SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report

Proposed Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities; and Proposed Amended Rule 463 – Organic Liquid Storage

February 2023

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EXECUTIVE SUMMARY

Rule 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (Rule 1178) limits volatile organic compounds (VOC) emissions from storage tanks at petroleum facilities that have emitted more than 20 tons of VOC in any reporting year since the rule's adoption in 2001. Applicable storage tanks have a design capacity of 19,815 gallons or more and store materials with a true vapor pressure (TVP) of greater than 0.1 pounds per square inch (psi) absolute. The rule requires more stringent controls for storage tanks located at higher emitting facilities such as gasketed and/or bolted covers, sleeves, and/or wipers on all roof components. Best available rim seal systems and domes were also required for certain tanks.

Rule 463 – Organic Liquid Storage (Rule 463) limits VOC emissions from above-ground storage tanks that store organic liquids. Applicable storage tanks have a design capacity of 19,815 gallons or more or have a design capacity between 251 and 19,815 gallons and are used to store gasoline. The rule requires floating roofs with seals, or fixed roofs with 95 percent (%) emission control, for storage tanks with capacity of 39,630 gallons or more used to store organic liquid with TVP of 0.5 psia or greater, and for storage tanks with capacity of 19,815 gallons used to store organic liquid with TVP of 1.5 psia or greater.

California Assembly Bill 617 (AB 617) was signed into state law in 2017 and required strategies to reduce toxic air contaminants and criteria pollutants in disadvantaged communities. During the development of the Wilmington, Carson, West Long Beach (WCWLB) Community Emission Reduction Plan (CERP), community members expressed concern about refinery emissions. Development of PAR 1178 was initiated in response to Chapter 5b, Action 4 in the WCWLB CERP that was adopted on by the South Coast AQMD Governing Board September 6, 2019. Recommendations for proposed amendments to Rule 1178 included improving current leak detection and repair requirements by incorporating advanced leak detection technologies and requiring additional controls.

Control Measure FUG-03 – Further Reductions of Fugitive VOC Emissions in the Final 2012 Air Quality Management Plan (AQMP) identified the implementation of advanced leak detection technologies, including optical gas imaging, as a method to reduce the emissions impact from leaks. The 2016 Final AQMP included Control Measure FUG-01 – Improved Leak Detection and Repair to utilize advanced remote sensing technologies to allow for faster identification and repair of leaks from equipment at oil and gas and other facilities that are currently required to maintain a leak detection and repair (LDAR) program. The 2022 Final AQMP included Control Measure FUG-01 - Improved Leak Detection and Repair to reduce emissions of volatile organic compounds (VOC) from fugitive leaks from process and storage equipment.

The United States Environmental Protection Agency (U.S. EPA) established Reasonably Available Control Technology (RACT) requirements for tanks subject to the agency's 2016 Control Techniques Guidelines (2016 CTG) for the Oil and Gas Industry. RACT deficiencies were identified in California Air Resources Board's (CARB) Oil and Gas Methane rule which partially relies on Rules 1178 and 463.

Proposed Amended Rule 1178 (PAR 1178) establishes more stringent leak detection and repair and control requirements. PAR 1178 establishes weekly optical gas inspections and additional control requirements for doming, emission control systems, and secondary seals. Additionally, PAR 1178 and Proposed Amended Rule 463 (PAR 463) address the RACT deficiency. PAR 1178 applies to 1,071 tanks located at 29 facilities including refineries, bulk storage, loading, and oil production facilities. The proposed requirements will reduce VOC emission by 0.76 tons per day. The cost-effectiveness to implement OGI inspections is $16,900 per ton of VOC reduced. The cost-effectiveness to require doming on additional tanks is $35,800 per ton of VOC reduced. The cost-effectiveness to require secondary seals on all floating roof tanks is $22,100 per ton of VOC reduced. PAR 463 applies to 1,391 storage tanks located at 211 facilities including petroleum, electricity generation and chemical manufacturing and distribution. There are no expected costs to address the RACT deficiency as no storage tanks have been identified that exceed six tons per year of emissions and are uncontrolled. PAR 1178 partially implements Control Measure FUG-01 of the 2022 AQMP.

PAR 1178 and PAR 463 were developed through a public process. Seven Working Group meetings for PAR 1178 were held on March 17, 2021, July 15, 2021, December 9, 2021, March 24, 2022, July 14, 2022, October 27, 2022, and January 5, 2022. Working Group meetings includes attendees from affected businesses, environmental and community representatives, public agencies, consultants, and other interested parties. The purpose of the Working Group meetings is to discuss details of proposed amendments and to listen to concerns with the objective to build consensus and resolve issues. Staff met with multiple stakeholders during the rule development process and conducted several site visits. A Public Workshop for PAR 1178 and PAR 463 will be held on March 1, 2023. The purpose of the Public Workshop is to present the proposed amended rule language to the general public and to stakeholders, as well as to solicit comments.

CHAPTER 1: BACKGROUND

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INTRODUCTION

Rule 1178 limits VOC emissions from storage tanks at petroleum facilities that have emitted more than 20 tons of VOC in any reporting year since the rule's adoption in 2001. Applicable storage tanks have a design capacity of 19,815 gallons or more and store materials with true vapor pressure of greater than 0.1 psia true vapor pressure (TVP). The rule implemented more stringent controls for storage tanks located at larger, higher emitting facilities including gasketed and/or bolted covers on roof openings, sleeves and wipers and best available rim seal systems for floating roof tanks. Fixed roofs vented to the atmosphere were required to be converted to an internal or external floating roof tanks or vent to a fuel gas system or an emission control system with at least 95 percent control efficiency. External floating roof tanks were required to be retrofit with domes if storing material with true vapor pressure of 3 psia or greater, excluding tanks storing crude oil.

Rule 463 regulates emissions from above-ground storage tanks with a design capacity of 19,815 gallons or greater used for storage of organic liquids, and any above-ground storage tanks with a capacity between 251 gallons to 19,815 gallons used for the storage of gasoline. Rule 463 requires tanks with capacity of 39,630 gallons storing liquids with TVP of 0.5 psia or greater and tanks with capacity of more than 19,815 gallons storing liquid with TVP of 1.5 psia or greater to have an external floating roof, internal floating roof or fixed roof and in which the tank is vented to a fuel gas system or vapor recovery system that meets 95 percent or greater control efficiency by weight.

California Assembly Bill 617 (AB 617) was signed into state law in 2017 and required strategies to reduce toxic air contaminants and criteria pollutants in disadvantaged communities. AB 617 requires the California Air Resources Board (CARB) to select specific disadvantaged communities to prepare and implement a Community Emission Reduction Programs (CERPs) for each community. In 2018, CARB selected the Wilmington, Carson, West Long Beach (WCWLB) community.

During the development of the WCWLB CERP, community members expressed concern about refinery emissions. Rule amendment development was initiated as a result of the Final WCWLB CERP adopted on September 6, 2019. Chapter 5b, Action 4 in the WCWLB CERP initiates rule development to amend Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities. Recommendations for proposed amendments for Rule 1178 focused on improving leak detection requirements with the use of advanced technologies and requiring additional controls.

Control Measure FUG-03 – Further Reductions of Fugitive VOC Emissions in the Final 2012 Air Quality Management Plan (AQMP) identifies the implementation of advanced leak detection technologies, including optical gas imaging, as a method to reduce the emissions impact from leaks. The 2016 Final Air Quality Management Plan included Control Measure FUG-01 – Improved Leak Detection and Repair to utilize advanced remote sensing technologies to allow for faster identification and repair of leaks from equipment at oil and gas and other facilities that are currently required to maintain a leak detection and repair (LDAR) program.

Staff assessed current Rule 1178 requirements and identified potential areas of improvement including leak detection and repair requirements and the potential for further emission reductions from requiring more stringent controls. Leak detection using enhanced leak detection technologies have become more widespread since the adoption of Rule 1178. Staff has assessed multiple leak

detection technologies as part of the PAR 1178 rule development process. Staff also analyzed control technologies and methods that have gained popularity since the rule's adoption in 2001 as well as analyzed the potential for requiring existing control technologies for additional tanks. Proposed amendments to PAR 1178 are based on determination of feasible and cost-effective technologies that were assessed through a best available retrofit control technologies (BARCT) analysis.

Deficiency Identified by U.S. EPA

In 2016, U.S. EPA released control techniques guidelines (2016 CTG) for oil and gas industry containing reasonably available control technology (RACT) for sources covered under the 2016 CTG. Nonattainment areas classified as "Moderate" or above, such as South Coast AQMD, are required to implement RACT for VOC sources covered by the CTG. Storage tanks covered by the 2016 CTG include those with potential for VOC emissions of six tons per year or more and are located at oil and natural gas facilities (excluding distribution). The RACT recommendation for storage tanks covered by the 2016 CTG is 95% emission control. Rules 463 and 1178 contain requirements for 95% emission control or greater, however, do not apply to storage tanks based on their potential for VOC emissions. Rather, Rules 463 and 1178 apply to tanks based on capacity and true vapor pressure of the material stored. U.S. EPA has stated that it is unclear whether all tanks subject to the 2016 CTG are included in the applicability of Rules 463 and 1178. PAR's 463 and 1178 will address the deficiency by modifying the applicability to include tanks with a potential for VOC emissions of six tons per year or greater.

REGULATORY HISTORY

Rule 463 was adopted in 1977 and regulates emissions from above-ground storage tanks. Rule 463 requires tanks to have an external floating roof, internal floating roof, or fixed roof and in which the tank is vented to a fuel gas system or vapor recovery system that meets 95 percent or greater control efficiency by weight. The most recent amendments to Rule 463 include removal of the hydrogen sulfide content standard and associated test method shown to be non-reproducible and to harmonize test methods and leak standards as Rule 1178.

Rule 1178 was adopted in 2001 and requires additional emission controls for tanks with capacity of 19,815 gallons or greater used for the storage of organic liquids with a true vapor pressure of greater than 0.1 psia located at any petroleum facility that emits more than 20 tons of VOC in any reporting year since 2000. The additional emission controls included domes, gasketed and/or bolted covers with sleeves or wipers on all roof opening, best available rim seal systems, and emission controls systems for fixed roof tanks.

Rule 1178 was amended on April 7, 2006 to allow an alternative for drain cover, include a modified seal requirement, update the inspection form, and clarify compliance schedule. Rule 1178 was amended again on April 6, 2018 to specify requirements for flexible enclosure systems, require repairs or replacements to be conducted within 72 hours of an identified leak, and clarify report submissions. Rule 1178 was amended again on November 6, 2020 to allow certain operators to accept a permit condition limiting vapor pressure on the material stored in lieu of installing a domed roof.

AFFECTED INDUSTRIES

PAR 1178 affects 1,071 tanks located at 29 facilities in the petroleum industry including refineries, bulk storage, terminals, and oil production. Staff identified 10 refineries, 7 bulk storage, 10 terminals, and 2 oil production facilities affected by PAR 1178. PAR 463 affects tanks in the petroleum, electricity generation, and chemical manufacturing and distribution industries.

PUBLIC PROCESS

PAR 1178 and PAR 463 were developed through a public process. Seven Working Group meetings for PAR 1178 were held on March 17, 2021, July 15, 2021, December 9, 2021, March 24, 2022, July 14, 2022, October 27, 2022, and January 5, 2022. Working Group meetings include affected businesses, environmental and community representatives, public agencies, consultants, and other interested parties. The purpose of the Working Group meetings is to discuss details of proposed amendments and to listen to concerns with the objective to build consensus and resolve issues. Staff met with multiple stakeholders during the rule development process and conducted several site visits.

In addition, a Public Workshop for PAR 1178 and PAR 463 is scheduled for March 1, 2023. The purpose of the Public Workshop is to present the proposed rule language to the general public and to stakeholders, as well as to solicit comments. Determination of the applicable California Environmental Quality Act (CEQA) document is pending.

Staff has also held numerous individual meetings regarding PAR 1178 and PAR 463 with stakeholders, including facilities and environmental groups to understand specific concerns and how the rule may uniquely affect them. Staff also met with technology and lead detection service providers. In addition, staff conducted 12 site visits to understand the different types of tanks and operations.

CHAPTER 2: BARCT ASSESSMENT

INTRODUCTION

PAR 1178 development was initiated in response to concerns voiced during the development of the WCWLB CERP. Additionally, South Coast AQMD periodically assesses rules to ensure that BARCT is reflected in rule requirements. To address these concerns, staff conducted a BARCT assessment. During the BARCT assessment process, staff examines current rule requirements, current rule requirements at other agencies, emission reducing technologies and methods, and cost-effectiveness for feasible technologies and methods with potential to reduce emissions.

Staff assessed current rule requirements and identified areas for improvement. During the AB 617 WCWLB CERP development, recommendations were made for improved leak detection and repair requirements and additional controls. Staff analyzed current storage tank regulations at agencies in the United States, as well as European and Canadian regulations and identified where requirements are more stringent than the current requirements of Rule 1178.

Staff reviewed enhanced leak detection technologies and methods, and control technologies. Leak detection technologies reviewed included optical gas imaging (OGI), gas sensors, and open path devices. Methods reviewed included continuous monitoring and more frequent inspections. Control technologies reviewed included domes, proximity switches, cable suspended floating roof systems, and vapor recovery.

As part of the technology assessment, a cost-effectiveness analysis was conducted for technologies with potential to reduce emissions. A cost-effectiveness analysis determines the cost per ton of pollutant reduced. In the 2022 AQMP, a cost-effectiveness threshold of $36,000 per ton of VOC reduced was established. An incremental cost-effectiveness was conducted for proposed controls and monitoring methods and is detailed in Chapter 4.

Staff obtained data from multiple sources which included: online articles, industry publications, scientific and vendor literature, permits and source tests, annual emission reports, inspection reports, site visits, stakeholder meetings, Working Group meetings, a public workshop, and South Coast AQMD inter-departmental meetings.

Staff will be conducting a separate rule development process to assess BARCT for Rule 463.

EMISSIONS FROM STORAGE TANKS

Rule 1178 applies to aboveground storage tanks with capacity of 19,815 gallons or more and are used to store organic liquids with a true vapor pressure of greater than 0.1 psia under actual storage conditions and are located at facilities that have emitted 20 tons or more in any calendar year since year 2000. There are 5 major categories of storage tanks subject to the rule: fixed roof tanks, external floating roof tanks, domed external floating roof tanks and internal floating roof tanks. There are a total of 1,072 stationary tanks subject to PAR 1178 as well as 55 individually permitted portable tanks and 25 permitted portable tank systems consisting up to 20 portable tanks for each permit.

Storage tanks emit VOC through openings inherent in the tank design. Rule 1178 requires the use of seals and covers to reduce the amount of VOC that can migrate out of the tank through the tank openings. Tank openings on fixed roof tanks include, but are not limited to, vapor recovery connection points, pressure vacuum vents and sample hatches. Floating tanks also contain roof openings including around the rim seal, guidepoles, rim vents, pressure vents, hatches, and roof legs. Controls are currently required on all roof openings. For this rule development staff has reviewed other technologies with the potential to further reduce emissions from the roof openings.

CURRENT REGULATORY REQUIREMENTS

South Coast AQMD Requirements

Rule 1178 contains requirements for storage tanks with organic liquid with a TVP greater than 0.1 psia, with capacity of 19,815 gallons or more, and are located at facilities that have emitted over 20 tons of VOC in any inventory year since 2000. Control requirements include specifications for tank roofs, emission control systems, and cover and seals for roof openings. Inspection and monitoring requirements are specific to the type of tank.

Floating roofs, or fixed roofs with 95% by weight emission control, are required for every tank. Domes on external floating roof tanks are required for tanks storing organic liquid with TVP of 3 psia or greater. Tanks used to store crude oil are exempt from the doming requirement. Rim seals systems for floating roofs have gap requirements. Primary seals must not have gaps larger than 1.5 inch. Gaps greater than 0.5 inch cannot exceed 30% of the circumference and gaps greater than 0.125 inch cannot exceed 60% of the circumference and there cannot be a continuous gap of greater than 0.125 inch for more than 10% of the circumference. Secondary seals must not have gaps greater than 0.5 inch and gaps greater than 0.125 inch cannot exceed 5% of the circumference of the tank.

Controls for floating roofs include gaskets, gasketed covers, and sleeves or flexible enclosure systems for all roof penetrations. Certain roof openings cannot have a visible gap which is a gap greater than 1/8 inch and must be maintained in a vapor tight condition that does not emit more than 500 ppm of VOC. Fixed roof tanks are required to maintain a vapor tight condition for all roof openings and have at least 95% by weight emission control.

Rule 1178 contains differing inspection requirements for different tank types. Below is a summary of the inspection requirements.

Fixed roofs:

- U.S. EPA Method 21 measurements quarterly
- Annual performance tests on vapor recovery systems
- Engineering data sheets on pressure-vacuum vents

External floating roof tanks:

- Measure gaps of all roof openings semi-annually and each time tank is degassed of emptied, or U.S. EPA Method 21
- Complete gap measurements of rim seal system on semi-annual basis and each time the tank is emptied or degassed

Internal and dome external floating roof tanks:

- Visual inspections of rim seal and roof openings and LEL readings semi-annually
- Complete gap measurements of rim seal system when tank is emptied or degassed (at least every 10 years).

Other Regulatory Requirements

Staff reviewed rules and regulations of other air regulating agencies including U.S. EPA, San Joaquin Valley Air Pollution Control District (SJVAPCD), and Bay Area Air Quality Management District (BAAQMD). Staff identified requirements more stringent than those contained in South Coast AQMD's Rule 1178 for controls and monitoring. It is important to note there are several requirements where South Coast AQMD's Rule 1178 is more stringent than requirements contained in other air districts' rules, such as applicability, inspection frequency, doming and other requirements and may be more stringent overall. However, the following discussion describes the requirements that are more stringent than Rule 1178 found in other regulations.

U.S. EPA 40 CFR Part 60 Subpart Kb applies to tanks that were constructed, reconstructed or modified after July 23, 1984. Staff identified requirements for primary seal gaps that are more stringent. Subpart Kb requires primary seal gaps do not exceed 212 cm^2 per meter of tank diameter.

SJVAPCD's Rule 4623 contains more stringent gap requirements. A visible gap is any gap that is 0.060 inch. Primary seal gaps greater than 0.5 inch cannot occur for more than 10% of the tank circumference and primary seal gaps greater than 0.125 inch cannot occur for more than 30% of the tank circumference.

BAAQMD's Regulation 8, Rule 5 has more stringent gap requirements and a more stringent leak definition. BAAQMD defines a visual gap as a gap that is 0.060 inch. Primary seals gaps greater than 0.5 inch can occur for more than 10% of the tank circumference, gaps greater than 0.125 inch cannot occur for more than 40% of the tank circumference. BAAQMD also requires that the maximum gap on newer welded tanks cannot exceed 0.06 inch. BAAQMD has a leak definition of 100 ppm for all components with the exception of pressure vacuum vents.

CONTROL TECHNOLOGIES

Doming for External Floating Roof Tanks Storing Crude Oil

Domes are roofs that can be installed onto external floating roof tanks. They are typically a geodesic dome shape and made of lightweight material such as aluminum. Domes that are affixed onto external floating roof tanks are not vapor tight and have vents along the bottom of the dome where it meets the tank shell. This is a required design for floating roof tanks to allow the floating roof to move up and down without adverse effects. Domes are effective at reducing emissions from tanks by eliminating wind moving over the external floating roof. Wind can carry vapors out from inside the tanks through the floating roof seals. It is estimated that installing domes on external floating roof tanks storing crude oil and reduce standing losses by 70%-75%[1].

[1] Based on results from Tank ESP for doming external floating roofs of different diameters storing crude with RVP 6-9 at 80F in Los Angeles, with deck fittings currently required by Rule 1178.

Cost to install domes vary with diameter size. External floating roof tanks can be as small as 30 feet in diameter and as large as 260 feet in diameter. Costs associated with doming include materials, labor, vehicles for supply delivery and crane support, crane rentals, site preparation, cleaning, degassing, storage leasing and permitting. Costs were obtained from vendors for equipment and installation of domes of different sizes. Facilities supplied costs from vendor quotes and past doming projects. Costs were provided by seven facilities for doming external floating roof tanks of with diameters ranging from 50-260 feet. Doming project costs ranged from approximately $207,000 to $3.7 million and included costs for fire suppression systems and union labor required by Senate Bill 54. Refer to Chapter 4 for additional cost details.

Staff identified 54 external floating roof tanks used to store crude, 90 feet to 260 feet in diameter. Tanks storing crude oil were identified using 2019 Annual Emission Reports. Based on cost information provided by facilities, staff developed a cost curve that estimates costs for tanks of all diameters. The cost-effectiveness to require domes on 54 tanks is $35,800 per ton of VOC reduced. Refer to Chapter 4 for additional cost-effectiveness details.

Alternative to Doming

Staff analyzed alternative options to doming with potential to result in equivalent emission reductions. Staff's analysis showed that limiting the TVP of crude stored has potential to result in equivalent emission reductions. Based on emissions calculations using Tank ESP PRO software, staff found that limiting Reid Vapor Pressure (RVP) of crude to approximately 3.7 psia results in equivalent emission reductions to doming. RVP is the vapor pressure of the organic liquid at 100 degrees Fahrenheit as determined by ASTM Method D-323, whereas true vapor pressure is the vapor pressure of the organic liquid at actual storage temperature. The average true vapor pressure of the crude stored in the tanks proposed to be domed is approximately 2.2 psia. Staff is proposing to maintain the requirement for doming on external floating roof tanks used to store organic liquid with TVP of 3 psia or greater and remove the exemption for crude oil tanks. It is expected that some facilities will elect to only store crude oil with a true vapor pressure below 3 psia in lieu of doming.

Proximity Switches

Proximity switches are sensors designed to detect when covers to roof openings, such as sample hatches, are not properly closed. Proximity switches are also designed to detect when pressure vacuum relief vents (PVRV) have not re-seated properly. The sensors system consists of a switch, transmitter, and receiver. Solar power options are available for power in remote locations. The system is intrinsically safe and explosion proof.

Proximity switches can reduce emissions from sample hatches left open, or not properly closed, or from PVRVs that do not re-seat properly by alerting facilities when an opening is detected, resulting in faster repair timelines. Remote tanks that are not frequented and/or subject to regular inspections may emit for extended periods of time. Network systems can be designed to alert facilities via email or cellular phone text. One limitation reported by a proximity switch provider is in the proximity switch's ability to detect small openings of the sample hatch cover or PVRV

seat. The provider estimates covers and/or PVRV seat open 10%-15% may go undetected by the proximity switch.

Many proximity switches are in use today and most commonly found on tank batteries at oil production sites. Staff is not aware of proximity switches implemented at large tank farms containing tanks very large in diameter with large footprints, such as the tanks subject to Rule 1178. Figures 2.1 and 2.2 illustrate the difference where proximity switches have been implemented and tank farms subject to PAR 1178.

Figure 2.1 – Tank Battery at Oil Production Site

trends.directindustry.com/project-166290.html

Figure 2.2 – Tank Farm at Rule 1178 Facility

Costs for proximity switches were obtained from one supplier that provided a quote. One transmitter and switch per tank is required and was quoted at $1,850. One base radio can accommodate up to 96 transmitters and is required for each facility. Staff is the distance between tanks at facilities subject to PAR 1178 would affect the number of transmitters one base radio can connect with. The base radio was quoted at $2,650. For facilities without access to grid power, a solar power supply may be used and was quoted at $2,400. For facilities without internet connection, a cellular option is available to alert the facility via text or email and was quoted at

$1,300. Staff estimated costs for 1,072 tanks. Staff assumed approximately 3/4 tanks are floating roof (external, domed, internal) tanks (804 tanks) and 1/4 are fixed roof tanks (268 tanks). It was estimated that floating roof tanks would need to one switch for the guidepole cover and fixed roof tanks would need 3 switches per tank for each of the PVRVs. The total number sensors needed for all tanks is 1,605. The total number of transmitters required is also 1,605. The total estimated cost for 1,605 switches and transmitters is $2,969,250. Assuming one base radio can connect to all transmitters at a large facility, staff applied costs for one base radio per facility and one solar power supply per facility. The total estimated cost for base radios and power supply is $146,450. The proximity switch supplier did not provider costs for installation of the sensor system. Staff assumed installation costs at 50% of equipment costs to include travel, site evaluation, planning, and installation. The total estimated equipment cost is $4,600,325. Cost-effectiveness was based on available cost information, assumed equipment life of 10 years and assumed emission reductions equivalent to the reductions estimated be achieved with continuous monitoring (refer to Figure 4.2). The total cost-effectiveness is $2,600 per ton of VOC reduced.

Staff has reviewed inspector reports to obtain information on how often sample hatches are found open or not properly closed. Staff also discussed with facilities about the frequency that hatches are open. Notice of violations were reviewed for the past five years for Rule 1178 and 463. One notice of violation was written to a facility subject to Rule 463 for a sample hatch cover that was not properly closed. Discussions with facilities revealed that guidepole covers are not often open for sampling. Sampling frequency and methods at facilities differed and some facilities may sample more frequently than others or more frequently at certain times, depending on operations. One facility stated that they may manually take sample monthly and sometimes weekly for some tanks.

Although cost-effectiveness is estimated at $2,600 per ton of VOC reduced, staff is not proposing to require proximity switches on tanks subject to PAR 1178. PAR 1178 will require facilities to inspect tanks on a weekly basis with an OGI device. OGI inspections will capture leaks resulting from an open sample hatch or PVRV that has not re-seated properly. Additionally, OGI inspections will identify open sample hatches or open PVRVs and leaks when proximity switches cannot, such as when a sample hatch cover or PVRV is open less than 15% or when sample hatch gaskets and covers are worn or degraded. Staff believes that the proposed weekly OGI inspections are more effective in detecting leaks from hatches and PVRVs

Cable Suspension Systems

Cable suspended floating roofs are designed with cable suspensions systems to support the floating roof and remove the need for roof legs. The emissions benefits of cable suspension systems include the elimination of floating roof leg penetrations that provide a potential opening where VOC can migrate from below the floating roof to atmosphere.

It was initially estimated that cable suspended floating roofs would decrease standing losses by 35%[2]. Estimated emission reductions were based on results from Tank ESP PRO software. Staff

[2] Based on results from Tank ESP for eliminating roof legs on internal floating roof tanks 70', 90' and 117' in diameter storing various organic liquids including gasoline with RVP 10 at 80F in Los Angeles, with standard deck fittings currently required by Rule 1178 and Tank ESP default settings for roof leg controls.

comparing emissions from a tank with roof legs with standard controls to a tank with no roof legs. The standard controls inputted were based on defaults provided by the software for each tank type and size. Staff was made aware that the default option for roof leg controls does not reflect current requirements in Rule 1178 for roof legs socks on all adjustable roof legs. Staff has revised the input to reflect controls currently required on internal floating roof tanks which are impervious VOC socks for adjustable roof legs. The results from the revised calculation show an 8%[3] reduction in total emissions when a tank's roof legs are eliminated.

Costs vary to retrofit internal floating roof tanks with cable suspension systems and depend on factors such as the existing floating roof and the structure of the fixed roof. Not all existing floating roofs are compatible with cable suspension systems and the fixed roof of the tank must be able to support the cable suspension system. Costs were obtained from two suppliers for the retrofit of a cable suspension system on an existing floating roof and the retrofit of a cable suspension system with a new compatible floating roof. Both cost estimates assume that the fixed roof is compatible with the cable suspension system and would not require significant modification or replacement. One supplier provided two cost estimates. The cost to retrofit an existing floating roof with a cable suspension system was estimated at $70,000. The cost to install a cable suspension system with a new floating roof was estimated at $200,000. Another supplier provided a quote that included costs for equipment, shipping, demolition, roof modification and labor for installation. Total costs ranged from $120,000 to $670,000 depending on the size of the tank, up to 150 feet in diameter. During Working Group Meeting #5, staff presented a cost-effectiveness of greater than $39,800. The cost-effectiveness to require cable suspension systems is $153,000 per ton of VOC reduced. Staff is not proposing to require cable suspension systems for internal floating roof tanks.

Emission Control Systems (Vapor Recovery)

Vapor recovery systems are systems that collect VOC vapors and either destroy the VOC by combustion or remove VOC from gas streams prior to reaching the atmosphere with adsorption. Vapor recovery systems are currently used for emissions control on sources at petroleum facilities such fixed roof tanks and truck loading racks. The most common type of vapor recovery system used on fixed roof tanks are combustion systems that have associated NOx emissions. Adsorption with carbon canisters do not emit NOx emissions, however, have higher capital costs and are less desirable for tanks. One supplier stated they would guarantee 98% efficiency for combustion systems and 95% for non-combustion systems.

Staff also obtained information during site visits and from vapor recovery performance tests. One facility stated that truck loading rack vapor recovery system achieves greater than 99% control efficiency. Staff reviewed compliance reports and initial performance tests for combustion units. All annual performance tests confirm compliance with current rule requirements but do not specify the efficiency of the unit. One compliance report showed results of greater than 99% control efficiency. Four initial performance tests for combustion vapor recovery systems were reviewed and showed greater than 99% control efficiency. Based on the information staff obtained and

[3] Based on results from Tank ESP for eliminating roof legs on internal floating roof tanks 70', 90' and 117' in diameter storing various organic liquids including gasoline with RVP 10 at 80F in Los Angeles, with standard deck fittings and current required emission controls for roof legs.

vendor guarantees, staff proposes to require at least 98% control efficiency for emission control systems.

Seal Requirements

When reviewing other agency requirements, staff identified seal requirements more stringent than those in Rule 1178. Staff analyzed the feasibility of requiring more stringent seal gap requirements that reflected requirements at other agencies. The new requirements would revise the gap allowances for secondary seals. Gaps between the secondary seal and tank shell greater than 1/8 inch could not exceed 30% (currently 60%) of the tank circumference. Gaps greater than 1/2 inch cannot exceed 10% (currently 30%) of the circumference.

Staff reviewed a statistically significant sample of leak reports for floating roof tanks (10%). Eighty-four leak reports were reviewed to determine the feasibility of meeting more stringent gap requirements. Forty-eight out of 84 leak reports showed no gaps. Gaps reported on the remaining 36 leak reports showed gaps that met the more stringent gap requirements established at other agencies. Based on the information reviewed, staff concludes that tanks are already in compliance with more stringent proposed gap requirements.

Staff reviewed facility permits to identify internal floating roof tanks without secondary seals. Staff identified eight internal floating roof tanks storing organic liquid with TVP greater than 0.1 psia that were not equipped with secondary seals. The cost-effectiveness for requiring secondary seals on internal floating roof tanks storing organic liquid with TVP greater than 0.1 psia is $22,100 per ton of VOC reduced. Refer to Chapter 4 for cost-effectiveness details for requiring secondary seals. Staff is proposing the installation of secondary seals when a tank is next emptied or degassed but no later than 10 years after date of adoption.

LEAK DETECTION TECHNOLOGIES

Staff reviewed leak detection technologies, including continuous monitoring systems. Technologies reviewed included optical gas imaging devices, gas sensors and open path detection devices. Several suppliers were contacted to obtain information about the viability of the technologies. Staff also contacted leak detection service providers to understand their experience with using leak detection technologies.

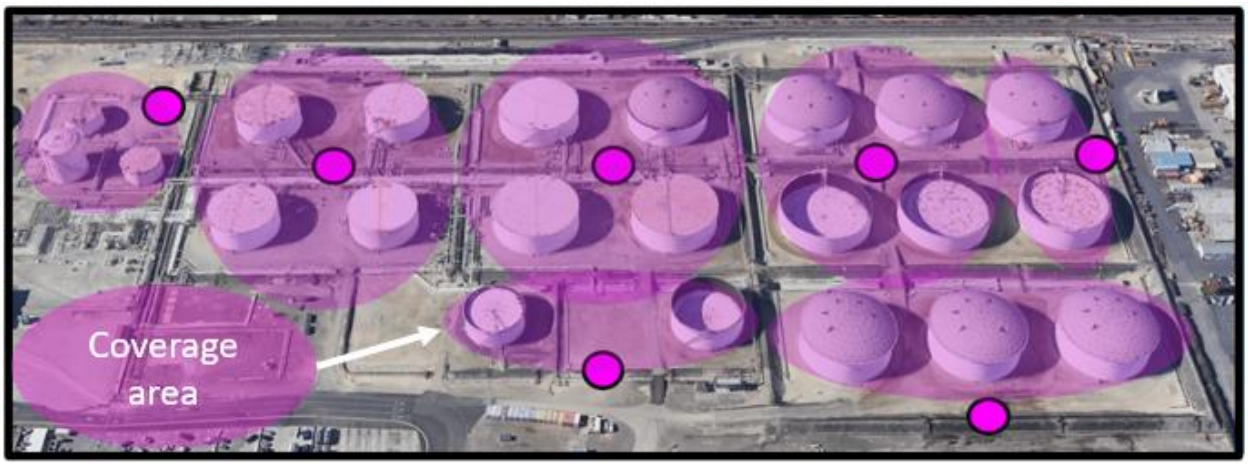
Optical Gas Imaging (OGI)

An optical gas imaging camera uses infrared technology capable of visualizing vapors. Optical gas imaging cameras have different detectors capable of visualizing a variety of gas wavelengths. VOC wavelengths are in the 3.2-3.4 micrometer waveband. OGI cameras with the ability to detect or visualize in this range of waveband contain a cryocooler that is integrated into the sensor and increases the sensitivity of the camera and the ability to detect smaller leaks. OGI cameras are widely used a screening tool for leak detection purposes.

OGI cameras are accepted as a viable leak detection technology and have continuous monitoring capability. Fixed OGI systems have been implemented at well sites and compression stations for continuous emissions monitoring. Handheld OGI cameras are used widely by leak detection

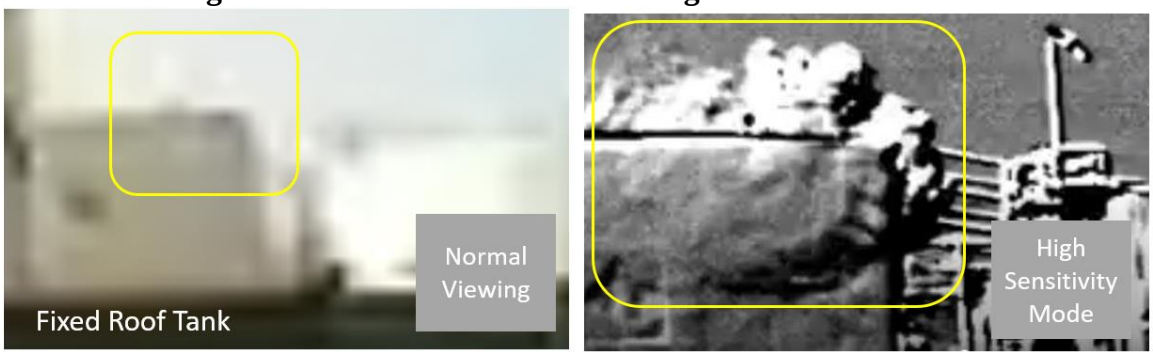
service providers as well as facilities. Figure 2.1 contains an example of the coverage a network of fixed OGI camera can provide.

Figure 2.1 – Example of Leak Detection Coverage with 7 Fixed OGI Devices



Fixed OGI cameras would likely not catch all leaks that may be identified during an inspection where a portable OGI device is manually operated. Fixed OGI cameras are limited in the number of angles from which a tank can be viewed and would likely be further away from a source compared to a person conducting an inspection with a portable OGI device. There is greater likelihood that smaller leaks would be identified during manual field inspections. As with other fixed monitoring systems, it is unlikely tanks can be monitored in as close a proximity as with portable monitoring devices such as a portable OGI or even a toxic vapor analyzer (TVA). Figures 2.1 and 2.2 show images captured with an OGI device by South Coast AQMD compliance and enforcement staff.

Figure 2.1 – Fixed Roof Tank Viewing with an OGI Device



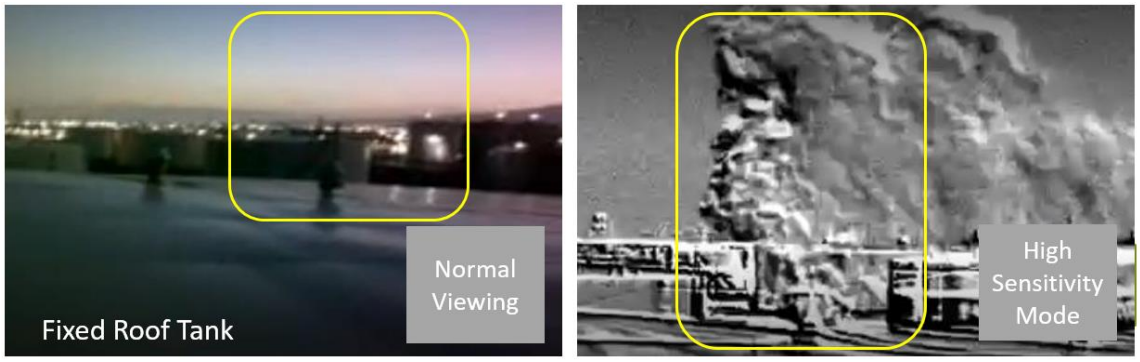
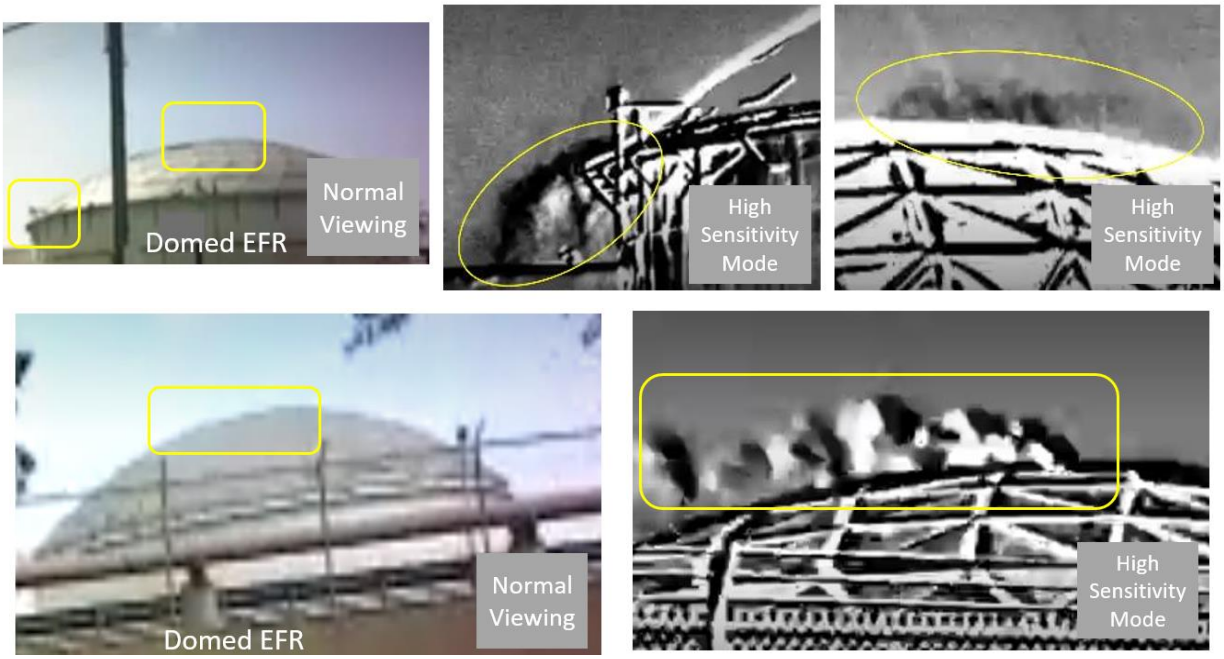


Figure 2.1 – Domed External Floating Roof Tank Viewing with an OGI Device



Costs

Costs were obtained from OGI providers for handheld OGI cameras and fixed continuous monitoring cameras. A portable cooled OGI camera costs approximately $106,000 and requires replacement of the cryocooler every 3-4 years or every 10,000-13,000 hours of operation. The replacement cost is approximately $15,000. Cameras for fixed applications cost approximately $97,000. Explosion proof enclosures and pan and tilt fixtures would increase costs by $12,500 per camera. Options provided for fixed applications include cellular connection and power for use in remote areas. These options are more costly would increase the cost per camera to approximately $120,000.

Hardware as a service is a business model that allows facilities to have technology installed, maintained and operated by the technology provider. This option would remove the responsibility from facilities for installation, maintenance, repair and operation and well as associated costs. Hardware as a service also ensures experienced personnel that specializes in the equipment. Fixed OGI systems are offered as hardware as a service and costs range from approximately $11,000 per month per camera, for a basic fixed system which includes the camera mounted in explosion proof housing, to approximately $20,000 per month per camera for a basic fixed system with its own power source.

Open Path Detection

Open path detection devices emit a beam that detects VOCs. For VOC to be detected with an open path device, the VOCs must come in contact with the beam. Open path detection devices can detect gas concentrations in the parts per billion range and from distances as far as 300 meters away from a source, with some models advertised as having a range of 1,000 meters. One open path device has the ability to cover multiple paths. Staff is aware of open path devices currently operating that cover two paths per unit. Once VOC has been detected by an open path device, it is likely a follow up investigation is required to pinpoint the source of the leak. To find the source of emissions, leak detection service providers stated they use an OGI camera or a toxic vapor analyzer to pinpoint the source of the leak.

Open path devices can detect small concentrations of VOC in the ppb range and can also speciate VOC. A significant limitation is that VOC needs to contact the emitted beam to be detected. This provides a chance for VOCs to go undetected if travelling on a path that does not intercept the beam. Another drawback for open path is the dilution factor. It is likely that VOC would need to travel a distance before contacting the emitted beam. The concentration of VOC may dilute so significantly that VOCs are undetectable by the time the VOCs reach the emitted beam. Open path systems have lower detection capabilities and are likely to capture more leaks than a gas sensor; however, not as many leaks as an OGI device, especially a manually operated OGI device. Figure 2.2 demonstrates the general leak detection coverage area with an open path device. Costs are estimated at approximately $200,000 per unit and do not include installation and any additional structures required to be built to support the fixed monitors.

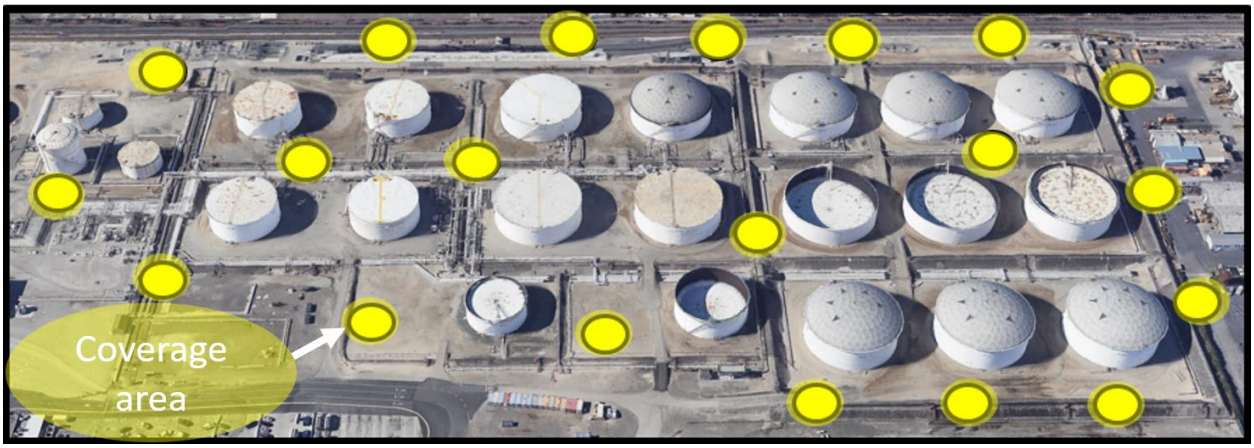
Figure 2.2 – Example of Leak Detection Coverage with 5 Open Path Devices

Fixed Gas Sensors

A toxic vapor analyzer (TVA) is a gas sensor that is commonly handheld and used currently for inspections. The gas sensors referred to in this section have the capability to continuously monitor for emissions and are installed as fixed applications. Concentrations of VOC detected with fixed gas sensors are in the ppb/ppm range depending on the sensor and have a maximum detection range of about 50-100 ppm. Similar to open path devices, gas sensors can only detect emissions when VOCs contact the fixed sensor. Leaks at the source must be significant to be detected due to the dilution factor of gas from the source to the sensor. According to one supplier, it is estimated that a leak with a concentration of about 72,000 ppm is detectable by a gas sensor 100 feet away from the source of the leak. A leak about 18,000 ppm is detectable by a gas sensor 50 feet away. Figure 2.3 demonstrates the general leak detection coverage area with gas sensors.

Equipment costs for gas sensors, compared to open path and OGI devices, are much lower, however, operating and maintenance costs are likely higher due to sensor replacements and service/operation costs. Staff obtained costs from one supplier that quoted equipment at approximately $2,000 per unit and monthly operating cost of $400 per unit.

Figure 2.3 – Example Leak Detection Coverage with 20 Fixed Gas Sensors



Each leak detection technology has advantages and limitations. Through an analysis of the advantages and limitations of each technology and an analysis of the suitability for leak detection for storage tanks subject to Rule 1178, staff concludes OGI has benefits that would most effectively reduce the emissions impact from leaks when implemented by conducting manual OGI inspections. The significant advantage of requiring manual OGI inspections is the high likelihood that a large leak will not go undetected and the likelihood for smaller leaks to also be detected.

COST-EFFECTIVENESS SUMMARY

Cost-effectiveness was calculated for feasible technologies and methods with potential to reduce emissions from tanks. A detailed discussion on the cost-effectiveness is contained in Chapter 4.

Table 2.1 summarizes the cost-effectiveness for technologies and methods with potential to reduce emissions.

Table 2.1 – Cost-Effectiveness for Emission Reducing Technologies and Methods

Technology/Method	Cost-Effectiveness ($/ton of VOC Reduced)
Doming	$35,800
Gap Requirements	N/A
Vapor Recovery	N/A
Secondary Seals	$22,100
Proximity Switches	$1,000
Cable Suspension Systems	Greater than $150,000
Continuous monitoring – Gas sensors	$44,800 / $53,000 (as a service)
Continuous monitoring – Open path	$30,700
Continuous monitoring - OGI	$23,900 / $188,500 (as a service)
Periodic OGI monitoring (weekly)	$18,500

CHAPTER 3: PROPOSED AMENDED RULES 1178 AND 463

INTRODUCTION

PROPOSED RULE STRUCTURE (PAR 1178)

PROPOSED AMENDED RULE 1178

PROPOSED AMENDED RULE 463

INTRODUCTION

PAR 1178 establishes requirements for storage tanks located at petroleum facilities storing organic liquid. PAR 1178 includes requirements for tank seals, emission control systems, doming, inspections and monitoring, reporting and recordkeeping.

The following information describes the structure of PAR 1178 and explains the provisions incorporated from other source-specific rules. New provisions and any modifications to provisions that have been incorporated are also explained.

PROPOSED RULE STRUCTURE

PAR 1178 will contain the following subdivisions:

a) Purpose
b) Applicability
c) Definitions
d) Requirements
e) Identification Requirements
f) Inspection and Monitoring Requirements
g) Maintenance Requirements
h) Record Keeping and Reporting Requirements
i) Test Methods and Procedures
j) Exemptions

PROPOSED AMENDED RULE 1178

Subdivision (a) – Purpose

The purpose of this rule is to reduce VOC emissions from storage tanks containing organic liquid located at large petroleum facilities

Subdivision (b) – Applicability

PAR 1178 applies to storage tanks located facilities that have emitted 20 tons of VOC or more in any calendar year beginning year 2000 with either, a minimum capacity of 19,815 gallons storing organic liquid with a true vapor pressure of greater than 0.1 pounds per square inch absolute under actual storage conditions. Staff is including tanks with a potential for VOC emissions of six tons per year calculated as specified in the definition of Potential For VOC Emissions used in Crude Oil Production as defined in Subdivision (c) – Definitions, to address RACT deficiencies identified by U.S. EPA in CARB's Oil and Gas Methane rule that partially relies on Rule 1178.

Subdivision (c) – Definitions

Definitions were added for clarity for new requirements and are referenced and discussed below.

- *COMPONENT INSPECTION is monitoring of a Storage Tank roof and individual components, including but not limited to Roof Openings and Rim Seal Systems, with an*

Optical Gas Imaging Device and where the person conducting the inspection can clearly view each component with Optical Gas Imaging Device.

This is a new definition added to specify the requirements for this type of inspection.

- *CRUDE OIL PRODUCTION is any operation from the well to the point of crude oil transmission pipeline or other mechanism that distributes crude oil from an oil production site.*

  This is a new definition added to clarify the applicability.

- *OPTICAL GAS IMAGING DEVICE is an infrared camera with a detector capable of visualizing gases in the 3.2-3.4 micrometer waveband.*

  This is a new definition to specify the capability of the OGI camera allowed to be used for required OGI inspections.

  POTENTIAL FOR VOC EMISSIONS means emissions calculated for a Storage Tank constructed after [Date of Adoption] in accordance with 40 CFR §60.5365a, and emissions calculated for a Storage Tank existing on or before [Date of Adoption] using a generally accepted model or calculation methodology based on permitted throughput limits or, when a permitted throughput limit is not available, based on the highest throughput for any one calendar month as reported in the Annual Emissions Report pursuant to Rule 301 - Permit Fees in years 2017 to 2022.

  This is a new definition to specify the method to calculate a tank's potential for emissions to determine applicability to the rule.

- *STORAGE TANK is any aboveground container that meets the applicability of this rule.*

  This definition was modified to include aboveground containers that meet additional applicability.

- *TANK FARM INSPECTION is monitoring of all applicable Storage Tanks at a Facility with an Optical Gas Imaging Device where the person conducting the inspection can clearly view the top of the tank shell, and fixed roof or dome, if applicable. Tank Farm Inspections may be conducted at an elevated position, at ground level, or a combination of both.*

  This is a new definition added to specify the requirements for this type of inspection.

- *REID VAPOR PRESSURE is the absolute vapor pressure at 100 degrees Fahrenheit as determined by test method ASTM D-323.*

  This is a new definition to clarify the vapor pressure that is referred to for requirements within the rule.

- *VISIBLE VAPORS is any vapors detected with an Optical Gas Imaging Device during a Component or Tank Farm Inspection, when operated and maintained in accordance with manufacturer training, certification, user manuals, specifications, and recommendations.*

  This is a new definition to clarify rule requirements for storage tanks that must be maintained in a condition that is free of Visible Vapors.

Subdivision (d) – Requirements

PAR 1178 includes revisions to existing requirements and new requirements. PAR 1178 establishes requirements for secondary seal gaps, emission control systems efficiencies, doming, testing, implementation and monitoring. Requirements with implementation dates that that have already been met have been removed for clarity and simplicity.

Secondary Seal Gap Requirements - Clause (d)(1)(C)(iii)
Gap requirements for secondary seals have been revised to reflect the stringency of gap requirements at other air districts as well as the stringency of gap requirements contained in U.S. EPA's 40 CFR 60 Subpart Kb. The lengths of gaps greater than ½ inch wide cannot, when totaled together, exceed 10% of the length of the circumference. The length of gaps greater than 1/8 inch wide cannot, when totaled together, exceed 30% of the length of the circumference.

External Floating Roof Tank Condition – Subparagraph (d)(1)(D)
External floating roofs tanks, including but not limited to tank components such as Roof Openings (definition contained in subdivision (c)) and Rim Seal Systems (definitions contained in subdivision (c)) are required to be maintained in a condition that is free of Visible Vapors (definition added for clarity in subdivision (c)), unless compliance with subparagraphs (d)(1)(B) and (d)(1)(C) can be demonstrated within 24 hours from when Visible Vapors were detected. Rim Seal Systems are not required to be free of Visible Vapors if the vapors were detected during a Component Inspection.

Doming External Floating Roof Tanks – Subparagraph (d)(1)(E)
Facilities are required to install a dome on any External Floating Roof Tank storing Organic Liquid with a true vapor pressure of 3 psia or greater.

True Vapor Pressure Measurements – Subparagraph (d)(1)(F)
Facilities are required to measure and record the true vapor pressure of the material inside all external floating roof tanks not equipped with a dome on a semi-annual basis to verify that material stored has a true vapor pressure of 3 psia or less. Facilities will conduct measurements according to the procedure contained in this subparagraph and in according to ASTM D-323.

Internal/Domed External Floating Roof Tank Condition Requirements – Subparagraphs (d)(2)(C), (d)(3)(C), and (d)(4)(C)
Internal floating roof tanks and domed External Floating Roof Tanks are required to comply with the requirements of subparagraph (d)(1)(D) that specify the condition in which tank must be maintained.

Emission Control Systems for Fixed Roof Tanks – Clause (d)(4)(A)(i)
Emission control systems required on fixed roof tanks must achieve 98% control efficiency by weight.

Fixed Roof Tank Condition Requirements – Subparagraph (d)(4)(C)
All tank Roof Openings (definition contained in subdivision (c)) are required to be maintained in a condition that is free of Visible Vapors (definition added for clarity in subdivision (c)), unless compliance with clauses (d)(4)(A)(ii)-(iii) and (d)(4)(A)(v) can be determined within 24 hours from when visible vapors were detected.

Compliance Schedules – Paragraph (d)(5)
This paragraph contains compliance schedules for requirements of the rule for facilities currently subject to the rule, facilities that may later become subject to the rule, equipment that become subject to specific rule requirements on date of adoption and equipment that may later become subject to specific requirements.

External floating roof tanks requirements – Subparagraph (d)(5)(A)
Any external floating tanks that become subject to the rule after date of adoption must meet the requirements of paragraph (d)(1) within one year of becoming subject to the rule.

Doming Requirements – Subparagraph (d)(5)(B)
Any facility or facilities under common ownership with external floating roof tanks that are required to be domed upon date of adoption are required to dome 1/3 of their applicable tanks by December 31, 2031, ½ of their applicable tanks by December 31, 2033 and all of their applicable tanks by December 31, 2038. External floating roof tanks that later become subject to doming requirements and are not used to store crude, must have a dome installed no later than two years after becoming subject to the doming requirements of subparagraph (d)(1)(E). External floating roof tanks that store crude that later become subject to the doming requirement, must have a dome installed no later than 3 years after becoming subject to the requirement.

Internal Floating Roof Tank Requirements – Subparagraph (d)(5)(C)
Any internal floating roof tanks not equipped with a secondary seal are required to have a secondary seal installed the next time the tank is emptied and degassed and no later than 10 years after date of adoption. Any internal floating roof tank that later becomes subject to requirements is required to have a secondary seals installed no later than 5 years after becoming subject to the requirement.

Subdivision (f) – Inspection and Monitoring Requirements

Optical Gas Imaging (OGI) Inspections – Paragraph (f)(4)
Optical gas imaging inspections are required to determine compliance with the requirement for tanks to be maintained in a condition that is free of Visible Vapors. This paragraph contains the requirements for OGI inspections.

Certification/Training of Inspector – Subparagraph (f)(4)(A)

Contains requirements for qualification for the persons conducting an OGI inspection. Persons conducting the OGI inspection must be certified or have undergone training for the camera used provided by the manufacturer of the OGI camera. The persons conducting the inspections must also complete all subsequent training or certification recommended by the OGI manufacturer.

Camera Operation and Maintenance – Subparagraph (f)(4)(B)
Contains requirements for proper operation and maintenance of the OGI device. The OGI camera must be operated and maintained in accordance with all manufacturer guidance including but not limited to that stated in any training or certification course, user manuals, specifications, recommendations.

Tank Farm Inspections – Subparagraph (f)(4)(C)
Contains requirements for frequency of Tank Farm Inspections. Tank Farm Inspections are required at least every 7 days since the last Tank Farm Inspection was conducted. Tank Farm Inspections may be conducted from one or several vantage points at the facility including the ground-level and elevated positions.

Component Inspections – Subparagraph (f)(4)(D)
Required in the 3rd month following the inspection required for external floating roof tanks by paragraph (f)(1). Required semi-annually for domed external floating roof tanks and internal floating roof tanks. Component inspections include monitoring of individual components including, but not limited to rim seals, pressure-vacuum vents, hatches, guidepoles, roof legs, emission control system connections and rim vents.

Verification of Compliance – Subparagraph (f)(4)(E)
Contains timelines for determining compliance with subparagraphs (d)(1)(D), (d)(2)(C), (d)(3)(C), (d)(4)(C). An owner or operator has 24 hours from the time Visible Vapors were detected to determine compliance by conducting the applicable monitoring inspection, such as Method 21 or rim seal gap measurements.

Subdivision (g) – Maintenance Requirements

Contains maintenance requirements for tanks that do not meet the requirements of the rule.

Maintenance Requirements – Subdivision (g)
Provides repair schedules and requirements when non-compliance is determined. Repairs or replacements must be completed before a tank is filled or refilled. An owner or operator has 72 hours to complete a repair or replacement for any materials or components that did not meet the requirements of the rule.

Reporting and Recordkeeping Requirements – Subdivision (h)
Contains updated recordkeeping and reporting requirements for OGI inspections and additional reporting requirements of inspections required by paragraphs (f)(1) through (f)(3).

Reporting for Inspections Required by Paragraphs (f)(1) through (f)(3) – Subparagraph (h)(1)(A)

Contains notification requirements for tanks that do not meet the applicable requirements of the rule. Notification must be made by calling 1-1800-CUT-SMOG within 8 hours of determination that a tank is not in compliance with the requirements of the rule.

Recordkeeping and Reporting for OGI Inspections – Paragraph (h)(2)
Contains reporting and recordkeeping requirements specific to OGI inspections.

Notification of Visible Vapors – Subparagraph (h)(2)(A)
Notification must be made by calling 1-1800-CUT-SMOG within 8 hours of detecting Visible Vapors.

Recordkeeping Requirements for OGI Inspections – Subparagraphs (h)(2)(B) through (h)(2)(D).
Contains recordkeeping requirements for Tank Farm and Component Inspections and requirements for digital recordings of Visible Vapors. Visible Vapors must be recorded for a minimum of five seconds and recordings must be kept on-site for at least two years.

Exemptions – Subdivision (j)

Contains criteria for exemption from all or some of the requirements of the rule.

Exemption for tanks storing Organic Liquid with low True Vapor Pressure – Paragraph (j)(2)
Specifies conditions in which tanks storing Organic Liquid with low TVP are exempt from certain rule requirements. Tanks storing Organic Liquid with TVP of 0.1 psia or less are exempt from all requirements of the rule, except for OGI inspections, provided that the owner or operator tests the TVP of the Organic Liquid at least once annually to verify TVP is 0.1 psia or less.

Exemption Removals
Paragraph (j)(2) - Removed exemption for secondary seals for domed external floating roof tanks. All domed external floating roof tanks subject to the rule must have secondary seal installed.

Paragraph (j)(7) – Removed exemption from doming for tanks permitted to contain more than 97% by volume crude oil. Any tank organic liquid with true vapor pressure of 3 psia of greater are required to install a dome unless otherwise stated in the rule.

PROPOSED AMENDED RULE 463

PAR 463 will address the deficiency identified by U.S. EPA by amending the applicability to include tank subject to the 2016 CTG. Definitions were added to clarify applicability.

Subdivision (a) – Purpose and Applicability

In addition to the existing applicability, PAR 463 will apply tanks located at petroleum facilities that have potential for VOC emissions of six tons per year or more.

Subdivision (b) – Definitions

Definitions were added for clarity of the proposed amended applicability.

CRUDE OIL PRODUCTION is any operation from the well to the point of crude oil transmission pipeline or other mechanism that distributes crude oil from the oil production site.

This is a new definition added to clarify the applicability.

POTENTIAL FOR VOC EMISSIONS means emissions calculated for a Tank constructed after [Date of Adoption] in accordance with 40 CFR §60.5365a, and emissions calculated for a Storage Tank existing on or before [Date of Adoption] using a generally accepted model or calculation methodology based on permitted throughput limits or, when a permitted throughput limit is not available, based on the highest throughput for any one calendar month as reported in the Annual Emissions Report pursuant to Rule 301 - Permit Fees in years 2017 to 2022.

This is a new definition to specify the method to calculate a tank's potential for emissions to determine applicability to the rule.

Subdivision (c) – Tank Roof Requirements

This subdivision specifies tank roof requirements for tanks based on the applicability of the rule. PAR 463 will modify the subdivision so that tank roof requirements will also apply to tanks with potential for VOC emissions of six tons per year or greater used in Crude Oil Production.

Subdivision (g) – Exemptions

<u>Exemption for certain tanks – Paragraph (g)(1)</u>
This paragraph was modified to not include tanks with Potential For VOC Emissions of six tons per year or more used in Crude Oil Production.

CHAPTER 4: IMPACT ASSESSMENT

INTRODUCTION

Impact assessments were conducted during the PAR 1178 rule development to assess the environmental and socioeconomic implications of PAR 1178. These impact assessments include emission reduction calculations, cost-effectiveness and incremental cost-effectiveness analyses, a socioeconomic assessment, and a California Environmental Quality Act (CEQA) analysis. Staff prepared draft findings and a comparative analyses pursuant to Health and Safety Code Sections 40727 and 40727.2, respectively.

EMISSION REDUCTIONS

PAR 1178 will establish more stringent control and monitoring requirements. The proposed amendments will increase the stringency of existing requirements for seals, emission control systems, doming, and monitoring. Emission reductions were calculated based on estimated baseline emissions and the expected efficacy for the proposed control or monitoring requirement. TankESP PRO software was used to determine baseline emissions and emission reductions for proposed control requirements. The software is a tank emissions calculator that uses emissions estimate procedures from Chapter 7 of U.S. EPA's Compilation of Air Pollutant Emission Factors for VOC emissions from storage tanks. Calculated emissions are based on many parameters such as diameter, height, controls, location of tank, product stored, characteristics of product stored and throughput. U.S. EPA's estimates for uncontrolled tanks contained in the 2016 CTG were used as a basis to determine baseline emissions for the cost-effectiveness analysis for implementing OGI inspections. The total estimated emission reductions from the implementation of PAR 1178 is 0.76 ton per day.

Secondary Seals

Tank ESP PRO software was used to calculate emission reductions from adding secondary seals to eight internal floating roof tanks. All other tanks already have secondary seals. The total emission reductions from installing secondary seals on eight internal floating roof tanks over 20 years is 19.4 tons (0.01 tons per day).

Secondary Seal Gap Requirements

Tank ESP PRO was used to estimate emission reductions from requiring more stringent gap requirements. The associated emission reductions are expected to be 0.01 ton per day based on Tank ESP PRO calculations.

Vapor Recovery

Tank ESP PRO was used to calculate emission reductions increasing emission control efficiency to 98% from 95%, by weight. The estimated emission reductions are 0.02 ton per day.

Doming

TankESP PRO was used to calculate emissions reductions that would result from doming. Fifty-four external floating roof tanks were identified as crude oil tanks. Staff used 2019 Annual Emission Reports to identify which tanks stored crude oil and the throughput for each tank. It was determined that operations that occurred in 2019 were more representative of normal operations compared to years 2020 and 2021 since the COVID-19 pandemic may have affected normal operations. Staff inputted specific information where information can be obtained from permits or

rule requirements. For other information, Tank ESP default values were used. The total emissions reductions from doming over the life of the equipment (50 years) is 2,233 tons, or 0.12 ton per day.

Reid Vapor Pressure

Vapor pressure of organic liquid stored may significantly affect the emissions from the tank. Currently, in Rule 1178, doming is not required for tanks storing material with a True Vapor Pressure of 3 psia or less and are not required for tanks storing organic liquid with at least 97% crude oil. The true vapor pressure of crude oil can vary greatly since it is not a material that is refined to specification. Staff reviewed the vapor pressures of crude oil stored that were reported by facilities on tank inspection reports. The method used by facilities to determine the vapor pressures reported is unknown and may vary between facilities. There were also several inspection reports that did not state a vapor pressure for the crude stored. The reported Reid vapor pressures in 2020 inspection reports ranged from 1.77 psia to 7.87 psia for external floating roof tanks storing crude oil. Since all inspection reports did not have RVP information, staff took the average reported RVP in the 2020 inspection reports within two standard deviations to determine a maximum RVP of crude stored the external floating roof tanks. The resulting RVP was 8.19 psia. This RVP was used as the RVP value in TankESP to determine emission reductions from doming. Upon review of 2019 inspection reports, a more complete data set was obtained for reported RVP values of crude. The highest reported value was 8.14 psia. Using 8.14 psia as the RVP value in TankESP also resulted in 0.12 tons per day of emission reductions.

PAR 1178 will require doming on all external floating roof tanks storing material with a true vapor pressure of 3 psia or greater. The baseline emissions for the cost-effectiveness analysis is based on maximum actual TVP of crude oil stored. The total emission reductions based on permitted TVP and rule limits (11 psia) are 0.27 tons per day.

Monitoring with OGI

Baseline emissions were estimated using emission factors established in U.S. EPA's 2016 Control Technology Guidelines for Oil and Gas Industry. Table 4-2 of the 2016 CTG contains emissions estimates for an uncontrolled tank expressed in tons of VOC per year for different brackets of throughput in barrels per day. The average throughput of fixed roof tanks storing crude oil was used to determine the bracket to consider for estimating emissions from an uncontrolled tank. The average throughput was 7,537 barrels per day which corresponded to estimated emissions of 1,464 tons per year. Staff compared the resulting emission estimate using EPA factors to measured emissions from a 2015 emissions study that South Coast AQMD conducted with monitoring technology companies. Measured emissions that were concluded to be attributed to a malfunctioning pressure vacuum vent on a crude fixed roof tank was about 4.5 tons per day whereas the estimated losses contained in Table 4-2 the 2016 CTG is about four tons per day.

Based on compliance reports and discussion with leak detection service providers, malfunctioning pressure vacuum vents are likely to be the source of a leak on a tank. The assumption that one large leak would occur once per year was made from one tank out of all tanks subject to Rule 1178. The shortest frequency between inspections in current rule requirements is every quarter. An assumption that a leak would occur 45 days after an inspection (45 days before the next quarterly inspection) was made. Total emissions using the emission factors in Table 4-2 and the assumption

that a leak would occur 45 days before the next quarterly inspections and once per year results in baseline emissions of 180 tons per year.

Emission reductions depend on the monitoring frequency. Staff analyzed the emission reductions associated with different monitoring frequencies that were based on different monitoring technologies. Figure 4.2 shows the emission reductions associated with different monitoring technologies and frequencies.

Figure 4.2 Estimated Emission Reductions for Different Monitoring Methods

Staff calculated costs cost-effectiveness for continuous monitoring and performing weekly tank inspections at all facilities subject to PAR 1178 based on the costs assumed to monitor the example tank farm with 22 tanks. Table 4.1 shows the cost-effectiveness to implement different monitoring methods. PAR will require weekly inspections with an OGI device. Baseline emissions were based on the assumption that one large leak would occur from one tank out of all tanks subject to the rule, per year. The estimated emission reductions from proposed weekly OGI tank inspections are 0.45 tons per day.

COSTS AND COST-EFFECTIVENESS

The Health and Safety Code Section 40920.6 requires a cost-effectiveness analysis when establishing BARCT requirements. The cost-effectiveness of a control technology is measured in terms of the control cost in dollars per ton of air pollutant reduced. The costs for the control technology include purchasing, installation, operation, maintenance, and permitting. Emission reductions were calculated for each requirement and based on estimated baseline emissions. The 2022 AQMP established a cost-effectiveness threshold of $36,000 per ton of VOC reduced. A cost-effectiveness that is greater than $36,000 per ton of VOC reduced requires additional analysis and a hearing before the Board on costs. The cost-effectiveness is estimated based on the present value of the retrofit cost, which was calculated according to the capital cost (initial one-time equipment and installation costs) plus the annual operating cost (recurring expenses over the useful life of the control equipment multiplied by a present worth factor). Capital costs are one-time costs that cover the components required to assemble a project. Annual costs are any recurring costs required to operate equipment. Staff obtained costs for secondary seals, domes, and monitoring with OGI from facilities and vendors.

Doming

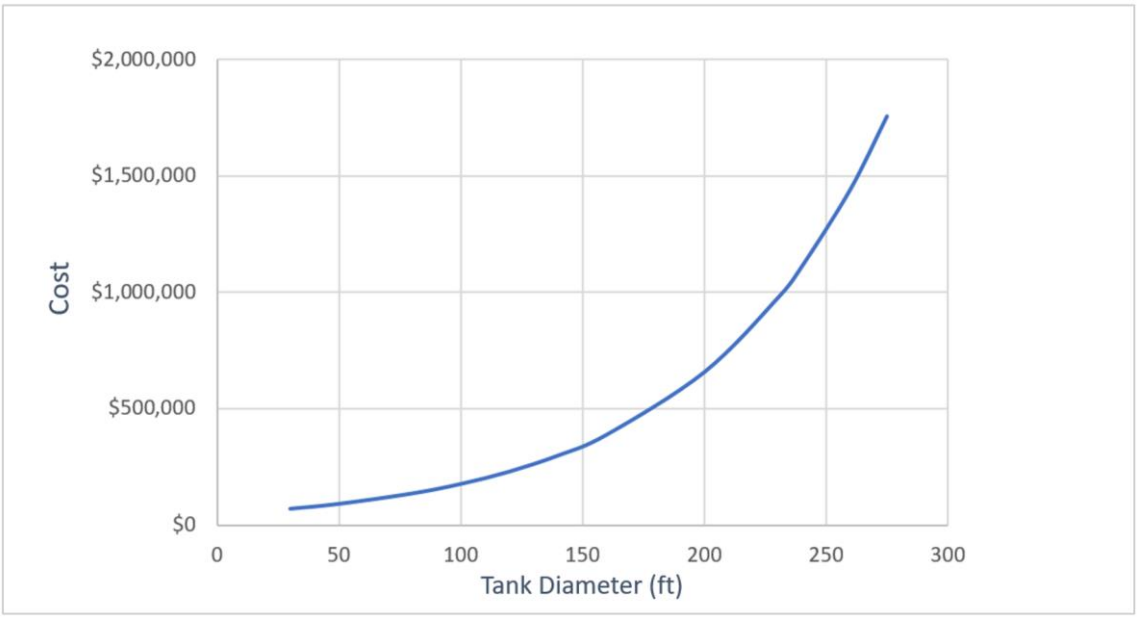
Fifty-four external floating roof tanks were identified tanks used to store crude oil. Currently, Rule 1178 exempts external floating roof tanks used to store material with TVP of 3 psia or less and tanks used to store organic liquid containing more than 97% by volume crude oil, regardless of the TVP of the organic liquid, from doming. Staff performed a cost-effectiveness analysis for doming 54 external floating roof tanks storing organic liquid containing at least 97% by volume crude oil. Staff obtained costs and information from facilities and dome suppliers. Methods for estimating costs and emission reductions is discussed below. Total cost-effectiveness to dome 54 crude oil tanks is $35,800 per ton of VOC reduced.

Costs

Staff obtained costs for equipment and installation for doming external floating roof tanks of different diameters. Costs provided by vendors did not include all costs necessary for some doming projects such as crane rentals, union labor, worker facilities, fire suppression systems, and cleaning and degassing. The cost-effectiveness for doming underwent three iterations where the most current available information was used for each cost-effectiveness calculation.

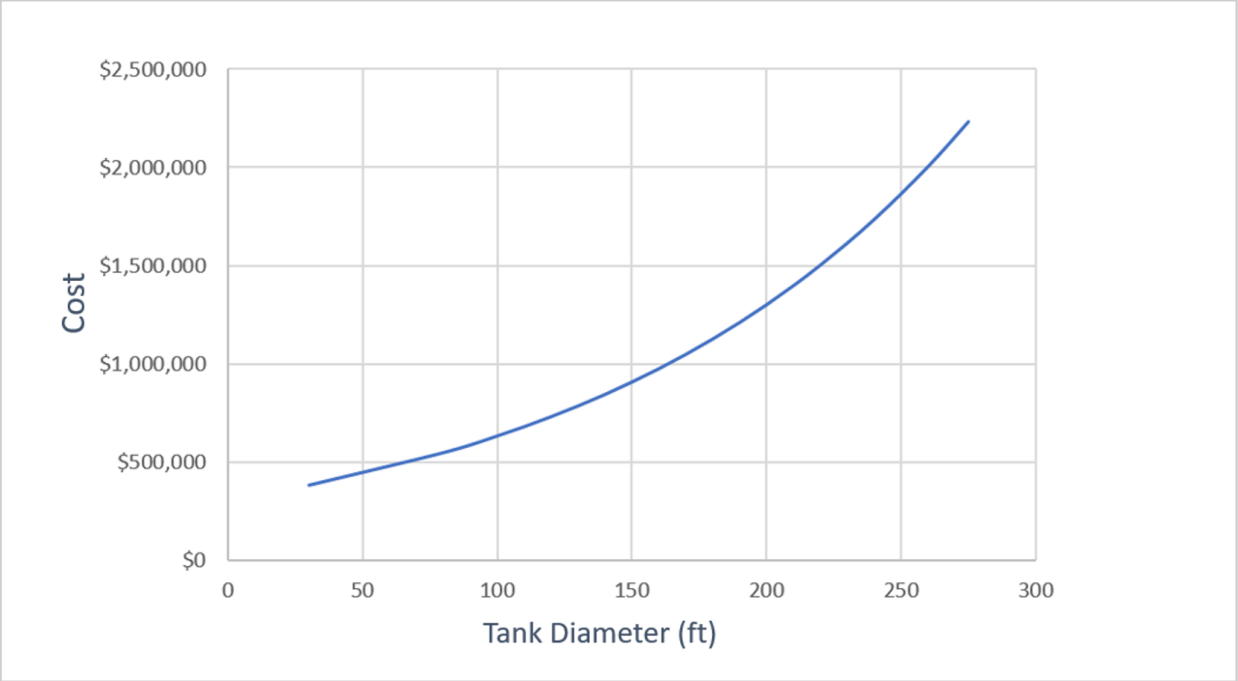
The first cost-effectiveness calculation relied on the costs provided by vendors for doming equipment and installation. Staff estimated the additional costs for creating space for dome assembly and crane rental and added costs for union labor. At the time that the first cost-effectiveness analysis was conducted, no costs have been provided by facilities. A 25-year equipment life was assumed that was based on the equipment life assumed in the Rule 1178 adoption in 2001. Costs ranged from approximately less than $100,000 to $1.75 million for tanks 30 feet to 275 feet in diameter. Figure 4.1 shows the cost curve used in the first cost-effectiveness analysis based on vendor quotes and additional costs assumptions for dome assembly, crane rental and union labor.

Figure 4.1 - Vendor Cost Curve



Cost-effectiveness was subsequently revised. The second iteration was based on cost information later provided by facilities and included total project costs for doming external floating roof tanks. Total project costs were obtained from vendor quotes or past projects adjusted to reflect current day dollars. Costs provided by facilities were representative of costs to dome tanks less than 200 feet in diameter. Equipment life was also revised to reflect expectations from current dome suppliers. Two dome suppliers estimated a 50-year useful life, while one dome supplier estimated 30 years of useful life considering precipitation and additional load from snowfall. Staff determined that a 50-year useful is reasonable and consistent with the condition of domes observed that were installed almost 20 years ago. A hybrid cost curve was created using vendor data for the larger tanks and facility data for the smaller tanks. To create the hybrid cost curve staff added a calculated premium based on costs provided by facilities to the costs provided by vendors to reflect total project costs. Costs ranged from approximately $400,000 to $2.25 million dollars for tanks ranging in size from 30 to 275 feet in diameter. Figure 4.2 shows the hybrid cost curve based on facility information for tanks less than 200 feet in diameter and vendor quotes for tanks ranging in size from 75-300 feet in diameter.

Figure 4.2 - Hybrid Cost Curve



Subsequent to the second cost-effectiveness analysis, facilities provided additional cost information for doming 33 tanks, including tanks larger than 200 feet in diameter. Another cost-effectiveness analysis was performed and relied solely on facility data for total project costs to dome external floating roof tanks storing crude oil. A cost curve was created using 47 cost data points provided by 7 facilities. Costs ranged from approximately $150,000 to $3.1 million dollars for tanks ranging in size from 30 to 275 feet in diameter. Figure 4.2 shows the cost curve based on facility information only.

Figure 4.3 - Facility Cost Curve

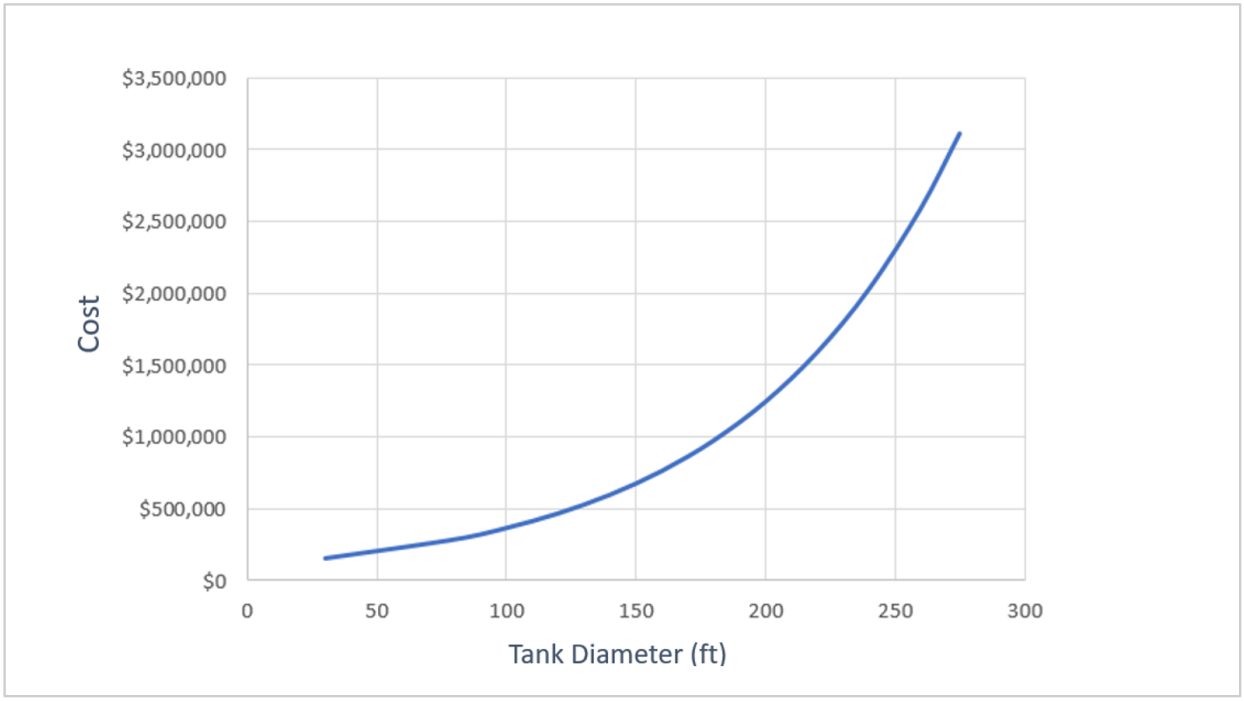
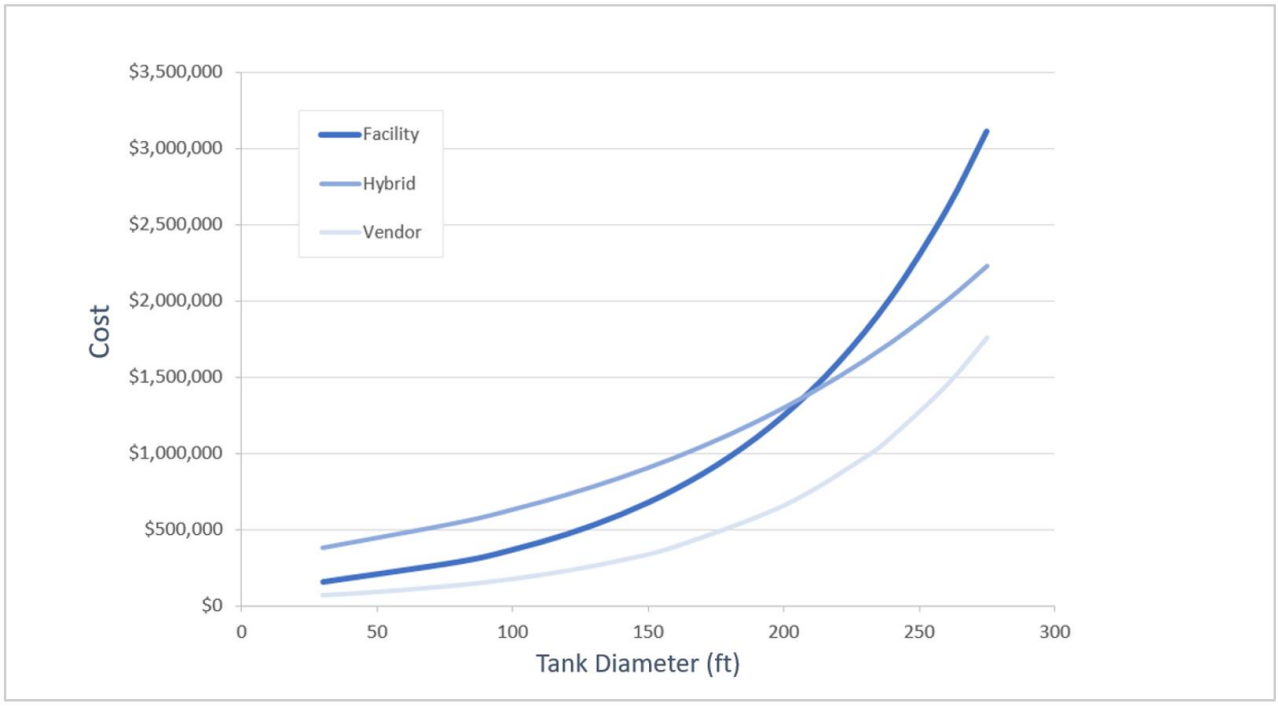


Figure 4.4 - Cost Curve Comparison



Loss of Capacity Costs

In addition to equipment and installation costs, staff considered costs for loss of storage capacity. Some facilities stated that tanks would be required to be taken out of service for dome installation. Although not all facilities stated they would take tanks out of service for dome installation, staff

considered costs for storage leasing. Two facilities estimated leasing storage costs was approximately $0.50 per barrel. Staff is aware of two facilities that would potentially rent storage offsite if a tank was out of service for doming. One facility stated that they can accommodate facility demand without renting additional storage but would potentially incur a loss of production if additional crude was available to purchase while a tank was out of service for doming. The other facility would be required to lease storage offsite due to the limited number of tanks available for crude storage. Staff has considered storage leasing costs for the facility that would be required to lease off-site storage during doming construction. Costs to lease storage were only considered for the amount of time that a tank would be out of service beyond the API 653 internal inspection assumed timeline of six weeks.

Implementation and Costs

The proposed implementation schedule for doming has a great effect on cost-effectiveness. Costs to empty and degas a tank prior to doming installation is costly. The size of tank and type of facility the tank is located at affect the cost to empty and degas. Some facilities stated their tanks are required to be cleaned and degassed prior to installing a dome. Some facilities stated the dome would be installed with the tank in service but idled, and other facilities stated cleaning and degassing a tank would depend on a case-by-case basis. Including costs for cleaning and degassing would increase total cost for doming by approximately $45,200,000 and would result in cost-effectiveness of $49,000 per ton of VOC reduced. Staff is proposing implementation schedules based on submitted API schedules from facilities. Out of 54 tanks, 18 tanks do not have an API 653 internal inspection scheduled before the proposed full implementation by the end of 2038. Staff included costs for cleaning and degassing the 18 tanks and revised the cost-effectiveness to include cleaning and degassing, and storage leasing based on the proposed implementation schedule.

Cost-Effectiveness

The total cost to dome 54 tanks that includes equipment, installation, permitting, cleaning and degassing (18 tanks only) and loss of capacity is $79,891,000. The total reductions over 50 years are 2,233 tons. The cost-effectiveness to dome 54 external floating roof tanks is $35,800 per ton of VOC reduced.

Secondary Seals

Eight internal floating roof tanks were identified as not having secondary seals installed and storing material with TVP greater than 0.1 psia. Currently, Rule 1178 does not require secondary seals on internal floating roof tanks. PAR 1178 would require secondary seals on all floating roof tanks. Staff obtained cost information from a facilities and secondary seal suppliers. Methods for estimating costs and reductions are discussed below.

Costs

Cost estimates were obtained from suppliers, one facility, and reported costs in the Rule 1178 adoption staff report that were adjusted to current dollars. Total costs ranged from $163 per foot installed and $297 per foot installed. Suppliers estimated that the equipment life of stainless steel components were 20 years and that rubber components are expected to last approximately 10 years. Staff used an average of the cost per linear foot based on the cost estimates received. The average cost was $220 per linear foot for equipment and installation. Permitting costs based on South Coast

AQDM's Rule 301 were included. Operating and maintenance costs included costs to replace rubber components every 10 years after installation of a complete seal with a 20-year equipment life. Costs were estimated at $42 per linear foot from one supplier to replace rubber components.

Implementation and Costs

Staff is proposing to require the installation of secondary seals when the tank is next emptied and degassed and no later than 10 years from date of adoption. Suppliers have stated that tanks would not be required to be emptied and degassed for the installation of a secondary seal, however, one facility stated that it would require the tank to be emptied and degassed prior to installing a secondary seal to ensure the safety of personnel. No costs were considered for emptying and degassing the tank since installation of the secondary seal is required when the tank is already emptied or degassed.

Cost-Effectiveness

The total cost to install secondary seals on eight internal floating roof tanks is $428,800. Total emissions reductions over 20 years are 19.4 tons. The cost-effectiveness to install secondary seals is $22,100 per ton of VOC reduced.

Enhanced Leak Detection

Staff conducted a cost-effectiveness analysis on the implementation of continuous monitoring using fixed gas sensors, open path detection devices, and fixed OGI devices. A cost-effectiveness analysis was also conducted for implementing OGI monitoring with a handheld OGI device. An example facility with 22 tanks was used to estimate and compare costs for continuous monitoring systems.

Example tank farm

Continuous Monitoring - Fixed Gas Sensors

Staff obtained costs from two fixed gas sensor providers. One supplier quoted equipment costs at $1,800 per unit including installation and annual costs at $400 per month per unit that includes access to the dashboard that displays high level emissions data, calibration, bump tests, produced reports. Sensors would also require replacement about every 6 months and cost $1,800 per unit. Installation does not include any structures that may have to be built to position the sensor at an optimal height or position. It is estimated that 20 sensors are required to detect very large leaks at the example tank farm. Total annual cost is $168,000.

Continuous Monitoring - Open Path

Two open path providers were contacted to obtain cost information, however both providers were not able to provide costs. Staff obtained equipment costs from one facility that currently uses open

path for fenceline monitoring. Installation and maintenance were assumed. The open path devices were estimated at $190,000 per device. Installation costs were assumed to be the same as the equipment costs. Annual maintenance costs were assumed to be the same costs as OGI maintenance costs at approximately $5,000 per unit. Staff estimated that 5 open path devices are required to detect very large leaks at the example tank farm. Total annual costs to implement a network of 5 open path devices is $115,000 and is based on 20-year service life for the equipment.

Continuous Monitoring – Optical Gas Imaging

Staff obtained costs from OGI providers. One provider quoted costs to implement an OGI network to continuously monitor tanks at the example tank farm. Optical gas imaging networks are offered for purchase and as a service.

Costs for a basic fixed continuous monitoring system for purchase include one-time costs and periodic maintenance costs. The one-time cost for a basic fixed system with a cooled OGI camera is $108,000 per camera and includes the camera, camera mounting in an ATEX rated enclosure and service costs. Additional options are available such as pan and tilt systems, explosion proof enclosures, and power and cellular connection for remote areas. A basic fixed system with cellular connection would increase the cost from $108,000 to approximately $118,000 per camera and a basic fixed system with trailer power system increase the costs from $108,000 to $132,000 per camera. Maintenance costs include costs to replace the cooling component in the camera. The cooling component is expected to need replacement every 3-4 years and costs $15,000 to replace.

Costs for hardware as a service include one-time down payment and monthly costs. The one-time cost is approximately $11,000 per camera for a basic fixed system, $12,000 for a fixed system with cellular connected, and $20,000 for a basic fixed system with a trailer power system. The monthly fee is $6,000 per camera for a basic fixed system, $6,500 per camera for a basic fixed system cellular connection, and $7,500 per camera for a basic fixed system with a trailer power system. Seven fixed OGI devices on a pan and tilt system were assumed to be required to detect large leaks at the example tank farm.

Periodic Monitoring – Leak Detection Service

PAR 1178 will require facilities to monitor storage tanks for leaks by conducting tank farm inspections with an optical gas imaging (OGI) device on a weekly basis. A total of 1,071 tanks will be subject to the inspections, located at 29 facilities. Staff obtained costs for OGI inspections from leak detection service providers. Staff obtained costs from two leak detection service providers.

One service provider estimated that about 10-20 tanks can be inspected in one day and would cost approximately $2,000 per day. Another provider estimated services at approximately $1,000 per day and that it may take 1 week to inspect a large tank farm with 100 tanks. Staff assumed a $2,000 per day rate for leak detection services where 15 tanks can be closely inspected. Staff inquired with the leak detection provider about the ability survey the entire tank farm at a facility with an OGI device to identify large leaks. This tanks farm survey would not require the inspector to monitor from the platform of each tank but would require a grounds walk by all tanks to inspect for leaks that can be observed from a distance which would be large leaks in most cases. The

service provider stated that an OGI survey of the entire tank farm can conducted in addition to individually monitoring 15 tanks at the same cost of approximately $2,000 per day. For 29 facilities, the total cost per week for OGI inspections is $58,000 ($3,016,000 per year total for all facilities).

Table 4.1 Cost-Effectiveness for Monitoring Methods

Monitoring Method	Cost-Effectiveness ($/ton of VOC reduced)
Continuous monitoring - gas sensors	$44,800
Continuous monitoring - open path	$30,700
Continuous monitoring - OGI	$23,900/$188,500 (as a service)
Weekly monitoring - OGI	$18,200

SOCIOECONOMIC ANALYSIS

A socioeconomic impact assessment will be prepared and released for public review and comment at least 30 days prior to the SCAQMD Governing Board Hearing of Proposed Amended Rule 1178 and Proposed Amended Rule 463, which is anticipated for May 5, 2023.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l) and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is currently reviewing the proposed project (PAR 1178 and PAR 463) to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

Health and Safety Code Section 40727 requires that prior to adopting, amending, or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. In order to determine compliance with Health and Safety Code Section 40727, Health and Safety Code Section 40727.2 requires a written analysis comparing the proposed amended rule with existing regulations, if the rule meets certain requirements. The following provides the draft findings.

Necessity

A need exists to amend PAR 1178 and PAR 463 to address deficiencies identified U.S. EPA and implement emission reduction strategies recommended in the WCWLB CERP as part of the AB 617 commitment. PAR 1178 will establish improved leak detection and control requirements that reflect current BARCT.

Authority

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40506, 40510, 40702, 40725 through 40728, 41508, 41700, and 42300 et seq.

Clarity

PAR 1178 and PAR 463 are written or displayed so that their meaning can be easily understood by the persons directly affected by them.

Consistency

PAR 1178 and PAR 463 are in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non-Duplication

PAR 1178 and PAR 463 will not impose the same requirements as any existing state or federal regulations. The proposed amended rules are necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

In amending these rules, the following statutes which the South Coast AQMD hereby implements, interprets or makes specific are referenced: AB 617, Health and Safety Code Sections 39002, 40001, 40406, 40506, 40702, 40440(a), 40725 through 40728.5, 40920.6, and 42300 et seq.

COMPARATIVE ANALYSIS

Health and Safety Code Section 40727.2 requires a comparative analysis of each proposed amended rule with any federal, or South Coast AQMD or other air district rules and regulations applicable to the same source. A comparative analysis is presented below in Table 4-7.

Table 4-7 – Comparative Analysis

Rule Element	PAR 1178	PAR 463	40 CFR 60	SJVAPCD
Applicability	• Storage tanks at facilities emitting 20 tpy or more in any year since 2000 that: • have capacity of 19,815 gallons or more and stores organic liquid with true vapor pressure of >0.1 psia; or • have PTE of 6 tpy or more	• Storage tanks from 19,815-39,630 gallons storing material with TVP of 1.5 psia or greater • Storage tanks with capacity 39,630 gallons or more storing liquids with TVP of 0.5 psia or greater • Storage tanks from 251 gal to 19,815 gal storing gasoline • Storage tank with PTE of 6 tpy or more located at petroleum facilities	• Storage constructed, reconstructed or modified after July 23, 1984 with capacity of 75 m^3 or greater • Tanks with capacity of 19,185-39,889 gallons with a vapor pressure between 4 psia and 11.1 psia and tanks with capacity greater than 39,889 gal with vapor pressure between 0.75 psia and 11.1 psia.	• Storage tanks with capacity 1,100 gallons and greater

Requirements	• Floating roofs or fixed roofs with 95% control • Seals and covers on all roof openings • Rim seal systems consisting of primary and secondary seals on all floating roof tanks • Vapor recovery with minimum efficiency of 98% by volume on all fixed roof tanks with • Gap requirements for primary and secondary seals	• Floating roofs or fixed roofs with 95% control	• Seals and covers on all roof openings • Rim seal systems consisting of primary and secondary seals on all floating roof tanks • Vapor recovery with minimum efficiency of 95% by volume on all fixed roof tanks with • Gap requirements for primary and secondary seals	• Seals and covers on all roof openings • Rim seal systems consisting of primary and secondary seals on all floating roof tanks • Vapor recovery with minimum efficiency of 95% by volume on all fixed roof tanks with • Gap requirements for primary and secondary seals
Reporting	• Submit reports for all semi-annual and quarterly inspections • Submit report for all leaks identified during any inspection	• Submit reports for all semi-annual and quarterly inspections • Submit report for all leaks identified during any inspection	• Inspection reports of floating roof tanks submitted within 30 days. • For fixed roofs vented to a flare or incinerator a report shall be submitted indicating any period of pilot flame out within 6 months of initial start-up and on a semi-annual basis thereafter • Records to be kept for a minimum of 2 years.	• Submit inspection reports within 5 days of completion • Report prior to conducting voluntary tank inspection
Monitoring	• Periodic gap measurements for floating roof tanks • Periodic Method 21 measurements for fixed roof tanks • Weekly OGI monitoring for all tanks	• Periodic gap measurements for floating roof tanks • Periodic Method 21 measurements for fixed roof tanks	• Measurements of gaps between the tank wall and the primary seal (seal gaps) shall be performed during the hydrostatic testing of the vessel or within 60 days of the initial fill with VOL and at least once every 5 years thereafter. • Measurements of gaps between the tank wall and the secondary seal shall be performed within 60 days of the initial fill with VOL and at least once per year thereafter.	• Annual gap measurements for external floating roof tanks • Gap measurements for internal floating roof tanks at least once every 60 months • Voluntary annual visual and EPA Method 21 inspections for all tanks
Recordkeeping	• Written records of inspections and findings • Digital recordings of all leaks identified during OGI inspections • All data required by this rule shall be maintained for at least five years and made available for inspection by the Executive Officer	• All data required by this rule shall be maintained for at least five years and made available for inspection by the Executive Officer • Written records of inspections and findings	• For fixed roof tanks vented to vapor recovery an operating plan shall be kept, indicating the parameter monitored. • Records to be kept for a minimum of 2 years.	• Records of tank cleaning kept for 5 years

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code section 40920.6 requires an incremental cost-effectiveness analysis for Best Available Retrofit Control Technology (BARCT) rules or emission reduction strategies when there is more than one control option which would achieve the emission reduction objective of the proposed amendments relative to ozone, carbon monoxide, sulfur oxides, oxides of nitrogen, and their precursors. Incremental cost-effectiveness is the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control options as compared to the next less expensive control option.

Incremental cost-effectiveness is calculated as follows:

Incremental cost-effectiveness = $(C_{alt}–C_{proposed}) / (E_{alt}–E_{proposed})$

Where:

$C_{proposed}$ is the present worth value of the proposed control option;
$E_{proposed}$ are the emission reductions of the proposed control option;
C_{alt} is the present worth value of the alternative control option; and
E_{alt} are the emission reductions of the alternative control option

The proposed amendments would require facilities to meet more stringent control or monitoring requirements. The next progressively more stringent potential control option is different for each proposed requirement.

PAR 1178 will require facilities to dome any external floating roof tank storing organic liquid with a true vapor pressure of 3 psia or greater. The next progressively more stringent requirement would be to require all external floating roof tanks to be domed, regardless of the TVP of the organic liquid stored. Staff conducted a cost-effectiveness analysis for doming all external floating roof tanks including those storing material with TVP less than 0.1 psia. The same assumptions were made as we made in the cost-effectiveness analysis for doming tanks with TVP of 3 psia and greater and TankESP Pro software was used to calculate emission reductions. The majority, approximately 85%, of EFRs storing material with TVP less than 3 psia are used to store heavy petroleum products such as diesel, jet fuel and kerosene. These products have a TVP of less than 0.1 psia. Because of the low TVP, far less emission reductions result in doming tanks storing such material. Staff analyzed EFRs in which emissions were reported for in the 2019 Annual Emission Reports. The incremental cost-effectiveness to dome all tanks is:

Incremental cost-effectiveness = ($127,200,000 - $71,600,000) / (2,346 - 2,205) = $394,000 per ton of VOC reduced

The incremental cost analysis presented above demonstrates that the alternative control option is not viable when compared to the control strategy of the proposed amendments.

PAR 1178 will require secondary seals on all internal floating roof tanks storing material with TVP of 0.1 psia or greater. The next progressively more stringent requirement would be to require secondary seals on all internal floating roof tanks regardless of the TVP of material stored. Staff conducted a cost-effectiveness analysis for requiring secondary seals on all internal floating roof tanks including those used to store material with TVP of 0.1 psia and lower. Thirty-one internal

floating roof tanks do not have secondary seals installed. The total cost to install secondary seals on 31 tanks is $1,521,696. Costs to empty and degas a tank are not included in the estimate. The total emission reduction is 1 ton per year. The cost-effectiveness is $76,000 per ton of VOC reduced.

Incremental cost-effectiveness = ($1,522,000 - $428,800) / (20 -19.4) = $1,822,000 per ton of VOC reduced

The incremental cost analysis presented above demonstrates that the alternative control option is not viable when compared to the control strategy of the proposed amendments.

PAR 1178 will require emission control systems to meet 98% control efficiency. Emission control systems are required on fixed roof tanks storing organic liquid with TVP greater than 0.1 psia. The next progressively more stringent requirement would be to require emission control systems with 98% control efficiency on all fixed roof tanks regardless of the TVP of the material stored. Staff conducted a cost-effectiveness analysis for requiring emission controls systems with 98% control efficiency on all fixed roof tanks, including those used to store material with TVP of 0.1 psia and lower. Staff analyzed the cost to require emission controls systems on tanks used to store material with TVP less than 0.1 psia at a refinery. Costs were obtained from a vapor recovery provider however, this provider explained that vapor recovery is not typically the best option for low flow systems. Capital costs range from approximately $700,000 to $2 million depending on the size of the system and install costs are approximately 70% of the capital costs. Costs for maintenance were not provided. Also, costs to modify existing tanks to be routed to a vapor recovery system were not considered. It is expected that costs to modify existing tanks would be significant. Assuming only capital and install costs, the cost-effectiveness to require emission control systems with at least 98% control efficiency by weight is $69,000 per ton of VOC reduced. It should be noted that actual feasibility of this technology on low flowrate systems may not be efficient and the actual costs to connect tanks to a vapor recovery systems is anticipated to be significantly higher than the capital and install costs assumed. Total costs to install vapor recovery on tanks storing material with TVP of 0.1 psia at the refinery is $19,040,000. The total emission reductions would be 276.4 tons over 25 years (assumed equipment life).

Incremental cost-effectiveness = ($19,040,000 - $0) / (276.4 - 0) = $69,000 per ton of VOC reduced

The incremental cost analysis presented above demonstrates that the alternative control option is not viable when compared to the control strategy of the proposed amendments.

PAR 1178 will require OGI inspections on a weekly basis. The next progressively more stringent requirement would be to require OGI inspections on a daily basis Staff conducted a cost-effectiveness for daily OGI inspections. Based on the total annual cost for weekly OGI inspections for all facilities of $3,016,000, the total annual cost for all facilities is $6,032,000. Estimated reductions are 172 tons per year.

Incremental cost-effectiveness = ($6,032,000 - $3,016,000) / (172 -166) = $503,000 per ton of VOC reduced

The incremental cost analysis presented above demonstrates that the alternative control option is not viable when compared to the control strategy of the proposed amendments

Table 4.3 summarizes the proposed requirement, the next progressively more stringent requirements, and the incremental cost-effectiveness.

Table 4.3 – Summary of Incremental of Cost-Effectiveness Results

Proposed Requirement	More stringent potential requirement	Incremental cost-effectiveness ($/ton)
Doming for TVP of 3 psia or greater	Doming for all EFR tanks	$394,000
Secondary seals for IFR tanks TVP greater than 0.1 psia	Secondary seals for all IFR tanks	$1,822,000
Emission control system with 98% control efficiency for fixed roof tanks TVP greater than 0.1 psia	Emission controls systems with 98% control efficiency for all fixed roof tanks	Greater than $69,000
Weekly OGI inspections	OGI inspections twice per week	$503,000

APPENDIX A: RESPONSE TO PUBLIC COMMENTS

1. Comment Letter from the Regulatory Flexibility Group (Latham and Watkins), dated 1/4/2023

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January 4, 2023

Michael Morris, Planning and Rules Manager
Planning, Rule Development and Implementation
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Regulatory Flexibility Group Comments on Proposed Amended Rule ("PAR") 1178

Dear Mr. Morris,

Thank you for the opportunity to provide comments regarding Proposed Amended Rule 1178 ("PAR 1178"). We submit these comments on behalf of the Regulatory Flexibility Group ("RFG"), a coalition of Southern California businesses in the aerospace, automotive, energy and petrochemical sectors. The RFG is committed to supporting strategies for achieving state and national air quality standards that are cost-effective and fairly allocated among all sectors of the Southern California economy.

We appreciate the number of Working Group meetings the South Coast Air Quality Management District ("District") has held on PAR 1178. We are, however, concerned with the current cost-effectiveness analysis. The District's analysis and methodology to date raise a number of issues that cut across sectors and industries as the District moves forward with future rulemakings, particularly in light of the Governing Board's recent adoption of the 2022 Air Quality Management Plan ("AQMP") and its reliance on "extensive use of zero emission technologies across all stationary and mobile sources."[1] Accordingly, and as summarized in more detail below, we respectfully request the District fully consider the costs of the proposed rule and anticipated equipment life-cycle when establishing a cost-effectiveness threshold, and that the District undertake a tiered cost-effectiveness, incremental cost-effectiveness, and socioeconomic analysis prior to bringing the rule forward for a public hearing[2], as required by the AQMP.

[1] South Coast Air Quality Management District, 2022 Air Quality Management Plan, at Preamble to Executive Summary.

[2] Currently scheduled for April 2023. *See* South Coast Air Quality Management District, Presentation for Working Group Meeting 7 ("WGM 7 Presentation"), at 28 (presentation posted December 30, 2022).

The District Should Consider Additional Information to Ensure an Accurate Cost-Effectiveness Analysis

The Health & Safety Code requires the District to adopt rules which, among other things, "are efficient and cost-effective" (Health & Safety Code § 40440(c).) The Code states that:

> In adopting any regulation, the district shall consider, pursuant to Section 40922 [cost-effectiveness assessment], and make available to the public, its findings related to the cost-effectiveness of a control measure. . . . A district shall make reasonable efforts, to the extent feasible within existing budget constraints, to make specific reference to the direct costs expected to be incurred by regulated parties, including businesses and individuals.

(Health & Safety Code § 40703.)

Health & Safety Code Section 40440.8 requires the District to examine "[t]he availability and cost-effectiveness of alternatives to the rule or regulation" by considering the socioeconomic impacts of proposed rules and regulations.

Further, Health & Safety Code Section 40920.6 requires the District to, among other things:

1) Review the information developed to assess the cost-effectiveness of the potential control option. For purposes of this paragraph, "cost-effectiveness" means the cost, in dollars, of the potential control option divided by emission reduction potential, in tons, of the potential control option.
2) Calculate the incremental cost-effectiveness for the potential control options . . . . To determine the incremental cost-effectiveness under this paragraph, the district shall calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option.
3) [And consider t]he effectiveness of the proposed control option, . . . [t]he cost-effectiveness of each potential control option, . . . [and t]he incremental cost-effectiveness between the potential control options.

(Health & Safety Code § 40920.6.)

The requirements that the District create rules that are efficient and cost-effective and provide socioeconomic impact assessments reflect the legislature's intent: that the District consider and seek to minimize socioeconomic impacts and have these considerations as objectives of its rulemaking authority.

However, at this point in the PAR 1178 process, the District has not fully taken into account the significant costs this rule will impose on the regulated community. Specifically, we respectfully request the District further consider the following:

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- ***True Dome Installation Costs***. When considering labor costs (particularly union labor), necessary tank cleaning and degassing prior to doming, required modifications to fire suppression systems, water treatment and disposal associated with the work and installation costs are significantly higher than the doming costs assumed by the District.

- ***Lost Productivity Costs***. The contemplated doming could require refiners to take tanks offline for potentially months at time. This would result in productivity losses that could be orders of magnitude greater than the District's applied lost productivity number (0.50/barrel to tanks with diameters greater than 200 ft.) in the October 2022 Working Group Meeting presentation.[3]

- ***The Useful Life Expectation Must Consider Actual Anticipated Lifecycle of the Equipment***. The District assumes, based on vendor and facility estimates, that the domes will have a 50-year life. However, this fails to recognize that state, regional, and local policies, rules and regulations will likely reduce the consumption of certain fuels produced by Basin refineries, and, accordingly, the likelihood that the domes required pursuant to this rule will actually be in place 50 years from now. Use of a 50-year assumption makes the control equipment appear more cost-effective by diluting the significant capital costs of required projects over a much longer time table than is likely to occur. The staff analysis should reflect a 25-year assumption, which is more consistent with the anticipated use of the domes. Considering actual anticipated life-cycle is also consistent with broader District commitments to consider equipment life on a case-by-case basis, attempt to avoid stranded assets, and in cases of stranded assets, include equipment replacement costs and salvage values in the analysis.[4]

The cost-effectiveness analysis called for throughout the Health & Safety Code is a critical element of the rulemaking process. The analysis is only as good as the assumptions made and the cost data used; use of incomplete and/or inaccurate data renders the entire process meaningless. While we appreciate that the rulemaking process has been underway for some time, it is clear that additional data is needed to support an appropriate cost-effectiveness determination.

And while we recognize the District has endeavored to consider some of the factors summarized above (and we appreciate the same), to date the analysis has not undergone the rigor necessary obtain meaningful cost-effectiveness numbers. We refer you to RFG member letters for additional detail on the anticipated costs of this rulemaking, and encourage you to work closely with the regulated community to get a more comprehensive understanding of the potential impacts of the rule.

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[3] South Coast Air Quality Management District, Working Group Meeting 6, at 28 n.2 (Oct. 27, 2022).

[4] We acknowledge Staff's indication it is open to considering permit conditions to remove tanks from service upon a future date in lieu of doming. *See* WGM 7 Presentation, at 5. However, RFG still believes the Health & Safety Code-driven cost-effectiveness analysis must consider the anticipated use timeline of the domes, not just the technical "useful life."

The AQMP Requires the District to Engage in a "Tiered" Cost-Effectiveness, Incremental Cost-Effectiveness, and Socioeconomic Impact Analysis

As you know, proposed amendments to Rule 1178 stem from 2016 AQMP Control Measure FUG-01.[5] The 2016 AQMP established cost-effectiveness thresholds for "tiered levels of analysis." More specifically, the 2016 AQMP provides that the :

> *2016 AQMP proposes* ***thresholds of $30,000 per ton of VOC*** *and $50,000 per ton of NOx for tiered levels of analysis. Note, however, with the new focus on incentives and public funding, not all of this cost will necessarily be borne by industry. Specifically, proposed rules with an average cost-effectiveness above these thresholds will trigger a more rigorous average cost-effectiveness, incremental cost-effectiveness, and socioeconomic impact analysis. A public review and decision-making process will be instituted to seek lower, more cost-effective alternatives. In addition, the SCAQMD staff, with input from stakeholders, will attempt to develop viable control alternatives within the industry source categories that a rule is intended to regulate. If it is determined that control alternatives within the industry source category are not feasible, staff will perform an evaluation of the control measure as described in the next paragraph. Viable alternatives will be reviewed by the SCAQMD Governing Board at a public meeting no less than 90 days prior to rule adoption and direction can be given to staff for further analysis. During this review process, incremental cost-effectiveness scenarios and methodology will be specified, and industry-specific affordability issues will be identified as well as possible alternative control measures.*[6]

The tiered analysis supports rigorous and careful consideration of the balance between air quality improvements and the economic concerns and impacts on the regulated community. As summarized above, we believe the current cost-effectiveness analysis vastly underestimates the actual costs. Notwithstanding, even the District's revised $32,400 per ton cost[7] exceeds the 2016 AQMP's established threshold for tiered review. Accordingly, we respectfully request the District undertake the more rigorous average cost-effectiveness, incremental cost-effectiveness, and socioeconomic impact analysis in connection with this rulemaking.

1-6

[5] *See* South Coast Air Quality Management District, 2016 Air Quality Management Plan at 4-21.

[6] *Id.* at 4-54 (emphasis added).

[7] *See* South Coast Air Quality Management District, Presentation for Working Group Meeting 7, at 27 (presentation posted December 30, 2022).

Conclusion

Thank you for considering these comments. We will reach out separately to you in order to request a meeting with District staff to discuss these comments in greater detail as the rulemaking advances.

Sincerely,

John C. Heintz

John C. Heintz
of LATHAM & WATKINS LLP

cc: Michael Krause, Assistant Deputy Executive Officer, SCAQMD
Michael Carroll
RFG Members

Comment 1-1
Thank you for your comment. Staff is committed to following the process outlined in the California Health and Safety code.

Comment 1-2
Initial cost-effectiveness calculations were based on vendor information. Since the initial cost-effectiveness was presented, staff received direct cost information for doming from seven facilities for a total of 45 tanks of different diameters. Facilities provided direct costs based on vendor quotes, past doming projects and current estimations from facility project engineers and staff. The current cost-effectiveness for doming is based solely on costs provided by facilities. Costs for fire suppression systems and water treatment and disposal were included in facility estimates and included in the costs used for the cost-effectiveness analysis. Similarly, direct costs received related to seals and other requirements have also been incorporated into the costs used to determine cost-effectiveness and incremental cost-effectiveness. Staff included labor costs (including union labor) for work associated with doming. Refer to the cost-effectiveness discussion in Chapter 4 for additional details.

Comment 1-3
Staff considered loss of capacity costs for facilities with limited capacity that would require storage leasing offsite to continue operations. Loss of productivity or profit were not considered in the cost-effectiveness for doming projects. Staff does not consider costs outside of the project costs to implement controls. Refer to the cost-effectiveness discussion for doming in Chapter 4 for additional details.

Comment 1-4
If facilities believe that reduced consumption will make some storage tanks obsolete before a 50-year cycle, staff is open to considering permit conditions to be taken to remove tanks from service for facilities that will not operate tanks in the future. Staff has not received feedback from any facilities regarding anticipated dates that tanks may be removed from service.

Comment 1-5
These costs used in rule development have been shared with the working group to continue to refine the costs to be as accurate and complete as possible. Staff has received additional cost estimates (and appreciates the information) and incorporating the information into the cost estimates provided in this document.

Comment 1-6
On December 2, 2022, the South Coast AQMD Governing Board adopted the 2022 Air Quality Management Plan that establishes a cost-effectiveness threshold of $36,000 per ton of VOC reduced. Staff is not proposing to require controls with a cost-effectiveness greater than $36,000 per ton of VOC reduced.

2. Comment Letter from the Earth Justice, et. al., dated 1/13/2023

COMMUNITIES FOR A BETTER ENVIRONMENT
established 1978

CENTER for BIOLOGICAL DIVERSITY

COALITION FOR CLEAN AIR

EARTHJUSTICE

SIERRA CLUB

CCAT

January 13, 2023

VIA: ELECTRONIC MAIL ONLY

Michael Morris
South Coast AQMD
mmorris@aqmd.gov

Re: Comments on Proposed Amendments to Rule 1178 (Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities)

Dear Mr. Morris:

The undersigned organizations submit additional comments concerning rule amendments recommended by staff during working group meetings (WMG) nos. 6 and 7. While we appreciate staff's decision to implement many recommended control and monitoring measures, we remain concerned that several opportunities to reduce VOC emissions are being ignored or dismissed. As detailed below, there are various cost-effectiveness issues and controls that staff should consider.

***

- **The South Coast AQMD must implement a moratorium on new and expanded petroleum storage tanks in EJ communities – California refineries already over-produce finished products beyond California demand, in favor of exporting overseas.**

We do not believe we need to reiterate the well-known cumulative impacts due to high concentrations of petroleum storage tanks and other refining activities in our communities. If this is in question, we would be happy to provide abundant evidence. We urge the Air District to include in Rule 1178, measures to stop expansion of petroleum storage tanks in over-burdened communities. A moratorium on new petroleum storage tanks is consistent with regional and state Environmental Justice policies. It is consistent with the recently adopted smog plan, which found that zero emission energy sources will be needed across the board in the region. It is consistent with state goals to phase out fossil fuels through the state Greenhouse Gas Scoping Plan. Not expanding fossil fuels is the first step!

If the Air District is concerned that it needs to continue supporting refinery expansion permits in order to meet California's fossil fuel demand, we must point out that oil refineries already substantially over-produce finished products for export overseas, beyond California's demand (e.g., gasoline and diesel). As a result, our local communities are left with concentrated

2-1

oil refinery expansions and impacts, including from refinery storage tanks. But increased petroleum storage (and refining) is not needed to meet California demand. Furthermore, as California's Zero Emission Vehicle (ZEV) regulations increase electric vehicles (including requirements for no new sales of gasoline vehicles by 2035), California's demand for oil refineries and their storage tanks will be further drastically reduced. But instead of reducing refining and related activities including storage, oil refineries are increasing exports of finished fuels at the same time that California has decreased in-state demand.[1] We need the Air District to begin addressing this unfair burden of fossil fuels not only through emission controls, but by ceasing the expansion of fossil fuel infrastructure, including storage tanks. Upgrades are one thing, new tanks or expanded throughput are another – this needs to stop.

2-1 Cont.

- **The South Coast AQMD must provide the public with a comprehensive list of storage tanks for each refinery or related petroleum tank farm, including facility name, tank size, location, construction type, controls, contents, and emissions.**

This type of information is not company secret – this is part of Title V permits, but the public currently has to dig through permits and inventories to pull this together in a comprehensive way that is useful during a regulatory proceeding. We have previously asked in each proceeding if the Air District would provide Environmental Justice and environmental organizations and the public with such lists of equipment and emissions, without requiring time-consuming public records requests. The Air District did provide lists during the Boilers and Heaters regulation (Rule 1109.1). We would really appreciate receiving storage tank lists within the Rule 1178 process. We assume the Air District has such lists readily available, and if it does not, surely should develop this for its own review purposes. This should be a normal part of the public process.

2-2

- **The South Coast AQMD should exceed the cost-effectiveness threshold for control and monitoring measures that are close to the 2022 cost-effectiveness threshold.**

As noted in previous comments, staff should not be anchored to a fixed threshold to dismiss control and monitoring measures as not cost effective. In fact, during WGM no. 6, staff acknowledged that cost-effectiveness thresholds serve as "guidelines" rather than a cap.[2] Thus, if a cost-effectiveness threshold would be exceeded, the Air District would not dismiss a control or monitoring measure but would instead engage in "a more rigorous cost analysis" that would be

2-3

[1] For example, detailed data from State of California was submitted in the CEJA comments during the state Scoping Plan process. *See* Cal. Air Res. Bd., Comment Letter Specific Sectors and Greenhouse Gas Emission Reduction Measures in the 2022 Draft Scoping Plan, (June 24, 2022), https://www.arb.ca.gov/lists/com-attach/4453-scopingplan2022-UjFQM1I5VWdRCAlt.pdf (details in Attachment D demonstrate that refineries export substantial amounts of finished refinery fuels, which was also acknowledged during CARB Board and EJAC hearings) [archived at https://perma.cc/NAV5-B29X]; https://www.arb.ca.gov/lists/com-attach/4459-scopingplan2022-UDMAY1Y9V2VQCQBk.pdf [archived at https://perma.cc/MBG3-Q5N5]; https://www.arb.ca.gov/lists/com-attach/4462-scopingplan2022-AWJcPwFqBTdXDgVh.pdf [archived at https://perma.cc/JAG9-P56R].

[2] Working Grp. Meeting No. 6, Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, 6 (Oct. 27, 2022). Zoom Meeting. [archived at https://perma.cc/6SLF-2LMF].

"reviewed by the Governing Board no less than 90 days prior to rule adoption."[3] Moreover, during WGM no. 6, staff committed to using the cost-effectiveness threshold of $36,000 per ton of VOC under the 2022 AQMP if adopted by the Governing Board.[4] The Governing Board adopted the 2022 AQMP on December 2, 2022.[5]

Staff dismisses several control measures as not cost effective even though such measures only marginally exceed the 2022 cost-effectiveness threshold of $36,000. For example, staff dismissed retrofitting existing IFR tanks with cable suspension systems as not cost effective. Staff elected not to pursue that control measure due to costs at around $39,800 per ton of VOCs reduced, which would be above the applicable 2022 AQMP cost-effectiveness threshold.[6] Because this control is near the 2022 cost-effectiveness threshold, staff should pursue this option and prepare the necessary analysis to justify going above this non-binding cost-effectiveness threshold.[7] Given the region's severe air quality problems and the localized impacts of toxic VOC emissions, the Air District must secure every emission reduction measure available.

2-3 Cont.

- **The South Coast AQMD must adjust the 2022 AQMP cost-effectiveness threshold for VOCs to reflect 2023 dollars under the consumer price index.**

The Air District must adjust the 2022 AQMP cost-effectiveness threshold to reflect 2023 dollars. Staff must update the $36,000 threshold under the approved 2022 AQMP by the consumer price index. As noted by staff during WGM no. 7, the Air District's practice is to use updated figures when bringing a rule to the Governing Board for approval, which presumably would include updating any cost-effectiveness threshold. This practice is echoed under the 2022 AQMP where the Air District notes that the cost-effectiveness threshold amount "would be inflated by the consumer price index *annually*."[8]

2-4

The Air District originally proposed the $36,000 per ton of VOC threshold in May 2022 and the Governing Board approved the AQMP in December 2022. The current rule forecast for Rule 1178 anticipates an April 2023 rule adoption or about a year after the Air District calculated the 2022 AQMP cost-effectiveness threshold for VOC emission reductions.[9] As a result, staff must update the current cost-effectiveness threshold based on the consumer price index in

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[3] *Id.*
[4] *Id.* at 8.
[5] Certify the Final Program Env't Impact Rep. for the 2022 AQMP and Adopt the 2022 AQMP, (Dec. 2, 2022). http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2022/2022-Dec2-026.pdf?sfvrsn=6 (Exhibit 1).
[6] Working Grp. Meeting No. 6, 2022, at 3.
[7] Notably, as detailed below, the Air District relied on a deficient cost-effectiveness analysis for suspension systems. The Air District must reconsider this control measure for this reason as well.
[8] S. Coast Air Quality Mgmt. Dist., Governing Bd., Draft Final 2022 Air Quality Management Plan, 390 (2022).
[9] Rule and Control Measure Forecast, (Dec. 2, 2022). http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2022/2022-dec2-015.pdf?sfvrsn=4 [archived at https://perma.cc/AH4Y-LKAG].

accordance with both the Air District's practice and AQMP commitments to update these figures annually.

2-4 Cont.

- **The South Coast AQMD's evaluation of control and monitoring measures should be guided by health benefits from reducing VOCs that are ozone precursors and often hazardous.**

In assessing the potential costs associated with various control and monitoring measures, staff should factor in the health benefits associated with reducing VOCs, which are not only ozone precursors but also include several hazardous and cancer-inducing pollutants. The health benefits associated with improved air quality by reducing ozone include "reduced hospitalizations, reduced premature mortality, and [a reduction in] other adverse public health outcomes."[10] Moreover, reducing VOC exposure would in turn decrease chronic exposure to various toxic VOCs, such as benzene and toluene, that are known to have a range of negative health impacts, including immune system damage, leukemia, and brain disorders.[11]

2-5

In fact, recognizing these health benefits, the Governing Board approved staff's 2022 AQMP recommendation to use a threshold for NOx of $325,000 per ton of NOx reduced that would be adjusted for inflation over the years.[12] In making this recommendation, staff considered various approaches and technical assessments, including U.S. EPA's analysis of benefits associated with reducing directly emitted ozone precursors, specifically NOx *and VOCs*.[13] Given that petroleum refineries are the largest stationary source of VOC emissions in the Wilmington, Carson, and West Long Beach areas, significant reductions are needed to address regional and localized impacts associated with refinery VOC pollution.[14]

Accordingly, the health benefits (and therefore reduced health costs) associated with lowering VOC emissions should guide the Air District's consideration of control and monitoring measures rather than petroleum facility costs. Or at a minimum, these health benefits and related cost savings should be factored into the cost-effectiveness threshold used by the Air District.

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[10] Draft Final 2022 Air Quality Mgmt. Plan, 2022, at 88.

[11] Off. of Env't Health Hazard Assessment & Cal. E.P.A., Analysis of Refinery Chemical Emissions and Health Effects, (Mar. 2019). https://oehha.ca.gov/media/downloads/faqs/refinerychemicalsreport032019.pdf [archived at https://perma.cc/7U6M-C7BD].

[12] Certify the Final Program Env't Impact Rep., AQMP 2022, at 12.

[13] Off. of Air Quality Plan. and Standards, U.S. E.P.A., Technical Support Document: Estimating the Benefit per Ton of Reducing Directly-Emitted PM 2.5, PM 2.5 Precursors and Ozone Precursors from 21 Sectors, (Jan. 2022). https://www.epa.gov/system/files/documents/2021-10/source-apportionment-tsd-oct-2021_0.pdf [archived at https://perma.cc/WFQ2-3W3K].

[14] S. Coast Air Quality Mgmt. Dist., *Community Emissions Reduction Plan,* 3b-3 (Sept. 2019), https://www.aqmd.gov/docs/default-source/ab-617-ab-134/steering-committees/wilmington/cerp/final-cerp-wcwlb.pdf?sfvrsn=8 [archived at https://perma.cc/NAG4-V6S7].

- **The South Coast AQMD's assessment of risk from toxic exposures ignores California RELs and relies on a constrained analysis to conclude limited exposure and risk to residents.**

In response to comments urging that staff consider localized health benefits of reducing VOCs, staff responded that it considered health impacts from toxics exposure to benzene, toluene, ethylbenzene, and xylene (BTEX) compounds using modeling.[15] The Air District's analysis relies on "a hypothetical setup at one large tank (230 ft diameter EFR tanks) located across the street from a resident receptor."[16] Based on this model, staff concluded that BTEX concentrations would not exceed U.S. EPA reference concentration levels.[17] Staff's analysis is flawed for several reasons.

2-6

First, the Air District's modeling ignores the fact that nearby residents are exposed to pollutants from multiple storage tanks at various petroleum refineries and tank farm operations in the region. The cumulative impacts of these pollution sources increase the risk of adverse health effects from constant exposure to BTEX compounds. Moreover, this analysis ignores ozone-related health impacts that can also cause a range of respiratory diseases, particularly for children and elderly residents in the area.

Second, the Air District's modeling ignores California reference exposure levels (RELs) for BTEX compounds and available fenceline air monitoring data. For instance, actual measurements provided to U.S. EPA of benzene releases at the refinery fencelines confirm that benzene pollution crossing the fenceline and entering communities are often at levels that are significantly above OEHHA's REL level of 3 ug/m3. As summarized in Table 1 below, several refineries expose surrounding communities to significant levels of cancer-inducing benzene pollution.

[15] Working Grp. Meeting No. 5 Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, 7 (July 14, 2022). Zoom Meeting. http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par1178-wgm5-final.pdf?sfvrsn=12 [archived at https://perma.cc/L4M2-WZ6E].
[16] *Id.*
[17] *Id.*

Table 1. U.S. EPA Refinery Fenceline Benzene Concentrations.[18]

Facility	Highest benzene level recorded in the past year	No. of weeks in past year where benzene exceeded 3 ug/m3
Valero Wilmington	10 ug/m3	2
Tesoro Los Angeles	12 ug/m3	6
Torrance Refining	27 ug/m3	6
Phillips 66 Wilmington	3 ug/m3	2
Chevron El Segundo	7 ug/m3	6

2-6 Cont.

- **The South Coast AQMD initially improperly dismissed the installation of secondary seals on all internal floating roof tanks based on a flawed cost-effectiveness analysis.**

We appreciate staff's recent decision during WGM no. 7 to require secondary seals on all IFR storage tanks.[19] We urge staff to hold firm to this requirement to reduce VOC emissions.

During WGM no. 6, staff noted that it would only require secondary seals on storage tanks storing gasoline with RVP ≥ 5 or crude with RVP ≥ 6.[20] Staff rejected secondary seals on all IFR storage tanks based on a flawed cost-effectiveness analysis.[21] Based on this analysis, staff determined the total cost-effectiveness would be $118,100 per ton of VOC reduced, which would be above the $36,000 cost-effectiveness threshold and therefore would not be cost effective.[22]

2-7

For the record, we want to highlight at least four problems with the Air District's previous cost-effectiveness analysis. We believe that addressing these issues would have lowered costs below the $36,000 threshold and made secondary seals for large IFR storage tanks cost

[18] Ranking & Comparisons, Refinery Air Watch: A Project of the Fair Tech Collective, https://www.refineryairwatch.org/rankings, (last visited Jan. 12, 2023) (Exhibit 2); Valero Wilmington, https://www.refineryairwatch.org/refinery/#46 [archived at https://perma.cc/2SXG-XUAE]; Tesoro Los Angeles Refinery, https://www.refineryairwatch.org/refinery/#35 [archived at https://perma.cc/B2R9-CZY7]; Torrance Refining Company, LLC, https://www.refineryairwatch.org/refinery/#45 [archived at https://perma.cc/B2R9-CZY7]; Phillips 66 - Wilmington, https://www.refineryairwatch.org/refinery/#39 [archived at https://perma.cc/2RB3-UL4M].

[19] Working Grp. Meeting No. 7, Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, 22 (Jan. 5, 2022). Zoom Meeting. http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par-1178_wgm7_fin.pdf?sfvrsn=6 [archived at https://perma.cc/WNX9-G3WX].

[20] Working Grp. Meeting No. 6, 2022, at 14.

[21] *Id.*, at 13.

[22] *Id.*

effective, or at a minimum, would have brought costs close to the applicable threshold to secure at least 1 tpy of needed VOC reductions.

First, the Air District incorrectly assumed a 10-year equipment life for secondary seals.[23] This equipment life assumption is inconsistent with the Air District's previous determination that secondary seals have a useful life of at least *20 years*.[24] A longer useful life for secondary seals is also supported by vendor information submitted in our August 2022 comments confirming that these seals can last for as long as *25 or even 30 years*.

Second, in calculating costs, staff included a "100% installation cost factor."[25] It is unclear what installation costs are included, but presumably it includes inflated labor costs. As previously noted, however, not all projects would have increased labor costs due to union labor. In its current assessment, staff does not distinguish between operations that would be subject to Health and Safety Code section 25536.7 and those that are not, which would have lowered labor costs for installations.[26]

Third, the Air District relies on a single vendor quote of between $40 to $60 per linear foot in its cost-effectiveness analysis. Based on this quote, the Air District then proceeds to use the higher quoted amount in its installation costs without providing any explanation regarding why the agency could only identify one vendor and why the higher quoted amount would be appropriate. The public is left to speculate about the Air District's decision making.

Finally, the seal installation cost of $946,700 does not align with the $120 installation cost relied on by the Air District. Based on the $120 installation cost, installing secondary seals on a floating roof tank with a 5,808 linear feet circumference would result in a $696,960 seal installation cost, and when you add the $234,000 permitting expense, it equals $93,096 per ton of VOC ($930,960 / (1 tpy * 10 yrs).)[27] Thus, the cost per ton of VOC reduced would be significantly lower based on these calculations.

- **The South Coast AQMD erroneously asserted that all domed external floating roof tanks are required to be equipped with secondary seals under subparagraph (d)(2)(e).**

During WGM no. 6, staff claimed that *all* "domed external floating roof tanks are currently required to be equipped with secondary seals under subparagraph (d)(2)(e)."[28] Rule 1178 (j)(2), however, states that "[d]omed external floating roof tanks installed *prior to January 1, 2002* shall be *exempt* from the requirements of subparagraph (d)(2)(D) and (d)(2)(E) for secondary seals."

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Cont.

2-8

[23] *Id.*, at 12-13.
[24] Working Group Meeting No. 5, 2022, at 15. (n. 1, stating cost-effectiveness "based on 20-year equipment life.")
[25] Working Grp. Meeting No. 6, 2022, at 12.
[26] Cal. Health & Safety Code § 25536.7
[27] Working Grp. Meeting No. 6, 2022, at 12.
[28] Working Grp. Meeting No. 6, 2022, at 14.

We appreciate staff's statement during WGM no. 7 that this exemption would be removed to require secondary seals on *all* domed external floating roof tanks. It is critical that storage tanks constructed prior to January 1, 2002, be required to install secondary seals. As part of its staff report, the Air District should disclose the number of storage tanks benefitting from this exemption.

2-8 Cont.

- **The South Coast AQMD improperly dismissed proximity switches on fixed roof tanks despite being cost effective and assisting in identifying fugitive emissions.**

During WGM no. 6, staff noted that the Air District abandoned proximity switches on fixed roof tanks because "more emissions reductions from enhanced inspection monitoring" are possible.[29] Importantly, staff did not state that there would be *no emission reductions* from proximity switches or that proximity switches could not serve as an additional measure to prevent fugitive VOC emissions.

Based on staff's analysis, proximity switches are an important monitoring element to address open hatch covers, which can release as much as 4 tons of VOCs per day if left open.[30] These proximity switches are a useful tool to prevent operational error where a hatch is left open, which could go unaddressed for days and release significant quantities of VOCs into the area.

2-9

Moreover, this monitoring tool would be cost-effective at less than $1,000 per ton of VOC reduced.[31] This measure would supplement other monitoring requirements being proposed by the Air District and provide another layer of oversight where periodic monitoring might otherwise fail. As previously noted, an all-of-the-above strategy is necessary to control fugitive VOCs.

- **The South Coast AQMD wrongly dismissed concerns regarding the cost-effectiveness analysis for retrofitting internal floating roof tanks with cable suspension systems.**

Staff dismissed retrofitting IFR storage tanks with cable suspension systems "due to high cost-effectiveness" totaling $39,800 per ton of VOC, slightly above the applicable threshold.[32] In response to our August 2022 comments, the Air District ignored the concerns raised and concluded that the agency would make "[n]o changes to suspension system analysis for [existing] IFR tanks."[33]

2-10

As noted in our August 2022 comment letter, the Air District's cost-effectiveness analysis for installing suspension systems on existing IFR tanks relied on "2020 AER" data rather than 2019 AER (reported in 2020). The Air District should have used 2019 AER data because such data is more reflective of operating emissions than 2020 AER data. Moreover, the Air District did not address inflated labor costs concerns raised in the comment letter. Indeed,

[29] Working Grp. Meeting No. 6, 2022, at 3.
[30] Working Grp. Meeting No. 5, 2022, at 21.
[31] Working Grp. Meeting No. 5, 2022, at 22.
[32] Working Grp. Meeting No. 6, 2022, at 3.
[33] Working Grp. Meeting No. 6, 2022, at 16.

staff conceded that it "revised costs to reflect additional labor costs" in response to oil industry claims that unionized labor would be necessary to comply with the installation of control measures, including suspension systems for IFR tanks.[34] But as noted in our August 2022 comments, not all operations would be subject to unionized labor costs. Thus, the Air District must make that distinction in its analysis.

The Air District should revise its cost-effectiveness analysis to address these concerns. That said, even with current cost factors, installation of suspension systems for IFR storage tanks would be close to the Air District's cost-effectiveness threshold. As noted by staff, this cost-effectiveness threshold serves as guidance, rather than a cap to reject measures. These retrofits are necessary to reduce emissions. The Air District cannot rely solely on leak detection and repair to address VOC leaks. The Air District should be implementing all available measures to reduce the maximum amount of VOC emissions possible to assist the region in achieving air quality standards and to protect the health of some of the most overburdened communities in the region.

2-10 Cont.

- **The South Coast AQMD must confirm whether new internal floating roof storage tanks will be required to install cable suspension systems.**

The Air District asserts that *new* IFR tanks "will be subject to BACT."[35] As noted in previous comments, some jurisdictions consider cable suspended floating roofs BACT for bulk gasoline storage tanks.[36] Staff must confirm whether *all* new IFR storage tanks – regardless of contents – must install cable suspension systems in accordance with BACT.

2-11

Moreover, because Rule 1178 sets forth several new tank construction requirements, in addition to prompting retrofits for existing storage tanks, staff should be explicit about cable suspension system requirements for new tanks and update the Air District's BACT list. Accordingly, Rule 1178 should be amended to remove any ambiguity.

- **The South Coast AQMD cannot dismiss a higher efficiency rate for non-combustion vapor recovery systems that evidence supports is not only achievable but also a best practice.**

During WGM no. 5, the Air District noted that it is "aware of only one vapor recovery test result showing a 99% efficiency" for a combustion system, but that it is "not aware of any carbon adsorbers connected to large storage tanks."[37] Despite the Air District's conclusion, there is evidentiary support in the record to require the use of non-combustion vapor recovery on large storage tanks and to establish a 99 percent efficiency rate for these systems.

2-12

[34] Working Grp. Meeting No. 5, 2022, at 5.
[35] Working Grp. Meeting No. 6, 2022, at 16.
[36] Mass. Dep't of Env't Prot., Top Case Best Available Control Technology (BACT) Guidelines, at 47 (June 2011), https://www.mass.gov/doc/top-case-bact-guidelines/download [archived at https://perma.cc/7WH8-3NV4].
[37] Working Grp. Meeting No. 6, 2022, at 9.

In our August 2022 comment letter, we provided several materials finding that non-combustion vapor recovery systems can achieve up to 99 percent control efficiency and that this technology has been used to control VOC releases from storage tanks. Moreover, Valley Air guidance on best practice standards confirms the feasibility of 99 percent control for fixed roof storage tanks with a capacity of greater than or equal to 5,000 bbl using carbon adsorption.[38]

2-12 Cont.

- **The South Coast AQMD should remove the vapor recovery system compliance exemption for fixed roof storage tanks with a true vapor pressure of less than 0.1 psia.**

Contrary to staff's assertion, not all fixed roof storage tanks are required to install vapor recovery systems under Rule 1178 (d)(4)(A).[39] Subparagraph (d)(4)(A) creates an exemption for storage tanks that contain organic liquids with true vapor pressure of *less than* 0.1 psia. In fact, staff acknowledged this exemption after conducting additional review of fixed roof tanks equipped with vapor recovery systems and determined that a smaller amount of roof tanks have vapor recovery systems than previously estimated given that some of these tanks "store product < 0.1 psia TVP and are exempt from requirement to be equipped with a [vapor recovery unit]."[40]

2-13

In response to questions during WGM no. 7, staff noted that this language in the rule can be misleading and that in practice *all* fixed roof storage tanks are required to install vapor recovery systems. Given staff's interpretation and on-the-ground practice, as well as the need to ensure that all fixed roof storage tanks install vapor recovery systems, staff must update the rule language to remove this exemption from Rule 1178.

- **The South Coast AQMD should clarify whether currently domed external floating roof tanks would be subject to vapor recovery system requirements.**

In response to comments recommending that the Air District consider installing vapor recovery systems on floating roof tanks, staff responded that "conventional [vapor recovery] systems require vapor collection from closed system[s]" and because "floating roof tanks open to atmosphere," the use of vapor recovery systems would likely not be feasible. The Air District, however, should clarify whether domes (a self-supported fixed roof) on external floating roof tanks provide the necessary closed system for vapor recovery systems. If domes provide the necessary closed system, then the Air District should require the installation of vapor recover systems on currently domed external floating roof tanks, in addition to fixed roof storage tanks, which Rule 1178 defines as "a storage tank with a permanently affixed roof."[41]

2-14

[38] San Joaquin Valley Air United Air Pollution Control Dist., Best Performance Standard (BPS), at 9 (Feb. 23, 2011), https://www.valleyair.org/Programs/CCAP/bps/Approved_Evaluation_TanksVaporControl_OilandGas.pdf [archived at https://perma.cc/6TTQ-PKAB].
[39] Working Grp. Meeting No. 6, 2022, at 9.
[40] *Id.*, at 11.
[41] CA ADC AIR Reg. XI, Rule 1178(c)(12) (South Coast).

- **The South Coast AQMD continues to dismiss open path monitoring and gas sensor options, asserting limited cost and technology information.**

The Air District cites "absence of vendor data" as a reason for dismissing open path monitoring and does not explore gas sensor alternatives.[42] Although the Air District engaged one open path vendor "early in the rule development process," it should continue to explore that option and engage other vendors.[43] Moreover, staff conducted vendor outreach under the Rule 1180 development process, which should have provided the Air District with equipment estimates and other vendor information it can use in this rulemaking to assess potential costs.

Finally, the Air District should continue to explore gas sensor options. An option the Air District should explore is Molex sensors. For example, EPA ORD, Molex, and Flint Hills Resources conducted a collaborative research project to develop and test "a fugitive leak detection approach that provides environmental, safety, and cost saving advantages over the current manual EPA Method 21 inspection procedure."[44] This new approach – referred to as the Leak Detection Sensor Network (LDSN) – "enables leaks to be detected and repaired faster and more efficiently than with quarterly or annually executed Method 21."[45] Specifically, the project accomplished the following:

> The real-time analytics of Molex's mSyteTM sensor information system helped the facility repair team discover and assess a range of leak sizes, many with emission levels well below that routinely detectable with other next-gen survey approaches, such as optical gas imaging. In addition to leaks associated with routinely monitored components, unexpected emission sources not detectable by other approaches were also found, illustrating the value of the 24/7 area-monitoring concept. Multiyear simulated emission modeling based on real-world leak detection data showed that the new sensor-based approach can provide equivalent or better emissions control to Method 21 for cost-realizable sensor network node densities.[46]

The Air District should explore this monitoring option in addition to OGI cameras and increasing routine inspections of storage tanks.

2-15

[42] Working Grp. Meeting No. 6, 2022, at 17.
[43] *Id.*
[44] U.S. E.P.A., No. EPA/600-R-20/422, Progress on LDAR Innovation, 6 (Jan. 28, 2021) (Exhibit 3).
[45] *Id.*
[46] *Id.*

- **In addition to other monitoring, the South Coast AQMD should require a Fluxsense study at least every 3 years to identify emissions due to equipment degradation or other operations inconsistent with Air District requirements or with the emission inventory.**

The kinds of controls being considered for refinery storage tanks have largely been available for a long time, including vapor recovery on fixed roof tanks, adding a second roof (e.g., domes) onto external floating roof tanks, engineered fittings on seals / hatches, banning slotted guide poles, removing problematic exemptions (e.g., for vapor pressure), etc. Previous District regulatory efforts set expectations that such measures would be highly successful in drastically cutting emissions.

2-16

But expectations were dashed when the refinery Fluxsense study showed that not just one, but *all* South Coast Air Basin refineries had grossly underestimated VOC and benzene emissions,[47] which the authors found was generally because of storage tank emissions underestimation, probably due to degradation over time.[48] While the District has recently followed up with an additional Fluxsense study, by its nature we expect that will show lower emissions than the first. The first study was essentially a surprise inspection that identified previously unknown gaseous leaks. We presume those leaks were required to be fixed before the second study convened. *But to identify unknown leaks in the future*, regular Fluxsense studies would be needed. Other types of monitoring are essential as well, but the Fluxsense study caught major emissions underestimations across the board, and helped the Air District identify leak sources. Such Fluxsense conclusions were replicated in other regions, such as Texas.[49] We need such innovative, regular methods, to ensure that all the new standards are effective.

- **The South Coast AQMD should clarify the total number of crude external floating roof tanks that would be required to install domes.**

2-17

We appreciate staff's proposal to require the installation of domes on *all* crude external floating roof tanks. During WGM no. 6, staff estimated that it would require doming for about 51

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[47] Mellqvist, et al., *Emission Measurements of VOCs, NO2 and SO2 from the Refineries in the S. Coast Air Basin Using Solar Occultation Flux and Other Optical Remote Sensing Methods,* FluxSense Inc, 94 (2019) http://www.aqmd.gov/docs/default-source/fenceline_monitroing/project_1/fluxsense_scaqmd2015_project1_finalreport(040717).pdf [archived at https://perma.cc/HV28-7CBB]; *see also Full Report on Innovative Study Now Available – LA Oil Refineries' VOIC & Benzene Emissions Grossly Underestimated*, CBE Fluxsense Decoder (identifying refineries, labeled as Refinery A, B, C . . . in the Fluxsense study, but identifiable through the Fluxsense maps), https://www.cbecal.org/wp-content/uploads/2017/05/CBE-Decoder-Socal-Refinery-Study-Emissions-Underreported.pdf [archived at https://perma.cc/694N-6MU7].

[48] *See id.* at 5, 95.

[49] Johansson, et al., *Emission Measurements of Alkenes, Alkanes, SO2, and NO2 from Stationary Sources in Southeast Tex. Over a 5 Year Period Using SOF and Mobile DOAS*, J. of Geophysical Rsch.: Atmospheres, 1973, 1973-91 (2014). https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2013JD020485 (Exhibit 4).

crude external floating roof tanks. Staff should confirm the total number of crude external floating roof tanks that would be required to comply, including the diameters of these tanks.

2-17 Cont.

- **The South Coast AQMD must eliminate current loopholes and reject any proposed exemption from doming external floating roof tanks.**

In updating Rule 1178, the Air District must remove current exemptions. Currently, under Rule 1178 (j)(7), the Air District provides an exemption for external floating roof tanks that contain more than 97 percent by volume crude oil to avoid complying with doming requirements. The Air District must remove this exemption to bring all crude oil external roof tanks into compliance.

2-18

Additionally, the Air District must reject any proposed new compliance loopholes. In particular, staff is considering allowing refineries to take a permit condition to limit stored crude RVP to 4 psia in lieu of doming.[50] Staff should abandon this approach, which would be very difficult to enforce and verify given the reliance on operators to self-report and inspect these tanks.

- **The South Coast AQMD fails to consider over 200 additional external floating roof tanks that do not have any doming in place to control fugitive VOC emissions.**

As previously noted, staff identified at least 290 external floating roof tanks, many of which do not have any doming in place. These tanks are not considered for doming despite the potential for emissions reductions. The Air District fails to explain why doming these external floating roof tanks will not be considered despite the potential for emission reductions. Instead, the Air District focuses on a handful of crude oil external floating roof tanks, ignoring most external floating roof tanks.

2-19

- **The South Coast AQMD provides for a prolonged compliance timeline for dome installations that unnecessarily delays emission reductions.**

During WGM no. 7, staff proposed the installation of domes upon the next API internal inspection after January 1, 2026.[51] Staff asserted that this approach "reduces cost impacts from tank cleaning/degassing and loss of productivity/capacity," but staff did not provide cost estimates, including how much more it would cost to implement these measures sooner.[52] Indeed, these inspections can occur about every 10 years, meaning that doming for certain tanks would be delayed at least a decade or more.[53]

2-20

[50] Working Grp. Meeting No. 7, 2022, at 14

[51] Working Grp. Meeting No. 7, 2022, at 10.

[52] *Id.*

[53] Opus Kinetic: People Empowerment, *How Often Must You Inspect Your Storage* Tank, (Aug. 18, 2020), https://www.opuskinetic.com/2020/08/how-often-must-you-inspect-your-storage-tank/ [archived at https://perma.cc/X3BA-JWEK]; *see also* API 653 at 32), https://law.resource.org/pub/us/cfr/ibr/002/api.653.2003.pdf [archived at https://perma.cc/X5EB-Z7JR].

***

We appreciate your time to consider these comments. We welcome the opportunity to discuss these issues with you in more detail.

Respectfully,

Oscar Espino-Padron, Senior Attorney
Byron Chan, Senior Attorney
Lisa Fuhrmann[54], Senior Research and Policy Analyst
Community Partnerships Program
EARTHJUSTICE

Julia May, Senior Scientist
COMMUNITIES FOR A BETTER ENVIRONMENT

Jane Williams, Executive Director
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[54] Under the supervision of attorneys, contributed to the research and/or factual portions of this document but did not provide legal services or analysis.

Index of Exhibits to
Comments on Proposed Amended Rule 1178 Submitted January 13, 2023[55]

Exhibit No.	Description
1	Certify the Final Program Env't Impact Rep. for the 2022 AQMP and Adopt the 2022 AQMP (Dec. 2, 2022)
2	Ranking & Comparisons, Refinery Air Watch: A Project of the Fair Tech Collective, https://www.refineryairwatch.org/rankings (last visited Jan. 12, 2023)
3	U.S. E.P.A., No. EPA/600-R-20/422, Progress on LDAR Innovation, 6 (Jan. 28, 2021)
4	Johansson, et al., *Emission Measurements of Alkenes, Alkanes, SO2, and NO2 from Stationary Sources in Southeast Tex. Over a 5 Year Period Using SOF and Mobile DOAS*, J. of Geophysical Rsch.: Atmospheres, 1973, 1973-91 (2014).

[55] Exhibits are available for download at: **https://earthjustice.sharefile.com/d-s7d59600e33144dc79dbe7d817a33ca70**

Comment 2-1
Rule 1178 addresses Best Available Retrofit Control Technology (BARCT) for storage tanks at petroleum refineries. New tanks and expanded throughput are addressed in provisions contained in Regulation XIII – New Source Review. Establishing a moratorium on new petroleum storage tanks is outside of the scope of Rule 1178.

Comment 2-2
Staff is compiling a list of storage tanks and associated information as requested. Some information requested may be business confidential and provided in aggregate or generalized.

Comment 2-3
Staff is utilizing the cost-effectiveness threshold of $36,000 per ton of VOC reduced adopted in the 2022 AQMP as a guideline. At this time, there are no identified measures that provide significant emission reduction benefits that marginally exceed the threshold. In the example provided, retrofitting existing IFR tanks with cable suspension is not being pursued because the cost-effectives has been revised to $153,000 per ton of VOC reduced due to revisions to the incorrect inputs used in Tank ESP regarding existing controls on internal floating roof tank.

Comment 2-4
Staff will utilize the cost-effectiveness threshold inflated by the consumer price index annually. This update has not yet occurred for 2023.

Comment 2-5
The 2022 AQMP allows the use of an alternative cost-effectiveness threshold which includes health benefits for NOx emissions. Rule 1178 does not regulate NOx emissions. While there may be some health co-benefits from the reduction of VOCs, Rule 1178 does not include any specific reductions for toxic air contaminants. For rules that regulate toxics, costs are calculated but no cost-effectiveness determination is made as there is no cost-effectiveness threshold.

Comment 2-6
Rule 1178 does not specifically regulate air toxics. The regulation of VOCs from these sources already considers the air quality benefits from reductions in ozone formation. Control measure FUG-01 is included in the 2022 AQMP to capitalize on the air quality benefits and PAR 1178 partially implements that control measure. There is insufficient data to determine emissions of benzene, toluene, ethylbenzene, or xylene due to storage tank emissions.

Comment 2-7
Staff has revised the cost-effectiveness analysis for requiring secondary seals on internal floating roof tanks based on updated information from vendors and facility costs. This analysis was presented in Working Group Meeting #7. Refer to the discussion in Chapter 4 for requiring secondary seals on internal floating roof tanks.

Comment 2-8
Staff erroneously stated that all domed external floating roof tanks are required to be equipped with secondary seals. Rather, all domed external floating roof tanks staff identified are permitted

with secondary seals. PAR 1178 will remove the exemption from secondary seals for domed external floating roof tanks.

Comment 2-9
Staff is not proposing to require proximity switches on tanks subject to Rule 1178 due to proximity switches limited ability to detect all leaks and the efficacy of proposed OGI inspections. Refer to the BARCT assessment for proximity switches in Chapter 2 for additional details.

Comment 2-10
Staff is not proposing to require cable suspension systems on internal floating roof tanks. Staff has revised the cost-effectiveness for accuracy. The cost-effectiveness to implement cable suspension systems is greater than $36,000 per ton of VOC reduced. Refer to the BARCT assessment in Chapter 2 for cable suspension systems.

Comment 2-11
Requirements for cable suspension systems as best available control technology (BACT) is determined through the BACT Guidelines. This determination is independent of the Rule 1178 amendment process.

Comment 2-12
While testing has shown that vapor recovery systems in operation have been able to achieve better than 99% efficiency at times, the vendor guarantees staff has obtained only guarantee combustion vapor recovery at 98% efficiency and 95% for non-combustion systems. Proposed language requires all vapor recovery systems to achieve 98% control efficiency. Newly installed system will be subject to BACT and required to meet the best available control efficiency available at the time of installation.

Comment 2-13
Rule 1178 requires emission control systems on all fixed tanks subject to the rule. The rule applies to storage tanks with a minimum capacity that store organic material with a TVP of greater than 0.1 psia. Therefore, all fixed roof tanks storing organic material with TVP greater than 0.1 psia are required to have emission control of at least 95% or be connected to a fuel gas system. Staff has performed a cost-effectiveness analysis for requiring 98% emission control on all fixed roof tanks storing organic material regardless of the TVP of the liquid stored. Such a requirement has been found not to be cost-effective. Refer to the incremental cost-effectiveness in Chapter 4.

Comment 2-14
All floating roof tanks including external floating roof tanks, domed external floating roof tanks, and internal floating roof tanks are open to atmosphere above the floating roof. This is inherent in the design of a floating roof tank. The installation of a dome on a floating roof tanks does not result in a closed system and thus are not suitable for a vapor recovery system.

Comment 2-15
Staff has concluded that inspections with OGI is the most effective method to detect leaks and improve current leak detection and repair requirements. Open path monitoring and gas sensors were evaluated and found not cost-effective as compared to OGI. The proposed OGI requirements

will enable leaks to be detected and repaired faster and more efficiently than with quarterly or annually executed Method 21. Refer to the BARCT assessment for enhanced leak detection technologies in Chapter 2 for additional details.

Comment 2-16
Mobile monitoring is helpful to identify areas where further rule development are necessary. PAR 1178 rule development was initiated based on community concerns related to finding from mobile monitoring to explore improved leak detection and controls. Proposed amendments would require weekly OGI inspections to quickly identify leaks and improve repair timelines. Staff is supportive of further mobile monitoring but disagrees that mobile monitoring every 3 years should be incorporated into Rule 1178. The provisions incorporated into PAR already address the need to detect leaks sooner.

Comment 2-17
Staff has provided the number of tanks expected to be domed as a result of PAR 1178 based on the most current information available. Fifty-four tanks are expected to be domed as a result of PAR 1178 implementation. Staff has provided the range of diameters for the tanks expected to be domed in the BARCT analysis for doming in Chapter 2. Tanks may accept a permit condition to only store materials with a TVP of 3 or less in lieu of installing a dome. Storing materials with a TVP of 3 or less would result in similar emission reductions as installing a dome.

Comment 2-18
Staff has presented the analysis on the emission reductions from doming compared to the emission reductions from limiting the RVP of crude stored. Analysis showed that equivalent emissions reductions would result if stored crude is limited to a maximum RVP of approximately 4 psia. PAR 1178 requires facilities to periodically test the TVP of the crude stored in external floating roof tanks that are not domed according to the approved test method ASTM D-323 to confirm qualification for doming exemption.

Comment 2-19
Staff has conducted an incremental cost-effectiveness for requiring domes on tanks storing organic liquid with TVP less than 3 psia. It is not cost-effective to dome tank with materials with a TVP less than 3 psia. Refer to the incremental cost-effectiveness discussion in Chapter 4.

Comment 2-20
Staff is proposing a phased schedule to require doming to occur on 30% of tanks by 2031, 50% of tanks by 2033, and 100% of tanks by 2038. Staff established percentages of tanks to be domed by 2031 and 2033 based on submitted API internal inspections. Some tanks will have to be domed prior to the next schedule API internal inspection. In those cases, added costs for cleaning and degassing were included. A further hastened doming schedule would likely result in doming no longer being cost-effective. Refer to the BARCT analysis for doming in Chapter 4 for cost estimates to empty and degas tanks of different sizes.

3. Comment Letter from the Western States Petroleum Association, dated 1/19/2023

WSPA

Ramine Cromartie
Senior Manager, Southern California Region

January 19, 2023

Mike Morris
Manager, Planning and Rules
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Via e-mail at: mmorris@aqmd.gov

Re: SCAQMD Proposed Amended Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities – WSPA Comments on the Cost-Effectiveness Analysis

Dear Mr. Morris,

Western States Petroleum Association (WSPA) appreciates the opportunity to participate in the Working Group Meetings (WGMs) for South Coast Air Quality Management District (SCAQMD or District) Proposed Amended Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (PAR 1178). WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport, and market petroleum, petroleum products, natural gas, renewable fuels, and other energy supplies in five western states including California. WSPA has been an active participant in air quality planning issues for over 30 years. WSPA-member companies operate petroleum refineries and other facilities in the South Coast Air Basin that will be impacted by PAR 1178.

The California Health & Safety Code requires the District, in adopting any Best Available Retrofit Control Technology (BARCT) standard, to ensure the standard is technologically feasible, and take into account "environmental, energy, and economic impacts" and to assess the cost-effectiveness of the proposed control options.[1] Cost-effectiveness is defined as the cost, in dollars, of the control alternative, divided by the emission reduction benefits, in tons, of the control alternative.[2] If the cost per ton of emissions reduced is less than the established cost-effectiveness threshold, then the control method is considered to be cost-effective. Cost-effectiveness evaluations need to consider both capital costs (e.g., equipment procurement, shipping, engineering, construction, and installation) and operating (including expenditures associated with utilities, labor, and replacement) costs. Currently, the District is applying a cost-effectiveness threshold of $36,000 per ton of VOC emissions reduced, consistent with the 2022 Air Quality Management Plan (2022 AQMP).[3]

On October 21, 2022, SCAQMD published the presentation slides for PAR 1178 Working Group Meeting (WGM) #6, which was held on October 27, 2022.[4] WSPA offers the following comments on the information presented therein:

[1] California Health & Safety Code §40406, 40440, 40920.6.
[2] California Health & Safety Code §40920.6.
[3] SCAQMD Draft Final 2022 Air Quality Management Plan. Available at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan.
[4] Available at: http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1178

1. **In estimating costs for doming of external floating roof crude oil tanks, the District has not included potential operating and maintenance costs. This is not a complete view of costs, does not align with the Discounted Cash Flow (DCF) method, and results in a significant understatement of the control costs.[5] Operating costs must be considered (along with capital costs) in the calculation of the present value of the proposed controls. Ramboll's cost-effectiveness analysis demonstrates that the proposed doming controls would be above the District's cost-effectiveness threshold when reasonable operating costs are considered.**

SCAQMD's cost-effectiveness thresholds presented in the 2022 AQMP are based on the DCF method, in which the present value of control costs over the life of the equipment is calculated by incorporating capital costs, annual operating costs, and other periodic costs over the life of the equipment. [6] For this rule, SCAQMD has stated that they are using the DCF method but has assumed that operations and maintenance costs would be $0.[7] Therefore, costs related to annual operation and maintenance and other periodic costs over the life of the equipment have not been included in SCAQMD's estimate of lifetime costs.

SCAQMD has proposed a 50-year lifetime for the doming of crude oil tanks. While WSPA strongly disagrees with that assumption (see below comment), it is simply not reasonable to assume that such industrial equipment could be operated for such an extended term without incurring operations or maintenance costs. Staff must incorporate reasonable estimates for both operations and maintenance costs, as well as periodic costs, in order to provide a meaningful cost estimate for doming of crude oil tanks.

3-1

WSPA's technical consultant, Ramboll US Consulting (Ramboll), considered the impact of including annual operating costs in the analysis and compared estimated costs to the District's presented results. WSPA members had provided the District with cost estimates for doming of crude oil tanks, which were also provided to Ramboll. Separately, SCAQMD provided Ramboll a list of tanks and the District's assumed costs and estimated emission reductions.[8] Ramboll used these data to calculate the cost-effectiveness for three installation cost scenarios. For each scenario, the overall cost-effectiveness was calculated considering the installation-only costs (i.e., initial capital investments), and then using a present weighted value (PWV)-adjusted cost which included operating costs, as prescribed by the Discounted Cash Flow Method prescribed in the SCAQMD Air Quality Management Plan (AQMP). The cost-effectiveness of each scenario was calculated for a 50-year equipment lifetime. Cost calculation methodologies for each scenario were as follows:

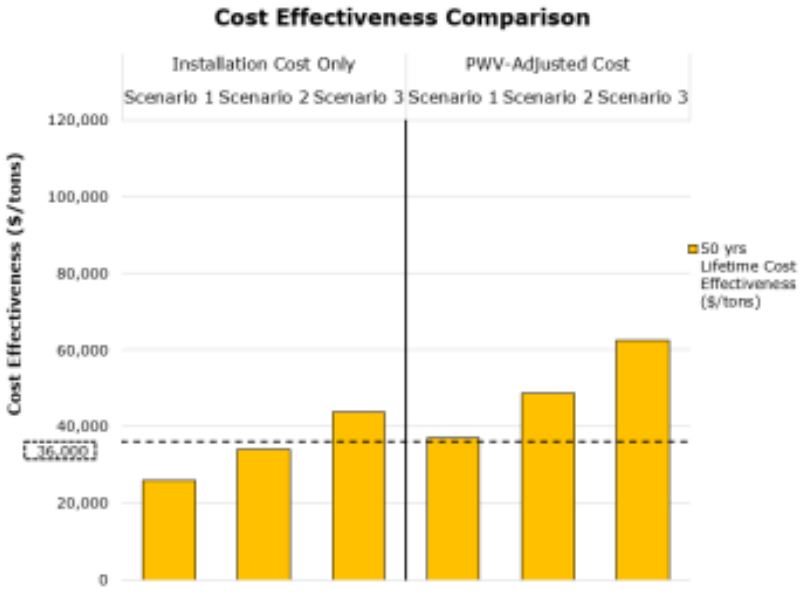
- **Scenario 1**: Installation costs and emission reductions were based on the information presented in Slides 27 and 28 of the PAR 1178 WGM #6 presentation, respectively.[9] Staff's "hybrid cost curve" was used to calculate the installation cost for each tank in the list provided by SCAQMD. A PWV-adjusted cost was also calculated for each tank based on the hybrid cost curve, assuming annual operational costs were equivalent to 2% of the total installation cost.

[5] SCAQMD. Cost-Effectiveness Values and Calculations. Available at: https://www.aqmd.gov/home/permits/bact/cost-effectiveness-values.
[6] SCAQMD Draft Final 2022 Air Quality Management Plan. Available at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan.
[7] Personal communication between Yasmine Stutz, Ramboll, and Melissa Gamoning, SCAQMD on 11/9/22
[8] Email communication from James McCreary, SCAQMD, 11/9/22
[9] SCAQMD PAR 1178 Working Group Meeting #6 Presentation. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par-1178_wgm-6_v9.pdf?sfvrsn=14.

- **Scenario 2**: Installation costs and emission reductions were based on data provided by SCAQMD.[10] A PWV-adjusted cost was then calculated for each tank based on the individual installation cost, assuming annual operational costs were equivalent to 2% of the total installation cost.
- **Scenario 3**: Installation costs were based on the cost data provided by WSPA members. Costs collected from WSPA members were used to create a cost curve based on tank diameter. Emission reductions were based on data provided by SCAQMD.[11] A similar PWV-adjusted cost curve was created assuming annual operational costs were equivalent to 2% of the total installation cost.

Costs for each tank were summed and divided by the total emission reductions for each scenario to calculate the overall cost-effectiveness. The results are summarized in Figure 1 below and compared against the $36,000 cost-effectiveness threshold.

Figure 1. Results of the Cost-Effectiveness Analysis



As shown in Figure 1, Ramboll's analysis demonstrates that under most cost estimation scenarios, the proposed doming controls would actually exceed the cost-effectiveness threshold of $36,000 per ton of VOC emissions reduced. It is important to note the following:

- SCAQMD costs presented in Working Group Meeting #6 assume no operation and maintenance costs over the lifetime of the equipment. As presented in the bars on the right side of Figure 1, if annual operation and maintenance costs are incorporated, none of the scenarios are cost-effective.
- The data presented in Figure 1 is based on District's estimated emission reductions which assume all materials stored in the tanks have a Reid Vapor Pressure (RVP) of

[10] Email communication from James McCreary, SCAQMD, 11/9/22
[11] Ibid.

3-1
Cont.

8.19. Because SCAQMD has not grouped the tanks based on class and category, it is not possible to know whether doming of the tanks would be cost-effective. Given the potential overstatement of emission reductions discussed in Comment #2, it is likely that doming of tanks would be significantly less cost-effective than presented in Figure 1.

- There will be additional costs associated with tanks being out of service during the retrofitting projects, which were not considered in any of these scenarios.

Given the issues with the cost-effectiveness calculations presented by the District, WSPA believes the SCAQMD needs to reevaluate cost-effectiveness to incorporate operations and maintenance costs and create classes and categories suitable to the materials handled in the tanks.

3-1 Cont.

2. SCAQMD has significantly overstated the potential emission reductions for doming of external floating roof crude oil tanks by assuming an RVP of 8.19 psi across all tanks modeled. Staff needs to consider RVP as a parameter in establishing class and category and revise their emissions modeling to get more accurate estimates.

Under California HSC Section 40406, BARCT is defined as "an emission limitation that is based on the maximum degree of reduction achievable by each class or category of source, taking into account environmental, energy, and economic impacts by each class or category of source".[12] As presented at WGM #6, the District has modeled crude oil tank emissions and estimated potential emission reductions based on an RVP value of 8.19 psi for all tanks. SCAQMD Staff stated that 8.19 was calculated based on RVP data provided in leak reports (Table 1) to calculate the mean, and then added two standard deviations. This approach significantly overstates the amount of emission reductions which could result from the control measure, and would subject all of the tanks to a control measure that is not supportable if the District properly considers class and category.

3-2

Refineries in the South Coast are generally oriented towards processing crudes which are heavier (i.e., have a lower API gravity), and sourer (i.e., have a higher sulfur content) than crude stocks in the rest of the United States.[13] Refinery units are configured for these crude stocks.[14] Heavier crudes contain, on average, larger organic molecules and as a result, exhibit lower vapor pressures as compared to lighter crude stocks.[15] Vapor pressure serves as an indirect measure of the evaporation rate of volatile petroleum solvents, with higher vapor pressures indicating greater potential losses from evaporation.[16]

[12] CA Health & Safety Code § 40406 (2019)
[13] California Energy Commission. Petroleum Watch. February 2020. Available at: https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf
[14] Ibid.
[15] Chemistry Comes Alive! Vapor Pressure: Molecular Size. Available at: https://www.chemedx.org/JCESoft/jcesoftSubscriber/CCA/CCA2/MAIN/VAPORESS/CD2R1.HTM
[16] Congressional Research Service. Crude Oil Properties Relevant to Rail Transport Safety: In Brief. February 2014. Available at: https://glslcrudeoiltransport.org/wp-content/uploads/2019/01/Andrews_CRS_Crude-Oil-Properties-Relevant-to-Rail-transportation-Safety-in-brief.pdf

As shown in Table 1, all of the crude stock RVP values referenced by SCAQMD were reported to be below 8.19 psi.

Table 1. RVP Values from Leak Reports as provided by SCAQMD[17]

RVP (psi)
1.77
2.17
2.4
2.5
3.2
3.2
3.8
3.93
4.0
5.85
6.15
6.3
6.63
7.33
7.87

To illustrate the degree of potential overstatement associated with the District's RVP assumption, Ramboll used the TankESP program to model emissions for a hypothetical floating roof tank at different RVP values, holding all other model inputs constant.

In both the pre-dome scenario (i.e., external floating roof design) and the domed scenario (i.e., domed floating roof design), Ramboll utilized TankESP model inputs provided by SCAQMD staff.

Table 2. TankESP Potential Emission Reductions based on Crude RVP[18]

Product	Emissions: Pre-Dome (lb/yr)	Emissions: Domed (lb/yr)	Potential Reductions (lb/yr)
Crude – RVP 8.19	3,747	1,010	2,736
Crude - RVP 6	2,378	755	1,624
Crude - RVP 4	1,458	582	876
Crude - RVP 2	782	455	327

This analysis demonstrates the degree of potential overstatement for emission reductions associated with the District's RVP assumption. Considering tanks that the District analyzed had

[17] Email communication from James McCreary, SCAQMD, 11/9/22.

[18] Based on Ramboll analysis of emissions for a hypothetical tank assumed to have a diameter of 145 ft, annual throughput of approximately 57 million gallons, and an assumed dome roof height of one-sixth the diameter for the "domed" tank emissions, modeled using TankESP.

3-2
Cont.

reported RVPs well below 8.19, the District's estimated emissions reductions from doming (based on an assumed RVP of 8.19) could be overstated by a factor of three to eight times.

RVP is an important criterion in determining the emissions and potential emissions reductions for crude tanks. By failing to accurately consider crude RVP, the District appears to have overstated the potential emission reductions for the proposed rule and failed to fulfill its obligation under HSC to consider class & category in establishing BARCT.

3-2 Cont.

3. **The District's 50 year useful life assumption is arbitrary and unreasonable. This is especially significant given the direct conflict with policy goals presented in the SCAQMD's Air Quality Management Plan (AQMP) and the State of California's Final 2022 Scoping Plan Update. The District must consider a more appropriate time frame for amortizing estimated costs.**

Retrofitting large petroleum tanks with domes for emissions control is a practice that started in the early 2000's, so there is no empirical data to suggest that such retrofitted tanks could remain in service for as long as 50 years. While the District has claimed that one or more vendors suggested 50 years, the District has not demonstrated it would be possible for a facility to obtain a commercial guarantee from a manufacturer for that long a term.

Based on information presented in WGM #6 and reproduced in Figure 2 below, it appears the District arrived at the 50-year assumption by an iterative process. As presented in WGM #6, it was the first useful life length to produced a cost-effectiveness result below the threshold.

Figure 2. SCAQMD Estimates for the Cost-Effectiveness of Doming External Floating Roof Tanks by Dome Useful Life

Dome Useful Life (yrs)	Total Costs ($)	Total Emission Reductions (tons)	Cost-Effectiveness ($/ton)
25	$73,807,300	1,131	$65,300
30		1,357	$54,400
35		1,584	$46,600
40		1,810	$40,800
45		2,036	$36,300
50		2,262	$32,600

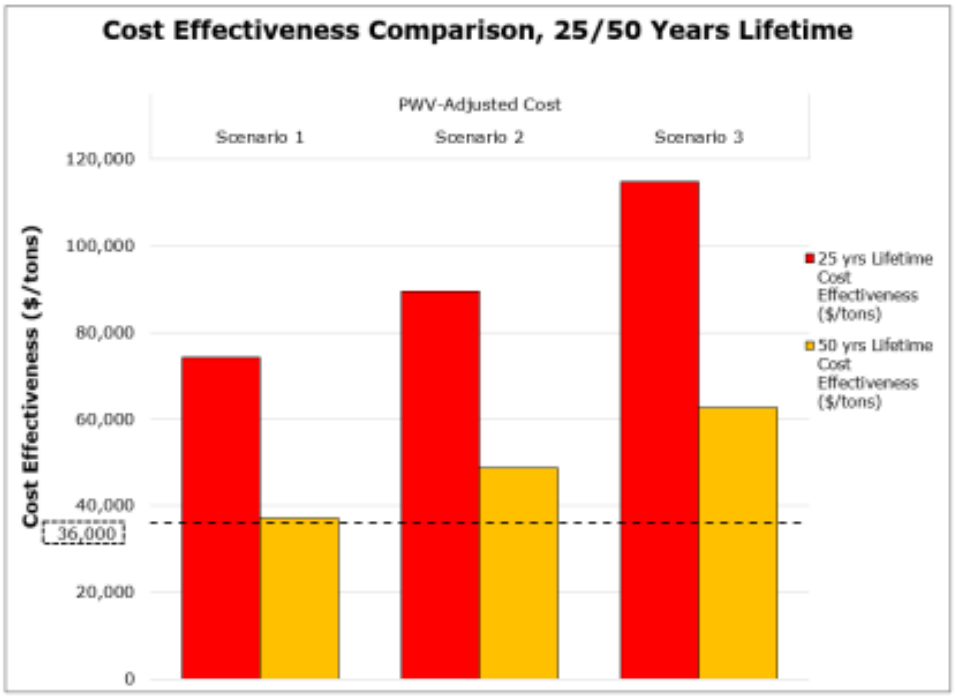
3-3

While this 50-year assumption raises legitimate engineering feasibility questions, it also conflicts with policy directives issued by the District and State of California. A 50-year life on capital investments in response to PAR 1178 would extend until approximately 2075. But the California Air Resources Board (CARB)'s Final 2022 Scoping Plan for Achieving Carbon Neutrality makes it clear that the level of oil and gas infrastructure in operation today should not be in use by 2075. That plan states "Successfully achieving the outcomes called for in this Scoping Plan would reduce demand for liquid petroleum by 94 percent and total fossil fuel by 86 percent in 2045 relative to 2022".[19] With this projection, it leads to the question: On what basis does the District expect these tanks to be operating for another 50 years?

Ramboll considered cost-effectiveness (as discussed in Comment #1) using the District's more typical 25-year useful life assumption (which would extend to 2048). This was done for the three scenarios discussed above. The results are summarized in Figure 3 below and compared against the $36,000 cost-effectiveness threshold.

[19] CARB. 2022 Scoping Plan for Achieving Carbon Neutrality. November 16, 2022.

Figure 3. Results of the Cost-Effectiveness Analysis – Useful Life Comparison



As shown in Figure 3, none of the scenarios would be below the cost-effectiveness threshold (for PWV-adjusted estimates) using the 25-year useful life assumption. The District needs to re-analyze cost effectiveness considering a more reasonable useful life.

3-3 Cont.

4. The District has not completed all of the cost-effectiveness analyses required under the California Health and Safety Code. Incremental cost-effectiveness of each technology must be analyzed and compared to the cost-effectiveness threshold.

The District has not completed all of the cost-effectiveness analyses required under the California HSC. HSC Section 40920.6 prescribes two different cost-effectiveness analyses for BARCT rules[20]:

- 40920.6(a)(2): "Review the information developed to assess the cost-effectiveness of the potential control option. For purposes of this paragraph, "cost-effectiveness" means the cost, in dollars, of the potential control option divided by emission reduction potential, in tons, of the potential control option."; and
- 40920.6(a)(3): "Calculate the incremental cost-effectiveness for the potential control options identified in paragraph (1). To determine the incremental cost-effectiveness under this paragraph, the district shall calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option."

3-4

While the District has presented the stakeholders with cost-effectiveness analyses for the different control options under 40920.6(a)(2), SCAQMD has not presented any information concerning the 40920.6(a)(3) analyses. Such incremental cost-effectiveness analyses are necessary to evaluate the cost per emission reduction for each progressively more stringent control option as compared to the next less expensive control option. Since the District is required to perform both cost-effectiveness evaluations to determine to establish a BARCT standard, the District must include both analyses in its evaluation of proposed BARCT limits.

The District is proposing both optical gas imaging (OGI) systems and doming as potential emission control technologies. To comply with HSC Section 40920.6, District staff must estimate the cost-effectiveness of each control individually and compare them according to the methodology laid out in the HSC in order to complete the incremental cost-effectiveness evaluation.

5. The District must consider the regulatory and cost implications of 40 CFR Subpart Kb in their cost-effectiveness analysis.

40 CFR Part 60 Subpart Kb contains Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.[21] Because many of the crude oil storage tanks in the South Coast were constructed prior to the rule's effective date of July 23, 1984, they are not subject to the performance standards. However, these tanks may become subject to it if the retrofits would be deemed a "Reconstruction" under the NSPS regulations. In the context of the subpart, reconstruction means the replacement of components of an existing facility to such an extent that:

3-5

- "The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility"; and
- "It is technologically and economically feasible to meet the applicable standards set forth in this part".[22]

[20] California Health and Safety Code §40920.6. Available at: https://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-40920-6/.
[21] 40 CFR Part 60 Subpart Kb. Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-Kb.
[22] 40 CFR 60.15 - Reconstruction

Based on the level of capital investment, a project to modify an existing tank might potentially be considered a Reconstruction. In such an event, the tank would be treated as a new source instead of modification. Tanks that become subject to Subpart Kb due to retrofits being classified as reconstructions may have to be further reengineered in order to meet the NSPS. The District must investigate the potential additional costs which might result from 40 CFR Subpart Kb applicability in its cost analysis.

3-5 Cont.

6. **The District's proposal to consider any amount of VOCs detected by an OGI camera as a leak could overestimate the number of leaks exceeding 2,500 ppm. The proposed rule should allow for follow-up investigations following OGI detections and clearly lay out the protocols for conducting such investigations in order to confirm potential leaks.**

OGI systems may not correctly attribute observations to a single emitting source. Depending on observational specifics, VOCs observed in a viewshed might be from several different sources. The rule should not rely on OGIs to determine leaks, because there are no existing reference methods for OGI inspections and different OGI equipment may produce different results. Rather, the rule should make clear what type of follow-up investigations are required based on initial results from OGIs and allow technicians to confirm the presence of leaks.

3-6

7. **There are personal and process safety concerns associated with domed floating roof tanks that can result in additional operating costs, which the District must consider in its cost-effectiveness analysis.**

Operating domed floating roof tanks entails additional safety requirements not present with external floating roof tanks. These additional requirements result in costs to ensure the safety of staff working inside of these tanks. For example:

- Accessing domed tanks for inspection and repair, since they are considered confined spaces with limitations under OSHA standards. These include equipment specifications such as limits on the maximum length for supplied air hoses.
- Cleaning tank seals for inspection, which is more difficult with domed tanks, increasing their down time.
- Vapor recovery systems, which cannot be installed on domed floating roof tanks due to explosion hazards. An alternative option to vapor recovery would be a standalone oxidizer, but this would create additional pollutants through the treatment (e.g., nitrogen oxides [NOx] and carbon monoxide [CO]).

3-7

The District has not considered operation and maintenance costs in its analysis, including those related to safety. This would result in understated costs and lower cost-effectiveness estimates than would likely be experienced for tank doming as proposed. The District should work with refineries to properly understand these costs and incorporate them into the calculations of cost-effectiveness for the proposed controls.

WSPA appreciates the opportunity to provide these comments related to PAR 1178. We look forward to continued discussion of this important rulemaking. If you have any questions, please contact me at (310) 808-2146 or via e-mail at rcromartie@wspa.org.

Sincerely,

Marnie Comate

Cc: Wayne Nastri, SCAQMD
Sarah Rees, SCAQMD
Michael Krause, SCAQMD
Rodolfo Chacon, SCAQMD
Melissa Gamoning, SCAQMD
James McCreary, SCAQMD

Comment 3-1
Staff initially presented costs for doming in March 2022. Since initial costs were presented, staff has been in discussions with facilities and WSPA regarding the proposed doming requirements. Over the past several months, facilities have provided substantial cost information that staff has considered and incorporated into the cost-effectiveness calculations. The current cost-effectiveness analysis is based solely on cost information facilities have provided. No costs have been provided by facilities for maintenance of a dome, nor have facilities made mention of maintenance requirements for a dome. It is unclear how 2% annual operating costs were figured and no supporting data has been provided to substantiate this assertion. Staff believes that the information provided by facilities is accurate and will base the cost-effectiveness on the cost provided by facilities. Refer to cost-effectiveness for doming in Chapter 4 for additional details.

Comment 3-2
Staff has reviewed compliance reports for year 2019 since the throughput values used for emission reduction analysis has relied on 2019 information for representation of normal operations. The highest reported RVP is 8.14 psia. Furthermore, permits and rules reflect TVP limitations of 11 psia for crude tanks. Staff affirms that crude has the potential to have a TVP higher than those reported at a point in time and that using the highest reported crude TVP value is conservative in comparison with using the allowed permitted TVP limit. PAR 1178 provides an exemption from doming for tanks storing crude with consistently low RVP/TVP. The feedback staff has received regarding the exemption for doming suggests that the TVP of crude stored is not consistently low and that most facilities tanks will not store crude that qualifies for the exemption.

Comment 3-3
Staff has relied on statements from dome vendors to determine the equipment life of a dome. The information from vendors regarding equipment life of a dome was presented during Working Group Meeting (WGM) #6. No engineering feasibility questions have been raised to staff and staff sees no evidence that tanks that had installed domes more than 20 years ago were planning replacement in the near future. Staff presented the effect on cost-effectiveness between using 25-year equipment life compared to using a 50-year equipment life because the prior cost-effectiveness calculation assumed a 25-year equipment life. The intent was to show why the new doming proposal in WMG #6 differs from the doming proposal in WGM #5.

Staff is open to considering permit conditions to be taken to remove tanks from service for facilities that will not operate tanks in the future. Staff has not received feedback from any facilities regarding anticipated dates that tanks may be removed from service.

Comment 3-4
Staff agrees that incremental cost-effectiveness analysis is required under the California Health and Safety Code. Staff has conducted an incremental cost-effectiveness for each control technology proposed. Refer to Chapter 4 for the analyses.

Comment 3-5
Staff has no information suggesting that the costs of proposed controls would exceed 50% of the fixed capital cost of the tank. If this information was provided, staff would include potential 40 CFR Subpart Kb costs incurred. Staff has not identified requirements in 40 CFR Subpart Kb that

are more stringent than the requirements of PAR 1178. It is expected that tanks in compliance with PAR 1178 are also in compliance with 40 CFR Subpart Kb.

Comment 3-6

The proposed rule utilizes a new technology, OGI cameras, to assist in leak detection and repair to more easily detect leaks, particularly large leaks, more readily. Staff has met numerous times with stakeholders to discuss actions needed to demonstrate compliance after the OGI detects vapors. The proposed amendments incorporate requirements for compliance verification, recordkeeping and reporting and follow up inspections in the event that VOC vapors are detected during an OGI inspection.

Comment 3-7

Refer to staff's response to Comment 3-1. Costs for operation and maintenance costs, including those related to safety have not been provided. If provided, staff could consider them and incorporate into the cost-effectiveness analysis if appropriate.

4. Comment Letter from the Western States Petroleum Association, dated 2/1/2023

WSPA

Ramine Cromartie
Senior Manager, Southern California Region

February 1, 2023

Mike Morris
Manager, Planning and Rules
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Via e-mail at: mmorris@aqmd.gov

Re: SCAQMD Proposed Amended Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities – WSPA Comments on Initial Preliminary Draft Rule Language

Dear Mr. Morris,

Western States Petroleum Association (WSPA) appreciates the opportunity to participate in the Working Group Meetings (WGMs) for South Coast Air Quality Management District (SCAQMD or District) Proposed Amended Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (PAR 1178). WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport, and market petroleum, petroleum products, natural gas, renewable fuels, and other energy supplies in five western states including California. WSPA has been an active participant in air quality planning issues for over 30 years. WSPA-member companies operate petroleum refineries and other facilities in the South Coast Air Basin that will be impacted by PAR 1178.

SCAQMD released revised initial preliminary draft rule language for PAR 1178 on January 11, 2023.[1] WSPA offers the following comments on the draft rule language.

1. PAR 1178(b), Applicability:

The rule language has been updated to include applicability for

> *"…all aboveground storage tanks with a Potential For VOC Emissions of 6 tons per year or more…"*

In PAR 1178 working group meeting #6, SCAQMD indicated that the applicability was updated to reflect the stringency of US EPA's Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry.[2,3] Because Rule 1178 applies to petroleum facilities, not crude oil production facilities, the requirements of this CTG are not applicable to the facilities regulated under Rule 1178.

4-1

[1] Proposed Amended Rule 1178, Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities: Initial Preliminary Draft Rule Language. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par-1178-initial-pdrl.pdf?sfvrsn=12.
[2] SCAQMD PAR 1178 WGM #7, Slide 18. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par-1178_wgm7_fin.pdf?sfvrsn=6/
[3] US EPA Control Techniques Guidelines for the Oil and Natural Gas Industry. Available at: https://www3.epa.gov/airquality/ctg_act/2016-ctg-oil-and-gas.pdf.

Western States Petroleum Association 1415 L Street, Suite 900, Sacramento, CA 95814 805.701.9142 wspa.org

This particular CTG was created to provide recommendations to state, local, and air agencies on what constitutes RACT for sources of VOC emissions in the **upstream** oil and natural gas industry. In Section 3.1 of the CTG, the oil and natural gas industry is clearly stated to cover oil and natural gas operations involved in the extraction and production of crude oil and natural gas, as well as the processing, transmission, storage, and distribution of natural gas. Oil-related operations include those at the well to the point of custody transfer at a petroleum refinery, but do not include operations that occur at refineries.[4] Section 3.1 goes on to state that[5]:

> *"The oil refinery sector is considered separately from the oil and natural gas industry. Therefore, at the point of custody transfer at the refinery, the oil leaves the oil and natural gas sector and enters the petroleum refining sector."*

Additionally, the 6 tons per year applicability threshold was based in part on the 2012 and 2016 NSPS, which also does not apply to petroleum refinery operations.[6] Subpart OOOOa applies to the Crude Oil and Natural Gas Production source category, as defined in § 60.5430a. The source category is defined as[7]:

(1) Crude oil production, which includes the well and extends to the point of custody transfer to the crude oil transmission pipeline or any other forms of transportation; and
(2) Natural gas production and processing, which includes the well and extends to, but does not include, the point of custody transfer to the natural gas transmission and storage segment.

Given that the referenced threshold is not applicable to refineries, WSPA recommends that the PAR 1178 Applicability section be updated for clarity as follows:

> *Applicability*
> *The rule applies to all aboveground Storage Tanks that have capacity equal to or greater than 75,000 liters (19,815 gallons), are used to store Organic Liquids with a True Vapor Pressure greater than 5 mm Hg (0.1 psi) absolute under actual storage conditions, ~~and all aboveground storage tanks with a Potential For VOC Emissions of 6 tons per year or more,~~ and are located at any Petroleum Facility that emits more than 40,000 pounds (20 tons) per year of VOC as reported in the Annual Emissions Report pursuant to Rule 301 - Permit Fees in any emission inventory year starting with the Emission Inventory Year 2000. In addition, this rule applies to aboveground storage tanks with a Potential for VOC Emissions of 6 tons per year or more located at facilities subject to 40 CFR Part 60 Subpart OOOOa.*

4-1 Cont.

[4] US EPA Control Techniques Guidelines for the Oil and Natural Gas Industry, Section 3.1. Available at: https://www3.epa.gov/airquality/ctg_act/2016-ctg-oil-and-gas.pdf.
[5] Ibid
[6] Sources Covered by the 2012 New Source Performance Standards (NSPS) for VOCs and the 2016 NSPS for Methane and VOCs, by Site. Available at: https://www.epa.gov/sites/default/files/2016-09/documents/sources_covered_2012nsps.pdf.
[7] 40 CFR Part 60 Subpart OOOOa 60.5430a. Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-OOOOa/section-60.5430a.

2. PAR 1178(c), Definitions:

(c)(7): Emission Inventory Year

WSPA recommends that the definition of Emission Inventory Year be updated as follows:

EMISSION INVENTORY YEAR is the annual emission-reporting period from January 1 – December 31 ~~beginning from July 1 of the previous year through June 30 December 31 of a given year. For example, Emission Inventory Year 2000 covers the period from July 1, 1999 through June 30, 2000~~.

4-2

(c)(45): Visually Leak Free Condition

The definition for Visually Leak Free Condition requires that the rim seal inspection be performed when the tank is "static". This is very restrictive because tanks cannot always be made static. SCAQMD should consider including roof openings that meet the requirements of the rule in this language. Suggested language is presented below:

VISUALLY LEAK FREE CONDITION is a condition that exists when vapors are not visible or detectable with an Optical Gas Imaging Device when operated and maintained in accordance with manufacturer training, certification, user manuals, specifications, and recommendations. A Visually Leak Free Condition also exists when a Vapor Tight Condition can be demonstrated for the component in which VOC vapors are emitted and detected with an OGI device and when VOC vapors are emitted from a rim seal or roof openings ~~when the tank is static~~ and the rim seals and roof openings meet~~s~~ the requirements of ~~this rule~~ Rule 1178 Attachment A.

4-3

Current Rule 1178(c)(45): Waste Stream Tank

SCAQMD has proposed deletion of the definition for Waste Stream Tank. This action was not discussed in any of the rulemaking working group meetings. WSPA would like to understand the reasoning and potential impacts of this change.

4-4

(c): Out of Service

WSPA is proposing a new exemption from OGI inspections for tanks that are out of service. WSPA is therefore proposing a new definition be added to Section (c). The suggested definition is presented below:

4-5

[New Section]
OUT OF SERVICE means the tank has lost suction, has met the requirements of Rule 1149, and is open to the atmosphere.

3. PAR 1178(d), Requirements:

(d)(1)(C): Rim Seal Requirements

SCAQMD has proposed modifying the gap specifications in section (d)(1)(C)(iii). Rim seals on existing tanks were designed and engineered to meet the gap specifications in the current

4-6

rule. Because tanks are not round, if a facility adjusts the rim seal gap on one section of a tank, it could affect the rim seal gap at other parts of the tank. Thus, changing the gap specifications as proposed could potentially result in a refinery being required to completely reengineer both the floating roof and its seal.

Such a proposal would require a complete BARCT analysis, including evaluation of technical feasibility, potential compliance costs, and potential emission reductions benefits. To our knowledge, SCAQMD has not performed this evaluation. Therefore, WSPA recommends that SCAQMD remove the proposed changes to section (d)(1)(C).

4-6 Cont.

(d)(1)(G):

PAR 1178(d)(1)(G) proposes to require an owner or operator to measure and record the TVP of the organic liquid stored in any undomed External Floating Roof (EFR) tank on a monthly basis. This proposal is excessive because the properties of materials stored in the tanks should not significantly change during the year. WSPA recommends the following:

- Require semi-annual testing (not monthly).
- Tanks storing commodities with TVP <0.1 psia are not subject to Rule 1178. Therefore, one-time testing should be sufficient to demonstrate non-applicability.
- In lieu of semi-annual testing, facilities should be allowed to rely on the Safety Data Sheet for the materials stored in the tank.
- In lieu of semi-annual testing, add a provision that data can be obtained from refinery or terminal available data, such as crude oil assays or routine quality control testing, provided the facility is within the SCAQMD.
- In lieu of semi-annual testing, add a provision to allow facilities to refer to the Rule 463 Addendum for use of Initial Boiling Point (IBP) and flash point to determine compliance under certain temperatures for materials at 0.5 psia and 1.5 psia, and allow facilities to opt out of testing for products listed in the Addendum.[8]

WSPA recommends the PAR1178 language be updated as follows:

4-7

An owner or operator shall measure and record the True Vapor Pressure of the Organic Liquid stored in any External Floating Roof Tank where a dome has not been installed pursuant paragraph (d)(1)(E), on a ~~monthly~~ semi-annual basis to demonstrate that the True Vapor Pressure of the Organic Liquid stored is 3 psia or less (annual average basis). Measurements shall be taken in accordance with the specified test method in paragraph (i)(4). The True Vapor Pressure of shall be determined based on at least one representative sample or multiple samples collected from the top surface layer that is no deeper than six inches. In lieu of semi-annual testing, facilities may use one of the following methods to establish True Vapor Pressure for a Tank:

(i) Safety Data Sheets, or;
(ii) Other pertinent refinery or terminal data (e.g. crude oil assays or routine quality control testing, or;
(iii) For materials listed in the Addendum to Rule 463, use the temperature, initial boiling point, and flash point to determine compliance for materials at 0.5 psia and 1.5 psia, or;
(iv) alternate method approved by the Executive Officer.

[8] SCAQMD Rule 463 and Rule 463 Addendum. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-463.pdf.

Current Rule 1178 (d)(2)(C)(ii):

SCAQMD has proposed deletion of section (d)(2)(C)(ii). This language was recently added to address potential process safety concerns for waste water tanks from accumulation of pyrophoric materials. The new proposal to eliminate that provision was not presented to the Working Group. SCAQMD should retain the current section (d)(2)(C)(ii) language to ensure that waste water tanks can be operated safely.

4-8

(d)(4)(A)(1)

SCAQMD has proposed that Fixed Roof Tank emissions be vented to a Fuel Gas System or an Emissions Control System with an overall control efficiency of 98%. The control efficiency in the current rule is 95%. During PAR 1178 Working Group Meeting #7, the District stated that existing operating emission control systems already meet the proposed control efficiency.[9] WSPA is not aware that the District provided any evidence to support this statement. Current permits are issued based on a 95% control efficiency. If the District intends to update the control efficiency requirement, the technical basis for this update should be provided. WSPA recommends that the language revert back to the current rule language:

The tank emissions are vented to an emission control system with an overall control efficiency of at least 95% by weight or the tank emissions are vented to a fuel gas system.

4-9

(d)(5)(C):

PAR 1178(d)(5)(C) requires that the facility submit the American Petroleum Institute (API) 653 internal inspection schedule for EFR Tanks no later than 6 months after the date of adoption. WSPA recommends the language be updated as follows:

Effective [Date of Adoption], submit to the Executive Officer the API 653 internal inspection schedule for any External Floating Roof Tank storing Organic Liquid with a True Vapor Pressure of 3 psia or greater no later than 6 months after [Date of Adoption]. If the API 653 internal inspection schedule changes from what was previously submitted, the owner or operator shall submit to the Executive Officer a revised internal inspection schedule within 90 days of becoming aware of the schedule change.

4-10

(d)(5)(D):

PAR 1178(d)(5)(D) requires a facility to comply with the requirements for Internal Floating Roof (IFR) Tanks when the tanks are scheduled for emptying and degassing, but no later than 10 years after becoming subject to the requirements of the rule. This could force an early turnaround of an IFR Tank before its next required API inspection, adding to the cost of compliance. To our knowledge, SCAQMD has not evaluated the impact of such compliance schedule requirements, nor the associated costs to determine whether such a requirement would be cost effective. WSPA recommends the proposed language be updated as follows:

4-11

[9] SCAQMD PAR 1178 Working Group Meeting #7 Presentation. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par-1178_wgm7_fin.pdf?sfvrsn=6.

Effective [Date of Adoption], comply with the requirements for Internal Floating Roof Tanks specified in paragraph (d)(3) when the tanks are scheduled for emptying and degassing ~~but no later than 10 years after becoming subject to the requirements of this rule~~. Any Internal Floating Roof Tanks that later becomes subject to the rule shall comply with the requirements of paragraph (d)(3) when the tanks are scheduled for emptying and degassing ~~, but no later than 5 years after becoming subject to the rule~~.

4-11 Cont.

4. PAR 1178(f), Inspection and Monitoring requirements:

(f)(4): General Comments BARCT Analysis

The BARCT analysis presented by the District for OGI inspections is not representative of the nature of the inspections presented in the rule language. The District must therefore reassess technical feasibility and cost-effectiveness for OGI inspections.

SCAQMD presented an estimated cost-effectiveness of $16,900 per ton VOC reduced from weekly third party OGI inspections.[10] The cost estimate used in the cost-effectiveness analysis assumed partial tank monitoring (15 tanks per weekly inspection) and a tank farm overview with an OGI camera. Costs were predicated based on the survey of 15 tanks in one day. As written in the proposed rule language, it simply would not be possible for one inspector to perform OGI inspections of 15 tanks in a day for the following reasons:

- The language in PAR 1178 (f)(4)(B)(i)(A) for individual tank inspections is significantly more prescriptive than described during the working group meetings. The extensive nature of the described inspection will require more time than previously understood.
- There will be safety considerations and physical limitations that need to be addressed, including ladders, wet surfaces, and heat exposure. All of these could potentially result in slip, trip, and fall injuries. Safety concerns must be taken into account as the OGI inspections are performed, again adding to the time it would take to complete a tank inspection.
- While the District mentioned a tank farm overview as being part of the cost-effectiveness analysis, there was no time allocation for the inspector to walk the grounds and stand at an elevated position to obtain a clear view at roof level height of each tank that is not part of the 15 individually monitored tanks. Walking the grounds around all tanks would be a significant additional undertaking.
- Additional time would be required to demonstrate a Visually Leak Free Condition if detection is identified. This demonstration would require deployment of an inspector and supporting crew to conduct inspections as required by Rule 1178 Appendix A.

4-12

(f)(4): Comments on Rule Language:

Notwithstanding the previous comments regarding the infeasibility of monitoring 15 tanks in one day and the associated request for SCAQMD to reassess cost-effectiveness and technical feasibility analyses, WSPA offers the following comments on the proposed rule language for OGI inspections:

- SCAQMD should include flexibility to use other monitoring methods, as approved by the Executive Officer, that would be equivalent to OGI inspections.

4-13

[10] SCAQMD PAR 1178 Working Group Meeting #5. Available at: http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1178/par1178-wgm5-final.pdf?sfvrsn=12.

- PAR 1178(f)(4)(B) would require a facility's inspector to monitor all tanks at a facility with an OGI device at least every 7 calendar days. WSPA recommends that SCAQMD take into account weekends, holidays, and inclement weather in the OGI inspection schedule.
- The requirement to walk the grounds around the tanks and view all tanks at an elevated position is not reasonable and should be removed.
- Some tanks may show evidence of vapors during an OGI inspection, even when the tank is operating in compliance with rule requirements. If a tank is monitored and is found to have vapors, but is operating in compliance, no repairs or adjustments would be made. However, this same result would be expected during the next inspection. A facility would be forced to monitor, assess compliance, and monitor again in an endless cycle. WSPA recommends that language be added to the rule that states that if a detection is identified due to OGI monitoring, the tank shall be deemed compliant if the fixed roof tank meets the vapor tight condition and the floating roof tank meets the applicable requirements, under Rule 1178 Attachment A.
- If no vapors are detected from an individual tank for a year, then OGI monitoring should be reduced to annual monitoring until vapors are detected.
- SCAQMD has not prescribed an implementation timeline for OGI monitoring. OGI monitoring could take up to a year to implement. An implementation schedule should be included in the rule.

WSPA recommends the proposed language be updated as follows:

(f)(4) Optical Gas Imaging Instrument (OGI) Inspections
To demonstrate compliance with subparagraphs (d)(1)(D), (d)(2)(C), (d)(3)(C) and (d)(4)(C), an owner or operator of a tank shall conduct OGI inspections in accordance with the following requirements:

(A) The person conducting the inspection shall:
(i) Complete a manufacturer's certification or training program for the OGI device used to conduct the inspection prior to conducting inspections; and
(ii) Operate and maintain the OGI device in accordance with the manufacturer's specifications and recommendations.

(B) The inspector shall monitor all tanks at a Facility with an OGI device or alternate monitoring method as approved by the Executive Officer at least every 7 calendar days since the last OGI inspection occurred. For each inspection, the person(s) conducting the inspection shall:
(i) Individually monitor a minimum of 15 tanks at facilities with more than 15 tanks, and individually monitor all tanks at facilities with 15 or fewer tanks, according to the following:
(A) ~~Monitor all rim seals and Roof Openings, including but not limited to, vents, Roof Legs, Sample Ports, Access Hatches, Guidepoles, and Emission Control System connections.~~ Monitor all visible external tank components by conducting a horizon scan of 15 individual tanks.
(B) For facilities with 15 or more tanks, no tank shall be monitored again and counted towards the minimum of 15 tanks until all tanks have had an equal number of OGI inspections.

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~~*(ii) Monitor all remaining tanks at the Facility that were not monitored pursuant to clause (f)(4)(B)(i) according to the following:*~~

~~*(A) Walk the grounds around the tanks to obtain a clear view of each tank; and*~~

~~*(B) Stand at an elevated position to obtain a clear view at the roof level height of each tank.*~~

If a detection is identified due to OGI monitoring the tank shall be deemed compliant if the fixed roof tank meets the vapor tight condition and the floating roof tank meets requirements of Rule 1178 Attachment A.

4-21

(f)(4)(C) Follow-Up Optical Gas Imaging Inspections

(i) A person that meets the requirements of subparagraph (f)(4)(A) shall monitor with an OGI device all sources that were not maintained in a Visually Leak Free Condition and identified during a weekly inspection required by subparagraph (f)(4)(B) during the two weekly inspections immediately following the inspection where the source of a leak was identified. Tanks with components that are imaged after repairs shall not count towards the minimum number of tanks required to be monitored pursuant to clause (f)(4)(B)(ii). Follow-Up Optical Gas Imaging Inspections are not required if fixed roof tanks meet the vapor tight condition and floating roof tanks meet requirements of Rule 1178 Attachment A.

4-22

(ii) If no vapors are detected from an individual tank for a year, then OGI monitoring should be reduced to annual monitoring until vapors are detected.

4-23

(f)(4)(D) In lieu of using an OGI device for inspections required by (f)(4)(B) or (f)(4)(C), a Certified Person may conduct EPA Method 21 measurements for all rim seals systems and Roof Openings. If a Rim Seal System or Roof Opening is inaccessible and measurements cannot be taken using EPA Method 21, an owner or operator shall inspect the rim seal or Roof Opening using an OGI device in accordance with subparagraph (f)(4)(B).

(f)(4)(E) Compliance Schedule:

The owner or operator of any storage tank subject to the rule on or after [Date of Adoption] shall implement OGI monitoring no later than 12 months after [Date of Adoption].

4-24

5. PAR 1178(g), Maintenance Requirements

PAR 1178(g) proposes new maintenance requirements in response to deficiencies found during inspections. WSPA recommends that SCAQMD update the allowable timeframe for repairs to 3 calendar days to be consistent with Rules 1173 and 1176. WSPA proposes language be updated as follows:

(g)(1) The owner or operator shall repair, or replace any materials or components, including but not limited to, piping, valves, vents, seals, gaskets, or covers of Roof Openings or seals that do not meet all the requirements of this rule before filling or refilling an emptied and degassed storage tank, or within ~~72 hours~~ 3 calendar days after an inspection, including one conducted by the owner or operator or the contracted third-party as specified in subdivision (f).

4-25

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The proposed rule should specify a timeline for compliance demonstration. WSPA recommends the following language be added to Section (g):

[New Section]

(g)(2) If a detection is identified on a tank via OGI monitoring, the facility shall complete the following steps in the timeframe provided:

(A) Within 7 days of the OGI monitoring, determine compliance with Rule 1178 using the inspection procedures in Attachment A.

(B) If the tank is found not to be in compliance with Rule 1178 Attachment A, repair the tank within 3 days.

4-26

6. PAR 1178(h), Record Keeping and Reporting Requirements

SCAQMD is requiring that records of leaks identified with an OGI device include a digital recording of the leak for a minimum of 5 seconds. Capturing an entire tank seal would take at least 30 seconds, requiring 6 MB of storage space per video. Over a period of 5 years, this would require a significant amount of storage space. It is unclear how this video capture will contribute to compliance. WSPA recommends this requirement be struck from the rule language.

(h) Record Keeping and Reporting Requirements

(1) The owner or operator shall keep records of all inspections required in subdivision (f), including record of inspected tanks, inspection dates, inspection methods, and all findings, including but not limited to the readings measured according to EPA Reference Test Method 21 and leak identified with an OGI device. ~~Records of leaks identified with an OGI device shall include a digital recording of the leak for a minimum of 5 seconds.~~

4-27

(2) The owner or operator shall record all inspections conducted pursuant to paragraphs (f)(1) through (f)(3) of Primary Seals, Secondary Seals, a Flexible Enclosure System (if any), and Roof Openings on compliance inspection report forms approved by the Executive Officer as described in Attachment A.

(3) The owner or operator shall submit all inspection reports for inspections conducted pursuant to paragraphs (f)(1) through (f)(3) and documents to the Executive Officer semiannually within five working days of completion of the inspections specified in paragraph (f)(1) and (f)(2); and on January 31 and July 31, respectively, upon the completion of two consecutive quarterly inspections conducted as specified in subparagraph (f)(3)(B).

(4) If the owner or operator determines that a tank is in violation of the requirements of this rule during the inspections specified subdivision (f), the owner or operator shall submit a written report to the Executive Officer within ~~120 hours~~ 5 calendar days of the determination of non-compliance, indicating corrective actions taken to achieve compliance.

4-28

(5) The owner or operator who elects to install or modify an Emission Control System to comply with the requirement in clause (d)(4)(A)(i) shall conduct an initial performance test as described in clause (f)(3)(A) and submit a complete test report to the Executive Officer no later than 180 days after the effective date of the requirement for new installation; or 180 days after the modification. Subsequent annual performance test

and test report shall be submitted annually within 60 days after the end of each Emission Inventory Year.

(6) The owner or operator shall keep all monitoring, inspection, maintenance, repair records, and sampling results~~, and digital recordings~~ at the Facility for a period of five years and shall make the records available to the Executive Officer upon request

4-29

7. PAR 1178(j), Exemptions

PAR 1178(j)(4) exempts Fixed Roof Tanks from OGI inspections for weeks that inspections are conducted pursuant to (f)(3)(B). WSPA recommends that similar exemptions be added for External Floating Roof, Internal Floating Roof, and Domed External Floating Roof Tanks.

WSPA recommends the PAR1178 language be updated as follows:

(j)(4)

(A) ~~An owner or operator of a~~ A Fixed Roof Tank ~~shall~~ may be exempt from OGI inspections required by subparagraph (f)(4)(B) for weeks that inspections are conducted pursuant to subparagraph (f)(3)(B). OGI inspections shall resume within 7 days of an inspection conducted pursuant to subparagraph (f)(3)(B).

4-30

[New Section]

(B) An External Floating Roof Tank may be exempt from OGI inspections required by subparagraph (f)(4)(B) for weeks that inspections are conducted pursuant to subparagraph (f)(1). OGI inspections shall resume within 7 days of an inspection conducted pursuant to subparagraph (f)(1)(A).

4-31

[New Section]

(C) An Internal Floating Roof Tank or Domed External Floating Roof Tank may be exempt from OGI inspections required by subparagraph (f)(4)(B) for weeks that inspections are conducted pursuant to subparagraph (f)(2). OGI inspections shall resume within 7 days of an inspection conducted pursuant to subparagraph (f)(2).

4-32

PAR 1178(j) should also include an exemption from OGI inspections for tanks that are out of service.

WSPA recommends the PAR1178 language be updated to include the following:

[New Section]

(j)(6) A Fixed Roof Tank, an External Floating Roof Tank, an Internal Floating Roof Tank, and Domed External Floating Roof Tank may be exempt from OGI inspections required by subparagraph (f)(4)(B) if the subject tank is Out of Service.

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WSPA appreciates the opportunity to provide these comments related to PAR 1178. We look forward to continued discussion of this important rulemaking. If you have any questions, please contact me at (310) 808-2146 or via e-mail at rcromartie@wspa.org.

Sincerely,

Marina Comate

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Comment 4-1
Staff has been in communication with U.S. EPA regarding the applicability of the 2016 CTG. U.S EPA has stated that the applicability of 40 CFR Part 60 Subpart OOOOa is not sufficient to satisfy the applicability requirements of the 2016 CTG. Staff is continuing to work with U.S. EPA to fully understand the applicability of the 2016 CTG with the intent of mirroring the applicability in PAR 1178.

Comment 4-2
Staff does not propose to change the definition of Emission Inventory Years for all years since year 2000 since changing the definition may result in facilities no longer being subject to the rule. The intent of the rule is to continually apply to facilities that have emitted 20 per year or greater in any Emission Inventory Year from year 2000. Staff will consider revising the definition of Emission Inventory Year for years beyond 2023 to be calculated from January 1 to December 31, beginning in year 2024.

Comment 4-3
Staff established a definition of Visible Vapors and a requirement for tanks to be maintained in a condition that is free of Visible Vapors that includes Visible Vapors from Rim Seal Systems and Roof Openings.

Comment 4-4
The definition of Waste Stream Tank has been re-inserted into PAR 1178.

Comment 4-5
Staff is requesting clarification on the tanks expected to meet the proposed definition of an "out of service" tank.

Comment 4-6
(d)(1)(C) - Staff has presented findings, including a complete BARCT analysis, that support the proposal to require more stringent gap requirements established at other agencies and by U.S. EPA. Refer to the BARCT discussion on seal requirements in Chapter 2 for additional details.

Comment 4-7
(d)(1)(G) - Staff has revised the TVP testing requirements to allow for semi-annual testing as requested. Reliance on safety data sheets and or other pertinent refinery data does not offer the same amount of certainty of material's TVP as testing. Staff is not proposing to allow other forms of information to be used to determine the TVP of a material inside of a tank. Current guidelines already established in Rule 1178 may still be used to determine if a material has TVP of 0.1 psia or less.

Comment 4-8
Current Rule 1178 (d)(2)(C)(ii) - Staff has re-inserted the provision that allows exemption from doming for tanks storing pyrophoric materials.

Comment 4-9

(d)(4)(A)(1) - Staff has presented findings that support the proposal for requiring 98% by weight control efficiency for emission control systems, including vendor guarantees. Refer to the BARCT analysis on emission control systems for additional details. Staff has not received additional facility information, such as annual performance test results, suggesting that emission control systems are not achieving at least 98% by weight control efficiency.

Comment 4-10

(d)(5)(C) – Staff initially assumed that most API 653 Internal Inspections would occur every 10 years for most tanks. Staff has since learned that several API 653 internal inspections have been planned in the 2040s, with some inspections planned out to 2050. Staff has performed a cost-effectiveness analysis that considers additional costs that would be incurred if full implementation were required by 2038. Refer to "Implementation and Cost" discussion on page 4-7. Staff is proposing that facilities dome 30% of tanks by 2031, 50% of tanks by 2033, and 100% of tanks by 2038. Staff established percentages of to be domed by 2031 and 2033 based on submitted API internal inspections.

Comment 4-11

(d)(5)(D) – Staff has established a 10-year maximum time limit to add a secondary seal to an internal floating roof tanks based on the Rule 1178's requirements for performing gap measurements at least every 10 years. Staff has not received information indicating that a tank is taken out of service for complete gap measurements. Staff does not plan to remove the existing requirement for tanks that later become subject to the rule to meet the requirements of paragraph (d)(3) no later than 5 years after becoming subject to the rule as removal of the requirement would be backsliding and facilities have not reported any issues with this provision to date.

Comment 4-12

Stakeholders requested more specificity on how OGI inspections should be conducted and staff has responded to this request with added detail in the proposed rule. Staff has proposed OGI inspection requirements based on information from leak detection service providers that regularly conduct inspections with OGI at facility types subject to the rule. Additionally, staff has personally participated in the procedure for conducting an OGI inspection on tanks to gain a sense of the time it would take to perform an inspection. However, to address stated safety concerns and equity issues with the number of times a tank would be expected to be inspected at a larger facility versus a small facility, staff has revised the OGI inspection requirements to be conducted on a periodic basis. Proposed rule language includes provisions to avoid conducting OGI inspections due to safety concerns. Costs associated with a weekly tank farm inspection are included in the cost-effectiveness analysis for this provision. The time required could be accomplished by one person in one day. Additional time is provided to demonstrate a condition that is free of Visible Vapors.

Comment 4-13

PAR 1178 allows Method 21 measurements to be taken on all components required to be inspected during an OGI inspection in lieu of conducting monitoring with an OGI device. Staff is requesting information regarding alternative monitoring methods or technologies that facilities would like staff to consider.

Comment 4-14

Staff proposes that an inspection occur every 7 days which is sufficient to accommodate weekends and holidays and potential inclement weather.

Comment 4-15
The tank farm inspection allows the facility to walk the grounds or view at an elevated position. Walking the grounds would be simpler, while viewing at an elevated position would be quicker. Each facility may choose which options works best for them.

Comment 4-16
Staff has revised the requirements for OGI inspections that addresses the concern with verification of a Visibly Leak Free Condition.

Comment 4-17
Staff disagrees that inspections frequency should decrease to annually if vapors are not detected during inspections as components are more likely to leak with age, do not occur at regular frequencies, and are often associated with one-time events such as a hatch being left open. Furthermore, frequent OGI inspections are proposed to reduce the time that vapors are emitted once a leak occurs. Reducing the frequency of the OGI inspections provides an opportunity for a leak to occur for an extended time.

Comment 4-18
Staff has revised PAR 1178 to include an implementation schedule for OGI inspections. Component inspections for individual tanks will be required every three months for external floating roof tanks and every six months for internal floating roof tanks and domed external floating roof tanks rather than a specified number per week. Follow up inspection requirements are included to determine if the tank is in a vapor tight condition. The provisions for OGI monitoring are proposed to be effective January 1, 2024, approximately seven months after rule adoption. Staff believes this is sufficient time to implement an OGI monitoring program.

Comment 4-19
Please refer to Comment 4-13.

Comment 4-20
Please refer to Comment 4-15.

Comment 4-21
Please refer to Comment 4-16.

Comment 4-22
Please refer to Comment 4-16.

Comment 4-23
Please refer to Comment 4-17.

Comment 4-24
Please refer to Comment 4-18.

Comment 4-25
Staff proposes to keep repair timelines within 72 hours as three calendar days would be more than 72 hours thus relaxing that requirement may be considered backsliding.

Comment 4-26
Staff has revised OGI inspection requirements to address the concern with frequent follow up for verification of compliance with a condition in which the tank if free of Visible Vapors.

Comment 4-27
Staff proposes to keep requirements for digital recordings of leaks; however, has reduced the time in which recording must be kept to 2 years from 5 years to address concerns about data storage.

Comment 4-28
Staff proposes to keep the requirement for leak reports to be submitted within 120 hours of the determination on non-compliance. Relaxing that requirement to five days would be greater than 120 hours and may be considered backsliding.

Comment 4-29
Please refer to Comment 4-27.

Comment 4-30
(j)(4) – Component Inspections are not required for fixed roof tanks; however, staff is proposing weekly Tank Farm Inspections to capture any major event which would result in a large leak. Staff is proposing to maintain current weekly Tank Farm Inspections for every week since there is no way to predict when such a leak might occur. Additionally, OGI may capture leaks that are not addressed during current inspections such as gap measurements or when Method 21 measurements are taken.

Comment 4-31
Staff proposes to maintain weekly OGI inspections on all tanks to identify any potential emissions that are not identified during an inspection required by paragraphs (f)(1)-(3) and will consider exemption from Component Inspections for weeks that inspections required by paragraph (f)(1)-(3) are conducted.

Comment 4-32
Please refer to Comment 4-31.

Comment 4-33
Staff is requesting further information on the need for an exemption when tanks are out of service