

Process streams handled by this equipment have historically been categorized by phase, vapor pressure, and/or boiling point as being in gaseous or vapor phase, light liquid (initial boiling point equal to or below 302 degrees Fahrenheit [^{o}F]), or heavy liquid (initial boiling point greater than 302^{o}F). Equipment handling these process streams are prone to leaks due to the inherent properties of the material processed across the spectrum. Fugitive leaks resulting in emissions to the atmosphere are most likely to occur in components handling material in the gaseous or vapor phase, and components handling the heaviest liquids are least prone to fugitive leaks.

Organic liquids processed by this equipment include petroleum, alternative feedstock, and other organic hydrocarbons. Associated emissions to the atmosphere resulting from fugitive leaks would include volatile organic compounds and methane, along with toxic air contaminants such as benzene, 1,3-butadiene, naphthalene, and toluene that are components of the TOC emitted. Emissions of volatile organics can contribute to the production of ground level ozone (also called smog) through photochemical reactions with oxides of nitrogen. In addition, methane is a potent and short-lived greenhouse gas that can contribute to climate change impacts. Emissions of toxic air contaminants from equipment leaks may occur close to ground level at temperatures close to

ambient conditions so they are then less likely to disperse through plume rise, resulting in an increase in exposure rates to nearby residents.

C. Regulatory History

1. Air District Rules / Regulations

Bay Area Air Quality Management District

The Air District originally adopted Rule 8-18 in 1980 and has amended it multiple times, including in 1992, 1998, 2002, 2004, 2015, and again in 2021. 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 to reduce emissions and promote self-compliance. The 1992 amendments reduced emissions by an estimated 1.2 tons per day (tpd). Amendments in 1998 and 2002 were minor changes. The 2015 amendments expanded rule requirements to additional components, resulting in a legal challenge and a subsequent settlement. Administrative amendments were made to Rule 8-18 as part of a larger effort to revise the refinery definition in several Air District rules in order to accommodate fuel refining using alternative feedstocks other than petroleum.

The Air District's Rule 8-18 limits emissions of TOC from equipment leaks at petroleum refineries, chemical plants, bulk plants, and bulk terminals. Regulation 8, Rule 18 includes emissions standards, inspection, monitoring, and recordkeeping requirements. 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. The rule limits the maximum allowable concentration (parts per million by volume, ppmv) of equipment leaks before a leak is required to be minimized and then repaired within a given time allowance that is based on who discovers the leak (the Air District or the facility). Petroleum refineries, as an example, are comprised of thousands of pieces of equipment, piping, and fittings that handle a variety of process streams. This equipment may leak emissions ("fugitive emissions") from gaps in the equipment. Unless exempted, each piece of equipment is required to have a unique identifier and required to be monitored within an LDAR program.

Rule 8-18 provides the requirements necessary for an effective LDAR program for any facility that stores, transports, or processes organic liquids. Key provisions of Rule 8-18 include a list of definitions for terms used throughout the rule, a list of standards broken down by equipment type, identification and inspection requirements, monitoring, recordkeeping, and reporting requirements, inspection procedures, and sampling methodology. In addition, the rule provides exemptions for equipment routed to a control device, small facilities, and limited exemptions for specific types of equipment.

Rule 8-18 does not include a definition for heavy liquid service. Rather, the rule historically had a limited exemption, based on initial boiling point, for components handling heavier organic liquids (i.e., those with an initial boiling point greater than 302^{o}F). Equipment that met this criterion was subject to emission standards but exempted from monitoring requirements.

In December 2015, the Air District's Board of Directors approved amendments to Rule 8-18 that removed the monitoring exemption for components in heavy liquid service beginning in January 2018. The Board's adopting resolution directed Air District staff to examine emission reduction and cost effectiveness issues related to the inclusion in Rule 8-18 of requirements for monitoring of components in heavy liquid service.

This direction required re-evaluating the estimates used for existing emissions from such components as well as emissions expected to be reduced from such components. Subsequently, as part of a settlement of a legal challenge to the 2015 rule revision, the Air District agreed to: a) complete an ongoing joint study; b) in consultation with affected refineries, produce a report on the results of the study; and c) re-visit the cost effectiveness of monitoring components in heavy liquid service.

Over the course of five years the Air District conducted a joint study with the five Bay Area refineries and their trade association, the Western States Petroleum Association (WSPA). The Heavy Liquids Study Report (BAAQMD, 2022) summarizes the findings of the joint study and was published in April 2022. The Heavy Liquids Study (or "Study") involved measuring and evaluating emissions from equipment in heavy liquid service at five Bay Area petroleum refineries:

- Chevron Richmond Refinery (Richmond, California),
- Phillips 66 San Francisco Refinery (Rodeo, California),
- Shell Martinez Refinery (Martinez, California),
- Tesoro Golden Eagle Refinery (Martinez, California), and
- Valero Benicia Refinery (Benicia, California).

Two of the refineries have subsequently been acquired by other entities. Shell Martinez Refinery is now owned and operated by PBF Energy and is now known as the Martinez Refining Company. Tesoro Golden Eagle Refinery is now owned and operated by the Marathon Petroleum Corporation and known as Marathon Martinez Refinery.

Other Air Districts

Several other air pollution control districts in California have rules that address fugitive emissions from refineries and chemical plants. These districts include the South Coast Air Quality Management District (Rule 1173), the San Joaquin Valley Unified Air Pollution Control District (Rule 4455), Ventura County Air Pollution Control District (Rule 74.7), and Yolo-Solano Air Quality Management District (Rule 2.23). Table 1 provides a Comparison of the Basic Provisions of the Fugitive Emissions Rules of Five California Air Districts.

Table 1 - Comparison of the Basic Provisions of the Fugitive Emissions Rules of Five California Air Districts

Note: see legend (last row of table)	**Draft Amendments to BAAQMD Regulation 8 Rule 18**	**South Coast AQMD Rule 1173**	**SJVAPCD Rules 4455**	**Ventura Co. APCD Rule 74.7**	**Yolo-Solano AQMD Rule 2.23**
Minimum Leak Limits	§§8-18-211, 301-305	§1173 (d)(1)	§3.22	§§74-7 L.18-L.20, L.22 & L.23,	§210-212; 305.2
Liquid	3 drops/min	3 drops/min	minor:> 3 drops/min; Major: visible mist or continuous flow of liquid	minor >3 drops/min; Major = stream or mist	minor >3 drops/min; Major = stream or mist
Valves	50 ppm	HL > 500; LL > 50k/10k*	minor: 200 to 10,000 ppm; Major: >10,000 ppm (for valves + threaded connections in liquid service)	minor: 1,001 to 10,000 ppm; Major: >10,000 ppm	minor: 1,001 to 10,000 ppm; Major: >10,000 ppm
Connections					
Pumps/ Compressors	100 ppm	HL > 500/100*; LL > 50k/10k*	minor: 500 to 10,000 ppm; Major: >10,000 ppm		
PRDs/PRVs		LL > 50k/200*	minor: 100 to 10,000 ppm; Major: >10,000 ppm	Major > 200 ppm	100 ppm
INSPECTION FREQUENCIES	§§8-18 401.1-401.3	§§1173 (f)(1)(B) & (C)	§5.2.3 and 5.2.5	§74-7 D.1 & D.2	§301
Valves	Quarterly	Quarterly	Quarterly	Monthly/ Quarterly	Quarterly
Connections	Annually			Monthly/ Annually	
Pumps/ Compressors	Quarterly			Monthly/ Quarterly	
PRDs/PRVs				Quarterly (≤110 days)	

Note: see legend (last row of table)	**Draft Amendments to BAAQMD Regulation 8 Rule 18**		**South Coast AQMD Rule 1173**	**SJVAPCD Rules 4455**	**Ventura Co. APCD Rule 74.7**	**Yolo-Solano AQMD Rule 2.23**
Inaccessibles	Annually		Annually	Annually		Annually
NON-REPAIRABLE LIST	§§8-18-306.2 & 306.3		Leak Thresholds: §1173(d)(1) Table 1	§5.3.6		§305.3
Duration	< 5 yrs		No time limit (∞)	If essential/critical component, minimize and repair or replace next turnaround (but not later than 1 year)	none	See PRDs below
Valves	0.15% of total number of valves (connections count as two valves)	If leak is <10k ppm; Mass emissions must be determined for >=3k ppm	0.5%			none
Connections						
Pumps/ Compressors	0.5%		1%			
PRDs/PRVs	0.5%					Next shutdown
REPAIR SCHEDULES	§§8-18- 301-305		§1173 (g)(1) Table 2	§5.3.5 (Table 5)	§74-7 E Table 1	§302.1
Valves	24 hr (District) / 7 days (operator)		500 < LL < 10k:7 days 100 < HL< 500: 7 days 3 drops/min & 100 < HL < 500: 7 days 10k < L < 25k: 2 days/ext 3 days L > 25k: 1 day HL > 500: 1 day/ext 3 days LL > 3 drops/min: I day	m: 7 days M: 3 days M>50k: 1 day (with a limited number of extensions available) (1 day for liquid leaks)	m: 14 days M: 5 days M>50k: 1 day	m: 14 days M: 5 days M>50k: 1 day
Connections						
Pumps/ Compressors						

Note: see legend (last row of table)	**Draft Amendments to BAAQMD Regulation 8 Rule 18**	**South Coast AQMD Rule 1173**	**SJVAPCD Rules 4455**	**Ventura Co. APCD Rule 74.7**	**Yolo-Solano AQMD Rule 2.23**
PRDs/PRVs	7 days (District) / 15 days (operator)	200 < L ≤ 25k: 2 days			
Legend:		L = leak (in ppm or drops/min); HL = heavy liquid leak; LL = light liquid/gas/vapor leak; *Limits for leaks found above leak thresholds (see Turnaround Lists); leak ext = extended repair period	m: minor; M: Major; M>50k: Major > 50,000 ppmv	Leaks: minor (m) = >1,000 and <10,000 ppm; Major (M) = >10,000 ppm; M>50k = major leak >50,000 ppm	m: minor; M: Major; M>50k: Major > 50,000 ppmv

2. State Regulations

At the State level, there is no direct equivalent regulation to Rule 8-18. However, there are leak standards and similar LDAR program requirements for components included in the Oil and Gas Regulation, which was most recently approved by the California Air Resources Board (CARB) for amendment in June 2023 (CARB, 2023).

3. Federal Regulations

The United States Environmental Protection Agency (EPA) has promulgated LDAR standards for facilities in the synthetic organic chemical manufacturing industry but not for 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 and do not rely on instrumental monitoring, but instead rely on "visual, audible, olfactory, or any other detection method."

Numerous federal requirements apply to fugitive emissions at the facilities subject to Rule 8-18. 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 2 – Comparison of the Basic Provisions of the Federal Fugitive Emissions Rules and BAAQMD's Draft Amended Rule 8-18

BAAQMD Rule 8-18 with draft amendments	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 includes quarterly inspection of equipment in light liquid/gas/vapor service and a subset of components in heavy liquid service. 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 50 ppm for any general equipment, valves, and connectors. Leak threshold of 100 ppm for any pumps, compressors, and PRDs. Leak threshold of 50 ppm for any connections.	Leak threshold at 10,000 ppm for pumps and valves in heavy liquid service. Pump, valves, PRDs, and connectors in light liquid service/gas/vapor service leak threshold at 10,000 ppm. PRDs in gas/vapor service leak threshold at 500 ppm.

BAAQMD Rule 8-18 with draft amendments	40 CFR 60 VV/Vva & GGG/GGGa 40 CFR 63 CC
Leaks detected by operator minimized within 24 hours and repaired within 7 days. Leaks detected by BAAQMD repaired within 24 hours. A percentage of non-repairable equipment may delay repair until unit turnaround.	Compressors required to have a seal system with barrier fluid. Leaks > 10,000 ppm repaired within 15 days maximum, first attempt at repair within 5 days.
Recordkeeping and Reporting	
Submit quarterly reports of equipment found leaking in more than 3 consecutive quarters, non-repairable equipment, and inspection records for equipment opened during turnarounds. 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	
EPA Method 21 for leak screening, ASTM Method D-1078-11, D-86, or 1160 initial boiling point and EPA Protocol for Equipment Leak Emissions Estimates, Chapter 4 or monitoring for mass emission sampling.	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 valves and other appurtenances on storage tanks (but still subject to Air District Regulation 8, Rule 5 requirements).	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.	

The draft amendments are not duplicative of any current requirements for equipment in heavy liquid service.

4. Litigation

As stated in section C.1 above, the Air District Board of Directors adopted amendments to Rule 8-18 as part of a Petroleum Refinery Emissions Reduction Strategy in December of 2015 along with a Resolution directing staff to examine emissions through completion of a Heavy Liquids Study conducted with cooperation of the staff from the five Bay Area refineries. In January and February of 2016, representatives from three of the refineries filed a Petition and Complaint in the Superior Court of California for the County of Contra Costa alleging that the Air District had violated the California Environmental Quality Act (CEQA), its implementing regulations, and other provisions of the California Health and Safety Code. The Air District responded later that year and the two sides began negotiations aimed at staying further litigation and eventual settlement of the lawsuit. In March of 2017, the parties entered into an Enforcement Agreement and Agreement to Stay Litigation (Preliminary Agreement) approved by Superior Court. The purpose of this Preliminary Agreement is to establish terms and conditions moving forward and to provide a framework for further analysis to help facilitate a full settlement of the lawsuit.

The Preliminary Agreement set forth provisions for completion of the Heavy Liquids Study, consultation procedures for subsequent documentation of the results, identified sections of Rule 8-18 that would not be enforced during the term of the agreement, and provided guidance on the manner by which the rule may be amended to remedy the violations of State Law allegedly committed as part of the amendments made in 2015. With respect to revision of the amendments, the Preliminary Agreement requires the Air District to make a cost effectiveness determination based on the Heavy Liquids Study identifying which components may be included in the LDAR program taken from the larger set included in the 2015 amendments. The Air District will provide a thorough analysis of emissions and costs as part of the final proposal package for the amendments described in a later section.

D. Technical Review of Control Technologies

The most efficient means of preventing these leaks is through implementation of an LDAR program whereby potential sites of leaks are first properly identified and then periodically monitored for emissions above set leak standards. When discovered, equipment found to be above that standard is either repaired, replaced, or placed on a limited list of non-repairable equipment. This latter category of non-repairable equipment is limited to that which is deemed essential to the process in that it would require a total shutdown of a facility to complete repairs.

The draft amendments do not require new control mechanisms, only expansion and improvement of the existing LDAR program. When the EPA initially developed guidelines for LDAR programs at large industrial facilities, they estimated that such a program can reduce emissions from equipment leaks by 63% (U.S. EPA, 2007). For components that handle materials for light liquid at petroleum refineries, the estimated control effectiveness for an LDAR program ranged from 45% to 96% across different component types (U.S. EPA, 2007).

The main goal of an LDAR program is to determine compliance with leak standards by monitoring for leaks and repairing those leaks discovered in a timely manner. In addition, there are recordkeeping and reporting requirements to verify compliance for equipment functioning as required. To implement an LDAR program, the facility must:

- Identify components: The facility must have each regulated component assigned a unique identification number (ID), record each ID in a log, and be able to locate each component in the facility and verify its location on the plot plan.
- Maintain recordkeeping: The facility must maintain proper documentation for all the components that have been identified and are subject to the LDAR program.
- Monitor components: The facility must perform Method 21 leak evaluation using a portable hydrocarbon detector that has been approved by the Air District at a frequency required by the rule.
- Repair components: For the components that have been determined to exceed the emission rate required by the rule, these components must be repaired within the appropriate time frame as required by the rule.
- Report monitoring results and repairs for review by regulatory agencies.

III. DRAFT RULE AMENDMENTS

A. Description and Applicability

There are no draft amendments to the description or applicability sections of Rule 8-18.

B. Exemptions

Section 8-18-111 – Exemption, Small Facilities: Draft amendments to this section remove "or less than 10 pumps and compressors." Regulation 8: Organic Compounds, Rule 22: Valves and Flanges at Chemical Plants regulates facilities with up to 100 valves, exempting those with 100 valves or more and referring to Rule 8-18. Currently, facilities with more than 100 valves, but less than 10 pumps or compressors would be exempt from both rules. Draft amendments would remove this unintended regulatory loophole.

Section 8-18-113 – Limited Exemption, Initial Boiling Point: Draft amendments to this section reflect the findings of the Heavy Liquids Study and subsequent emissions and cost estimations, along with stipulations in the Settlement Agreement. Currently, and until one year after adoption, all equipment handling organic liquids with an initial boiling point greater than 302°F will be exempt from the Administrative Requirements of the rule (Inspection, Identification, et al.). Effective one year after rule adoption, connections that handle organic liquids with an initial boiling point greater than 302°F and valves and non-steam-quenched pump seals that handle organic liquids with an initial boiling point greater than 372°F will be exempt from the Administrative Requirements of the rule. Connections, valves, and non-steam-quenched pump seals handling organic liquids in a vapor or gas phase do not qualify for either of these limited exemptions, regardless of initial boiling point of the organic liquid.

Section 8-18-119 – Limited Exemption, Open-Ended Valve or Line: Draft amendments to this section add components of a lubrication system or those containing non-process lube oil to the list of equipment that is not subject to the standards of Section 8-18-309.

Section 8-18-120 – Limited Exemption, Non-repairable Equipment: This exemption is no longer valid and will be deleted as part of the draft amendments. Non-repairable Equipment subject to this exemption was required to be repaired or replaced by December 16, 2020.

C. Definitions

Draft amendments to Rule 8-18 include several new definitions to clarify language in other sections of the rule as well as for reasons of consistency. Notable amendments to definitions include the following:

Section 8-18-206 – Inaccessible Equipment: Draft amendments to this section add steam-quenched pump seals that cannot be inspected at the distance provided in Section 8-18-602.3 to the set of inaccessible equipment as approved by the Air District. Inspections of this equipment will be required to be performed annually rather than quarterly. The number of steam-quenched pump seals meeting this definition are expected to be few in number.

Section 8-18-215 – Process Area: Draft amendments to this section replace "Process Unit" with "Process Area" to reflect current practice for identification of equipment. A Process Area contains a group of processing units that are continuous and independent of other processes at the facility. Depending on the size and complexity of a process unit, it may be considered to comprise a process area in and of itself. In other sections of the rule, "process unit" has been replaced with "process area or process unit" (See Sections 8-18-220, 226, 502, and 503).

Sections 8-18-231 through 8-18-233, and 8-18-239 – Gaseous, Vapor, Gas/Vapor Service, and Organic Liquid: Draft amendments to this section add three definitions to clarify language in Section 8-18-113 as well as other sections of the rule. Without these additional definitions, it may be unclear what is meant by "heavy liquid" (one with a high initial boiling point) in a gaseous or vapor phase. Organic liquids may be in a gaseous phase well below the temperature of their initial boiling point, depending on pressure and other variables.

Sections 8-18-234, 8-18-237, and 8-18-238 – Steam-Quenched Pump Seal, Compressor, and Pump: Draft amendments to this section add definitions to complete the list of equipment subject to emissions standards in the rule. Definitions for connections and valves are already in the current version of the rule.
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Sections 8-18-235, and 8-18-236 – Lubrication Systems, and Non-Process Lube Oil: Draft amendments to this section define the equipment and material used to operate production equipment that are subject to the limited exemption in Section 8-18-119 (see above).

D. Standards

Throughout the 300 section of the Rule, draft amendments reduce emission leak standards to reflect leak levels demonstrated to be achievable due to advances in equipment design since these leak levels were first proposed or last amended. Mass emissions will no longer need to be determined for leaks less than 3,000 ppm in the draft amended rule. Additional draft amendments to the rule include new operating requirements and leak standards for steam-quenched pump seals.

Sections 8-18-301 through 8-18-305, and 8-18-309 – General, Valves, Pumps and Compressors, Connections, Pressure Relief Devices, and Open-Ended Valve or Line: Draft amendments to this section reduce emission leak standards for this equipment from 500 ppm to 100 ppm, and from 100 ppm to 50 ppm. These revised leak standards reflect leak levels demonstrated to be achievable due to advances in equipment design; manufacturer guarantees and demonstrated LDAR monitoring of this equipment indicate that these lower leak standards can be met.

Section 8-18-303 – Pumps and Compressors: Draft amendments to this section add a reference to Section 8-18-313 for steam-quenched pump seals that cannot be measured at the normal distance specified in EPA Method 21.

Section 8-18-306 – Non-repairable Equipment: Draft amendments to this section clarify that mass emissions determinations are not required for equipment leaks of less than 3,000 ppm.

Section 8-18-308 – Alternate Compliance: Draft amendments to this section add a reference to Section 8-18-313 for steam-quenched pump seals that cannot be measured at the normal distance specified in EPA Method 21.

Section 8-18-312 – Operating Requirements for Steam-Quenched Pump Seals that cannot be measured at a distance of 1 centimeter or less: Draft amendments to this section provide minimum operating requirements for steam-quenched pump seals that must be met in order for the equipment to be measured at the greater distance as provided in Section 8-18-602.3 (see below) and subject to the alternate leak standards and repair requirements of the following section (Section 8-18-313).

Section 8-18-313 – Steam-Quenched Pump Seals that cannot be measured at a distance of 1 centimeter or less: Draft amendments to this section provide the leak standards and repair requirements for this equipment. Steam-quenched pump seals are not required to meet the standards and repair requirements in Section 8-18-303, so long as they meet the operating requirements in section 8-18-312 and are then subject to the leak standards and repair requirements contained in this section as per the requirements in Section 8-18-602.3 (see below).

E. Administrative Requirements

Section 8-18-401 – Inspection: Draft amendments to this section require semi-annual inspection of all valves handling organic liquids with an initial boiling point greater than 302°F, effective one year from adoption. Inaccessible steam-quenched pump seals are added to the list of inaccessible equipment to be inspected annually rather than more frequently as required for accessible equipment. The draft amendments include administrative changes to address added rule language elsewhere in the rule, and also add a requirement to re-inspect within 24 hours any equipment that was inspected using an instrument that shows a calibration drift of more than 10 percent from the initial calibration value (see Section 8-18-602, below).

Section 8-18-402 – Identification: Draft amendments to this section remove past effective dates, correctly indicate the equipment to be identified, and bring consistency to the order of equipment listings.

Section 8-18-406 – Interim Compliance: Draft administrative amendments to this section include the addition of the new leak standard for steam-quenched pump seals that cannot be measured at the distance normally required by EPA Method 21.

F. Monitoring and Records

Section 8-18-502 – Records: Draft amendments to this section clarify that all records must be maintained for at least 5 years and made available for Air District inspection at any time. Further draft amendments include data necessary to determine the rate of inspections and to record calibration drift assessments for each monitoring day (see Section 8-18-602, below). As leak standards are made more stringent, acceptable background is similarly reduced and is equal to half of the lowest leak standard. Additionally, the subsection referring to Piping and Instrumentation Diagrams (P&IDs) was amended to remove a past effective date, and to clarify that components handling material with initial boiling points greater than 302°F must be clearly identified.

Section 8-18-503 – Reports: Draft amendments to this section remove past effective dates and clarify that reports are to be submitted to the Air District within 30 days following the end of each quarter. Further draft amendments clarify the information to be provided for equipment opened during turnarounds, and the identification and listing of components in P&IDs as well as updates

to past submittals. Effective one year from rule adoption, new Subsections 8-18-503.6 through 503.8 address reporting of equipment information required by changes to the limited exemption for equipment handing material of given initial boiling point and/or in gas/vapor service (see Section 8-18-113, above).

G. Manual of Procedures

Section 8-18-601 – Analysis of Samples: Draft amendments to this section update test methods for determining the initial boiling point of samples with additional language provided to allow for alternative methods deemed equivalent by the EPA or approved in writing by the Air District.

Section 8-18-602 – Inspection Procedure: Draft amendments to this section provide additional guidance regarding the acceptable speed of inspections performed by the facility staff, protocols for determining calibration drift as a percentage, and inspection requirements for steam-quenched pump seals that must be measured at a greater distance than normally required by EPA Method 21.

Section 8-18-603 – Determination of Control Efficiency: Draft amendments to this section provide additional language to allow for alternative methods deemed equivalent by the EPA or approved in writing by the Air District.

Section 8-18-604 – Determination of Mass Emissions: Draft amendments to this section provide consistent language to allow for alternative methods deemed equivalent by the EPA or approved in writing by the Air District.

IV. EMISSIONS, EMISSIONS REDUCTIONS AND COST

Current Emission Estimates and Potential Emission Reductions

The total current emissions for the components in heavy liquid service affected by the draft amendments were estimated for the five petroleum refineries using component counts and emission factors from Air District's Heavy Liquid Study Report (BAAQMD, 2022), and additional emission factors obtained from the California Air Pollution Control Officers Association (CAPCOA) (CAPCOA, 1999) and EPA reports (U.S. EPA, 1979). The current TOC emissions for the five petroleum refineries range from 12 to 45 tons per year.

Table 3 – Current Emission Estimates for Components in Heavy Liquid Service

Facility	**Current TOC Emissions** (tons/year)
Chevron Richmond	33
Marathon Martinez	45
Martinez Refining Company	16
Phillips 66 Rodeo	12
Valero Benicia	28
Total	**134**

Note: *Emissions estimates do not reflect potential changes that may result due to conversions from petroleum to alternative feedstocks.*

For valves and non-steam quenched pump seals, preliminary evaluations indicate that a majority of the emissions are attributed to components handling liquids with an initial boiling point between 302°F and 372°F using the data from Air District's Heavy Liquid Study Report (BAAQMD, 2022). Similarly, emission reductions are greatest for the components handing liquids with an initial boiling point in this range for valves and pump seals.

For steam quenched pump seals and pressure relief valves, the emissions are calculated for components handling heavy liquid using emissions factors from CAPCOA (CAPCOA, 1999) and EPA reports (U.S. EPA, 1979). The steam quenched pump seals and pressure relief valves have the highest emissions reductions among the components in heavy liquid service. However, the emissions from these components are estimated using emission factors from the CAPCOA report and the EPA report, since the Heavy Liquid Study did not have an emission factor available for these component types.

Staff is evaluating potential emission reductions from further control of these components in heavy liquid service using information from the Air District's Heavy Liquid Study Report (BAAQMD, 2022), CAPCOA report (CAPCOA, 1999), and EPA report (U.S. EPA, 1979). The Air District continues to evaluate emissions reductions expected as a result of draft amendments to the Rule and will provide a complete assessment in the final staff report and proposed rule amendment package for consideration by the Air District Board of Directors.

Compliance Costs

Staff are evaluating potential compliance costs associated with the draft amendments, including costs for the newly monitored components and costs for existing monitored components subject to the lower leak standards of the draft amendments. Costs associated with newly monitored components may include both capital costs for identifying components subject to monitoring requirements as well as annual costs for monitoring components (including inspecting components and repairing components found leaking in excess of standards). Cost associated with existing components that are already included within a facility's LDAR program will be lower than newly monitored components, as existing components have already been identified and are currently being monitored. Because emissions from equipment leaks represent a direct material loss with a monetary value (either as an increase in fixed costs or a decrease in profit) for a facility, staff are also evaluating the recovered product value from potential product losses that would be mitigated from the control of fugitive leaks.

The Air District continues to assess and gather additional information related to compliance costs. Analysis of the compliance costs, cost effectiveness, and socioeconomic impact of these amendments will be included as appropriate in the final staff report and proposed rule amendment package for consideration by the Air District Board of Directors.

V. RULE DEVELOPMENT / PUBLIC PARTICIPATION PROCESS

Amendments to Rule 8-18 are based in part on the results of a Heavy Liquids Study conducted in cooperation with representatives of the five Bay Area refineries. The study involved several phases including study design, preliminary activities, component selection, component screening, mass emissions measurement, laboratory analysis, statistical analysis, and reporting of findings.

Prior to initiating the study, the Air District discussed and developed the study design with representatives of the five Bay Area refineries and their trade association, WSPA. The Air District considered technical comments submitted by the refineries on preliminary drafts of the report and addressed these in the Final report.

Staff presented an update on the Rule 8-18 amendment effort to the Air District Stationary Source and Climate Impacts Committee on October 11, 2023. No public comments on these efforts were stated during this meeting, but representatives of the regulated industries contacted staff in response to the presentation. Air District staff anticipate targeted engagement with both the public and regulated industries in the near future to discuss the draft amendments to the rule. Air District staff is publishing the draft amendments to Rule 8-18 and Preliminary Staff Report for public review to solicit comments on these materials. Staff will consider input received during the public comment period and further develop the rule amendments. Staff will then prepare the final proposal and staff report, along with other supporting documents, for further review and comment prior to a Public Hearing where staff anticipates presenting proposed rule amendments for consideration by the Air District Board of Directors.

As part of the rule development process, Air District staff evaluates potential environmental impacts as required by the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., as well as the CEQA Guidelines that have been adopted by the Air District to help implement the statutory provisions of CEQA. Potential environmental impacts related to projects under the AB 617 Expedited BARCT Implementation Schedule, including amendments to Rule 8-18, were previously analyzed in an Environmental Impact Report (EIR) certified by the Air District Board of Directors in December 2018 (BAAQMD , 2018). Air District staff will review the conclusions drawn in this previous EIR and evaluate the potential environmental impacts resulting from amendments to Rule 8-18 through completion of an Initial Study.

Air District staff will contract an external environmental consultant to prepare an Initial Study to evaluate the potential for significant environmental impacts resulting from amendments to Rule 8-18, which will be published for public comment. If the Initial Study indicates that the amendments to Rule 8-18 may have a significant impact on the environment, Air District staff may conduct a scoping meeting in anticipation of preparation of an EIR. If the Initial Study finds that there is no substantial evidence suggesting that the amendments to Rule 8-18 may have a significant environmental effect, then Air District staff will prepare a Negative Declaration under CEQA for consideration by the Board of Directors. All CEQA materials will be made available for public review and comment as required by State law.

In addition, Air District staff will contract an external economic consultant to prepare a socioeconomic analysis to evaluate the potential economic effects on the Bay Area that may result from amendments to Rule 8-18. 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.” This report will be made available for public review and comment along with other materials prepared for the final proposal package before consideration by the Air District Board of Directors.

VI. CONCLUSION / RECOMMENDATIONS

The Air District is developing amendments to Rule 8-18 to further address emissions of TOC from equipment leaks at refineries, bulk loading plants and terminals, and chemical processing facilities in the Bay Area. Further reductions of TOC are needed to ensure progress towards attainment

of the ambient air quality standards, reduce climate pollutant emissions, and reduce public health impacts from toxic compounds and ozone exposure.

The draft amendments are intended to ensure that Air District regulations are as health protective as possible. Air District staff has published the draft amendments to Rule 8-18 and preliminary staff report for public review and encourages interested parties to submit comments for consideration. Air District staff will continue to further develop and evaluate the rule amendments in preparation of presenting final proposed rule amendments for consideration by the Air District Board of Directors.

REFERENCES

BAAQMD. (2018). *Final Environmental Impact Report for AB 617 Expedited BARCT Implementation Schedule Project.* San Francisco, CA.

BAAQMD. (2022). *Fugitive Emissions from Petroleum Refinery Equipment.* San Francisco, CA.

CAPCOA. (1999). *California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Refinery Facilities.*

CARB. (2023). *Proposed Amendments to the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities*. Retrieved from California Air Resources Board: https://ww2.arb.ca.gov/rulemaking/2023/oil-and-gas-2023

U.S. EPA. (1979). *Emission Factors and Frequency of Leak Occurrence for Fittings in Refinery Process Units EPA-600/2-79-044.*