



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

## **STAFF REPORT**

### **Proposed Amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks**



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# STAFF REPORT

## Proposed Amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks

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**APPENDIX A:** Proposed Amendments to Regulation 8: Organic Compounds, Rule 18:  
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**APPENDIX B:** Socioeconomic Impact Analysis

**APPENDIX C:** Initial Study and Draft Negative Declaration

**APPENDIX D:** Emissions and Cost Information

## I. EXECUTIVE SUMMARY

The Bay Area Air Quality Management District (“BAAQMD” or “Air District”) is proposing 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 organic liquids in bulk quantities in the Bay Area. Further emissions 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 Air District Board of Directors adopted amendments to Rule 8-18 in December 2015 that removed the monitoring exemption for equipment servicing heavy liquids (liquid with an initial boiling point greater than 302 °F). The Board’s adopting resolution (Board Resolution No. 2015-12) directed staff to examine emission reduction and cost effectiveness issues related to the inclusion of requirements for monitoring of components in heavy liquid service. In addition, three refinery facilities brought a legal challenge to the 2015 rule revision, which resulted in an enforcement agreement and agreement to stay litigation (enforcement agreement) between the parties. As part of the enforcement agreement and to determine appropriate emission factors for heavy liquid leaks, the Air District completed an ongoing Heavy Liquids Study and produced a report detailing the results of the study 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 enforcement 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,<sup>1</sup> 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.

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<sup>1</sup> <https://www.baaqmd.gov/rules-and-compliance/rule-development/barct-implementation-schedule>

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

- Subject a subset of components in heavy liquid service to Leak Detection and Repair (LDAR) program requirements:
  - Valves and non-steam quenched pumps handling material with initial boiling points between 302 and 372 °F;
  - Steam-quenched pumps, compressors, pressure relief devices, and open-ended valves or lines handling material with initial boiling points greater than 302 °F; and
  - Components in a gas or vapor service.
- Other administrative updates and clarifications
- Additional definitions for clarity and completeness

Proposed rule amendment language is included in Appendix A. As described above, the proposed amendments would enact more stringent requirements by expanding the number of components subject to leak detection and repair requirements, expand associated reporting and recordkeeping, and provide other updates adding clarity to the rule. Proposed amendments reflect findings from the Heavy Liquid Study and are in alignment with the provisions of the enforcement agreement.

The Air District anticipates that the proposed amendments would affect components handling heavy liquids at five refineries and seven non-refinery facilities. The current TOC emissions from components in heavy liquid service affected by the proposed amendments are estimated to be 148 tons per year, and the proposed amendments are anticipated to reduce these emissions by 146 tons per year. The Air District anticipates that the affected facilities would incur potential compliance costs from the proposed amendments; costs would be associated with additional identification and tagging of components, additional component leak inspections, and additional repair and potential replacement of leaking components. The Air District estimates that the total annualized cost for the five refineries would range from \$141,000 to \$212,000 per year (for all affected refineries combined). The total annualized cost for the seven non-refinery facilities affected by the amendments would range from \$29,000 to \$42,000 per year (for all affected non-refinery facilities combined). The cost effectiveness associated with the proposed amendments varies depending on the component type, ranging from less than \$100 per ton of TOC reduced up to approximately \$45,000 per ton of TOC reduced.

An analysis of the potential socioeconomic impacts found that costs incurred from the proposed amendments would not be expected to result in significant socioeconomic impacts. The socioeconomic impacts analysis is included in Appendix B to this Staff Report. An analysis of the potential environmental impacts of the proposed amendments concluded that there is no substantial evidence suggesting that the proposed amendments will have any significant adverse environmental impacts. Accordingly, Air District staff prepared a Draft Negative Declaration under CEQA for consideration by the Board of Directors, which is included in Appendix C to this Staff Report.

Air District staff recommends adoption of the proposed amendments to Rule 8-18. Air District staff is releasing this Staff Report and proposed amendments to Rule 8-18 for public review and comment. Staff will accept written comments and will present a final proposal to the Air District Board of Directors for their consideration at a Public Hearing. At the Public Hearing, the Air District Board of Directors will consider the final proposal and receive public input before taking action.

## II. BACKGROUND

### A. Industry Description

Facilities subject to Rule 8-18 requirements include refineries, chemical plants, bulk plants, and bulk loading terminals 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 and store or blend them prior to loading for delivery to distributors, marketers, or product end users. All five refinery facilities and seven non-refinery facilities are expected to have heavy liquid service components that would be impacted by the proposed amendments.

### B. Process

Rule 8-18 governs fugitive emissions specific to equipment leaks. Leaks from equipment at facilities that store, transport, or process organic liquids result in emissions of TOCs (methane and volatile organic compounds) to the atmosphere. These fugitive leaks may occur at various sources: joints or connections between two pieces of equipment; 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 (e.g. joints, connections, valves, pressure relief devices, pumps, and compressors) have historically been categorized by phase, vapor pressure, and/or boiling point – i.e., as gaseous or vapor phase, light liquid (initial boiling point equal to or below 302 degrees Fahrenheit [°F]), or heavy liquid (initial boiling point greater than 302°F). The likelihood of equipment having leaks/fugitive emissions is in part influenced by properties inherent to the types of material processed: generally, fugitive emissions to the atmosphere are most likely to occur in components in gaseous or vapor service, while components handling the heaviest liquids are least prone to fugitive leak emissions.

### C. Regulatory History

#### 1. Air District Rules / Regulations

##### a. 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 2021. 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 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 made minor changes to the rule. The 2015 amendments, as part of a Petroleum Refinery Emissions Reduction Strategy, expanded the rule's requirements to additional components; however, these amendments resulted in a legal challenge and a subsequent settlement (see Section II.C.4. Litigation below for more information). In 2021, administrative amendments were made to Rule 8-18 as part of a larger effort to revise the definition of "refinery" in several Air District rules to accommodate fuel refining using alternative feedstocks other than petroleum.

As noted above, the Air District's Rule 8-18 limits emissions of TOC from equipment leaks at any facility that stores, transports, or processes organic liquids, including refineries, chemical plants, bulk plants, and bulk terminals. 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 TOC from gaps in the equipment. 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.

With respect to standards, the rule limits the maximum allowable concentration (parts per million by volume, ppmv) of equipment leaks. Above those concentrations, a leak is required to be minimized and then repaired within a given timeframe that is based on who discovers the leak (the Air District or the facility). Furthermore, Rule 8-18 provides requirements for effective monitoring necessary to identify leaks in need of repair; this is in the form of an LDAR program. Unless exempted, each piece of equipment is required to have a unique identifier and required to be monitored within an LDAR program. In addition, the rule provides exemptions for equipment routed to a control device, for small facilities, and limited exemptions for specific types of equipment. One exemption of note is related to liquids of different initial boiling points. While Rule 8-18 does not include a definition for heavy liquid service, it has 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°F). Equipment that met this criterion was subject to emission standards but exempted from monitoring requirements. As noted above, rule amendments removing this exemption were adopted in 2015 but then became the subject of litigation, an enforcement agreement, and a Heavy Liquids Study (see Section II.C.4. Litigation).

#### b. 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 these air districts.

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

| <i>Note: see legend<br/>(last row of table)</i>              | <b>BAAQMD Proposed Amended Rule 8-18</b> | <b>South Coast AQMD Rule 1173</b>       | <b>San Joaquin Valley APCD Rule 4455</b>  | <b>Ventura Co. APCD Rule 74.7</b>                 | <b>Yolo-Solano AQMD Rule 2.23</b>                 |
|--|--|---|---|---|---|
| <b>Minimum Leak Limits</b>                                   | §§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;<br>Major: visible mist or continuous flow of liquid                             | Minor: >3 drops/min;<br>Major: stream or mist     | Minor: >3 drops/min;<br>Major: stream or mist     |
| Valves   | 100 ppm                                  | HL > 500 ppm;<br>LL > 50k/10k* ppm      | minor: 200 to 10,000 ppm;<br>Major: >10,000 ppm (for valves + threaded connections in liquid service) | minor: 1,001 to 10,000 ppm;<br>Major: >10,000 ppm | minor: 1,001 to 10,000 ppm;<br>Major: >10,000 ppm |
| Connections  |  |   |   |   |   |
| Pumps/ Compressors   |  |   |   |   |   |
| Pressure Relief Devices (PRD) / Pressure Relief Valves (PRV) | 500 ppm                                  | HL > 500/100* ppm;<br>LL > 50k/10k* ppm | minor: 500 to 10,000 ppm;<br>Major: >10,000 ppm   | Major: > 200 ppm                                  | 100 ppm   |
| <b>Inspection Frequencies</b>                                | §§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/<br>Quarterly                             | Quarterly   |
| Connections  | Annually                                 |   |   | Monthly/ Annually                                 |   |
| Pumps/ Compressors   | Quarterly                                |   |   | Monthly/<br>Quarterly                             |   |
| PRDs/PRVs  |  |   |   | Quarterly (≤110 days)                             |   |

| <i>Note: see legend (last row of table)</i> | <b>BAAQMD Proposed Amended Rule 8-18</b>   | <b>South Coast AQMD Rule 1173</b>   | <b>San Joaquin Valley APCD Rule 4455</b>  | <b>Ventura Co. APCD Rule 74.7</b>       | <b>Yolo-Solano AQMD Rule 2.23</b>       |
|---|--|---|---|---|---|
| Inaccessibles                               | Annually   | Annually  | Annually  |   | Annually                                |
| <b>Non-Repairable List</b>                  | §§8-18-306.2 & 306.3   | Leak Thresholds: §1173(d)(1) Table 1  | §5.3.6  |   | §305.3                                  |
| Duration                                    | < 5 yrs or next turnaround   | No time limit (∞)   |   |   | See PRDs below                          |
| Valves                                      | 0.15% of total number of valves (connections count as two valves)<br><br>If leak is <10k ppm; Mass emissions must be determined for >=3k ppm | 0.5%  | If essential/critical component, minimize and repair or replace next turnaround (but not later than 1 year)           | None                                    | None                                    |
| Connections                                 |  |   |   |   |   |
| Pumps/Compressors                           |  | 0.5%  |   |   |   |
| PRDs/PRVs                                   |  | 0.5%  |   |   | Next shutdown                           |
| <b>Repair Schedules</b>                     | §§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/GV < 10k: 7 days/ext. 7 days; 100 < HL < 500: 7 days/ext. 7 days; 3 drops/min & 100 < HL < 500: 7 day/ext. 7 days; 10k < L < 25k: 2 days/ext. 3 days; L > 25k: 1 day; HL > 500: 1 day; LL > 3 drops/min: 1 day | m: 7 days<br>M: 3 days<br>M>50k: 1 day<br>(with a limited number of extensions available)<br>(1 day for liquid leaks) | m: 14 days<br>M: 5 days<br>M>50k: 1 day | m: 14 days<br>M: 5 days<br>M>50k: 1 day |
| Connections                                 |  |   |   |   |   |
| Pumps/Compressors                           |  |   |   |   |   |

| <i>Note: see legend<br/>(last row of table)</i> | <b>BAAQMD Proposed<br/>Amended<br/>Rule 8-18</b> | <b>South Coast<br/>AQMD<br/>Rule 1173</b>  | <b>San Joaquin Valley<br/>APCD<br/>Rule 4455</b>        | <b>Ventura Co.<br/>APCD<br/>Rule 74.7</b>   | <b>Yolo-Solano<br/>AQMD Rule<br/>2.23</b>               |
|---|--|--|---|---|---|
| PRDs/PRVs                                       | 7 days (District) / 15 days<br>(operator)        | 200 < L ≤ 25k: 2<br>days/ext. 3 days   |   |   |   |
| <b>Legend:</b>                                  |  | L = leak (in ppm or<br>drops/min); HL =<br>heavy liquid leak;<br>LL = light<br>liquid/gas/vapor<br>leak; *Limits for<br>leaks found above<br>leak thresholds<br>(see Turnaround<br>Lists);<br>leak ext = extended<br>repair period<br>GV = gas/vapor | m: minor;<br>M: Major;<br>M>50k: Major > 50,000<br>ppmv | Leaks: minor (m)<br>= >1,000 and<br><10,000 ppm;<br>Major (M) =<br>>10,000 ppm;<br>M>50k = major<br>leak >50,000<br>ppm | m: minor;<br>M: Major;<br>M>50k: Major ><br>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 at crude oil production, separation, and storage facilities and at natural gas facilities 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

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 Standard for Equipment Leaks (Fugitive Emission Sources)), and to 40 CFR Part 63, Subpart CC (National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries). Table 2 provides a comparison of the basic provisions of these federal regulations and the proposed amended Rule 8-18.

**Table 2 – Comparison of the Basic Provisions of the Federal Fugitive Emissions Rules and BAAQMD’s Proposed Amended Rule 8-18**

| BAAQMD Proposed Amended Rule 8-18   | 40 CFR 60 VV/VVa & GGG/GGGa<br>40 CFR 63 CC   |
|---|---|
| <b>Applicability</b>  |   |
| 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.  |
| <b>Requirements</b>   |   |
| LDAR program includes quarterly inspection of equipment in light liquid/gas/vapor service and of a subset of components in heavy liquid service.<br>Connectors in light liquid/gas/vapor service and inaccessible equipment inspected annually. | Pumps in liquid service inspected monthly.<br>Valves in light liquid/gas/vapor service inspected monthly.<br>Owners/operators may also comply through alternative methods, including meeting standards on allowable percentage of leaks and/or electing a monitoring schedule with reduced frequency based on leak percentage and consecutive leak-free readings. |
| Leak threshold at 100 ppm for any general equipment, valves, and connections.<br>Leak threshold of 500 ppm for any pumps, compressors, and PRDs.  | Leak threshold at 10,000 ppm for pumps and valves in heavy liquid service.<br>Pump, valves, PRDs, and connectors in light liquid service/gas/vapor service leak threshold at 10,000 ppm.<br>PRDs in gas/vapor service leak threshold at 500 ppm.  |
| Leaks detected by operator to be minimized within 24 hours and repaired within 7 days.  | Compressors required to have a seal system with barrier fluid.  |

| <b>BAAQMD Proposed Amended Rule 8-18</b>   | <b>40 CFR 60 VV/VVa &amp; GGG/GGGa<br/>40 CFR 63 CC</b>  |
|--|--|
| Leaks detected by BAAQMD to be repaired within 24 hours.<br>A percentage of non-repairable equipment may delay repair until unit turnaround.   | Leaks > 10,000 ppm repaired within 15 days maximum, first attempt at repair within 5 days.   |
| <b>Recordkeeping and Reporting</b>   |  |
| Submit quarterly reports of equipment found leaking in more than 3 consecutive quarters, non-repairable equipment, and inspection records for equipment opened during turnarounds.<br>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. |
| <b>Test Methods</b>  |  |
| United States Environmental Protection Agency (U.S. EPA) Method 21 for leak screening.<br>ASTM Method D-1078-11, D-86, 1160, or equivalent method approved by Air Pollution Control Officer (APCO) for initial boiling point.<br>U.S. EPA Protocol for Equipment Leak Emissions Estimates (Chapter 4), monitoring, or equivalent method approved by APCO for mass emission sampling. | U.S. EPA Method 21 for leak screening.<br>ASTM E-260, E-168, or E-169 for VOC content.<br>ASTM Method D-2879 for vapor pressure.                   |
| <b>Exemptions</b>  |  |
| Limited exemption small facilities with less than 100 valves.  | Exemption for facilities that have the design capacity to produce less than 1,000 Mg/year of the chemicals listed in the subpart.                  |
| Limited exemption for 1) connections that handle organic liquids having an initial boiling point greater than 302 °F and 2) valves and non-steam-quenched pump that handle organic liquids having an initial boiling point greater than 372 °F.  | Limited exemption for affected facilities that produces heavy liquid chemicals only from heavy liquid feed or raw materials.                       |
| Limited exemption for open-ended valves or lines that are part of a lubrication system or that contain non-process lube oil to supply that system.   | Limited exemption for open-ended valves or lines containing asphalt.   |

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

**4. Litigation**

As mentioned in earlier sections of this Staff Report, rule amendments to Air District Rule 8-18 that were approved in December 2015 resulted in additional questions regarding leak emissions associated with heavy liquids. At the time of adoption, the Air District’s Board of Directors approved amendments that would remove the monitoring exemption for components in heavy liquid service. 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. Additionally, in 2016, representatives from three of the refineries brought a legal challenge against the Air District alleging violations of the California Environmental Quality Act (CEQA), its implementing regulations, and other provisions of the California Health and Safety Code.

In March of 2017, the parties entered into an enforcement agreement that set forth provisions for completion of a Heavy Liquids Study, consultation procedures for subsequent documentation of the results, and provided guidance on the manner by which the rule may be amended. With respect to revision of the amendments, the enforcement agreement requires the Air District to make a cost effectiveness determination based on the Heavy Liquids Study that identifies which components (from the larger set of components included in the 2015 amendment) may be included in the LDAR program.<sup>2</sup>

In summary, as a result of the Board resolution and litigation, the Air District agreed to: a) complete an ongoing joint study that was already underway with affected refineries; b) produce a report on the results of the study, in consultation with affected refineries; 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 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.

### III. TECHNICAL REVIEW

#### A. Pollutants

Organic liquids handled by equipment covered under Rule 8-18 include petroleum, alternative feedstocks, and other organic hydrocarbons. Associated emissions to the atmosphere result from fugitive leaks from components handling these liquids. These emissions may include pollutants such as volatile organic compounds and methane, along with toxic air contaminants such as benzene, 1,3-butadiene, naphthalene, and toluene, which are components of the TOC emitted.

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<sup>2</sup> See Section V – Emissions and Emissions Reductions and Section VI – Economic Impacts for discussion of a thorough analysis of emissions and costs.

Emissions of volatile organics can contribute to the production of ground level ozone (also called smog) through photochemical reactions with oxides of nitrogen. Exposure to ozone can damage the lungs and aggravate respiratory conditions such as asthma, bronchitis, and emphysema. The San Francisco Bay Area does not currently attain all Federal and State ambient air quality standards for ozone, and further reductions in precursor emissions including volatile organic compounds are needed for attainment and maintenance of the standards. In addition, methane is a potent and short-lived greenhouse gas that can contribute to climate change.

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 and potential cancer risks and acute and chronic hazards to nearby residents. According to the California Health and Safety Code,<sup>3</sup> a toxic air contaminant is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health."

Overall, further reductions of TOCs are needed to ensure progress towards attainment of ambient air quality standards, reduce climate pollutant emissions, and reduce public health impacts from toxic compounds and ozone exposure.

## B. Emissions Estimates

The current emissions associated with the components in heavy liquid service that would be affected by the proposed amendments were estimated for the five 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 U.S. EPA reports (U.S. EPA, 1979). For the non-refinery facilities, seven bulk terminal facilities are expected to operate heavy liquid service components that would be affected by the proposed amendments. Emission estimates for affected components at these facilities were developed using the emission factors described above, along with component count data and heavy liquid-to-light liquid component ratio data. These emission estimates are provided in Table 3 below. More information on the emission estimates is provided in Section V.A. and Appendix D.

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<sup>3</sup> California Health and Safety Code, Division 26, Part 2, Chapter 3.5, Article 2, Section 39655(a).  
Staff Report



**Table 3 – Current TOC Emissions Estimates**  
(for Heavy Liquid Components Affected by Proposed Rule Amendments)

| Facility  | Current TOC Emissions (tons/year) <sup>a</sup> |
|---|--|
| <b>Refineries</b>                                     |  |
| Chevron Richmond Refinery                             | 32.9   |
| Marathon Martinez Refinery                            | 45.0   |
| Martinez Refining Company                             | 15.9   |
| Phillips 66 Refinery                                  | 12.3   |
| Valero Benicia Refinery                               | 27.7   |
| <b>Non-Refinery Facilities</b>                        |  |
| Equilon Enterprises San Jose Terminal                 | 0.5  |
| Nu Star Selby Terminal                                | 2.1  |
| Kinder Morgan San Jose Terminal                       | 3.7  |
| Kinder Morgan Brisbane Terminal                       | 2.1  |
| Kinder Morgan Concord Pump Station                    | 2.5  |
| Phillips 66 Richmond Marine Terminal                  | 2.2  |
| PBF Energy Terminal (Martinez Terminal Company)       | 0.6  |
| <b>Total - Refineries and Non-Refinery Facilities</b> | <b>148</b>                                     |

<sup>a</sup> The current emissions associated with the components in heavy liquid service that would be affected by the proposed amendments were estimated for the five 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 U.S. EPA reports (U.S. EPA, 1979)

### C. Control and Leak Detection Methods

The most efficient means of preventing these types of fugitive leaks is through implementation of an LDAR program, whereby potential sites of leaks are first properly identified then periodically monitored for emissions above 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.

When the U.S. 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 refineries, the estimated control effectiveness for an LDAR program ranged from 45% to 96% across different component types (U.S. EPA, 2007).

The Texas Commission on Environmental Quality (TCEQ) estimated the control efficiency of an LDAR program with a leak definition of 500 parts per million by volume (ppmv) and quarterly monitoring to be 97 percent for valves in heavy liquid service and 93 percent for pumps in heavy liquid service (TCEQ, 2018).

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, recordkeeping and

reporting requirements serve to verify compliance for equipment functioning as required. Generally, to implement an LDAR program, a facility must inspect and identify leaking components, repair and replace leaking components, monitor components for compliance, and report monitoring results and repairs for review by regulatory agencies.

## IV. PROPOSED RULE AMENDMENTS

The Air District is proposing 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 proposed amendments are intended to ensure that Air District regulations are as health protective as possible.

Proposed amendments expand and improve upon the existing LDAR program required by Rule 8-18. They expand monitoring requirements to cover a subset of components in heavy liquid service. Amendments include updates to aid with readability and clarity, as well as changes covering Exemptions, Definitions, Standards, Administrative Requirements, Monitoring and Records, and Procedures. Administrative amendments are proposed to correct typos, provide consistency regarding the use of commas in lists throughout the rule, and to correct subsection numbering in section 8-18-503. The rest of the main provisions of the amendments are as follows:

### A. Description

Section 8-18-101 – Description: This section states that the purpose of the rule is to limit emissions at facilities defined in the rule (refineries, chemical plants, bulk plants, and bulk terminals) from equipment including but not limited to the list provided. Proposed amendments to this section would make this equipment list consistent with the list provided in the definition of equipment found later in the rule. See Section 8-18-205 below.

### B. Exemptions

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

Section 8-18-113 – Limited Exemption, Initial Boiling Point: Proposed amendments to this section reflect the findings of the Heavy Liquids Study and subsequent emissions and cost estimations, along with stipulations in the enforcement agreement. Currently, and until one year after proposed rule amendment 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.). The proposed amendments would change this limited exemption such that, effective one year after rule adoption, valves and non-steam-quenched pump seals that handle organic liquids with an initial boiling point greater than 372°F will continue to be exempt from the Administrative Requirements of the rule. Connections that handle organic liquids with an initial boiling point greater than 302°F would also continue to be exempt from the

Administrative Requirements of the rule. Connections, valves, pressure relief devices, and pump seals in gas/vapor service do not qualify for this limited exemption, regardless of the initial boiling point of the organic liquid.

Section 8-18-119 – Limited Exemption, Open-Ended Valve or Line: Proposed 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. This exemption reflects the findings of the Heavy Liquid Study that this equipment should be excluded from the requirements of Section 8-18-309 as the emission rates for components handling non-process lube oil could not be derived during the study and there is currently no methodology for estimating the number of components in such lubricating systems.

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

## C. Definitions

Proposed 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 8-18-205 – Equipment: Proposed amendments to this section would make this inexhaustive list of equipment consistent with the list provided in the rule description found earlier in the rule. See Section 8-18-101 above.

Section 8-18-215 – Process Area: Proposed 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 and 8-18-237 – Gas/Vapor Service, and Organic Liquid: Proposed amendments to this section add two definitions to clarify language in Section 8-18-113 as well as other sections of the rule. These added definitions help provide additional clarity regarding 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. The definition is in alignment with the “in gas/vapor service” definition in Section 60.481 of 40 CFR Part 60, Subpart VV/VVa and GGG.

Sections 8-18-232, 8-18-235, and 8-18-236 – Steam-Quenched Pump Seal, Compressor, and Pump: Proposed amendments to this section add definitions to complete the list of equipment subject to emissions standards in the rule. Definitions for the terms connection and valve are already in the current version of the rule.

Sections 8-18-233 and 8-18-234 – Lubrication Systems and Non-Process Lube Oil: Proposed 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

Section 8-18-306 – Non-repairable Equipment: Proposed amendments to this section clarify that mass emissions determinations are not required for equipment leaks of less than 3,000 ppm. Such leaks have been evaluated by the Air District and determined to be unlikely to result in substantial excess emissions.

## E. Administrative Requirements

Section 8-18-401 – Inspection: Proposed amendments to this section require semi-annual inspection (once every 6 months) of all valves handling organic liquids with an initial boiling point greater than 302°F, effective one year from adoption. The proposed amendments include administrative changes to address added language elsewhere in the rule.

Section 8-18-402 – Identification: Proposed amendments to this section remove past effective dates, correctly indicate the equipment to be identified, and bring consistency to the order of equipment listings. Connections in heavy liquid service (excluding those in gas/vapor service) are not subject to these identification requirements as per the limited exemption in Section 8-18-113 (see above).

Section 8-18-404 – Alternative Inspection Schedule: Proposed amendments to this section incorporate changes necessary to expand the alternative inspection schedule option for valves handling organic liquids with an initial boiling point greater than 302°F. Section 8-18-401.2 requires equipment to be inspected quarterly, with the exception of valves handling heavy liquids which are required to be inspected every 6 months per Section 8-18-401.12. Section 8-18-404 allows the inspection schedule to be changed to annually for pumps and valves that demonstrate they have operated leak free for a period of five quarters. In order to satisfy this requirement, records must be submitted to the Air District to show either six quarterly leak free inspections for equipment subject to quarterly monitoring or four leak free inspections for equipment subject to semi-annual monitoring.

## F. Monitoring and Records

Section 8-18-502 – Records: Proposed 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. 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: Proposed 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 proposed 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. Proposed amendments clarify that P&IDs are not required to be submitted to the Air District. Effective one year from rule amendment adoption, new Subsections 8-18-503.5 through 503.7 address reporting of equipment information required by changes to the limited exemption for equipment handling material of a 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: Proposed 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 U.S. EPA and approved in writing by the Air District.

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

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

## V. EMISSIONS AND EMISSIONS REDUCTIONS

### A. Current Emission Estimates and Potential Emission Reductions

#### Refinery Facilities

The emissions associated with the components in heavy liquid service affected by the proposed amendments were estimated for the five 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 U.S. EPA reports (U.S. EPA, 1979). The current TOC emissions, controlled TOC emissions, and TOC emission reductions for the refineries are presented in Table 4.

**Table 4 – Estimated Emissions Reductions for Affected Components in Heavy Liquid Service for Refinery Facilities**

| Component Type                        | Total Component Counts <sup>1</sup> | Current TOC Emissions <sup>2</sup> (tons/year) | Controlled TOC Emissions (tons/year) | TOC Emissions Reductions (tons/year) |
|---------------------------------------|-------------------------------------|--|--------------------------------------|--------------------------------------|
| Valves <sup>3</sup>                   | 15,629                              | 5.8  | 1.9                                  | 3.9                                  |
| Non-Steam Quenched Pumps <sup>3</sup> | 203                                 | 0.8  | 0.6                                  | 0.2                                  |
| Steam Quenched Pumps <sup>4</sup>     | 381                                 | 77.3   | 1.2                                  | 76.1                                 |
| Pressure Relief Valves <sup>4</sup>   | 600                                 | 49.9   | 0.3                                  | 49.6                                 |
| <b>Total</b>                          | <b>16,813</b>                       | <b>133.8</b>                                   | <b>4.1</b>                           | <b>129.7</b>                         |

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

1. The component counts are the sum of component counts for the five refineries.

2. Current TOC emissions and controlled TOC emissions were estimated using POC emission factors.

3. The component counts for valves and non-steam quenched pump are for heavy liquid service components handling material with an initial boiling point greater than 302 °F and less than or equal to 372 °F.

4. The component counts for pressure relief devices and steam quenched pump are for heavy liquid service components handling material with an initial boiling point greater than 302 °F.

For non-steam quenched pumps and valves, current emissions are calculated for components handling materials with initial boiling greater than 302 °F and less than or equal to 372 °F using

average emissions data and initial boiling points of materials as reported by the respective refineries as part of the Heavy Liquids Study Report (BAAQMD, 2022).

For steam quenched pumps and pressure relief valves, the current emissions are calculated for components handling materials with initial boiling point greater than 302 °F using emissions factors from CAPCOA (CAPCOA, 1999) and U.S. EPA reports (U.S. EPA, 1979) since emission factors from the Heavy Liquids Study Report were not available for these component types. The steam quenched pump seals and pressure relief valves have the highest emissions reductions among the components in heavy liquid service.

Controlled emissions (i.e., emissions when the rule amendment provisions are applied) were calculated using emission factors derived using the correlation equation from CAPCOA (CAPCOA, 1999) for all component types. Staff assumed a screening value of 10 ppmv for valves and a screening value of 20 ppmv for steam-quenched pumps, non-steam quenched pumps, and pressure relief devices based on staff's review of historical LDAR screening data for light liquid components. Actual screening values and emissions from the heavy liquid service components would be expected to be lower than the estimated controlled emissions since heavy liquids are less volatile in comparison to the light liquids, typically leading to lower emissions.

TOC emission reductions were calculated using POC emission factors since TOC emission factors for fugitive components were not available. POC is defined in Section 1-235 of Regulation 1: General Provisions and Definitions and refers to any organic compound excluding methane and a set of other compounds. As defined in Section 8-18-219, TOC includes methane. As a result, actual TOC emission reductions may be greater than the estimated reductions shown. Appendix D contains additional details on the calculations of current emissions, controlled emissions, and emissions reductions.

### Non-Refinery Facilities

For the non-refinery facilities, seven bulk terminal facilities are expected to operate heavy liquid service components that would be affected by the proposed amendments. These component counts for the non-refinery facilities were estimated using facility-specific light liquid service component counts and an assumed heavy liquid-to-light liquid component ratio based on staff's review of historical data available. Current TOC emissions and controlled emissions were calculated using the emission factors described in Section V.A. Current TOC emissions, controlled TOC emissions, and TOC emission reductions for the non-refinery facilities are presented in

Table 5.

**Table 5 - Emissions Reductions for Affected Components in Heavy Liquid Service for the Seven Non-Refinery Facilities**

| Component Type                        | Total Component Counts <sup>1</sup> | Current TOC Emissions <sup>2</sup> (tons/year) | Controlled TOC Emissions (tons/year) | TOC Emissions Reductions (tons/year) |
|---------------------------------------|-------------------------------------|--|--------------------------------------|--------------------------------------|
| Valves <sup>3</sup>                   | 3,253                               | 1.2  | 0.4                                  | 0.8                                  |
| Non-Steam Quenched Pumps <sup>3</sup> | 34                                  | 0.14   | 0.11                                 | 0.03                                 |
| Pressure Relief Valves <sup>4</sup>   | 150                                 | 12.5   | 0.1                                  | 12.4                                 |
| <b>Total</b>                          | <b>3,437</b>                        | <b>13.8</b>                                    | <b>0.6</b>                           | <b>13.2</b>                          |

Note: Total summations may not match due to rounding.

1. The component counts are the sum of component counts for the seven non-refinery facilities.

2. Current TOC emissions and controlled TOC emissions were estimated using POC emission factors.

3. The component counts for valves and non-steam quenched pump are for heavy liquid service components handling material with an initial boiling point greater than 302 °F and less than or equal to 372 °F.

4. Component count information for pumps at these facilities did not specify whether pumps were non-steam quenched or steam quenched. For the purpose of this emissions calculation, all pumps for non-refinery facilities were assumed to be non-steam quenched pumps.

4. The component counts for pressure relief devices are for heavy liquid service components handling material with an initial boiling point greater than 302 °F.

## VI. ECONOMIC IMPACTS

### A. Control Cost and Cost Effectiveness

#### Compliance Costs and Cost Effectiveness

The Air District evaluated potential compliance costs associated with the proposed amendments, including costs for the newly monitored components under the proposed amendments. Costs associated with newly monitored components include both capital costs for identifying components subject to monitoring requirements as well as annual costs for inspecting components and repairing or replacing components found leaking in excess of standards. The Air District notes that actual incurred compliance costs may be lower than the estimates provided as some refineries have already identified and tagged the heavy liquid service components.

The Air District developed cost estimates based on a review of available cost data, methodologies, and estimates, including information previously published by the Air District, South Coast AQMD (SCAQMD, 2002, 2007, 2009), and San Joaquin Valley Unified APCD (SJVUAPCD, 2023). A range of potential compliance costs were estimated based on alternate inspection schedules for valves and pumps. Per Section 8-18-404, facilities may reduce the inspection frequency from quarterly (valves and pumps) or semi-annually (valves) to annual if the valve or pump is leak free for five consecutive quarters. The minimum cost scenario assumes that leak free valves and pumps are on an annual inspection schedule, while the leaking components are on a quarterly or semiannual inspection schedule. The maximum cost scenario assumes that all valves and pumps are on a quarterly inspection schedule. The assumptions used to calculate the inspection costs, repair costs, replacement costs, and identification costs are available in Appendix D.

Cost effectiveness is calculated by dividing the annualized compliance costs by the total number of tons of emission reductions expected each year. These calculations rely on the cost estimates



described above and the emission reduction estimates described in Section V of this report. Results for each component type and facility type are presented below.

Refinery Facilities

The estimated compliance cost and cost-effectiveness by component type for the five refineries are provided in Table 6 and Table 7, respectively.

**Table 6 – Estimated Total Annual Compliance Cost by Component Type for the Five Refineries**

| <b>Component Type</b>                 | <b>Identification Costs- Amortized <sup>1</sup> (\$/year)</b> | <b>Monitoring Costs (\$/year)</b> | <b>Total Annual Compliance Cost (\$/year)</b> |
|---------------------------------------|---|-----------------------------------|---|
| Valves <sup>1</sup>                   | \$32,827  | \$78,963 - \$142,947              | \$111,790 - \$175,774                         |
| Non-Steam Quenched Pumps <sup>1</sup> | \$426   | \$3,256 - \$5,749                 | \$3,682 - \$6,175                             |
| Steam Quenched Pumps <sup>1</sup>     | \$800   | \$6,111 - \$10,790                | \$6,911 - \$11,590                            |
| Pressure Relief Valves <sup>1</sup>   | \$1,260   | \$17,017                          | \$18,278                                      |
| <b>Total</b>                          | <b>\$35,314</b>   | <b>\$105,347 - \$176,503</b>      | <b>\$140,660 - \$211,817</b>                  |

1. The one-time costs for identification and tagging of components has been amortized over 10 years.

**Table 7 – Estimated Total Cost-Effectiveness by Component Type for the Five Refineries**

| <b>Component Type</b>                 | <b>TOC Emission Reduction (tons/year)</b> | <b>Compliance Cost (\$/year)</b> | <b>Cost-Effectiveness (\$/ton)</b> |
|---------------------------------------|---|----------------------------------|------------------------------------|
| Valves <sup>1</sup>                   | 3.9                                       | \$111,790 - \$175,774            | \$28,766 - \$45,230                |
| Non-Steam Quenched Pumps <sup>1</sup> | 0.2                                       | \$3,682 - \$6,175                | \$20,664 - \$34,656                |
| Steam Quenched Pumps <sup>1</sup>     | 76.1                                      | \$6,911 - \$11,590               | \$91 - \$152                       |
| Pressure Relief Valves                | 49.6                                      | \$18,278                         | \$369                              |

1. Minimum and maximum costs are calculated based on alternative inspection schedule per Section 8-18-404 for valves and pumps.

### Non-Refinery Facilities

The estimated compliance cost and cost-effectiveness by component type for the seven non-refinery facilities are provided in Table 8 and Table 9, respectively.

**Table 8 – Estimated Total Annual Compliance Cost by Component Type for the Seven Non-Refinery Facilities**

| Component Type                             | Identification Costs-Amortized <sup>1</sup> (\$/year) | Monitoring Costs (\$/year) | Total Compliance Cost (\$/year) |
|--|---|----------------------------|---------------------------------|
| Valves <sup>1</sup>                        | \$6,833   | \$16,435 - \$29,753        | \$23,268 - \$36,585             |
| Non-Steam Quenched Pump Seals <sup>1</sup> | \$71  | \$545 - \$963              | \$617 - \$1,034                 |
| Pressure Relief Valves <sup>1</sup>        | \$315   | \$4,254                    | \$4,569                         |
| <b>Total</b>                               | <b>\$7,219</b>  | <b>\$21,235 - \$34,970</b> | <b>\$28,454 - \$42,189</b>      |

1. The one-time costs for identification and tagging of components has been amortized over 10 years.

**Table 9 – Estimated Total Cost-Effectiveness by Component Type for the Seven Non-Refinery Facilities**

| Component Type                        | TOC Emission Reduction (tons/year) | Compliance Cost (\$/year) | Cost-Effectiveness (\$/ton) |
|---------------------------------------|------------------------------------|---------------------------|-----------------------------|
| Valves <sup>1</sup>                   | 0.8                                | \$23,268 - \$36,585       | \$28,766 - \$45,230         |
| Non-Steam Quenched Pumps <sup>1</sup> | 0.03                               | \$617 - \$1,034           | \$20,664 - \$34,656         |
| Pressure Relief Valves                | 12.4                               | \$4,569                   | \$369                       |

1. Minimum and maximum costs are calculated based on alternative inspection schedule per Section 8-18-404 for valves and pumps.

## B. Incremental Cost Effectiveness

Incremental cost effectiveness is calculated by 1) calculating the incremental difference in cost between the different regulatory options, and 2) dividing the incremental difference in cost by the incremental difference in emission reductions between each progressively more stringent regulation.

As discussed in Section II.C, the proposed amendments do not require new control mechanisms, but rather expand and improve the existing LDAR program requirements. The proposed amendments will subject valves and non-steam quenched pumps handling materials with initial boiling greater than 302 °F and less than or equal to 372 °F to the LDAR program. Steam quenched pumps and pressure relief devices handling materials with initial boiling greater than 302 °F will also be subject to the proposed amendments.

For valves and non-steam quenched pumps, an alternative control option may involve expanding LDAR requirements to all valves and pumps in heavy liquid service handling material with an initial boiling point greater than 302 °F (including those handling material with an initial boiling point greater than 372 °F). Including all heavy liquid service components instead of only a subset of components would increase emissions reductions but would also increase the compliance cost as additional components would need to be inspected more frequently.

The Air District estimated compliance costs for this alternative control option using the same cost data, methodologies, and information described previously in Section VI.A. A summary of the incremental cost-effectiveness analysis is provided in Table 10. The incremental cost-effectiveness to expand the LDAR program to include all heavy liquid components for valves and non-steam quenched pumps ranged from \$113,000 to \$177,000 per ton, and \$256,000 to \$429,000 per ton, respectively. Appendix D contains additional details on calculations for emissions reductions and compliance costs under the alternative control scenario.

**Table 10 – Incremental Cost-effectiveness for Pumps and Valves under Proposed Amendments and Alternative Control Scenario**

| Component Type           | Proposed Amendments: Components Handling Material 302 °F < IBP <sup>a</sup> ≤ 372 °F |                           | Alternative Control Scenario: Components Handling Material 302 °F < IBP <sup>a</sup> |                           | Incremental Cost-Effectiveness (\$/ton) |
|--------------------------|--|---------------------------|--|---------------------------|---|
|                          | TOC Emission Reduction (tons/year)   | Compliance Cost (\$/year) | TOC Emission Reduction (tons/year)   | Compliance Cost (\$/year) |   |
| Valves                   | 3.9  | \$111,790 - \$175,774     | 6.2  | \$376,196 - \$591,517     | \$112,725 - \$177,244                   |
| Non-Steam Quenched Pumps | 0.18   | \$3,682 - \$6,175         | 0.24   | \$20,370 - \$34,163       | \$256,043 - \$429,405                   |

<sup>a</sup> IBP = Initial Boiling Point

For steam-quenched pumps and pressure relief devices, the scope of the LDAR program cannot be expanded further to include additional components since the proposed amendments already include all heavy liquid service components for these component types. In addition, more granular emissions data for steam-quenched pumps and pressure relief devices at various initial boiling point ranges were not available in the Heavy Liquid Study Report or in the literature reviewed by the Air District. Thus, no further incremental cost effectiveness discussion is warranted for steam-quenched pumps and pressure relief devices.

### C. 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.” Air District staff contracted with an independent consultant, BAE Urban Economics (BAE), to develop estimates of potential socioeconomic impacts for the proposed amendments. The analysis and findings are summarized in this section, and the full report of the socioeconomic impact analysis is available in Appendix B. The Socioeconomic Analysis concludes that the compliance costs would not be

expected to result in significant socioeconomic impacts at the affected refinery and non-refinery facilities and would not be expected to impact small businesses or lead to job reductions.

## D. Air District Impacts

Staff anticipates that Amendments to Rule 8-18 will require additional staff time and resources in a number of areas. Implementation of amendments to Rule 8-18 would require additional compliance inspections, review and management of additional reporting and compliance records, and related oversight and support. The level of effort, and therefore full-time equivalent (FTE) staff, depends on the level of compliance at the facilities and prioritization of these sources for inspections. We anticipate that we would initially need to dedicate 1-2 FTE staff in the Compliance and Enforcement Division, noting that additional FTE may be required to fully implement compliance if the sources require extensive oversight.

## VII. 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 a 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 changes.

Table 1 in Section II.C.1 of the Regulatory History section of this Staff Report – Comparison of the Basic Provisions of the Fugitive Emissions Rules of Five California Air Districts – provides an analysis of differences between existing requirements at the air district level and the requirements imposed by the changes proposed in the proposed amendments to Rule 8-18. The Air Districts in the comparison include the South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, Ventura County Air Pollution Control District, and Yolo-Solano Air Quality Management District.

Table 2 in Section II.C.3 of the Regulatory History section of this Staff Report – Comparison of the Basic Provisions of the Federal Fugitive Emissions Rules and BAAQMD’s Proposed Amended Rule 8-18 – provides an analysis of all differences between existing requirements at the federal level and the requirements imposed by the changes proposed in the proposed amendments to Rule 8-18.

## VIII. ENVIRONMENTAL IMPACTS

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., requires a government agency that undertakes or approves a discretionary project to consider the potential impacts of that project on all environmental media. 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.<sup>4</sup> Air District staff contracted with

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<sup>4</sup> [https://www.baaqmd.gov/~/\\_media/files/ab617-community-health/barct/20181214\\_feir\\_ab617\\_barct-pdf.pdf?rev=7c0effc90d9b439c81e21445ac5165e0&sc\\_lang=en](https://www.baaqmd.gov/~/_media/files/ab617-community-health/barct/20181214_feir_ab617_barct-pdf.pdf?rev=7c0effc90d9b439c81e21445ac5165e0&sc_lang=en)

an external environmental consultant, Environmental Audit Inc., to prepare an Initial Study to evaluate the potential for significant environmental impacts resulting from proposed amendments to Rule 8-18. The Initial Study showed that no significant environmental impacts are expected, and therefore a Negative Declaration has been prepared. The CEQA Initial Study and Draft Negative Declaration will be posted for public review and comment at least 30 days before the Public Hearing. At the Public Hearing, the Air District Board of Directors will consider the final proposals, and public input before taking any action on the amendments to Rule 8-18 and the associated Draft Negative Declaration.

Appendix C provides the full details of the environmental analysis, including the Initial Study and the Draft Negative Declaration.

## **IX. RULE DEVELOPMENT / PUBLIC PARTICIPATION PROCESS**

Throughout the rule development process for amendments to Rule 8-18, including efforts leading up to the formal initiation of rule development, staff interacted with and reached out to interested parties.

Preceding the development of draft amendment language for Rule 8-18, industry and the public were engaged via development and adoption of the AB 617 Expedited BARCT Implementation Schedule and via the Heavy Liquids Study. As part of the BARCT schedule, staff identified potential efforts to develop amendments to Rule 8-18 that would address organic compound emissions; this was adopted by the Board via a public process in 2018. The Heavy Liquids Study spanned several years, with the Heavy Liquids Study Report finalized and published for the public in 2022. Amendments to Rule 8-18 are based in part on the results from that Heavy Liquids Study, which was 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 Heavy Liquids Study Report.

In October 2023, staff presented an update on the development of draft amendments to Rule 8-18 to the Stationary Source & Climate Impacts Committee (now the Stationary Source Committee) of the Air District Board of Directors. No public comments on these efforts were stated during this meeting, but representatives of the regulated industries contacted staff in response to the presentation. In November 2023, a draft rule amendments package was released to the public along with a request for comments. An email notification was sent to the Rules and Regulations listserv for interested parties announcing the availability of the documents and the comment period. The Air District also reached out to potentially affected facilities, including both refinery and non-refinery facilities, for comments. Staff was contacted by WSPA and met with representatives upon request to discuss feedback and additional data that could inform the rule development process: these meetings occurred in October 2023, January 2024, and April 2024.

The Air District received three written comment letters on the draft amendment materials released in 2023 from WSPA, Air Liquide, and Ashworth Leininger Group. Written comments received covered topics related to analyses required under the California Health and Safety Code, emission estimates, feasibility of implementing draft leak limits, monitoring methods, initial boiling

point cutoff for to specific component types, clarifications on rule language, and new test methods and testing requirements.

Air District staff is publishing the proposed amendments to Rule 8-18 and a Staff Report for public review to solicit comments on these materials. Staff will accept and respond to written comments and will present a final proposal to the Air District Board of Directors for their consideration at a Public Hearing. At the Public Hearing, the Air District Board of Directors will consider the final proposal and receive public input before taking any action on the proposed amendments to Rule 8-18.

## **X. CONCLUSION / RECOMMENDATIONS**

Pursuant to the California Health and Safety Code Section 40727, before adopting, amending, or repealing a rule the Board of Directors must make findings of necessity, authority, clarity, consistency, non-duplication, and reference. This section addresses each of these findings.

### **A. Necessity**

As stated in California Health and Safety Code Section 40727(b)(1), “‘Necessity’ means that a need exists for the regulation, or for its amendment or repeal, as demonstrated by the record of the rulemaking authority.”

The San Francisco Bay Area does not currently attain all Federal and State ambient air quality standards for ozone, and further reductions of precursor organic compound emissions are needed for attainment and maintenance of the standards. 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 proposed amendments to Rule 8-18 were identified in the Air District’s AB 617 Expedited Best Available Retrofit Control Technology (BARCT) Implementation Schedule. AB 617 requires that districts adopt an expedited schedule for implementation of best available retrofit control technology by the earliest feasible date, and no later than December 31, 2023. The proposed amendments to Rule 8-18 are needed to implement these BARCT requirements consistent with AB 617 and California Health and Safety Code Section 40920.6(c) and meet the December 31, 2023, deadline as required by AB 617. Moreover, the proposed rule amendments are required to include the provisions agreed upon in the enforcement agreement.

### **B. Authority**

The California Health and Safety Code Section 40727(b)(2) states that “‘Authority’ means that a provision of law or of a state or federal regulation permits or requires the regional agency to adopt, amend, or repeal the regulation.”

The Air District has the authority to adopt these rule amendments under Sections 40000, 40001, 40702, and 40725 through 40728.5 of the California Health and Safety Code.

## C. Clarity

The California Health and Safety Code Section 40727(b)(3) states that “‘Clarity’ means that the regulation is written or displayed so that its meaning can be easily understood by the persons directly affected by it.”

The proposed amendments to Rule 8-18 are written so that their meaning can be easily understood by the persons directly affected by them. Further details in the Staff Report clarify the proposals and delineate the affected industries, compliance options, and administrative requirements for the industries and persons subject to this rule.

## D. Consistency

The California Health and Safety Code Section 40727(b)(4) states that “‘Consistency’ means that the regulation is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.”

The proposed amendments to Rule 8-18 are consistent with other Air District rules and not in conflict with state or federal law.

## E. Non-Duplication

The California Health and Safety Code Section 40727(b)(5) states that “‘Nonduplication’ means that a regulation does not impose the same requirements as an existing state or federal regulation unless a district finds that the requirements are necessary or proper to execute the powers and duties granted to, and imposed upon, a district.”

The proposed amendments to Rule 8-18 are non-duplicative of other statutes, rules, or regulations.

## F. Reference

The California Health and Safety Code Section 40727(b)(6) states that “‘Reference’ means the statute, court decision, or other provision of law that the district implements, interprets, or makes specific by adopting, amending, or repealing a regulation.”

By adopting the proposed amendments to Rule 8-18, the Air District Board of Directors will be implementing, interpreting, or making specific the provisions of California Health and Safety Code Sections 40000, 40001, 40702 and 40727.

The proposed amendments to Rule 8-18 have met all legal noticing requirements, have been discussed with the regulated community and other interested parties, and reflect consideration of the input and comments of many affected and interested stakeholders.

## G. Recommendations

Air District staff recommends that the Air District Board of Directors adopt the proposed amendments to Regulation 8: Organic Compounds, Rule 18: Equipment Leaks and adopt the Negative Declaration under CEQA.

## XI. Reference

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- TCEQ. (2018). *Air Permit Technical Guidance for Chemical Sources - Fugitive Guidance*. Texas Commission on Environmental Quality.
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