SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report

Proposed Amended Rule 1118 – Control of Emissions from Refinery Flares

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Deputy Executive Officer
Planning, Rule Development, & Area Sources
Phillip Fine

Assistant Deputy Executive Officer
Planning, Rule Development, & Area Sources
Susan Nakamura

Planning and Rules Manager
Planning, Rule Development, & Area Sources
Ian MacMillan

AUTHOR: Dairo Moody, Air Quality Specialist

CONTRIBUTORS: Eugen Teszler, Air Quality Engineer
Ed Eckerle, Program Supervisor (retired)

REVIEWED BY: Daphne Hsu, Senior Deputy District Counsel

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EXECUTIVE OFFICER:

WAYNE NASTRI

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EXECUTIVE SUMMARY

In recent years, incidents at refineries, including offsite power disruptions and onsite process unit breakdowns, resulted in flaring events and increased emissions. These recent significant flaring events at refineries have resulted in increased public concern over the potential air quality impact of flaring emissions. Flaring activities have been conducted as a safety measure to relieve pressure in process units that are temporarily not operating within design parameters. Flaring also commonly occurs through routine activities such as planned start-ups/shut-downs of process units and facility turnarounds.

In 2012 US EPA initiated a review of its Refinery Regulations, New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP) and Maximum Achievable Control Technology (MACT) I and MACT II regulations for refinery process units and ancillary equipment operations, including flare operations. The review resulted in a Final Refinery Sector Rule released in December 2015. These updated federal requirements for flaring focus on reducing significant flaring events, and ensuring that when flaring does occur, combustion is as efficient as possible in order to reduce emissions. Based on recent studies, in December 2016, EPA also revised its AP-42 guidance for estimating Volatile Organic Compounds (VOC) emissions from flaring, increasing the emission factor about 10-fold.

Staff is proposing to amend Rule 1118 in two phases. Proposed amendments presented in this staff report represent the first phase, while the second phase of rulemaking is expected to begin in 2018. In this first phase for Proposed Amended Rule 1118, staff is recommending to:

1. Harmonize Rule 1118 with key updates from US EPA's recent Refinery Sector Rule update regarding flares, including new prohibitions on some types of flaring,
2. Require facilities subject to Rule 1118 to prepare a Scoping Document that evaluates the feasibility of minimizing or avoiding planned and unplanned flaring events,
3. Remove the $4 million annual cap on mitigation fees that facilities may pay for flaring,
4. Update emission factors based on EPA's updated AP-42 guidance, and
5. Update and clarify reporting requirements for facilities.

In the second phase of rulemaking, staff is proposing to use the information from Scoping Documents provided by facilities, the updated reporting requirements, and potentially the results from a separate Optical Remote Sensing Pilot Study that staff is proposing to develop a more comprehensive update to Rule 1118, though concepts for this second phase that have not yet been developed.

BACKGROUND

Introduction

In recent years several incidents at some refineries, including offsite power disruptions and onsite process unit breakdowns, resulted in flaring events and increased emissions, impacting neighboring communities. The amount of flaring that has occurred in recent years has varied, with some refineries flaring more than others (described further below). Whether from unplanned events like external power disruptions or onsite emergencies, or from planned events like refinery turnarounds, flaring occurs when the Flare Gas Recovery (FGR) system is unable to

handle the amount or type of gases being directed into that system at that time. Vent gases generated during the refining process (typically hydrocarbons) are often sent to the FGR system, where they are recovered by injecting them into the refinery's fuel gas system for use in other processes, such as fuel for a steam boiler. However, if the amount of gas coming into the FGR system is higher than the capacity of that system, for example higher than the gas compressor capacity of the FGR system, then the extra gas is discharged into the atmosphere at the flare tip to avoid unsafe over-pressurization. These gases are then combusted at the flare tip to reduce emissions and the potential buildup of combustible gases. While this simplified explanation describes why flaring occurs, individual flaring events all have their own unique cause and each refinery has varying abilities to prevent and/or handle flaring due to the complexity of each refinery.

All refineries in the SCAQMD have FGR systems, partially as a result of Rule 1118, and the amount of flaring has been reduced since the last amendment to the rule in 2005. However, some refineries continue to experience thousands of individual flaring events each year. While most events have only a minor release of emissions, some are significant events that result in substantial emissions of many pollutants, along with dark plumes of smoke. Proposed Amended Rule (PAR) 1118 seeks to build upon the improvements that refineries have made, and reduce flaring even further. This rulemaking effort consists of a phased approach, where Phase I includes mechanisms to gather more information, makes some adjustments to the rule to be consistent with federal requirements (described below). Phase II of the rulemaking will begin in 2018 and will act upon the information gathered from Phase I, and will seek more comprehensive changes to the rule.

The amendments being sought or considered in Phase I include:

1. Harmonize Rule 1118 with key updates from US EPA's recent Refinery Sector Rule update regarding flares, including new prohibitions on some types of flaring,
2. Require facilities subject to Rule 1118 to prepare a Scoping Document that evaluates the feasibility of minimizing or avoiding planned and unplanned flaring events,
3. Remove the $4 million annual cap on mitigation fees that facilities may pay for flaring,
4. Update emission factors based on EPA's updated AP-42 guidance, and
5. Update and clarify reporting requirements for facilities.

Each of these proposed amendments is described in more detail below. In addition to these rule amendments, staff is proposing to initiate an optical remote sensing Pilot Study to evaluate the viability of emerging technologies' ability to monitor emissions above the flare tip.

Flaring Emissions

The types of petroleum refinery operations subject to this rule are petroleum refineries, sulfur recovery plants that recover sulfur compounds from sour water generated by petroleum refineries and hydrogen production plants that produce hydrogen from refinery gas and supply hydrogen for petroleum refinery operations that operate a gas flare. The gas flares are used for the combustion and disposal of combustible gases due to emergency relief, overpressure, and process upsets, startups, shutdowns and other operational and safety reasons. Presently, there are eight operating petroleum refineries, one sulfur recovery plant and three hydrogen production plants with a total of 31 existing flares affected by this proposed rule.

Facilities Subject to Rule 1118

Facility Name	Number of Flares
Air Liquide	1
Air Products Carson	1
Air Products Wilmington	1
Chevron Products Company	6
Paramount Petroleum	1
Phillips 66 Carson	2
Phillips 66 Wilmington	4
Tesoro Carson	5
Tesoro Wilmington	2
Tesoro Sulfur Recovery Plant	1
Torrance Refinery	3
Ultramar/Valero	4
12 Facilities	**31 Flares**

Under the existing Rule 1118, facilities subject to the rule must report their flaring emissions by category every quarter to SCAQMD. Rule 1118 requires facilities to classify all flaring events using one of the categories listed in the box below.

Categories of Flaring

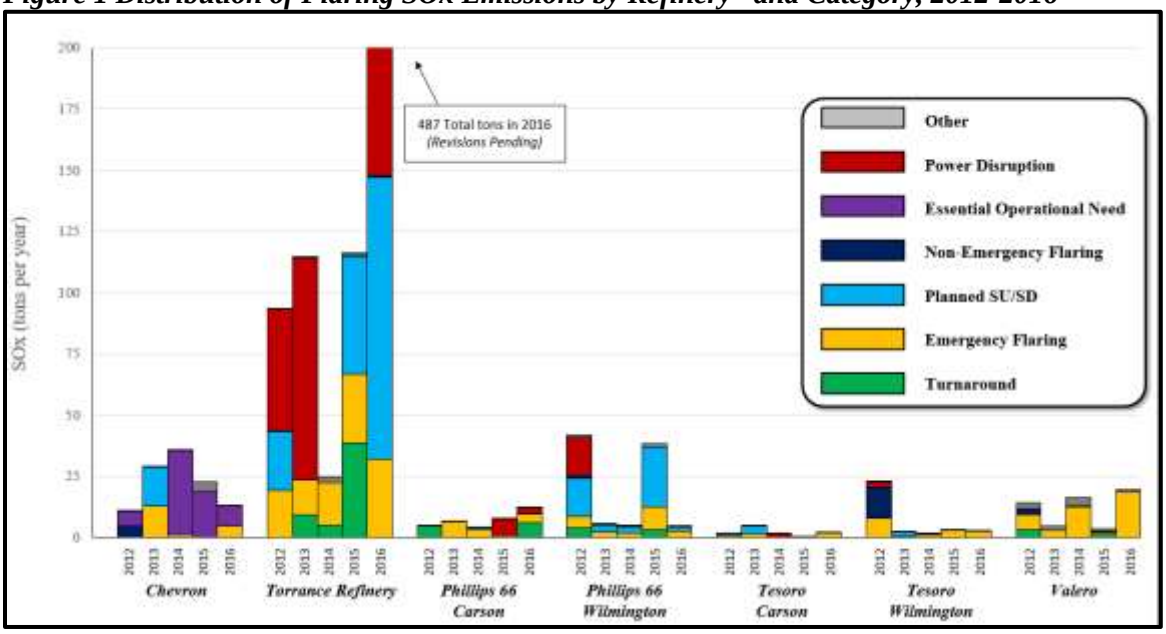
Turnarounds	Essential Operational Need (EON) – Clean Service Stream
Planned Maintenance	EON – Intermittent Minor Venting
Planned Start-up / Shut-down (SU/SD)	EON – Pressure/Temperature Excursion
Emergency Flaring	EON – Relief Valve Leakage
Non-Emergency Flaring	EON – Temporary Fuel Gas Imbalance
Minor Venting (<5,000 standard cubic feet)	EON – Unrecoverable Stream
Undetermined / Other	
Force Majeure (power disruption, Natural disaster, acts of war/terrorism)	

In addition to the category of flaring each facility must report the following information for each flaring event: criteria pollutant emissions (including sulfur oxides [SOx], volatile organic compounds [VOC], particulate matter [PM], carbon monoxide [CO]), the start and end time of the event, the heating value of the vent gas, the total vent gas flow, and which flare was used.

SOx Emissions

Although there have been nearly 59,000 reported flaring events between 2012-2016, about 44% of the total SOx emissions (506 tons of SOx out of a total of 1,158 tons) have been reported from 13 power disruption events. All other remaining events have resulted in 652 tons of emitted SOx. Of these ~59,000 non-power disruption events, approximately 96% of the total SOx emitted from flaring has come from the top 1% of flaring events. Further, 62% of all SOx has come from the top 50 non-power disruption flaring events. This distribution of emissions data indicates that while flaring is a common occurrence, the bulk of flaring emissions come from just a small number of high emitting events. Figure 1 provides a more detailed distribution of SOx emissions caused by flaring at each facility since 2012.

Figure 1 Distribution of Flaring SOx Emissions by Refinery* and Category, 2012-2016

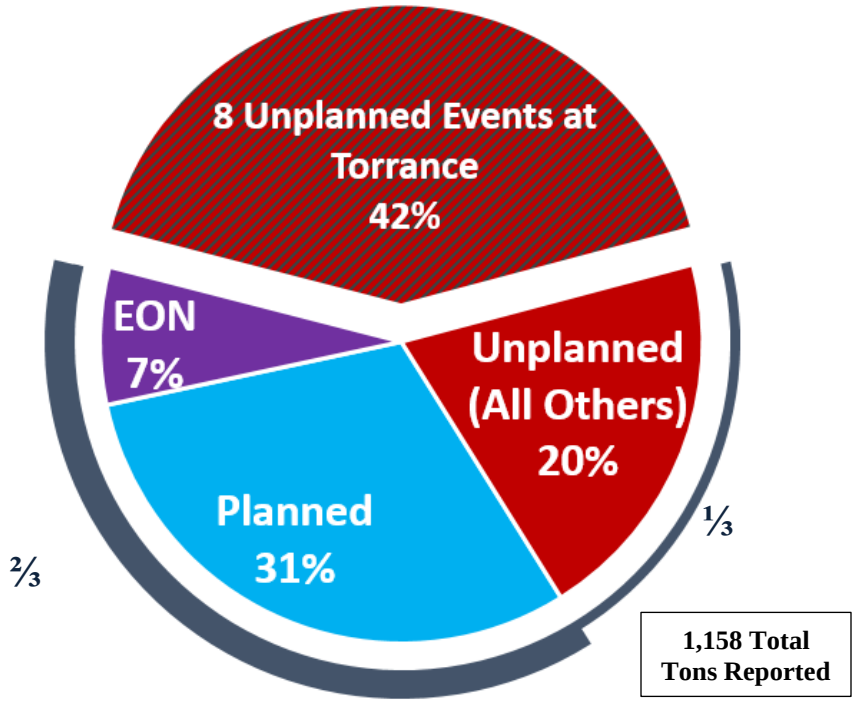


**Five other facilities subject to Rule 1118 emitted <1.0 tons of SOx cumulatively between 2012-2016.*

As illustrated in this chart, flaring emissions are not uniform, with emissions varying by year, category, and facility. Outside of emissions from external power disruptions, the largest source of flaring is from planned events, such as planned start-ups/shutdowns, and turnarounds. The pie chart in Figure 2 below illustrates the cumulative total SOx emissions from flaring, using simplified categories. As seen in Figure 2, a significant portion of the emissions is reported from eight individual power disruption events at Torrance Refinery.[1] Outside of these eight events, planned flaring events and essential operational needs (e.g., from flaring of gases that are incompatible with the fuel gas system) make up two-thirds of the remaining emissions.

[1] Torrance Refinery has submitted a draft revised estimate of their 2016 reported emissions which would reduce the estimated emissions if approved by SCAQMD.

Figure 2 Total SOx Flaring Emissions from 2012-2016 from All Rule 1118 Facilities



Torrance Refinery Flaring

Significant flaring that has occurred at the Torrance Refinery (previously ExxonMobil) recently from power disruptions was recently addressed in February 2017 through a Stipulated Order for Abatement with the SCAQMD Hearing Board.[2] This order, agreed to by Torrance Refinery, requires the facility to:

- Provide information regarding its plan to upgrade its power connection with the local electrical utility to a direct 220 kV connection, and conduct public outreach regarding the plan;
- Evaluate a temporary supply of steam to its flares that would be available during power outages;
- Evaluate the critical onsite utility systems (e.g., steam, nitrogen) that may need upgrading in case of power outages, and install all feasible upgrades within one year after receiving a permit or during the next facility turnaround;
- Evaluate all safety critical devices to determine which do not have backup power supply, and install backup within one year of receiving a permit or during the next facility turnaround;
- Conduct refresher training on refinery procedures during a power outage

[2] Available here: http://www.aqmd.gov/docs/default-source/compliance/Torrance-Refinery/stipulated-order-for-abatement-torrance-refinery-215-216-2017.pdf

SOx Mitigation Fund

Under Rule 1118, facilities must pay a Mitigation Fee if their SOx emissions exceed a Performance Target. The current version of Rule 1118 set a progressively declining Performance Target that began at 1.5 tons per million barrels of crude processing capacity[3] (tons/MMbbl) in 2006, and was reduced to its current level of 0.5 tons/MMbbl by 2012. All flaring emissions with the exception of those occurring from Force Majeure events (such as power disruptions) are subject to this fee. The fee level is set at:

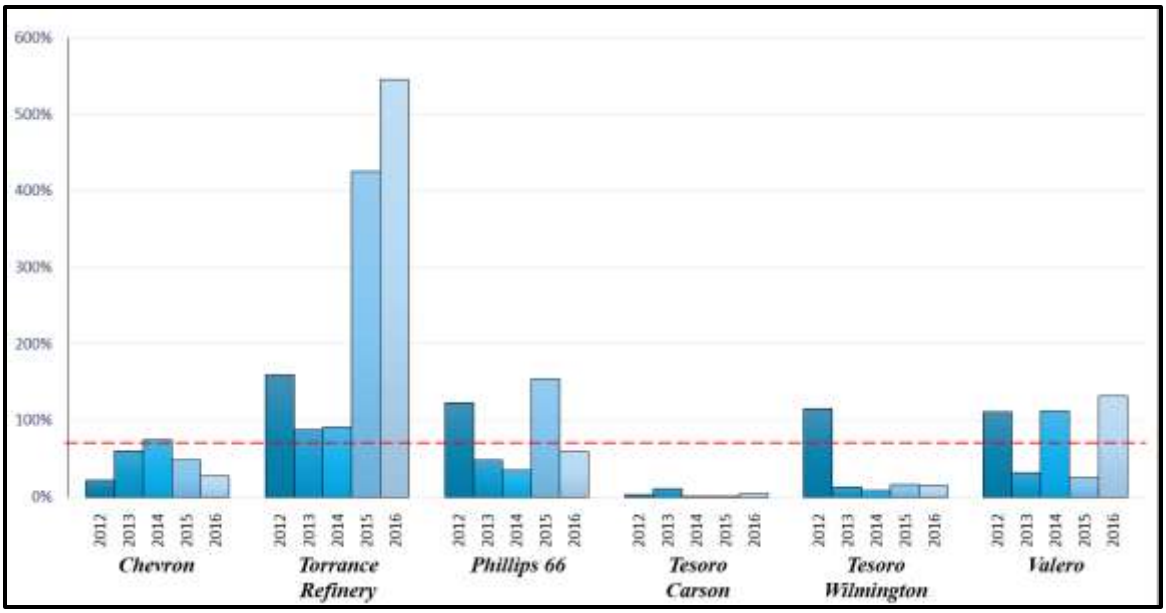
- $25,000 per ton up to 10% over the Performance Target
- $50,000 per ton between 10% and 20% over the Performance Target
- $100,000 per ton when 20%+ of the Performance Target
- With an annual cap of $4,000,000 per year

The chart in Figure 3 below illustrates each facility's SOx emissions relative to its performance cap between 2012-2016. To date, approximately $22.5 million has been deposited into a Mitigation Fund held by SCAQMD, with about 85% of this amount collected over the past three years, and more than three quarters collected from Torrance Refinery (or its predecessor).[4] This mitigation fund can only be spent with authorization from the SCAQMD Governing Board. A program for spending these mitigation fees will be developed outside of this rulemaking process.

The lowering of the performance targets from 2006 to 2012 has led to an increased number of exceedances of the Performance Targets in recent years. Four facilities have exceeded their targets a total of 8 times since 2012, as shown in the chart below. Note that target exceedances in 2016 for two facilities are not yet final as estimates are still being reviewed by SCAQMD staff. The most significant exceedances have been reported by the Torrance Refinery. The 2012 exceedance was due to the identification of a bypass around the flare vent gas flowmeter in 2013 that meant the facility had been under-reporting their emissions, and was required to nearly double their reported emissions for 2012. This problem was corrected in 2013. The Torrance Refinery's second exceedance occurred in 2015, when an explosion in the ESP unit caused a shutdown (for the next ~12 months) of the Fluid Catalytic Cracking (FCC) unit. The remainder of the refinery was able to operate only at a low capacity for the remainder of the year, and multiple units were shut down for maintenance throughout that year. These two periods of flaring by Torrance Refinery are the only times that a facility has reached the annual cap of $4,000,000.

[3] Based on calendar year 2004 crude processing capacity.
[4] Hereinafter, the Torrance Refinery will refer to itself and its predecessor Exxon Mobil.

Figure 3 Flaring SOx Emissions as a Percentage of Annual Performance Target

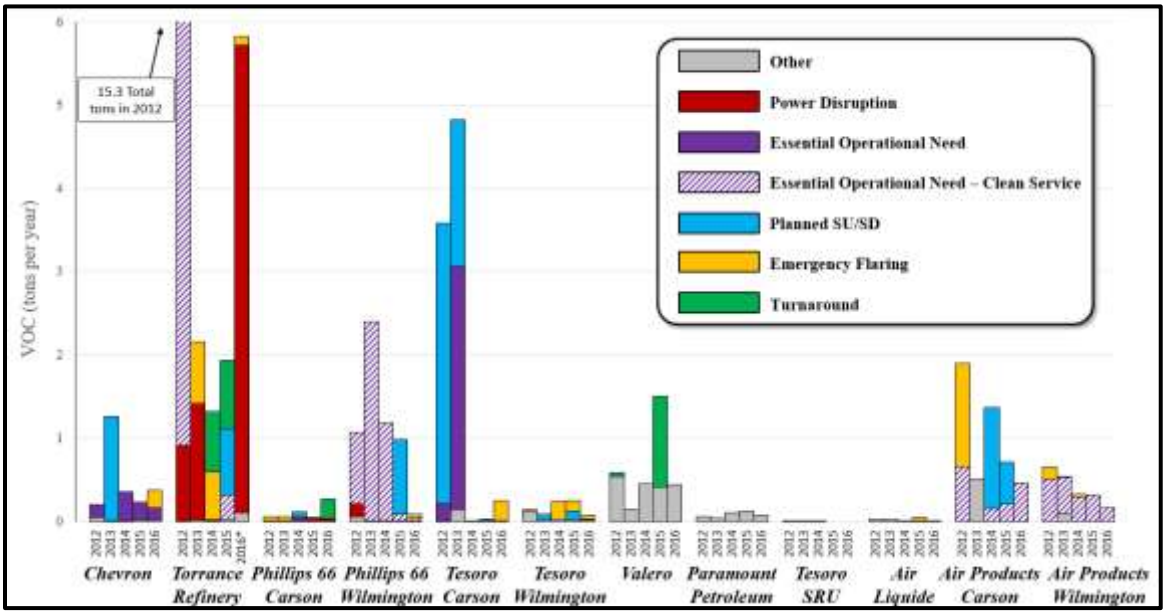


**Torrance Refinery has submitted a revision request for 2016 emissions.*

VOC Emissions

Although SOx emissions are used as the basis for paying mitigation fees under Rule 1118, there are other pollutants that are also emitted, including VOCs. While fees are not paid into the Rule 1118 Mitigation Fund for VOC emissions, facilities must pay annual emissions fees under Rule 301 for all flaring emissions, including those occurring under a Force Majeure event. Because some flaring of vent gases contain low levels of sulfur (such as clean service streams like natural gas or butane), the distribution of emissions among facilities shown below is different than that for SOx.

Figure 4 Distribution of Flaring VOC Emissions by Refinery and Category, 2012-2016



**Torrance Refinery has submitted a revision request for 2016 emissions*

As seen in the chart above, some of the facilities subject to Rule 1118 that are not large refineries also emit VOCs at a similar level as some large refineries, largely due to their flaring of clean service streams, either as an Essential Operational Need, or through other flaring events.

Flaring Destruction Efficiency

A key factor in determining the amount of VOCs emitted during flaring events is the destruction efficiency of combustion. The vent gases being released at the flare tip may be composed partially or entirely of VOCs. If the VOCs in the vent gas is entirely combusted with 100% efficiency at the flare tip (i.e. 100% combustion efficiency), then the only byproducts would be carbon dioxide and water (vapor). Similarly, the destruction efficiency is the percentage of a specific pollutant in the flare vent gas that is converted to a different compound (such as carbon dioxide, carbon monoxide, or other hydrocarbon intermediate). The destruction efficiency is higher than the combustion efficiency, though it is generally estimated that a combustion efficiency of 96.5% is equivalent to a destruction efficiency of 98%.

Estimated VOC Emissions from Flaring

EPA recently conducted a review of flaring[5] emissions and found that several factors could affect destruction efficiency, such as the amount of steam or air injected into the flare combustion zone (i.e. steam or air assist), the heating value of the flare gas, and the rate of flare gas discharge. Each of these factors ultimately affect the net heating value of the gases in the combustion zone (measured in millions of British Thermal Units [MMBTU]). If the net heating value of the combustion zone gases is too low, then the destruction efficiency is reduced and a larger amount of VOCs is released into the atmosphere.

As part of this review of flaring emissions, EPA updated its AP-42 emissions guidance for VOC. The current VOC emission factor in Rule 1118 is based on the AP-42 Total Hydrocarbon (THC) emission factor of 0.14 pounds per MMBTU, with an assumption that 55% of the THC is methane[6], yielding a final emission factor of 0.063 pounds VOC per MMBTU. Based on a review of more recent studies, the updated AP-42 guidance provides an updated VOC emission factor and states that "[t]he THC emissions factor may not be appropriate for reporting VOC emissions when a VOC emissions factor exists". The updated AP-42 emission factor applies to "well-operated flares achieving at least 98% destruction efficiency" and is now 0.66 pounds VOC per MMBTU.

During the rulemaking process, comments were made regarding the accuracy of the propane and butane combustion emission factors listed in Attachment B of PAR 1118 and if these emission factors were part of EPA's review. The emission factors in the existing rule were derived from EPA's AP-42 Section 1.5 – Liquefied Petroleum Gas Combustion. During the last amendment to Rule 1118 in 2005, the latest version of this AP-42 chapter available was from April 1993. As this AP-42 chapter was updated in 2008, the emission factors in Attachment B have been

[5] Table 13.5-2 in EPA AP-42 (2016) Chapter 13.5 https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf.
[6] See page 13.5-5 in EPA AP-42 (1995) Chapter 13.5 https://www3.epa.gov/ttn/chief/ap42/oldeditions/5th_edition/ap42_5thed_orig.pdf.
[6] See page 1.5.1 in https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s05.pdf.

updated in PAR 1118 for propane and butane combustion to be consistent with EPA's most recent guidance.

SCOPING DOCUMENT TO EVALUATE POTENTIAL ELIMINATION OF PLANNED FLARING

As shown in Figure 1 above, emissions from Planned Events and Essential Operational Needs make up about two thirds of total SOx flaring emissions, outside of eight large flaring events reported from Torrance Refinery. Of this two thirds, the majority is from Planned Flaring Events such as start-ups, shut-downs, and turnarounds. There are many potential ways to reduce flaring from Planned Events, such as:

- Increasing the capacity of the Flare Gas Recovery and Treatment System.
- Ensuring that when excess flare gases are produced that could be diverted into the refinery fuel gas system, that there are consumers of this fuel at the time (e.g., boilers, heaters, cogeneration units).
- Taking longer periods of time to start-up and shut-down process units, for example through slower vessel depressurization.
- Reviewing and revising refinery processes/procedures before Planned Events occur to reduce flaring.

Because facility operators know their processes best, staff is proposing to require facility operators to conduct an evaluation of two alternatives to eliminate Planned Flaring Events. In addition to evaluating the elimination of Planned Flaring, facility operators must also present an analysis of how to reduce emissions from Planned Flaring Events to much lower levels than is currently required by the rule, such as 0.1 and 0.05 tons of SOx per million barrels of crude processing capacity (tons/MMbbl). Table 1 below shows the distribution of the number of times that facilities have met or surpassed targets of 0.25, 0.1, and 0.05 tons/MMbbl between 2012 and 2016, based on reported emissions. The only threshold that facilities must meet currently in Rule 1118 is 0.5 tons/MMbbl, beyond which they must pay Mitigation Fees.

Table 1 Number of Times Planned Flaring SOx Emissions in Specified Range, 2012-2016

Facility	>0.25	0.1 - 0.25	0.05 - 0.1	<0.05
	(tons/MMbbl)			
Chevron	1	3	1	0
Torrance Refinery*	3	2	0	0
Phillips 66	2	1	2	0
Tesoro – Carson	0	0	0	5
Tesoro – Wilmington	1	0	1	3
Valero	1	2	1	1

**Torrance Refinery has submitted a revision request for 2016 emissions.*

Staff is proposing to review the results of these Scoping Documents (potentially with the assistance of a technical consultant with expertise in refinery processes) and to evaluate further potential amendments that could be made to Rule 1118.

REGULATORY HISTORY

SCAQMD Rule 1118

On February 13, 1998, the SCAQMD Governing Board adopted Rule 1118 with the purpose of monitoring, recording and reporting data on refinery and related flaring operations. Upon rule adoption, the AQMD Board passed a resolution directing staff to a) collect and analyze the data submitted by subject facilities and determine if flare emissions are significant, and b) recommend whether further controls are needed.

After evaluating the data submitted to the SCAQMD from October 1, 1999 through December 31, 2003, staff compiled the "Evaluation Report on Emissions from Flaring Operations at Refineries", which was presented to the SCAQMD Governing Board on September 3, 2004. The report concluded that, although refineries had made important progress in reducing emissions since the rule was adopted, flare emissions, especially sulfur dioxide, were significant. The report recommended amending Rule 1118 to reduce emissions by minimizing flaring, treating flare vent gases and by refining the monitoring, reporting and emission calculation methodology in order to improve the data accuracy.

On November 4, 2005, the SCAQMD Governing Board amended Rule 1118 by requiring subject facilities to minimize or eliminate routine flaring from oil refining operations and by establishing facility specific sulfur dioxide annual emission performance targets. Facilities exceeding the annual emission targets pay mitigation fees and submit a Flare Minimization Plan to the District for approval, subject to public review. The amended rule also mandates the use of continuous emission monitor systems (CEMS) for total sulfur and higher heating value of the vent gases combusted in flares in addition to monitoring vent gas flow. The amended rule also enacted enhanced monitoring, recordkeeping and reporting for flares at subject facilities.

As a result of all of these rule requirements, sulfur dioxide emissions from flares have been reduced in line with the declining annual emission performance targets that were reduced from 1.5 tons/MMbbl of crude capacity in 2006 to 0.5 tons/MMbbl of crude capacity by 2012.

SCAQMD 2012 AIR QUALITY MANAGEMENT PLAN

In May of 2014, a Technical Support Document based on the 2012 AQMP Control Measure – Multiple Component Source (MCS)-03 included an evaluation of potential emissions from refinery process units during startups or shutdowns that typically occur during process unit turnarounds. MCS-03 was planned for implementation in two phases. Phase I would include collection and review of emission impacts and operational procedures. Evaluation of Phase I data would lead to Phase II, which would involve identifying potential improved operating procedures and controls. This phased approach identified in MCS-03 is consistent with the proposed phased approach in the current proposed rulemaking.

The Technology Support Document recommended increasing Rule 1118 (c)(3) Flare Minimization Options and requiring facilities to annually review and revise Flare Minimization Plans to reduce flaring and flare emission during planned startup, shutdowns, and turnarounds. The Technology Support Document recommended amending Rule 1118 and requiring equipment

upgrades and increased stringency in work practices and operational procedures to reduce flaring activity.

US EPA Regulations

The USEPA New Source Performance Standards (NSPS), under 40 CFR 60.18 – General Control Device Requirements, contains provisions for flare operations. The federal regulation requires flares to operate without visible emissions, to maintain a pilot flame present at all times the flare is in operation and observe certain limits for the net heating value and exit velocity of the gases being combusted. The regulation also requires monitoring of the flares to ensure that they are operated in compliance with these requirements.

In May 2007, USEPA promulgated a new regulation, 40 CFR 60 Subpart Ja - Standards of Performance for Petroleum Refineries for which Construction, Reconstruction or Modification Commenced After May 14, 2007, which contains additional requirements to Subpart J for flares, including requiring a Flare Management Plan and root cause analysis for flare events with emissions exceeding 500 lbs SO_2.

In December 2015, the EPA issued a final rule for the Petroleum Refinery Sector Risk and Technology Review, New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP) that further control emissions from petroleum refineries and provide important information about refinery emissions to the public and neighboring communities. The final rule has many requirements for refineries, but relevant to flares it seeks to eliminate smoking flare emissions and ensure high destruction efficiency of flare gases when they are released. Most requirements of this rule take effect on January 30, 2019.

On February 1, 2016 the Refinery Sector Rule became effective. Following the promulgation of the final rule, the EPA received three separate petitions for reconsideration of certain provisions of the final rule, including some that pertain in a limited way to flaring such as certain recordkeeping requirements, and the designation of a single smokeless design capacity for a flare.[7] These petitions are currently under review.

Work Practice Standards for Emergency Flaring

Well-operated flares used as air pollution control devices are expected to achieve a 98% Hazardous Air Pollutant (HAP) destruction efficiency. However, if vent gases being flared have insufficient heat capacity, or if the flare is not operated under appropriate conditions (e.g., over-steaming at the flare tip), EPA concluded that a 98% HAP destruction efficiency may not be achieved.

To ensure that the 98% HAP destruction efficiency was being met, EPA revised the NSPS, NESHAP, and MACT regulations to include two work practice standards for flaring. The first work practice standard requires that flares operate with a continuously-lit pilot flame at all times when gases are sent to the flare, that a minimum net heating value in the combustion zone be maintained while flaring, and that refineries conduct additional monitoring and recordkeeping of flare operations.

[7] See the following link for further information regarding EPA's rule and the petitions for amendment. www.epa.gov/stationary-sources-air-pollution/petroleum-refinery-sector-risk-and-technology-review-and-new-source

A second work practice standard was established for flaring that occurs above a flare's smokeless capacity. In addition to the requirements from the first work practice standard, a flare management plan must be prepared detailing how a facility will minimize flaring, flaring above a flare's smokeless capacity must meet visibility and flare tip velocity limits, and if these limits are exceeded a root cause analysis and corrective action must be conducted. Violations of this second work practice standard occur when the smokeless capacity is exceeded and visibility or flare tip velocity limits are exceeded if: 1) any exceedance was caused by operator error or poor maintenance, or 2) two exceedances occur in any three year period and the exceedances have the same root cause (outside of force majeure), or 3) three exceedances occur in any three year period for any root cause (outside of force majeure).

SUMMARY OF PROPOSED RULE AMENDMENTS

The following amendments are proposed to Rule 1118. Each of these proposed amendments would be considered by the Governing Board for adoption as part of this first phase of rulemaking. Staff would act upon the information gained from these currently proposed amendments for a second phase of rulemaking. At this time, no language or concepts have been proposed for the second phase of rulemaking.

a. Purpose and Applicability

No changes are proposed in this section.

b. Definitions

The proposed rule has the following definitions amended, removed, or added to:

- "Clean Service Flare" – Removed and replaced with a definition for "Clean Service Stream" as follows:

"CLEAN SERVICE STREAM is a gas stream such as natural gas, hydrogen gas and/or liquefied petroleum gas. Other gases with a fixed composition that inherently have a low sulfur content and are vented from specific equipment may be classified as clean service streams if determined to be equivalent and approved in writing by the Executive Officer."

- Emergency Service Flare – Removed

- Essential Operational Needs – Removed flaring due to relief valve leakage and intermittent minor venting and removed emergency flare events from this definition

- Flare – Added two classifications of flares, "clean service" and "general service" as defined below:

"CLEAN SERVICE FLARE is a flare that is designed and configured by installation to combust only clean service streams.
GENERAL SERVICE FLARE is a flare that is not a Clean Service Flare."

- Flare Events – Amended with some clarifying text and added a new provision that defines that multiple flaring episodes within a single day and attributable to the same cause are considered a single flare event:
"For flare events that can be attributed to the same process unit(s) or equipment and has more than one start and end within a 24 hour period, it shall be considered a continuation of the same event, and not a separate or unique event."

- Flare Tip Velocity – Added
"FLARE TIP VELOCITY is the velocity of flare gases exiting a flare tip averaged over 15 minutes time periods, starting at 12 midnight to 12:15 am, 12:15 am to 12:30 am, and so on, concluding at 11:45 pm to midnight, and calculated as the volumetric flow divided by the area of the flare tip."

- General Service Flare – Removed

- Planned Flaring Event – Added
"PLANNED FLARING EVENT is any flaring as a result from process unit(s) startup, shutdown, turnaround, maintenance, and non-emergency flaring. Flaring from the planned startup of a process unit that is more than 36 hours after an unplanned shutdown of that same process unit shall be considered a Planned Flaring Event."

- Sampling Flare Event – Removed.

- Smokeless Capacity – Added
"SMOKELESS CAPACITY is the maximum vent gas flow rate or mass rate that a flare is designed to operate without visible emissions."

Web-Based Flare Event Notification System – Added
"*WEB-BASED FLARE EVENT NOTIFICATION SYSTEM is a web page that allows facilities to notify the District about flaring events and to enter information such as the time that flaring begins and ends, vent gas flow rates, and emissions.*"

c. Requirements

The proposed rule has the following requirements that have been amended.

- All references to effective dates that have already passed (e.g., January 2006) have been removed and replaced with general text requiring facilities to operate flares in the same manner, but without specifying an effective date.

- A new requirement has been added that flares at petroleum refineries must be operated below a velocity of 60 feet per second, or the lesser of 400 feet per second and a calculated velocity using an equation from EPA's Refinery Sector Rule.

- A new requirement has been added that no later than January 30, 2019, the net heating value of the combustion zone (NHV_{CZ}) during flaring must be at or above 270 MMBTU per standard cubic foot, averaged over a 15-minute period. The EPA Refinery Sector Rule is incorporated by reference for the calculation of NHV_{CZ}.

- Specific Cause Analyses currently are required for flare events that exceed certain thresholds, except for planned start-ups, shut-downs, and turnarounds. A provision has been added to require Specific Cause Analyses *"for any flare event resulting from non-standard operating procedure during a planned shutdown, planned startup or turnaround"* to provide greater clarity about which events are subject to this requirement.

- Consistent with requirements in the USEPA NESHAP, a requirement has been added for petroleum refineries that requires Specific Cause Analyses when the smokeless capacity of the flare is exceeded and either the visibility or flare tip velocity limit is exceeded, with an effective date of January 30, 2019.

- The timeline for facilities to submit a Specific Cause Analysis has been removed from section (i) Notification and Reporting Requirements and added in this section. The ability for facilities to request an extension up to 30 days beyond the original 30-day submission date has also been shortened to 15 days, to be consistent with the 45-day period facilities are provided to submit a root cause analysis under the USEPA NESHAP.

- A new provisions has been added, consistent with the USEPA NESHAP that requires facilities to complete the corrective action identified in Specific Cause Analyses within 45 days of the flare event or a longer period that is justified and as soon as practicable. The Executive Officer may require a modified schedule for corrective actions beyond 45 days.

- Consistent with requirements in the USEPA NESHAP, a requirement has been added for petroleum refineries that prohibits flaring above the smokeless capacity of the flare when either visibility or flare tip velocity limits are exceeded if:

    - A single flare event is caused by poor maintenance or operator error, or
    - Two flare events are found to have the same cause in any three year period as determined by a Specific Cause Analysis, or
    - Three flare events occur in any three year period from any cause.

The visibility limits already in Rule 1118 are consistent with USEPA NESHAP visibility limits, however this requirement has been expanded to also include the limits in SCAQMD Rule 401 as this visibility standard is also used for determining compliance by SCAQMD inspectors during flaring events.

- A new requirement has been added requiring facilities to submit a Scoping Document 12 months after rule adoption that includes:

    - An analysis of two alternatives to reduce Planned Flaring Events for each of three annual performance targets. The three performance targets are 0.10, 0.05, and 0.01 or lower tons of SOx per million barrels of crude processing capacity, and 0.1 tons of VOC per year from clean service flares. The Scoping Document must analyze the potential controls, technical feasibility, approximate cost, and timing constraints to implementing each of these alternatives as soon as feasible.
    - An analysis of how a facility can reduce emissions from Unplanned Flare Events caused by four scenarios including 1) a sudden influx of vent gas into the flare gas header, 2) a sudden loss of the process unit with the highest fuel gas consumption rate of recovered flare gas, 3) a sudden loss of all externally generated electrical power, 4) a sudden loss of

internally generated electrical power. Existing systems (such as flare gas recovery systems) may count towards the three alternative requirement.

- A description of the components of the flare system. Some portions of this description were previously required as part of a Flare Minimization Plan, but have now been moved into the Scoping Document, and added to in order to account for additional requirements in other parts of PAR 1118 (such as smokeless capacity).

- Requirements regarding the effective date to install flare gas recovery and treatment systems have been removed as all facilities subject to this provision have already installed these systems under the current version of the rule.

d. Performance Targets

Petroleum Refineries are required to reduce sulfur dioxide emissions from flares to less than 0.5 tons per million barrels of crude processing capacity averaged over one year. The proposed amended rule also removes outdated compliance deadlines and removes the Mitigation Fee annual cap of $4,000,000.

e. Flare Minimization Plan

Minor clarifying text has been added, and one provision requiring a detailed process flow diagram has been moved to the requirements for a Scoping Document and also the Flare Monitoring and Recording Plans (FMRP).

f. Flare Monitoring and Recording Plan Requirements

Outdated administrative deadlines and alternative sampling requirements have been removed. Detailed process flow diagrams that were previously required in a Flare Minimization Plan are now required in the FMRP instead, with some modifications. The detailed process flow diagram is only required for control equipment, while a representative flow diagram is required for connections to process units. Also, unless monitoring instruments already required in Rule 1118 are modified, the FMRP does not have to be updated with new instruments required by the EPA Refinery Sector Rule.

g. Operation, Monitoring, and Recording Requirements

Outdated deadlines, provisions regarding alternative sampling, and tables have been removed. Monitoring requirements in the EPA Refinery Sector Rule that are supplemental to existing requirements in Rule 1118 have been incorporated by reference. Video monitoring requirements have been updated to now require recording at no less than one frame every 15 seconds. For all flares the recording must include the flare and an area above the flare sufficient for visible emissions and flame observations.

h. Recordkeeping Requirements

The requirement to keep video records for a minimum of 90 days has been updated to five years.

i. Notification and Reporting Requirements

Outdated administrative deadlines have been removed and references have been updated. A new requirement has been added to submit flaring notifications via the Web-Based Flare Event Notification System, and will only use telephone notification if the web-based system is unavailable. A new notification requirement has been added that if the cumulative daily total of flare vent gas from a flare exceeds 100,000 standard cubic feet, the facility is required to notify the SCAQMD via the Web-Based Flare Event Notification System. Staff is proposing to maintain the thresholds used for the District's public notification regarding flare events. A new requirement has also been added for facilities to submit quarterly reports of data from new monitoring requirements in PAR 1118 and the EPA NESHAP as soon as it becomes available, or on January 30, 2019, whichever is earlier.

j. Testing and Monitoring Methods

Outdated administrative deadlines and sections have been removed and updated ASTM methods have been incorporated.

k. Exemption

A new exemption has been added so that events outside of the operator's control (i.e. external power disruptions, natural disasters, and acts of war/terrorism) do not count towards the new prohibitions listed in paragraph (c)(10). The (c)(10) prohibitions include the new 'three strikes' requirement imposed by the EPA NESHAP. This new exemption in PAR 1118 is also consistent with the requirements in the EPA NESHAP.

l. Attachment B

Emission factors for vent gas, propane, and butane have been updated using current guidance from EPA's AP-42 chapters 1.5 and 13.5.

COMPARATIVE ANALYSIS

As required by Health and Safety Code Section 40727.2, the purpose of this analysis is to identify and compare any other SCAQMD or federal regulations that apply to the same equipment or source type.

The proposed amended Rule 1118 was amended as to not conflict with National Emissions Standard for Hazardous Air Pollutants (NESHAP) 40 CFR Part 63 Subpart CC. On July 2016 the US EPA promulgated the most recent amendments to the Refinery Sector Rule (RSR) in NESHAP under the authority of CAA, section 112. The RSR NESHAP applies to Petroleum Refinery flares and the proposed amended rule has incorporated sections of the RSR to maintain equivalency with the federal standard for flares. Table 2 below shows a comparison with the proposed amended rule and subpart CC in areas where the PAR has incorporated sections of the RSR.

TABLE 2 - Comparison – PAR 1118 with EPA Refinery Sector Rule (RSR) [Part 63 Subpart CC]

Amended Rule Element	1. PAR 1118 Amendments	2. EPA RSR
Flare Tip Velocity	-Maintain velocity below 60 feet per second, or lesser of 400 feet per second or calculation based on net heating value of vent gas	-Same as PAR 1118
Net Heating Value in Combustion Zone (NHV_{CZ})	-Maintain NHV_{CZ} above 270 BTU/scf. Incorporates by reference EPA RSR calculations.	-Same as PAR 1118
Specific Cause Analysis (SCA)	-SCA required for flare events above VOC or SOx threshold or vent gas threshold for unplanned flare events and non-standard operating procedures from planned flare events. -SCA required when flaring occurs above smokeless capacity of flare and visibility or flare tip velocity limit is exceeded. -SCA due within 30 days with potential for 15 day extension -Corrective action required within 45 days with option to request extension from Executive Officer.	-No equivalent emissions or vent gas flow rate threshold requirement for SCA -SCA requirement (known as "root cause analysis" in EPA RSR) same in EPA RSR for flaring above smokeless capacity of flare. -SCA due in 45 days -Corrective action required in 45 days or as soon as practicable.
Scoping Document	-Facilities must prepare a Scoping Document that evaluates feasibility of minimizing or avoiding Planned and Unplanned Flare Events, using specific criteria. Information from Scoping Documents will be used for subsequent rulemaking.	-Facilities must develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases.
Removal of Annual Cap on Mitigation Fees	-Petroleum refineries must pay fees on flaring emissions above a performance target of 0.5 tons per million barrels of crude capacity. The cap on these fees would be removed.	-No similar requirement
Flare Monitoring and Recording Plan (FMRP)	-Facilities must submit detailed process flow diagrams of all associated upstream equipment and process units venting to each flare, with a general description of components, identifying the type and location of each flare and all associated control equipment including but not limited to knockout drums, flare headers, assist, and ignition systems.	-Facilities must submit in their Flare Management Plan a simple process flow diagram showing the locations of the following components of the flare: flare tip; knockout or surge drum(s) or pot(s); flare header(s) and subheader(s); assist system; ignition system; and all gas lines (including flare waste gas, purge or sweep gas, and supplemental gas) that are associated with the flare.
Flare Monitoring Requirements	-Facilities must monitor flares continuously for gas flow, continuously for heating value, and	-RSR also requires continuous monitoring for gas flow, heating

	semi-continuously for sulfur content. -Clean service flares may calculate the higher heating value and/or their sulfur content instead of monitoring. -For any flare monitoring that is different than what is required by this rule, the EPA RSR has been incorporated by reference (e.g., steam assist).	values and semi-continuously for sulfur content. -RSR is inapplicable to clean service flares. PAR wider scope in terms of types of flares.
Video Recording	-Facilities must monitor all flares for visible emissions using color video monitors with date and time stamp, capable of recording a digital image of the flare, the flame of elevated flares, and a sufficient area above the flame of all flares that is suitable for visible emissions observations, at a rate of no less than four frames per minute.	-Facilities must use a video surveillance camera to continuously record (at least one frame every 15 seconds with time and date stamps) images of the flare flame and a reasonable distance above the flare flame at an angle suitable for visual emissions observations.
Notification	-Facilities must notify the District via a web-based system if a flare event exceeds 100 pounds of VOC, 500 pounds of SOx, or 500,000 scf of vent gas, and if the cumulative daily total vent gas exceeds 100,000 scf.	-No similar requirement
Emissions Reporting	Facilities must report quantified flaring emissions quarterly to the District using emission factors that are consistent with EPA's AP-42 guidance.	-No similar requirement.

EXPECTED EMISSIONS IMPACT

PAR 1118 affects 31 flares at 12 facilities, all located in Los Angeles County. The proposed amendments to this rule will prohibit repeated smoking flaring events, excluding Force Majeure events, which tend to produce the highest emissions from flaring. PAR 1118 also requires a minimum net heating value in the combustion zone, ensuring that when flaring does occur that the destruction efficiency should be at least 98%. These prohibitions and limitations are consistent with federal requirements.

An updated emission factor for VOCs that is about ten times higher than the previous emission factor will increase the emissions inventory for each facility, assuming that their flaring is not reduced by more than a factor of ten. Although the inventory will show an increase for VOC emissions, this is not a reflection of an expected increase in emissions, rather it is an improvement in the understanding of emissions from this source.

Consistent with the EPA Refinery Sector Rule, PAR 1118 should also reduce emissions from all pollutants due to the new prohibitions on repeated flaring events above the smokeless capacity which were not caused by Force Majeure, and the new limits on flare tip velocity below the smokeless capacity that are designed to improve combustion efficiency. The level of emissions reductions cannot be quantified because there are new criteria and monitoring requirements used to determine the future level of emissions that were not used in previous estimates.

WEB-BASED FLARE EVENT NOTIFICATION SYSTEM

The District currently maintains a web-based Flare Event Notification System that facilities can use to satisfy the notification requirements of the existing rule. Facilities also currently use telephone notification instead of the web-based system in some instances. With the updated notification requirements proposed in the rule, the web-based system will need to be upgraded to handle the new requirements. A separate funding action is being proposed to the Governing Board, if the rule is passed, to transfer up to $100,000 from the Rule 1118 Mitigation Fund into the District's general fund for the purpose of upgrading the District's web-based Flare Event Notification System. A Board-approved software development contractor will be utilized to conduct this work.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

Pursuant to the California Environmental Quality Act (CEQA) and SCAQMD Rule 110, the SCAQMD, as lead agency for the proposed project, has reviewed the proposed amendments to Rule 1118 and the subsequent spending of up to $100,000 to update the web-based Flare Event Notification System pursuant to: 1) CEQA Guidelines § 15002(k) - General Concepts, the three-step process for deciding which document to prepare for a project subject to CEQA; and 2) CEQA Guidelines § 15061 - Review for Exemption, procedures for determining if a project is exempt from CEQA.

As provided in CEQA Guidelines § 15306 - Information Collection, the proposed project is exempt because it will consist of basic data collection, research and resource evaluation activities and will not result in a serious or major disturbance to an environmental resource. CEQA Guidelines §15306 exempts such a project for information-gathering purposes, or as part of a study leading to future action which the agency has not yet taken. Furthermore, SCAQMD staff has determined that it can be seen with certainty that there is no possibility that the proposed project may have a significant adverse effect on the environment. Therefore, the project is considered to be exempt from CEQA pursuant to CEQA Guidelines § 15061(b)(3) – Activities Covered by General Rule. A Notice of Exemption will be prepared pursuant to CEQA Guidelines § 15062 - Notice of Exemption. If the proposed project is approved, the Notice of Exemption will be filed with the county clerks of Los Angeles, Orange, Riverside and San Bernardino counties.

SOCIOECONOMIC IMPACT ASSESSMENT

PAR 1118 Phase I would affect 12 facilities operating a total of 31 flares. Eight out of 12 are refinery facilities which belong to the sector of petroleum refineries [North American Industrial Classification System (NAICS) 324110] and of the remaining four; one sulfur recovery plant and three hydrogen production plants belong to the sector of industrial gas manufacturing (NAICS 325120). All the affected facilities are located in Los Angeles County and none are small businesses.

The purpose of the proposed amendments (Phase I) is to gather more information and update the existing rule with federal requirements. Two proposed amendments could potentially have cost impacts. PAR 1118 would require the affected facilities to prepare a Scoping Document that evaluates the feasibility of reductions of emissions from planned and unplanned flaring events, and also would remove the $4 million annual cap on mitigation fees when a facility's SOx emissions exceed a Performance Target.

One-Time Cost of Scoping Documents

While the affected facilities have not been required by SCAQMD to prepare a scoping document before under the existing rule 1118, the cost is expected to be similar to other plans required by other rules such as flare monitoring and reporting. Based on staff's phone discussion with a refinery representative on May 18, 2017 and a refinery consultant on May 3, 2017, each scoping document may take about 50-70 hours of staff time and may require the hiring of outside consultants to prepare. Based on the number of flares located in each affected facility, the one-time cost of preparing a scoping document is estimated to be about $50,000 for a non-refinery facility and $250,000 for a refinery facility, respectively. As a result, the total one time cost of preparing scoping documents is estimated at $2.2 million (4*$50,000+8*$250,000) for all the facilities.

Table 1 has the distribution of the annualized cost by industry. The one-time cost of the PAR 1118 is annualized over a typical 10-year equipment life using a four percent real interest rate*. Refineries would absorb about 90 percent (or $246,000) of the $270,600 estimated annual cost. In addition, PAR 1118 could potentially increase the number of Specific Cause Analysis reports due to increase in the frequency of flaring events occurring at the new VOC emission limits. However, the additional costs of preparing these extra reports are expected to be minimal.

Table 1
Estimated Annual Cost of
Compliance (2017 dollars)

Industry (NAICS)	One-Time Costs Annualized Over 10 Years
Petroleum Refineries (324110)	$246,000
Industrial Gas Manufacturing (NAICS 325120)	$24,600
Total	**$270,600**

*Capital recovery factor for 10 years and four percent real interest rate is 0.123. Annualized cost over 10 years is calculated as ($2.2 million*0.123 = $270,600).

Mitigation Fees

Under the existing rule, facilities must pay a Mitigation Fee if their SOx emissions exceed a Performance Target. In 2012, this Performance Target was established at 0.5 tons of SOx emissions per million barrels of crude oil processing capacities. The affected facilities would pay a ratcheted mitigation fee when their SOx emissions exceed the Performance Target by up to 10 percent; between 10 and 20 percent; and above 20 percent. The mitigation fees are currently capped at $4 million per year.

PAR 1118 would remove the $4 million annual cap on mitigation fees when a facility's SOx emissions exceed the Performance Target. The removal of $4 million cap could potentially impose additional costs on affected facilities. Past performance records (2012-2016) for the 12 facilities show that only one facility in 2015 would have exceeded the $4 million cap ($7.7 million) due to an explosion which caused a shutdown and subsequent atypical operations for the remainder of the year. A second instance where a facility had a bypass valve that was unmonitored also exceeded the annual cap (this bypass valve has since been remove from service). Therefore, it is unlikely that the affected facilities would exceed the annual cap and pay more than $4 million of mitigation fees.

Since the overall annualized cost impacts of PAR 1118 is estimated at $270,600, the Regional Economic Impact Model (i.e., the REMI Policy Insight model) is not used. It has been a standard socioeconomic practice that, when the annual compliance cost is less than one million current U.S. dollars, REMI is not used to simulate jobs and macroeconomic impacts, because the resultant impacts would be diminutive relative to the baseline regional economy.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE

Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the hearing. The draft findings are as follows:

Necessity – PAR 1118 is needed to further reduce emissions from flaring, to gather more information about the emissions from flaring, and to update outdated administrative requirements in the rule.

Authority - The SCAQMD Governing Board obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, and 41508.

Clarity – The amendments to PAR 1118 are written and displayed so that the meaning can be easily understood by persons directly affected by them.

Consistency – PAR 1118 is in harmony with EPA's Refinery Sector Rule, and not in conflict with or contradictory to, existing statutes, court decisions, federal or state regulations.

Non-Duplication – Portions of the proposed amendments in PAR 1118 incorporate explicitly or by reference some federal NESHAP requirements that fall within the criteria and requirements in Health and Safety Code §40727.2(g). The remaining proposed amendments to PAR 1118 do not impose the same requirement as any existing state or federal regulation, and the proposed amendments are necessary and proper to execute the powers and duties granted to, and imposed upon, the SCAQMD.

Reference - In adopting these amendments, the SCAQMD Governing Board references the following statutes which the SCAQMD hereby implements, interprets or makes specific: Health and Safety Code Sections 40001 (rules to achieve ambient air quality standards), 40440(a) (rules to carry out the Air Quality Management Plan), and 40440(c) (cost-effectiveness), 40725 through 40728 and Federal Clean Air Act Sections 171 et seq., 181 et seq., and 116.

COMMENTS AND RESPONSES

A public workshop was held on May 11, 2017 in which approximately 25 people attended. Participants provided comments at the meeting and eight comment letters or emails have also been received. The following section includes comments received and staff's responses.

Comment Number	Commenter	Comment Date
1	Air Liquide	5/10/2017
2	Air Products	5/18/2017
3	Air Products	5/23/2017
4	Air Products	6/1/2017
5	Communities for a Better Environment (CBE)	5/9/2017
6	Communities for a Better Environment (CBE)	5/19/2017
7	Communities for a Better Environment (CBE)	6/2/2017
8	Communities for a Better Environment (CBE)	6/5/2017
9	Torrance Refinery	6/2/2017
10	Western States Petroleum Association (WSPA)	5/10/2017
11	Western States Petroleum Association (WSPA)	6/2/2017
PWS	Public Workshop Comments	5/11/2017

Air Liquide

AIR LIQUIDE US LP
Eric Kleinschmidt

4000 Nelson Ave
Concord, CA 94520
+1 (925)808-2606

May 10, 2017

Topic / Ref. : Rule 1118 Proposed Changes

We are writing in regards to the proposed changes to Rule 1118 and the effects it may have upon our hydrogen production facility located in El Segundo. We would also like to make a recommendation we believe would be beneficial to the District. Environmental stewardship is one of our core values, and Air Liquide is proud to be the lowest emitting Rule 1118 facility.
Our facility utilizes an enclosed ground flare (EGF) for the safe consumption of certain produced process gases during startup, shutdown, or process upsets. Synthesis gas (syngas) is a mixture of hydrogen, carbon monoxide, carbon dioxide, steam, and small amounts of unreacted methane produced by the steam reforming of methane that is present as an intermediate after reforming and before purification. It is a process stream inherently devoid of sulfur and VOCs. Syngas, along with pure hydrogen, and off-gas, the leftover products from syngas that are removed during purification, are the three streams that are capable of being combusted in our EGF. It is classified as a clean service flare. 1-1

EGFs by design shield the flame inside an enclosure to prevent radiant heating of the surroundings and emission of visible light and noise. While camera observation of the air above the flare for opacity is certainly feasible, the direct observation of the flame is not reasonably possible without placing a camera in the line of fire and subjecting it to damage during a flare event.

The wording of proposed 1118{g){6) requires the capture of digital images of both the flare and flame. We ask that clean service EGFs be exempted from the requirement to capture an image of the flame. To support that we ask that the district add a definition for an EGF as separate and distinct from a conventional tower or open ground flare. 1-2

We understand that some of the language in the proposed rule 1118 was adopted from 40 CFR 63.670 (as part of NESHAP CC) and specifically the aforementioned requirement was paraphrased from 40 CFR 63.670(h)(2) with additional district requirements added. However our facility is not within the scope of NESHAP CC, so we conclude that excepting an EGF combusting only streams not regulated under NESHAP CC (i.e. clean service flares) will not pose any conflicts with the EPA rules. 1-3

We also request clarification of the language found in the proposed 1118(c)(13) which requires the preparation of a Scoping Document to state that it applies to petroleum refineries only. While the context of 1118(c)(13)(B) leads one to the conclusion that it is intended for petroleum refineries and not hydrogen or sulfuric acid plants since they 1-4

do not process petroleum, the reader would be best served by a clear top-line explanation that 1118(c)(13) is applicable only to petroleum refineries. We would like to remind the staff that the presentation given at the Governing Board Special meeting of March 9, 2017 made sole mention of refineries. The other two source categories were not addressed, thus we conclude no board mandate was given to implement any additional regulation upon hydrogen producers.

1-4 cont'd

Rule 1118.1, for the control of non-refinery flares, is on the rulemaking calendar for later this year. Presumably it would regulate flares at landfills, wastewater treatment plants and the like. We would appreciate if the District would consider that a hydrogen facility's flare is far more akin to the types of facilities that would be regulated in 1118.1. Namely, they all combust a low BTU stream that does not contain HAPs, and use similar control devices such as enclosed ground flares. We ask the District to regulate non-refinery facilities with flares such as ours under the new rule 1118.1 instead of the proposed rule 1118.

1-5

We appreciate the District's efforts in this matter and ask the District to give due regard to our comments.

Regards,

Eric KLEINSCHMIDT

Response 1-1
Thank you for your comment. Please refer to responses 1-2 through 1-5 for specific responses.

Response 1-2
Paragraph (g)(7) of the rule has been modified to only require recording of a flare's flame if it is not enclosed.

Response 1-3
The new sections of the rule pertaining to the recently updated NESHAP have been amended to only apply to general service flares operating at petroleum refineries, including paragraphs (c)(3), (c)(4), and (g)(9).

Response 1-4
The Scoping Documents required by paragraph (c)(13) must be submitted by all facilities subject to the rule, including hydrogen plants. However, a Scoping Document can simply state what the facility is already doing to meet the goals specified in (c)(13) if the facility is already meeting or exceeding them. Also, the commenter is correct that hydrogen plants were not specifically mentioned in the single slide that summarized proposed amendments to Rule 1118 given to the Governing Board at its March 9, 2017 meeting. However, this presentation was not intended to provide a comprehensive analysis of all proposed amendments in the rule as that discussion is presented to the Board in rule-specific agenda items at the Stationary Source Committee (i.e., May 19, 2017, June 16, 2017) and at the Governing Board public hearing for rule adoption (set for July 7, 2017). As one of the purposes of the rule is to minimize flaring emissions from all facilities subject to the rule, it is appropriate that the Scoping Documents should be prepared by all facilities subject to the rule.

Response 1-5
During the rule-making process for 1118.1 and potentially during the second phase of rulemaking for PAR 1118, staff will evaluate whether it is appropriate to include flares from hydrogen plants within 1118.1. Because Proposed Rule 1118.1 has not yet been adopted, nor has draft rule language been released, it is premature to exempt hydrogen flares from Rule 1118.

From: Reebel,James C. <REEBELJC@airproducts.com>
Sent: Thursday, May 18, 2017 10:56 AM
To: Ian MacMillan; Dairo Moody; Eugen Teszler
Subject: Air Products Comments on Proposed Rule 1118 Language

Ian/Dairo/Eugene,

Thank you for taking the time to discuss some of our comments/concerns last week re: the proposed Rule 1118 language. As indicated, I wanted to provide 'official' comments/questions in writing for Air Products' Carson and Wilmington Hydrogen (H2) Plants:

- (b)(3)(C) – We discussed and it was noted that venting of clean service streams to a flare is considered and 'Essential Operational Need' (EON). A questions I have is that for facilities like AP Carson and Wilmington where all the streams that could be flared are considered clean service streams, would/should all flaring be considered as EON and how should this situation be represented on quarterly flare reports when assigning a relative cause to the flare event that the District relies on for its metrics/data to support these rule amendments? 2-1
- (b)(15) – We discussed the definition of 'Planned Flare Event' and staff clarified that unplanned flare events can still be longer than 24 hours and that the intent here was to address, along with section (i)(3), flaring emissions associated with the re-starts/startups themselves. 2-2
- (c)(6) – We discussed whether there was need for more specifics around the term 'non-standard operating procedure' in relation to when an SCA would be required for flaring that occurred as a result of any 'non-standard operating procedure' and my understanding was that the District does not intend to collect information on operating procedures or the procedures themselves and the facilities will be left to their own determination (subject to audit/inspection) whether flaring occurred due to something that was 'non-standard'. 2-3
- (c)(13)(B) – We would ask the District to either create target levels that both refineries and H2 plants can work with or separate target levels for H2 plants (i.e. SOx, million barrels of crude processing capacity). 2-4
- (c)(13)(C) and (C)(i) – Section (c)(13)(C) speaks to reducing flaring emissions during emergency (i.e. breakdowns, malfunctions, power disruptions, etc.) flaring events; however, subsection (c)(13)(C)(i) speaks to alternatives to avoid flaring which would imply alternatives to accomplish an elimination of flaring altogether. We would ask District to reword to make it more clear what is being requested (ideally alternatives for reductions and/or elimination of flaring and related emissions). 2-5
- (c)(14) and (c)(15) – There was an error within an item listed as (c)(13)(C)(vi) we discussed that it sounds like you are aware of and are correcting. 2-6
- (f)(3) – Although this language existed previously, we would suggest some addition that would clarify that the 'starting or restarting operations' means for a new or facility that has not been operated in some time; not to be confused with a start/restart of operations from a planned or unplanned maintenance outage/turnaround. 2-7
- (g)(7) – We discussed this and I expressed some apprehension in going from 1 fpm to 1 fps; however, upon further review I determined that we are currently recording at 3 fps so we would not have an issue with complying with the increased framerate requirement. We did also discuss the use of the phrase 'angle above' which staff indicated was meant to mean angle the camera to point above the flare (where visible emissions, if any, would occur) vs. placing the camera itself at an angle above the flare; and we feel clarification is needed to ensure there is no confusion. 2-8

- (i)(2) –It is unclear to us, as H2 facilities that vent only clean service streams to our clean service flares, whether we would need to comply with this requirement moving forward as subparagraph (b)(3)(C), venting of clean service streams, was omitted. Furthermore, as touched on above with regards to section (b)(3)(C), we would ask for clarification whether we should be designating all clean service flaring as only EON moving forward, regardless of whether routine venting or due to an emergency, shutdown/startup, maintenance, etc.? If this section does apply and everything is not intended to be labeled as EON, we would be concerned that the elimination of a previous 500,000 SCF notification threshold could create a significant, increased burden on our operations team to not only make these notifications much more frequently but more importantly to define whether any minor flaring that occurred beyond 'normal EON flaring' is attributable to an emergency (i.e. breakdowns, malfunctions, power disruptions, etc.) within the allowable 1-hour window. We also discussed that current practice would dictate that an accompanying breakdown notification would need to occur along with any unplanned, emergency flaring notification. This would create a significant, additional burden for both our operations and environmental staff (to perform notifications and complete/submit breakdown reports within 7 days) and District inspectors (to respond to potential magnitude(s) increase in breakdown notifications including review of reports and any follow-up needed). 2-9
- (i)(3) – We discussed and we shared concerns that were raised at Working Group Meeting #3 re: how this language maybe should be looked at closer, in conjunction with (B)15), to ensure that facilities aren't faced with potential startup delays based on timing of any required notification. 2-10
- Attachment B, Section 1 – We discussed the need to add additional tables or clarify regarding (1) sulfur-free streams which account for 3/4 of the clean service streams at Carson plant and 4/5 of the clean service streams at Wilmington plant and (2) H2 combustion which only generates NOx emissions. We think putting this in the these tables in some manner (i.e. additional tables, footnotes, etc.) would help in alleviating some concerns about clean service flaring that occurs at H2 plants (and what makes them clean) by providing a clear example of emissions that don't occur (i.e. no SOx for many, NOx only for H2). 2-11

Let me know if any questions or if you would like to discuss any of our concerns in further detail to ensure those concerns are understood and, as possible, addressed. Appreciate your understanding and cooperation!

Jim Reebel
Principal Environmental Engineer
Air Products and Chemicals, Inc. Los Angeles Area

Mobile: (714) 642-4252
Office: (310) 847-7300 x13
Fax: (310) 847-7311
Email: reebeljc@airproducts.com

Response 2-1
Clean service streams are classified as Essential Operational Need pursuant to clause (c)(3)(C) of PAR 1118, and should be reported as such in quarterly reports. However, if emergencies occur, even at a flare that only has clean service streams, they should be categorized as emergencies on quarterly reports.

Response 2-2
Paragraph (b)(15) has been clarified such that a Planned Flare Event will be separate from an Unplanned Flare Event if it begins more than 36 hours after then end of the Unplanned Flare Event from the same process unit that is starting back up. Paragraph (i)(3) has been modified, and paragraph (i)(4) has been added such that a single notification is now required if the cumulative daily total of vent gas exceeds 100,000 SCF.

Response 2-3
The comment is correct.

Response 2-4
Clause (c)(13)(B)(iv) has been added that includes a new emission level based on VOC emissions per year, instead of SOx emissions per MMbbl of crude capacity. For facilities that do not process crude, such as hydrogen plants, the emissions levels in clauses (c)(13)(B)(i) through (iii) do not need to be analyzed.

Response 2-5
Subparagraph (c)(13)(C) has been modified to provide more clarity and to add specific scenarios that should be analyzed in the Scoping Document for Unplanned Flaring.

Response 2-6
The numbering error noted in the comment has been corrected.

Response 2-7
Paragraph (f)(3) has been modified as requested.

Response 2-8
Paragraph (g)(7) has been modified to only require 4 frames per second, and the area that needs to be recorded (as opposed to the 'angle') has been clarified.

Response 2-9
Notification requirements in (i)(2), (i)(3), and (i)(4) have been modified. The requirement to notify the District for unplanned events greater than 500,000 scf remains, and is still applicable to all facilities subject to Rule 1118. As noted in Response 2-1, emergencies at hydrogen plants should be reported as such in quarterly reports, and for notification purposes under (i)(2) too. If a facility needs to file a Rule 430 breakdown notice, they can continue to do so where appropriate. A simpler requirement has been added in (i)(4) that requires a single notification to the District if the daily cumulative vent gas totals more than 100,000 scf. This notification does not require a Rule 430 breakdown report, unless the facility feels it is necessary to provide protection for potential violations that may occur due to a breakdown.

Response 2-10
Paragraphs (i)(3) and (4) have been modified to only require a single notification if the daily cumulative vent gas totals more than 100,000 scf.

Response 2-11
Clarification has been added to Attachment B. See also Response 3-1

From: Reebel,James C. <REEBELJC@airproducts.com>
Sent: Tuesday, May 23, 2017 1:16 PM
To: Ian MacMillan
Cc: Dairo Moody; Eugen Teszler
Subject: FW: Info Request - H2 Combustion Emissions

Entire e-mail chain is one comment. 3-1

Ian,
Some info I was able to obtain; let me know if you would like to discuss…
thanks! Jim

From: Hendershot,Reed J.
Sent: Tuesday, May 23, 2017 11:45 AM
To: Reebel,James C. <REEBELJC@airproducts.com>
Cc: Kloosterman,Jeffrey W. <KLOOSTJW@airproducts.com>; Govert,Scot C. <GOVERTSC@airproducts.com>; Sauers,Michael J. <SAUERSMJ@airproducts.com>
Subject: RE: Info Request - H2 Combustion Emissions

I think that it is a fair comparison. If you have flare pilot estimate using natural gas, then you could use these numbers to ratio the estimate for a flare pilot. I don't know the specifics of your flare pilot, but in general I would consider a pilot to be more similar to the "Uncontrolled" emissions since they are designed for stability over NOx.

Let me know if you want to discuss any more specifics on it. Reed

---

From: Reebel,James C.
Sent: Tuesday, May 23, 2017 1:23 PM
To: Hendershot,Reed J. <HENDERR2@airproducts.com>
Cc: Kloosterman,Jeffrey W. <KLOOSTJW@airproducts.com>; Govert,Scot C. <GOVERTSC@airproducts.com>
Subject: RE: Info Request - H2 Combustion Emissions

So air districts question is with regards to combustion of H2 stream in a flare… any idea if this would be treated/viewed any differently than the info you provided or is it a fair approximation (i.e. burners vs. flare pilots)? Thanks for your help!

Jim

From: Hendershot,Reed J.
Sent: Tuesday, May 23, 2017 10:12 AM
To: Reebel,James C. <REEBELJC@airproducts.com>
Cc: Kloosterman,Jeffrey W. <KLOOSTJW@airproducts.com>; Govert,Scot C. <GOVERTSC@airproducts.com>
Subject: RE: Info Request - H2 Combustion Emissions

Hi Jim,

In answer to your question on NOx for H2 use, we did have to do something similar for our emissions permit for our combustion test furnaces here in Allentown. The reference that I used for that is from the John Zink

Combustion Handbook on page 193 which references EPA- 453/R- 93- 015 which I was able to find on page 19 here
https://nepis.epa.gov/Exe/ZyNET.exe/2000HIWU.txt?ZyActionD=ZyDocument&Client=EPA&Index=1991%20Thru%201994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C91THRU94%5CTXT%5C00000014%5C2000HIWU.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&BackDesc=Results%20page&MaximumPages=1&ZyEntry=19.

The table in the document is attached.

TABLE 2-1. UNCONTROLLED EMISSION FACTORS FOR MODEL HEATERS

Model heater type	Uncontrolled emission factor, lb/MMBtu		
	Thermal NO_x	Fuel NO_x	Total NO_x[a]
ND, natural gas-fired[b]	0.098	N/A	0.098
MD, natural gas-fired[b]	0.197	N/A	0.197
ND, distillate oil-fired	0.140	0.060	0.200
ND, residual oil-fired	0.140	0.280	0.420
MD, distillate oil-fired	0.260	0.060	0.320
ND, residual oil-fired	0.260	0.280	0.540
ND, pyrolysis, natural gas-fired	0.104	N/A	0.104
ND, pyrolysis, high-hydrogen fuel gas-fired[c]	0.140[d]	N/A	0.140

[a]Total NO_x = Thermal NO_x + Fuel NO_x
[b]Heaters firing refinery fuel gas with up to 50 mole percent hydrogen can have up to 20 percent higher NO_x emissions than similar heaters firing natural gas.
[c]High-hydrogen fuel gas is fuel gas with 50 mole percent or greater hydrogen content.
[d]Calculated assuming approximately 50 mole percent hydrogen.
N/A = Not applicable.

2-3

The table references a “high- hydrogen fuel gas” and note c states that it is “50 mole percent or greater hydrogen content.” In addition note b states that “refinery fuel gas with up to 50 mole percent hydrogen can have up to 20 percent higher NOx emissions than similar heaters firing natural gas.” I think that based on the specifics of your case you should be able to use these footers and the emission factors to help answer the questions asked by the air district.

Please note that this table is for “Uncontrolled” emissions and therefore should be similar to a worst case scenario since most contemporary burners are at least partially low NOx.

For reference, the title page of the EPA document is here: https://nepis.epa.gov/Exe/ZyNET.exe/2000HIWU.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C91thru94%5CTxt%5C00000014%5C2000HIWU.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&Z yPURL.

In addition as an FYI, since Jimmy's departure, Jeff Kloosterman and myself are supporting HYCO activities now from a combustion point of view.

Let us know if you have any additional questions. Reed

From: Reebel,James C.
Sent: Monday, May 22, 2017 7:42 PM
To: Morris,Paul J. <MORRISPJ@airproducts.com>; Adams,Keith B. <ADAMSKB@airproducts.com>; Sauers,Michael J. <SAUERSMJ@airproducts.com>; Govert,Scot C. <GOVERTSC@airproducts.com>; Li,Jimmy Xianming <LIXM@airproducts.com>
Subject: Info Request - H2 Combustion Emissions

Gentlemen,

I am working with local air district staff on some proposed updates to our local flare rule and a question came up whether we had knowledge of or have utilized any emission factors (ideally w/ references) for hydrogen combustion. Have any of you come across anything or can share how you calculate any emissions from H2 combustion? My understanding is that theoretically the only emissions should be water; however, in reality due to flame characteristics you will get some amount of NOX formation (currently we just utilize a default NOx emission factor for H2 combustion; no other pollutant emissions). Please let me know by Wednesday if you could … thanks for the help!

Jim Reebel
Principal Environmental Engineer
Air Products and Chemicals, Inc.
Los Angeles Area
Mobile: (714) 642-4252
Office: (310) 847-7300 x13
Fax: (310) 847-7311
Email: reebeljc@airproducts.com

Response 3-1
A footnote has been added to the Vent Gas table in Attachment B that for pure hydrogen streams, only the NOx emission factor should be used.

From: Reebel,James C. <REEBELJC@airproducts.com>
Sent: Thursday, June 1, 2017 3:37 PM
To: Ian MacMillan; Eugen Teszler; Dairo Moody
Cc: Cathy Ragland; Rodolfo Chacon
Subject: APCI Rule 1118 Amendment Comments - 2nd Proposed Language Version

Ian,

Appreciate the time you and your staff spent with me following the working group meeting on Tuesday to discuss a few comments/concerns we had. Just wanted to provide in writing as well as add any additional information that has been reviewed/discussed internally as well as with refinery inspection team (Cathy and Rudy cc'd):

- **(c)(13)(C)(ii) –** This section is written as if a process already exists whereby recovered flare gas is utilized as fuel gas for a process unit. Recovery of flare gases does not occur at our facilities so if the intent is otherwise we would ask that this be reworded or clarified with our facilities in mind. If no changes, it should be expected that we would indicate this section as 'non-applicable by design' in our submitted scoping documents. 4-1
- **(i)(4) –** We initially raised concern that we have daily flows at both plants that exceed 100,000 SCF and that notifications would need to be submitted every day creating a nuisance (and likely defeating the purpose/intent of this condition). After further review internally and discussion with District refinery inspection staff, it was determined that only Carson plant exceeded 100,000 SCF on a daily basis and further investigation identified a compressor leak that was able to be immediately resolved which eliminated basically all flow to flare with the exception of (by design) N2 purge flows of approximately 2,500 SCFH. It was further discussed that a team including APCI, rules, engineering/permitting and/or compliance should probably meet in the near future to come to an official/unofficial agreement on methodology/approach to backing out N2 purge flow from our flare flow monitoring measurement (at both facilities) instead of treating it as a combustible flare stream w/ associated emissions which is the current practice. We have no further issues with this condition as written. 4-2
- **Attachment B –** We wanted to just clarify that under the proposed regulation our facilities are not required to install and certify monitors that can measure net heating value (NHV). As such, our expectation is that we would continue to utilize existing ROG and CO emission factors that rely on HHV values once amendment adopted and continuing beyond January 30, 2019. We would want to know ASAP if this understanding is incorrect and discuss. 4-3

Thanks and if you need to discuss anything tomorrow I am available.

Jim Reebel
Principal Environmental Engineer **Air Products and Chemicals, Inc.** Los Angeles Area
Mobile: (714) 642-4252, Office: (310) 847-7300 x13, Fax: (310) 847-7311
Email: reebeljc@airproducts.com

Response 4-1
The Scoping Document requirements in (c)(13) are designed to analyze the feasibility of making improvements to facilities to reduce flaring emissions. Clause (c)(13)(C)(ii) refers to an analysis of the sudden loss of a fuel gas consumer. For facilities that do not currently recover flare gases into their flare gas system, the Scoping Document could result in an analysis of adding a fuel gas consumer for other clauses [e.g., adding a cogeneration unit for (c)(13)(C)(i), (iii), or (iv)]. In this case, the response to (c)(13)(C)(ii) should include an analysis of what would occur with the sudden loss of this fuel gas consumer. If no fuel gas consumer is ever considered as a part of a facility's design, a response of 'non-applicable by design' would be acceptable.

Response 4-2
No changes have been made to (i)(4) in response to this comment. Staff appreciates that the facility has pro-actively taken steps to reduce the release of vent gas.

Response 4-3
Air Products as part of its permit is required to annually test its vent gases for high heating value content, and then utilize this value to calculate their emissions. The updated emission factors in Attachment B will require the facility to now use the net heating value instead of the high heating value, where appropriate.

Dairo Moody
Eugene Teszler
SCAQMD
21865 Copley Drive
Diamond Bar, CA 91765

COMMUNITIES FOR A BETTER ENVIRONMENT

Re: Summary Comments Flare Rule 1118 – detailed comments to be submitted later

Dear AQMD Staffmembers,

In addition to comments submitted orally at previous workgroup meetings, included below are a summary of key CBE comments on Rule 1118. We will also be submitting more detailed comments in writing. We provide this summary now because we understand you are considering the next version of your staff report and making changes to the proposed Rule 1118.

As flaring can cause major emissions and high pollutant concentrations in a short time frame and are indicators of stability of refinery operation, they are cause for careful scrutiny. Flaring is of great concern to CBE and our members who are impacted by multiple refineries in the South Coast (and Bay Area).

We appreciate the District's hard work to improve this rule! We especially appreciate the District's plan to evaluate measures to minimize or eliminate planned flaring, to carry out optical remote sensing of flare emissions, and additional improvements. **We also strongly support the District requiring fees for VOCs as well as SOx emissions, and we will be submitting comments about this subject.**

5-1

Here are some remaining key loopholes that need to be removed:

- **Flare Minimization Plans are required for all refineries in the Bay Area Air Quality Management District,[1] have been for over a decade, & should be added as a requirement in the South Coast** for all covered facilities (refineries as well as Air Products & Air Liquide flares). Right now, only facilities exceeding a certain threshold are required to submit them. This leaves out a major pollution prevention tool, and waits until after-the-fact to put it in place. We have been asking for this provision since the first rule adoption proceedings over ten years ago. Requiring Flare Minimization Plans across the board would allow the District to compare the plans of each refinery, and identify best practices and comparative deficiencies. Such plans should not be considered burdensome paperwork, but important pollution prevention and safety

5-2

[1] Bay Area Air Quality Management District requires Flare Minimization Plans for all refineries: *"12-12-401 Flare Minimization Plan Requirements: The owner or operator of a petroleum refinery with one or more flares subject to this rule shall submit to the APCO a FMP [Flare Minimization Plan] in accordance with the schedule in Section 12-12-402."* Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/reg-12/rg1212.pdf

plans. EPA's recent determination that flare VOC Emissions Factors were underestimated by at least 10 times, is one more reason to ensure that each facility has a robust, well documented plan to minimize ALL flaring.

5-2 cont'd

- **"Clean Service" flaring emissions and other flares burning propane, butane, and methane have low-balled Emissions Factors in the rule.** The ROG or VOC[2] emissions for "Clean Service" flares and other flaring of propane, butane, and methane (natural gas) are set at extremely low Emissions Factors. For example for propane and butane, an Emissions Factor is set at of 0.003 lbs/MMBTU[3] (compared to the 0.66 lbs/MMBTU for other hydrocarbons, which is 220 times higher). ROG emissions from all hydrocarbons should be increased to use a factor of at least 0.66 lbs/MMBTU factor currently set in the rule for vent gases in general. Even the 0.66 lbs/MMBTU emissions factor is identified in AP-42 as only applying to extremely efficient flaring under favorable conditions of gas content and flow velocity. It is well established that flare efficiency can become quite low under many conditions that are common, causing emissions to multiply to high levels. CBE routinely receives complaints from community members about flaring that the District has called "Clean Service" flaring. CBE previously submitted evidence on multiple studies regarding degraded combustion efficiency measured at oil refinery flares, and we will provide updated comments on this subject in our detailed upcoming letter.

5-3

- **Inspections should be made by the District to eliminate by-pass pipes that avoid flare monitoring equipment, such as those found at the Torrance refinery are present.** The same problem was found at the Chevron Richmond refinery in the past, indicating that California refineries require additional inspections.

5-4

- **"Essential Operational Needs" is too generalized a category, is not given special consideration in the Bay Area rule, and should be struck in the South Coast rule**: Currently the rule states a requirement to *"Operate all flares in such a manner that minimizes all flaring and that no vent gas is combusted except during emergencies, shutdowns, startups, turnarounds or essential operational needs."* The Bay Area regulation includes no such allowance.

5-5

- **Specific Cause Analysis language has a new exemption** for non-standard operation during planned events, which should not be added to the rule. [4]

5-6

[2] Reactive Organic Gases, or Volatile Organic Compounds

[3] Draft AQMD Rule 1118 updates, Attachment B, GUIDELINES FOR CALCULATING FLARE EMISSIONS, Propane and Butane, p. 36.

[4] Rule 1118 states: *"Specific Cause Analysis is a process used by a facility subject to this rule to investigate the cause of a flare event, identify corrective measures and prevent recurrence of a similar event."* and *"Conduct a Specific Cause Analysis for any flare event, excluding planned shutdown, planned startup and turnarounds, and for any flare event resulting from non-standard operating procedure during a planned shutdown, planned startup or turnaround, when either: (A) Emissions exceed 100 pounds of VOC; or (B) Emissions exceed 500 pounds of sulfur dioxide; or (C) More than 500,000 standard cubic feet of vent gas are combusted"*

- **Performance Targets now include a weakening amendment – previously the rule required minimizing all emissions including VOCs, SO2, and other emissions, but now only requires minimizing SO2 in this section:** "*The owner or operator of a petroleum refinery subject to this rule shall ~~minimize flare emissions~~ . . .*" This has been replaced with language further in the text to minimize only sulfur dioxide emissions. It is very important that the requirement to minimize all flaring emissions be reinstated.
- **Furthermore, the District had previously been evaluating tightening the SO2 Performance Standard to 2.5 tons/million barrels** of crude processing capacity, but currently the draft still allows 0.5 tons/million bbls. In fact, some refineries have met tighter standards at 0.1 tons/million barrels, and the District should set the standard to reflect Best Practices, not average practices.
- **Very important process description to be submitted to the District in Flare Minimization Plans has been removed.** (These are requirements that detailed process flow diagrams of all upstream equipment and process units venting to each flare be identified in the Flare Minimization Plan that were previously Section (c)(1)(B).)

5-7

5-8

5-9

Thanks again for all your work on this important regulation. Julia

May
Senior Scientist
Communities for a Better Environment (CBE)

Response 5-1
Thank you for your comment. Responses 5-2 through 5-9 contain specific responses.

Response 5-2
Staff agrees that additional analysis is required by facilities to further reduce their flaring emissions. The Flare Minimization Plan (FMP) requested in this comment is different than the current requirements for a FMP in Rule 1118. FMPs required by Rule 1118 and PAR 1118 investigate why an annual Performance Target was exceeded, and evaluate how to avoid this exceedance in the future. The requested FMP appears to be more of a forward-looking analysis that evaluates all potential causes of flaring, not just what may have caused an exceedance historically. Instead of changing the FMP definition and requirements in PAR 1118, there are two separate mechanisms, which should address this comment.

First, the EPA Refinery Sector Rule already requires facilities to undergo a similar process as requested in this comment. In the RSR, requires facilities to *"Develop a flare management plan to minimize flaring during periods of startup, shutdown, or emergency releases."* [40 CFR Part 63, Subpart CC § 63.670 (o)(1)]. The RSR also states *"The owner or operator must develop and implement the flare management plan no later than January 30, 2019 or at startup for a new flare that commenced construction on or after February 1, 2016."* and *"The owner or operator must comply with the plan as submitted by the date specified in paragraph (o)(2)(i) of this section. The plan should be updated periodically to account for changes in the operation of the flare, such as new connections to the flare or the installation of a flare gas recovery system, but the plan need be re-submitted to the Administrator only if the owner or operator alters the design smokeless capacity of the flare. The owner or operator must comply with the updated plan as submitted."* [40 CFR Part 63, Subpart CC § 63.670 (o)(2)(i) and (ii)]

Second, as Part of PAR 1118, facilities must evaluate even more stringent standards as part of a detailed engineering analysis in the Scoping Documents required in (c)(13). As part of the Board Resolution that will be considered by the Board with the adoption of PAR 1118, a resolution will be added directing staff to undertake a second phase of rulemaking to further reduce flaring that will consider the information returned in Scoping Documents. These Scoping Documents will include site-specific feasibility analyses of additional controls that are not currently required by any rules from BAAQMD, SCAQMD, or EPA.

Response 5-3
The flaring emission factors for butane and propane in Attachment B have been updated in response to this comment and are now consistent with recent updates to EPA's AP-42 Chapter 1.5. The emission factors in Attachment B in the existing Rule 1118 are based on an older version of AP-42 Chapter 1.5, which has since been updated since the last rule amendment. With regards to combustion efficiency, there are many parts of the EPA Refinery Sector Rule designed to improve combustion efficiency, and they have been included in PAR 1118, including limits on flare tip velocity [(c)(3)], net heating value in the combustion zone [(c)(4)], and new prohibitions on smoking flaring events [(c)(10)]. In addition, the proposed pilot study of optical remote sensing could lead to new techniques that can better evaluate flaring emissions, and can potentially improve flare combustion efficiency by providing real-time feedback on combustion dynamics to facility operators.

Response 5-4
In addition to regular facility inspections, SCAQMD Compliance staff have inspected every facility subject to Rule 1118 specifically to determine if there are any bypass lines that send vent gas to the flare tip that are not monitored. No bypass lines have been identified as part of these inspections.

Response 5-5
The definition of Essential Operational Needs has been narrowed to remove emergency flaring and minor venting that should be recovered by existing flare gas recovery systems. As noted by the commenter, BAAQMD Rule 12-12 does not specifically call out flaring under the term Essential Operation Need. However, every facility must submit a Flare Minimization Plan (different than a FMP required by SCAQMD Rule 1118) that details the steps a facility has taken and will take to minimize flaring, including from activity that is contained within the Essential Operational Need definition in Rule 1118. For example, under BAAQMD Rule 12-12, FMPs must evaluate the expeditious implementation of feasible prevention measures, and shall include an audit of *"the scrubbing capacity available for vent gases including any limitations associated with scrubbing vent gases for use as a fuel; and shall consider the feasibility of reducing flaring through the recovery, treatment and use of the gas or other means."* However, this requirement does not prohibit the flaring of gases that are incompatible with the fuel gas system if it is infeasible to provide sufficient scrubbing or storage capacity for all vent gases. The requirements in BAAQMD Rule 12-12 are therefore no more stringent than SCAQMD Rule 1118 with regards to Essential Operational Needs.

Response 5-6
Paragraph (c)(6) has been modified to make it clear that the described exemption does not apply.

Response 5-7
The phrase *"minimize flare emissions"* has been added back into subdivision (d). There are no amendments in PAR 1118 that change the purpose of the rule to *"control and minimize flaring and flare related emissions."*

Response 5-8
Before the Performance Targets can be lowered, a feasibility analysis must be conducted. The Scoping Documents proposed in (c)(13) will provide site-specific analyses conducted by facilities to evaluate what can be implemented to further reduce flaring emissions.

Response 5-9
The requirement for a detailed process flow diagram is now in the Scoping Documents in (c)(13)(D) and also in Flare Monitoring and Recording Plans in (f)(4)(E).

COMMUNITIES FOR A BETTER ENVIRONMENT

Via Electronic Mail

May 19, 2017

Dairo Moody
Eugene Teszler
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Proposed Amended Rule 1118

Dear SCAQMD Staff Members:

Thank you for your work on Proposed Amended Rule 1118. We submit these comments on behalf of Communities for a Better Environment ("CBE"), an environmental justice organizations that advocates on behalf of residents in Wilmington, a neighborhood cumulatively impacted by five oil refineries. This community is also impacted by the ports of Los Angeles and Long beach, the I-710 and I-110 freeways, heavy diesel truck traffic for goods movement through this corridor, and is home to the largest urban oil field in the United States. Wilmington currently ranks in the top 5% of communities with the highest pollution exposure and social vulnerability in the state.[1] These communities cannot bear more emissions of toxic air contaminants or criteria pollutants, and must be protected.

We commend the Air District for updating Rule 1118, and for taking steps to tighten regulation of flares at refineries, including by removing the $4 million cap on mitigation fees for violation of the performance standard for SOx emissions. Julia May, senior scientist at CBE, submitted written comments regarding Proposed Amended Rule 1118, and we also submitted oral comments during public working group meetings. This letter supplements comments already submitted, and provides further analysis regarding our proposed recommendations to tighten the performance standard for SOx emissions, and to establish a performance standard for VOCs.

6-1

The Air District may impose stricter performance standards pursuant to its police powers as a governing agency. The Air District is the air pollution control agency for the South Coast Basin, and has the authority to set air quality standards and impose fines for violations of these standards. In 2005, the Air District established a performance standard for emissions of SOx

6-2

The Air District may impose stricter performance standards pursuant to its police powers as a governing agency. The Air District is the air pollution control agency for the South Coast Basin, and has the authority to set air quality standards and impose fines for violations of these standards,

[1] Ofc. of Envt'l Health Hazard Assessment (2014) *CalEnviroScreen Version 3.0,* https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30.

from refineries, and imposed increasingly onerous fines depending upon the level of exceedance of the applicable performance target.[2] As documented in the Air District's May 11, 2017 Public Workshop, fines for violation of the SOx performance target were not imposed on all refineries, but were imposed only on refineries that violated the SOx performance standard.[3]

Penalties imposed by the Air District for violation of the SOx performance standards described in Rule 1118 do not constitute a "tax." **There is no justification in law for such a proposition.** The California Constitution provides that "[a]ny change in state statute which results in any taxpayer paying a higher tax must be imposed by an act passed by not less than two-thirds of all members elected to each of the two houses of the Legislature[.]"[4] However, "[a] fine, penalty, or other monetary charge imposed by . . . the State, as a result of a violation of law" is excepted from and not included within the definition of "tax."[5]

Mitigation fees assessed on refineries that violate the SOx performance standard are a penalty, because they are imposed only after a violation has occurred with the purpose of deterring law breaking activity. "A penalty . . . regulates conduct . . . by deterring those tempted not to [comply with the law.]"[6] In *Franchise Tax Board*, the Court of Appeals distinguished taxes from penalties by reasoning that "while a tax raises revenue if it is obeyed, a penalty raises revenue only if some legal obligation is disobeyed[.]"[7]

Taken to its logical conclusion, the argument that regulatory fines imposed by the Air District for violating air quality standards constitutes a tax, would eviscerate the Air District's authority to promulgate regulations to control regional air pollution. Under such a scheme, any air quality standards amended, or newly promulgated after 2011, would require approval by two-thirds of the Legislature. Such a broad prohibition of the Air District's regulatory authority was not contemplated by the passage of Proposition 26, and is not otherwise supported by law. Thus, under the plain language of the Constitution, penalties imposed by the Air District for violation of the SOx performance standard for refinery flares are not "taxes."[8] The Air District has plain authority to amend Rule 1118 and tighten the SOx performance standard, and also to impose a new performance standard for VOCs.

6-2 cont'd

The Air District should tighten the performance standard for SOx to 0.1 tons per million barrels, while it considers even tighter standards down to 0.0 tons. CBE strongly recommends tightening the performance standard for SOx emissions, to 0.1 tons per million barrels of crude processing capacity. Refineries have met lower emissions levels of 0.1 tons of

6-3

[2] S. Coast Air Quality Mgmt. Dist. (2005) Rule 1118, subd. (d).
[3] S. Coast Air Quality Mgmt. Dist. (May 11, 2017) *Public Workshop: Proposed Amended Rule 1118 – Control of Emissions from Refinery Flares*, at 13.
[4] Cal. Const. Art. 13A, § 3(a).
[5] *Id.* at § 3(b).
[6] *Cal. Taxpayers' Ass'n v. Franchise Tax Bd.* (2010) 190 Cal.App.4th 1139, 1148.
[7] *Id.* at 1148–49.
[8] *See People v Superior Court (Zamudio)* (2000) 23 Cal.4th 183, 192 ("If there is no ambiguity in the language of the statute, . . . the plain meaning of the language governs[.]") (internal citations and quotation marks omitted).

SOx/million barrels, and the District should set the SOx performance standard at this level to reflect *best* industry practices, not average industry practices. The Air District itself considered tightening the standard down to 0.25 tons per million barrels early in the current rulemaking update.

6-3 cont'd

The Air District should create a performance standard for VOCs. Actual emissions of VOCs exceeded reported emissions by over 6 times.[9] Excess emissions of VOCs from oil refineries is a serious and underreported problem, and the Air District should develop a performance standard for VOCs to lower these emissions. This problem is also consistent with EPA's finding that the current flare VOC emission factor should be ten times higher. As the South Coast is an extreme non-attainment zone, it is all the more important to use such available means to cut VOCs.

6-4

A performance standard is a successful regulatory successfully at reducing flaring. The slides presented in the Air District's first public workshop make a compelling case for establishing a performance standard for VOCs. During that presentation, the Air District documented that most facilities make the effort to reduce emissions below the SOx performance standard to avoid paying onerous penalties. S. Coast Air Quality Mgmt. Dist. (Feb. 28, 2017) *First Working Group: Proposed Amended Rule 1118*, at 19, 21. The Air District should replicate this successful regulatory approach, and establish a performance standard for flaring VOCs to deter refineries from excess VOC flaring.

6-5

Thank you for your work on Proposed Amended Rule 1118. The communities living near refineries in the South Coast Air Basin are paying the costs of excess SOx and VOC emissions with their health, and in some cases with their lives. We urge you to adopt a tighter performance standard for SOx and a strict performance standard for VOC emissions to protect these communities.

Respectfully submitted,

/s/

Jaimini Parekh
Attorney/ VABANC Law Foundation Fellow

Gladys Limón (ext. 117)
Staff Attorney

[9] FluxSense (Apr. 11, 2017) *Emission Measurements of VOCs, NO2, and SO2 from the Refineries in the South Coast Air Basin Using Solar Occultation Flux and Other Optical Remote Sensing Methods*, at 4.

COMMUNITIES FOR A BETTER ENVIRONMENT
6325 Pacific Blvd Suite 300 · Huntington Park, CA 90255 · P: (323) 826-9771 // F: (323) 588-7079
120 Broadway, Suite 2 · Richmond, CA 94804· P: (510) 302-0430 // F: (510) 302-0437

Response 6-1

Thank you for the comments. Specific responses are included in Responses 6-1 through 6-5 below.

Response 6-2

This comment states that the District has the authority to impose tighter SOx Performance Targets and to also impose a new Performance Target for VOCs, because the Mitigation Fees paid by the facilities when the SOx targets are exceeded are fines paid to settle a penalty and not taxes. However, these Mitigation Fees paid by facilities are neither taxes nor fines, they are instead an option that facilities can use to stay in compliance with the rule. The Mitigation Fees paid by facilities pursuant to Rule 1118 are not a result of a violation as the fees are an explicit compliance option allowed under the rule. Facilities could opt out of the fees by taking steps to keep their emissions levels lower than the Performance Target. In other words, reduction in emissions or payment of mitigation fees are each compliance options.

Further, because tightening the current SOx Performance Target or adding a new VOC Performance Target would significantly affect air quality or emissions limitations the District must first analyze the socioeconomic impacts of this change (Health and Safety Code §§ 40440.8, 40728.5, 40920.6). In addition, the new controls that may be required with tighter Performance Targets could require an extensive CEQA analysis, including an analysis of alternatives. Because of the extensive analyses that must be conducted before tightening the Performance Targets, including a full socioeconomic assessment, potential analysis under Proposition 26 for proposed fees, and a CEQA analysis, staff has proposed a two-phase rulemaking approach. Among other updates, the first phase requires facilities to conduct site-specific feasibility assessments with Scoping Documents. The second phase of rulemaking will then evaluate potential changes to the Performance Targets using the feasibility assessments within the submitted Scoping Document.

Response 6-3

As discussed in Response 6-2, any potential changes to the Performance Targets requires a feasibility and socioeconomic analysis. Staff has not proposed a lower Performance Target of 0.25 SOx tons per million barrels as part of this first phase of rulemaking, which commenced in October 2016. All facilities will be evaluated in the second phase of rulemaking to determine if there are best practices from lower emitting facilities that can be feasibly applied to other facilities.

Response 6-4

The comment states that VOCs are under-reported from refineries generally, and from flares specifically. The facility-wide under-reporting of VOCs from refineries was a conclusion of a SCAQMD-funded study conducted by FluxSense Inc. This study used a variety of different Optical Remote Sensing (ORS) techniques to evaluate facility-wide emissions from local refineries. While the results of this study are important, and point to further work that is needed to evaluate emissions from refineries, the monitoring techniques used have not yet been found to be appropriate for developing facility-wide emission inventories. SCAQMD staff plans to continue encouraging the development of the technologies evaluated in this study, including for specific

applications such as leak detection or stack-specific monitoring. For example, staff is proposing an ORS pilot study to evaluate the potential for using these technologies specifically for flare monitoring. EPA relied on similar ORS studies to revise its stack-specific flaring emission factor guidance in AP-42. PAR 1118 is updating its emission factors based on this updated EPA guidance.

Response 6-5

As stated in Response 6-2, a feasibility and socioeconomic analysis is required before the Performance Targets can be tightened. This analysis will be conducted in a second phase of rulemaking.

Entire e-mail chain is one comment. 7-1

From: Julia May
Sent: Friday, June 2, 2017 4:52 PM
To: Dairo Moody; Ian MacMillan
Subject: P.S: re 0.003lb/MMBTU flare EF came from, but I still question 0.009

Ok - Now I see that the new AP 42 External Boilers burning Propane has an EF for TOC of 1 lb/1000gals, which is roughly 3 times the old EF of 0.3lbs/1000 gals (which = .003 lbs/MMBTU from my corrected calcs below), so I see why you ended up with a new EF of .009lbs/MMBTU.

However, this still doesn't really reconcile well with other HC's having a new EF of 0.66lbs/MMBTU - drastically higher.

I think propane, butane, methane are getting off the hook with major emissions underestimations, and I'm very concerned about so called "Clean Service" flares continuing to get these breaks. Community members are also very concerned about these flares. They complain to us when they see these flaring.

On Fri, Jun 2, 2017 at 3:57 PM, Julia May wrote:

> Just saw a silly error a while back that I made in sending the email in the chain below too quickly to you guys, while I was on the phone at the same time. See correction below.
>
> **This may explain where the propane emission factor of .003lbs/MMBTU came from,** that you had in the rule. When I correct my calculation in the chain (divided by, not times!) you get 0.003lbs/MMBTU.
>
> **CORRECTING (**using the 0.3 lbs/thousand gals from San Diego APCD in link below, which came from the ROG EF from AP42 Boilers burning Propane, and 91,600 btu/gal for propane):
>
> 0.30 lbs/1000 gals / (91,600 BTU/gal propane x 1000/1000) =
>
> 0.30 lbs/1000 gals / (91.6MMBTU/1000 gal) = ,**003 lbs/MMBTU**
>
> However, regardless of where the factor came from, I do not believe that such a low number is correct, when other hydrocarbons are now found to be at 0.66lb/MMBTU. **Further, I didn't see where you got the new number of 0.009 lbs/MMBTU new EF that you inserted into the flare rule. That still seems to be an unreasonably low EF compared to other hydrocarbons.**
>
> **CAN YOU SEND POINT ME TO EXACTLY WHAT YOU ARE USING TO GET 0.009LBS/MMBTU?**
>
> Thanks much, Julia May, CBE

On Fri, May 12, 2017 at 9:23 AM, Julia May wrote:

For our discussion this morning, I wanted to bring up the Emission Factor for propane *(and same principles apply to butane, probably methane).* For example – the following is an Emission Factor for ROG that I just grabbed from the San Diego site for uncontrolled boilers burning propane, which comes from AP-42 - 0.30 lbs/1000 gals. (The South Coast probably has a similar one.)

http://www.sandiegocounty.gov/content/dam/sdc/apcd/PDF/Misc/EFT/Liquid_Combustion/APCD_Boiler_P ropane_Fired_10-100_MMBTU_Uncontrolled.pdf

CONVERTING FROM 1000 GALS TO MMBTU GIVES THE FOLLOWING:

0.30 lbs/1000 gals* x (91,600 BTU/gal x 1000/1000)=

0.30 lbs/1000 gals x 91.6MMBTU/1000 gal = **~27** lbs/MMBTU

While there are likely different EFs available, the above numbers are a far cry from the **0.003lbs/MMBTU** value in Rule 1118. Do you see anything wrong with this analysis? This indicates to me that the propane & butane EFs also need to be corrected (not just the general vent gas EF).

Response 7-1
This comment states that the ROG emission factor in Rule 1118 is too low for propane and butane and a higher value should be used since the vent gas emission factor is so much higher. Because more specific information is not currently available, the emission factors within PAR 1118 and the existing Rule 1118 rely on EPA's AP-42 guidance document. The proposed updates within PAR 1118 are consistent with updates to AP-42 since the last amendments to Rule 1118 in 2005. The ROG emission factor will be increased about three-fold for propane and butane, and about ten-fold for general vent gas. Recognizing the limitations of the use of emission factors, staff is proposing to conduct an Optical Remote Sensing pilot study to determine if direct monitoring of flaring emissions with emerging technologies is possible. This study will be designed to evaluate clean service flares as well as general service flares. Further, the Scoping Documents that facilities are required to prepare must now evaluate the feasibility of achieving a new VOC emissions limit of 0.1 tons per year from clean service flares. The second phase of rulemaking on 1118 will consider the findings from the Scoping Documents to determine what additional steps can be taken to further reduce flaring emissions, including from clean service flares.

From: Julia May [julia@cbecal.org]
Sent: Monday, June 05, 2017 4:08 PM
To: Ian MacMillan; Dairo Moody; Eugen Teszler
Cc: Jaimini Parekh
Subject: Rule 1118 Comment: AP-42 Flares Ch. higher TOC EF for burning propane/propylene

E-mail is one comment.
8-1

Good afternoon -- I will be sending a more formal comment letter in addition to our earlier Flare Comments, but **I wanted to repeat an important issue before you finalize your packet, on one particular concern of ours -- that pollutants such as propane would continue to have very low EFs (Emission Factors) in the most recent version of the rule, and this should be changed.** Although you have changed the ROG EF for Propane from 0.003lbs/MMBTU to up to 0.009, this is still orders of magnitude lower than the EF for other HCs (0.66)

You got the 0.009 lb/MMBTU I believe from converting the EF for external combustion industrial boilers, which is equivalent to the published 1 lb/1000 gallons EF. I sent corrected calculations last week showing the conversion to lbs/MMBTU. (I corrected earlier calculations which had an error.)

However, this Boiler EF has a rating of "E", which means Poor.

On the other hand, EPA set an EF in updated AP42 specifically for flaring a combination of propylene and propane, resulting in Total HCs emitting at 0.14 lbs/MMBTU for Total HCs. (p. 13.5-5) **This factor is given a B rating (Above Average).**
https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf

I propose you at a minimum use the 0.14 lbs/MMBTU, or don't differentiate propane at all, and use the 0.66 lbs/MMBTU factor for all HCs. Even the 0.66lbs/MMBTU factor is not conservative – I noticed that the EPA technical basis document for the new flare emissions factor showed that emissions can go much higher (up to 1.6 lbs/ MMBTU in their flare testing). Furthermore, they had previously thrown out any data where the efficiency went below 98%. If you continue to include the extremely low EF in Rule 1118 for so called "Clean Service" flares, this will low-ball and hide true impacts, without a good basis to do so. This is especially problematic when updated EPA investigations found that flares have far higher emissions than previously acknowledged.

The AP42 Flare Chapter 13.5 EF of 0.14 lb/MMBTU is at least in the ballpark of the EF for other HCs (0.66lbs/MMBTU), which seems much more reasonable than the extremely low factor of 0.009. I don't see why propane flaring should result in such drastically lower emissions compared to other HCs.

I would appreciate a response on this issue, and also want to thank you again for all your hard work on this regulation.

Julia May
Senior Scientist
Communities for a Better Environment (CBE)

Response 8-1
See Responses 5-3 and 7-1. The proposed emission factor from chapter 13.5 of AP-42 in this comment is not appropriate for use for propane and butane flaring. The emission factor cited is from a combination of 80% polypropylene and only 20% propane, whereas clean service streams include streams of 100% propane or 100% butane. Recognizing that more information is needed on flaring emissions, staff is proposing an Optical Remote Sensing pilot study to determine in emerging technologies can provide more information based on observations of flare plumes.

Torrance
Refining Company

Torrance Refining
Company LLC
3700 W 190th Street
Torrance, CA 90504
www.pbfenergy.com

June 2, 2017 Via e-mail at: IMacMillan@aqmd.gov

Mr. Ian MacMillan
Planning and Rules Manager
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Comments on Proposed Amended Rule 1118, Control of Emissions from Refinery Flares

Dear Mr. MacMillan:

Torrance Refining Company LLC ("TORC") appreciates the opportunity to provide comments on the South Coast Air Quality Management District's ("SCAQMD's") July 2017 Proposed Amended Rule 1118, Control of Emissions from Refinery Flares ("PAR 1118"). TORC adopts and incorporates by reference herein the comments of the Western States Petroleum Association ("WSPA") on PAR 1118.

Please note that in submitting this letter, TORC reserves the right to supplement its or WSPA's comments as it deems necessary, especially if additional or different information is made available to the public regarding PAR 1118.

We commend the SCAQMD for working closely with the regulated community and other stakeholders to incorporate many needed revisions to PAR 1118 over the past months. However, we believe that the recent comments from WSPA additional revisions to PAR 1118 are warranted in order to ensure an effective, technically feasible, and cost effective rulemaking. We look forward to continuing to work collaboratively with the SCAQMD to arrive at rulemaking that accomplishes the previously stated goals and that minimize flaring emissions without compromising process safety.

9-1

Sincerely,

David L. Ingram
Manager – Health, Safety, and Environmental

cc: Steve Steach
Darren W. Stroud
Penny Wirsing
Craig Sakamoto

Response 9-1
Thank you for your comments. This comment expresses support for a comment letter from WSPA. Responses can be found in Responses 10-1 through 10-17.

From: Patty Senecal <psenecal@wspa.org>
Date: Wednesday, May 10, 2017 at 9:10 PM
To: Wayne Nastri <wnastri@aqmd.gov>
Cc: Cathy Reheis-Boyd <creheis@wspa.org>
Subject: PAR 1118 (Refinery Flares) Wayne,

WSPA believes this rule is not ready to go to Stationary Source next week or to the Governing Board in July. This is a very technical rule and Staff is trying to include the USEPA Refinery Sector Rule requirements (and as currently written, some of the requirements, calculations, and technology for measurement conflict). There are a lot of technical concerns we all need to continue to work out and the short amount of time from the release of the draft language & draft preliminary report (April 21) until Board adoption (July 7) is problematic . We believe this rule is being unduly rushed, given that less than three weeks will have elapsed from the release of draft language to the public workshop tomorrow (May 11). Many of the refineries are making updates to their flare systems to bring them into compliance with USEPA Refinery Sector Rules, and with the short time frame of the District's rule, they are now having to consider making changes to comply with 3 regulations at the same time- the old R1118, PAR 1118, and USEPA RSR.

WSPA had a productive meeting with your staff yesterday, (5/10), but we weren't able to get through all our issues with the proposed language; we will schedule another meeting. This is also a two-part rulemaking, so having conflicts remain going into the second part of the rulemaking will only cause further confusion and issues if not thoughtfully addressed now.

WSPA is asking for your consideration to move this rule forward on the rule forecast to the October Board meeting and not to take this to Stationary Source on May 19. Thank you for your consideration.

Current schedule:

Feb 28	First working group meeting
March 3 & 27	Public meetings (Torrance & Wilmington)
April 19	Bridget and I had an initial meeting with Phil Fine and Ian MacMillan regarding the rule
April 21	Draft Rule Language and Draft Preliminary Report released
May 10	WSPA & members meet with District to present technical issues (productive meeting)
May 11	Public Work Shop & CEQA Scoping meeting (WSPA will make comment to slow down the process)
May 19	District has scheduled to present to Stationary Source Committee
July 7	Board adoption

10-1

Patty Senecal
Director
Western States Petroleum Association
(310) 678-7782
patty@wspa.org

Response 10-1
This comment asked for more time to develop PAR 1118 as there are many technical issues to consider with the EPA Refinery Sector Rule. Staff has continued to meet with individual refineries and WSPA since this comment has been received, and has made many changes to the rule that staff believes has resolved most of these technical issues. Responses to a subsequent comment letter from WSPA, which does not request more time for rule development, are contained in Responses 11-1 through 11-17.

Western States Petroleum Association
Credible Solutions • Responsive Service • Since 1907

Bridget McCann
Manager, Southern California Region

June 2, 2017

Mr. Ian MacMillan
Planning and Rules Manager
South Coast Air Quality Management District 21865
Copley Drive
Diamond Bar, CA 91765

Via e-mail at: IMacMillan@aqmd.gov

Re: **Comments on Proposed Amended Rule 1118, Control of Emissions from Refinery Flares**

Dear Mr. MacMillan:

Western States Petroleum Association (WSPA) appreciates this opportunity to provide comments on Proposed Amended Rule (PAR) 1118, Control of Emissions from Refinery Flares. WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in five western states including California. WSPA-member companies operate petroleum refineries in the South Coast Air Basin that are affected by Rule 1118.

The purpose of Rule 1118 is to monitor and record data on refinery and related flaring operations, and to control and minimize flaring and flare related emissions. The provisions of the rule are not intended to pre-empt any operations and practices with regard to safety.[1] The stated objectives for the proposed amendments included: (a) updating Rule 1118 emissions factors to reflect recent revisions to the U.S. Environmental Protection Agency's (EPA) AP-42 emission factors; (b) harmonizing Rule 1118 with the recently promulgated U.S. EPA Refinery Sector Rule (RSR) requirements for refinery flares; and (c) updating the emissions fees.[2]

11-1

The proposed rulemaking schedule for PAR 1118 has been incredibly aggressive, especially given the complexity of the facilities covered under the rule and the highly technical nature of the applicable requirements. Given that accelerated schedule, WSPA appreciates the District Staff's willingness to meet and work with WSPA, its members, and the other stakeholders, despite considerable time constraints.

WSPA and its members have reviewed the revised version of PAR 1118.[3] Numerous changes have been made by Staff in response to comments from the stakeholders. However, there remain a number of important areas in the draft language where improvements are needed to clarify the applicable requirements and, importantly, minimize conflicts with the EPA RSR regulation. These are presented below.

[1] South Coast AQMD Rule 1118, Section (a).
[2] South Coast AQMD, Presentation to First Working Group, PAR 1118, Control of Emissions from Refinery Flares, February 28, 2017.
[3] South Coast AQMD PAR 1118, Version 5/26/17.

Section (b), Definitions

1. **Section (b)(3)(B), Essential Operational Need**

The draft rule should be revised to maintain inclusion of "relief valve leakage" within the definition of Essential Operational Need (EON). Relief valves are configured to vent into flare gas headers when there is malfunction or intermittent minor venting from equipment or systems (e.g., sampling systems, pumps, compressors, etc.). In most cases, this venting is handled by flare gas recovery systems. However, the current draft language would create a conflict if such leakage happened to be occurring into the flare header during a flare event. It is most appropriate to maintain this activity within the EON definition. In the alternative, the relief valve leakage could be included under the definition of "Emergency" found in Section (b)(2). 11-2

Proposed Change

(b)(3)(B) ~~Relief valve leakage due to malfunction~~; Relief valve leakage due to malfunction;

2. **Section (b)(3)(E), Essential Operational Need**

Similarly, the draft rule should be revised to maintain inclusion of "intermittent minor venting" within the definition of Essential Operational Need (EON). Intermittent minor venting includes venting from sight glasses, compressor bottles, sampling systems or pump/compressor seals. These are vented to the flare headers and captured by the flare gas recovery system. However, the current draft language would create a conflict if such leakage was occurring into the flare header at the same time as a flare event. It would be most appropriate to maintain this activity within the EON definition. Alternatively, the District could add a de minimis flow exemption for intermittent minor venting instead of removing it. 11-3

Proposed Change

(b)(3)~~(E) Intermittent minor venting from:~~ (E) Intermittent minor venting from:

(i) ~~Sight glasses~~; Sight glasses;
(ii) ~~Compressor bottles;~~ Compressor bottles;
(iii) ~~Sampling systems; or~~ Sampling systems; or
(iv) ~~Pump or compressor systems;~~ Pump or compressor systems;

3. **Section (b)(5), Flare Event**

Under the current draft language, the definition of "Flare Event" would be revised to consider multiple flare events that can be attributed to the same process unit(s) or equipment and have more than one start and end within a 24 hour period as a single event (i.e., not separate or unique events). This would represent a significant change to the rule when considered together with per event requirements in the rule. WSPA recommends that this new language be removed from the Flare Event definition. 11-4

Proposed Change

(b)(5) FLARE EVENT is any intentional or unintentional combustion of vent gas in a flare. ~~The flare event ends when the flow velocity drops below 0.12 feet per second,~~ The start is determined by the vent gas flow velocity exceeding 0.10 feet per second and the end is determined when the vent gas flow velocity drops below 0.12 feet per second, or when the owner or operator can demonstrate that no more vent gas was combusted based upon the monitoring records of the flare water seal level and/or other parameters as approved by the Executive Officer in the Flare Monitoring and Recording Plan as described in subdivision (f). ~~For flare events that can be attributed to the same process unit(s) or equipment and has more than one start and end within a 24 hour period, it shall be considered a continuation of the same event, and not a separate or unique event.~~ For a flare event that continues for more than 24 hours, each calendar day of venting of gases shall constitute a flare event.

Section (c), Requirements

1. **Section (c)(3), Flare Tip Velocity Limits**

This section should be revised to directly incorporate applicable EPA RSR requirements for flare tip velocity. The current draft language would require flares at petroleum refineries to operate such that the flare tip velocity (averaged over 15 minutes) is less than 60 feet per second, or the lesser of 400 feet per second or Vmax. While this appears similar to the RSR requirements, it is not the same requirement.

The EPA RSR regulation's flare tip velocity standard is applicable when regulated material is routed to the flare for at least 15 minutes and uses 15-minute block averaging periods starting at midnight. The current draft PAR 1118 language would require flare tip velocity standards to be met at all times and averaged over 15 minutes. This would cause several types of conflicts between the two regulations. For example:

- Flaring events (less than 15 minutes) not subject to the RSR flare tip velocity standard could be subject under draft PAR 1118
- Flare tip velocity averaging periods could be different since RSR periods are pegged to midnight start
- Flare tip velocity standards are not the same; RSR regulation requires flare tip velocity to be less than 60 fps or less than 400 fps **and** V_{max} whereas Draft PAR 1118 language specifies "less than 60 fps or the lesser of 400 fps **or** V_{max}."

While these differences may seem small, they could create compliance difficulties and also conflict with the stated objective to harmonize Rule 1118 requirements with EPA RSR regulations. These potential issues can be easily avoided by directly incorporating the RSR specifications.

11-5

Proposed Change

(c)(3) All flares at petroleum refineries shall be operated such that the flare tip velocity is maintained as specified in Title 40 of the Code of Federal Regulations Part 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries.(40 CFR 63.670).

~~Except as specified in (c)(10), operate all flares at petroleum refineries such that the flare tip velocity averaged over 15 minutes is less than:~~

(A) ~~60 feet per second, or the lesser of 400 feet per second or VMax, where:~~

$$Log_{10}(V_{Max}) = \frac{Net\ Heating\ Value_{Vent\ Gas} + 1,212}{850}$$

~~and the Net Heating Value~~$_{Vent\ Gas}$ in British Thermal Units per standard cubic foot is ~~determined pursuant to monitoring required in subdivision (g).~~

2. Section (c)(4), Net Heating Value of Flare Combustion Zone (NHVCZ)

The language in this new section should be clarified to reflect that the requirement is intended to apply only to General Service Flares.

The current draft language requires "flares at petroleum refineries" to "maintain the net heating value of the flare combustion zone gas (NHVCZ) at or above 270 British Thermal Units per standard cubic feet, averaged over a 15-minute period. The owner or operator shall calculate NHVCZ as specified in subparagraph (g)(9)(C). Section (g)(9)(C) is applicable to general service flares." This requirement was only intended to apply to General Service Flares; not flares for Clean Service Streams. The following revision is proposed. 11-6

Proposed Change
(c)(4) Effective January 30, 2019, General Service Flares ~~flares~~ at petroleum refineries shall maintain the net heating value of the flare combustion zone gas (NHVcz) at or above 270 British Thermal Units per standard cubic feet, averaged over a 15-minute period. The owner or operator shall calculate NHVcz as specified in Title 40 of the Code of Federal Regulations Part 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries.

3. Section (c)(6)(A), Specific Cause Analysis - VOC Threshold

As noted in Attachment B, the VOC emission factor is proposed to increase by a factor of 10. For this reason, the flare event threshold for VOC emissions should be increased by a corresponding amount. Furthermore, the Flare Event definition in Section (b)(5) needs to be revised as noted above. 11-7

Proposed Change
(c)(6)(A) Emissions exceed 1000 ~~1~~2~~00~~ pounds of VOC; or

4. Section (c)(9), Specific Cause Analysis Requirements

Proposed language requires that all corrective actions identified in the Specific Cause Analysis shall be implemented within 45 days of the flare event, and the Executive Officer may be petitioned to grant an extension. WSPA recommends the same time requirements for corrective actions as EPA RSR to prevent potential conflicts. 11-8

Proposed Change
(9) All corrective actions identified in a Specific Cause Analysis required under paragraph (c)(6) or (c)(7) shall be implemented within 45 days, or as soon as practicable, of the flare event for which the Specific Cause Analysis was required. ~~The operator may petition the Executive Officer to grant a longer implementation period by demonstrating that such period is the shortest practicable.~~

5. Section (c)(13)(B), Scoping Document - Annual Emissions Levels

The revised draft language added a new requirement to analyze the feasibility of achieving an annual emission level of 0.1 tons per year of volatile organic compounds for planned flare events and essential operational needs for flares that only vent clean service streams. Staff has provided no basis for including clean service stream flares in the Scoping Document and no basis for the specified annual emissions target. Clean service streams represent, by definition, cleaner streams which inherently have a low sulfur content. These streams are typically covered by other District rules and routing these streams to other (non-flare) equipment (e.g., thermal oxidizer, etc.) could provide no environmental benefit and/or could compromise process safety. For these reasons, WSPA recommends that this requirement should be deleted from the rule. 11-9

Proposed Change
~~(c)(13)(B) 0.1 tons per year of volatile organic compounds from flares that only vent clean service streams.~~

11-9 cont'd

6. Section (c)(13)(C), Scoping Document – Flaring Alternatives

The revised draft language requires Scoping Documents to "…analyze the feasibility of installing and maintaining at least three physical systems as soon as feasible that can be used together or separately to avoid or minimize emergency flare events described in (c)(13)(C)(i) through (iv)" WSPA recommends that this language be revised to cover both physical systems and operational systems, which is consistent with Scoping Document alternatives described in (c)(13)(A).

11-10

Proposed Change
(c)(13)(C) Using the criteria described in clauses (c)(13)(A)(i) through (iv), the Scoping Document shall analyze the feasibility of installing and maintaining ~~maintening~~ at least three physical or operational systems as soon as feasible that can be used together or separately to avoid or minimize emergency flare events described in (c)(13)(C)(i) through (iv).

Section (f), Flare Monitoring and Recording Plan Requirements

1. Section (f)

Contiguous facilities under common control/ownership as defined under Title V should be allowed to submit one Flare Monitoring and Recording Plan. Section (f) should be amended to explicitly authorize such an approach.

11-11

Proposed Change (New Subsection)
(f)(5) The owner or operator of an existing petroleum refinery, sulfur recovery plant or hydrogen production plant may submit a single flare monitoring and recording plan to cover two or more contiguous covered facilities if under common control/ownership.

2. Section (f)(4)(E)

The District has revised Section (f)(4) to require detailed process flow diagrams be included in Flare Monitoring and Recording Plans. Such diagrams may be considered Confidential Business Information (CBI) and companies may be concerned about the District's ability to provide appropriate CBI protection for the diagrams. Unless the District can guarantee appropriate protection in the Flare Monitoring and Recording Plans for CBI material, WSPA recommends that the language in this section be reverted back to the prior version.

11-12

Proposed Change
(E) ~~Detailed process flow diagrams of all associated upstream equipment and process units venting to each flare, with a general description of components, identifying the type and location of each flare and all associated control equipment including but not limited to knockout drums, flare headers, assist, and ignition systems. A representative flow diagram showing the interconnections of the flare system(s) with vapor recovery system(s), process units and other equipment as applicable.~~ A representative flow diagram showing the interconnections of the flare system(s) with vapor recovery system(s), process units and other equipment as applicable.

Section (g) Operation, Monitoring and Recording Requirements

1. Section g(7)

11-13

The District has revised the section in an attempt to harmonize video monitoring and recording requirements for visible emissions with EPA RSR. WSPA recommends adding clarifying language addressing monitoring required by Rule 1118 prior to the EPA RSR deadline, as well as referencing EPA RSR directly for new monitoring requirements to alleviate any confusion.

Proposed Change

(7) Effective July 1, 2006, monitor all flares for visible emissions using color video monitors with date and time stamp, capable of recording a digital image of the flare and flame at a rate of no less than one frame per minute. Effective January 30, 2019, monitor all flares for visible emissions using color video monitors with date and time stamp, capable of recording a digital image of the flare, ~~and~~ the flame of elevated flares, and a sufficient area above the flame of all flares that is suitable for visible emissions observations, ~~at a rate of no less than one~~ four frames ~~per minute~~ as required per Title 40 of the Code of Federal Regulations Part 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries.

11-13 cont'd

2. Section g(9)(A)

The proposed Section g(9)(A) requires that "no later than January 30, 2019, for all general service flares" facilities "install, operate, calibrate, maintain, and record data from any monitoring systems" required by EPA RSR. EPA RSR allows for a one-year extension for the installation, operation, and calibration of required flare monitoring systems, and WSPA recommends that the language in this section align with EPA requirements.

Proposed Change

(9) No later than January 30, 2019, or as extended accordingly per Title 40 of the Code of Federal Regulations Part 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries , for all general service flares:

(A) Install, operate, calibrate, maintain, and record data from any monitoring systems required by Title 40 of the Code of Federal Regulations Part 63 Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries that are not already required by paragraph (g).

11-14

Section (i), Notification and Reporting Requirements

1. Section (i)(5)

This language should be revised to specifically include the District's 24-hour hotline or similarly recorded telephone number.

Proposed Change

(5) If the Web-Based Flare Event Notification System is not available, or if functions within the Web- Based Flare Event Notification System do not allow facilities to enter the necessary information required in (i)(2) through (i)(4), then notifications shall be made to 800-CUT-SMOG (288-7664). ~~the Executive~~ ~~Officer by telephone.~~

11-15

Section (k), Exemptions

1. Section (k)(1)

This section needs to be revised to include references to Net Heating Value (NHV) and NHV analyzers.

11-16

Proposed Change

(k)(1) Notwithstanding a flare monitoring system, consisting of a flow meter, higher heating value analyzer, Net Heating Value (NHV) analyzer, and total sulfur analyzer that is in operation, sampling and analyses of representative samples for higher heating values, Net Heating Value (NHV), and total sulfur concentration pursuant to paragraph (g)(3) may not be required for any flare event that…

11-16 cont'd

2. Section (k)(2)

Section (k)(2) should be clarified to exempt flaring events caused by or resulting from external power curtailments, natural disasters or acts of war or terrorism. WSPA recommends the following changes to the language.

Proposed Change

(k)(2) ~~Any sulfur dioxide emissions from flareing~~ Flaring events and any associated emissions caused by, or resulting from, external power curtailment beyond the operator's control, (excluding interruptible service agreements), natural disasters or acts of war or terrorism shall not count towards either:

(A) The performance targets specified in subdivision (d) upon submittal of documentation proving the existence of such events and certified in writing by the petroleum refinery official responsible for emission reporting; or

(B) The prohibitions listed in paragraph (c)(10).

11-17

If you have any questions concerning these comments, please contact me at (310) 808-2146 or by email at bmccann@wspa.org.

Sincerely,

cc: Cathy Reheis-Boyd,
WSPA Patty Senecal, WSPA

Response 11-1
Thank you for your comments. Specific responses are included in Responses 10-2 through 10-17 below.

Response 11-2
Relief valve leakage is still proposed to be removed from the definition of Essential Operational Needs. The commenter is concerned that any leakage that occurs during a flare event when the water seal is broken will be vented out the flare tip. Paragraph (c)(14) requires that no vent gas can be *"combusted except during emergencies, shutdowns, startups, turnarounds or essential operational needs."*, however it does not place limits on where the vent gas is generated from. So if flaring is occurring because of an allowed flaring event such as an emergency, any vent gases that are released from activities normally captured by the flare gas recovery system will not be distinguishable from the vent gases associated with the emergency. Therefore any flared gases from relief valve leakage during an allowed flare event would not be considered a violation of the rule, unless the leakage itself was the cause of the flare event and violated another part of the rule such as the prohibitions in paragraph (c)(10).

Response 11-3
See Response 10-2. Gases from intermittent minor venting released during an allowed flare event would be indistinguishable from the gases that are associated with the flare event itself. The release of the intermittent minor venting in this instance would not be a violation of the rule, unless the minor venting itself was the cause of the flare event and violated another part of the rule such as the prohibitions in paragraph (c)(10).

Response 11-4
No change is proposed in response to this comment. The commenter states that the proposed change would represent a significant change to the rule when considered together with the per event requirements in the rule, but the commenter does not state why the new language should be removed. The proposed change is designed to address situations where a process unit may be repeatedly causing flaring just below Rule 1118 thresholds, but is not addressed because there are no thresholds exceeded. The proposed change to the definition will require that all flare events within 24 hours from one process unit be evaluated against Rule 1118 thresholds.

Response 11-5
The comment states that the proposed rule language is inconsistent with the EPA Refinery Sector Rule (RSR) for three reasons. Two changes have been made in response to ensure that PAR 1118 is consistent with the EPA RSR. First, the definition for flare tip velocity in (b)(9) has been revised to measure the velocity in 15 minute blocks, beginning at 12 midnight. Second, (c)(3) has been changed to require that the flare tip velocity be maintained less than 60 feet per second, or the lesser of 400 feet per second **and** V_{Max}. These two changes align the requirements in the EPA RSR with PAR 1118 and address the concerns raised by the commenter.

Response 11-6
The requested change has been made to maintain consistency with the EPA RSR.

Response 11-7
The requested change has not been incorporated into PAR 1118. The previous threshold was 100 pounds for VOC, and a change to 200 pounds was proposed in the recent draft rule language sentto the working group. After hearing concerns from other stakeholders that questioned why the existing emissions threshold would not be applicable in the future, PAR 1118 now proposes to retain the existing VOC threshold at 100 pounds.

Response 11-8
In response to this comment, paragraph (c)(9) has been changed, with italicized sections below indicating the change from the previously proposed rule language.

(9) All corrective actions identified in a Specific Cause Analysis required under paragraph (c)(6) or (c)(7) shall be implemented within 45 days of the flare event for which the Specific Cause Analysis was required. *A corrective action identified in a Specific Cause Analysis may be implemented more than 45 days after the flare event if justified in a Specific Cause Analysis by showing the required elements in (c)(9)(A):*

(A) *An implementation schedule to complete the corrective action as soon as practicable, an explanation of the reason(s) why more than 45 days is needed to complete the corrective action, and a demonstration that the implementation schedule is the soonest practicable.*

(B) *After reviewing the Specific Cause Analysis, the Executive Officer may request additional information justifying why the implementation schedule beyond 45 days is the soonest practical.*

(C) *The Executive Officer may require a modification to the schedule, including increments of progress, and shall notify the operator in writing with an explanation describing why the justification is not sufficient.*

Response 11-9

No change has been made in response to this comment. The purpose of Rule 1118 is to reduce all flare related emissions, not just SOx. The proposed emission level of 0.1 tons of VOC per year that must be analyzed within the Scoping Document represents the median level of emissions from all clean service flares from 2012 to 2016. Further, five out of the seven clean service flares subject to Rule 1118 have achieved this annual level more than once during this five year period. Further, if this level were achieved during this five year period, it would have reduced VOC emissions by about 27 total tons using emission factors currently in Rule 1118. As shown in the first Working Group presentation, and in Figure 4 of this staff report, clean service streams represent a significant portion of VOC emissions from flaring. Further, with the ROG (i.e. VOC) emission factors for propane and butane increasing by about a factor of three in PAR 1118, the potential emissions reductions at this level could be even greater. In order to evaluate the feasibility of reducing these emissions, facility operators will evaluate the feasibility of achieving this emissions level within the Scoping Documents as required by PAR 1118.

Response 11-10

Subparagraph (c)(13)(C) has been modified in response to this comment as shown below in italics.

(D) Using the criteria described in clauses (c)(13)(A)(i) through (iv), the Scoping Document shall analyze the feasibility of installing and *maintaining* at least three physical *or automated process controls* as soon as feasible that can be used together or separately to avoid or minimize emergency flare events described in (c)(13)(C)(i) through (iv).

Response 11-11

No change has been made in response to this comment. If a facility has an integrated operation, they are already allowed to apply to operate under a single Flare Monitoring and Recording Plan.

Response 11-12

Subparagraph (f)(4)(E) has been changed as shown below in response to this comment. This proposed change should ensure that confidential business information is not included in Flare Monitoring and Recording Plans.

(E) Detailed process flow diagrams identifying the type and location of each flare and all associated control equipment including but not limited to knockout drums, flare headers, assist, and ignition systems, and a representative flow diagram showing the interconnections of the flare system(s) with vapor recovery system(s), process units and other equipment as applicable.

Response 11-13

In response to this comment, paragraph (g)(7) has been modified as shown below.

(7) Monitor all flares for visible emissions using color video monitors with date and time stamp, capable of recording a digital image of the flare and the flame of flares that are not enclosed, at a rate of no less than one frame per minute. Effective January 30, 2019, monitor all flares for visible emissions using color video monitors with date and time stamp, capable of recording a digital image of the flare, the flame of flares that are not enclosed, and a sufficient area above the flame of all flares that is suitable for visible emissions observations, at a rate of no less than one frame every 15 seconds.

Response 11-14

No changes have been made in response to this comment. If a facility chooses to apply for an extension of any requirement of the EPA RSR, the equivalent provision within Rule 1118 can also be extended through existing District procedures, such as a request for a variance from the SCAQMD Hearing Board.

Response 11-15

The requested modification has been made in paragraph (i)(5).

Response 11-16

The requested modification has been made in paragraph (k)(1). Although Net Heating Value analyzers are not required in Flare Monitoring and Recording Plans, they are required to be installed pursuant to (g)(9) in the incorporation of the EPA RSR.

Response 11-17

Paragraph (k)(2) has been modified as shown below in italics in response to this comment. The modifications were made to make the exemption specifically apply to limits that are described in the rule.

(2) Any sulfur dioxide emissions, *visible emissions prohibited in paragraph (c)(10), and flare tip velocities that exceed limits in subparagraph (c)(3)(A)* from flare events caused by external power curtailment beyond the operator's control (excluding interruptible service agreements), natural disasters or acts of war or terrorism shall not count towards either…

Comments Received at the May 11, 2017 Public Workshop

The following comments were received at the Public Workshop for Proposed Amended Rule 1118 held on May 11, 2017 at the SCAQMD headquarters in Diamond Bar.

PWS-1 Comment Video image extracts of flaring should be saved for five years.

PWS-1 Response PAR 1118 requires facilities to save video recordings, with one frame every 15 seconds, for five years.

PWS-2 Comment More monitoring should be conducted of flaring emissions, including for SOx, hydrogen sulfide, and hydrogen cyanide. Hydrogen cyanide emissions have been increasing at refineries based on EPA's Toxics Release Inventory Database, and hydrogen sulfide emissions are also high (see scanned handout from commenter on next page).

PWS-2 Response Monitoring of gases that are vented to the flare is already required by Rule 1118. These instruments monitor gases before they are combusted and vented to the atmosphere. One of the instruments is a sulfur analyzer, and the results from this instrument are used to determine the SOx emissions from every flare event. In addition, Rule 1118 already prohibits the combustion of vent gases with a hydrogen sulfide concentration exceeding 160 ppm. This limit was set to ensure that ambient air quality standards are not exceeded for hydrogen sulfide.

Finally, although hydrogen cyanide is reported as an emitted pollutant from refineries, staff has researched the annual emissions reports from refineries in the SCAQMD and none have reported hydrogen cyanide emissions from flaring. Staff was also unable to find research pointing to methods to quantify hydrogen cyanide emissions from flaring without conducting sampling of the flare emissions themselves. Hydrogen cyanide is not a known product within vent gas systems, however in some cases it could be created an intermediate product of hydrocarbon combustion. Because of the height of flare stacks, and the very high temperatures, it is generally considered infeasible to take samples of the post-combustion plume of refinery flares. However, in parallel with this rulemaking effort, an Optical Remote Sensing pilot study is proposed that may have the potential to evaluate individual compounds in the flare plume. As part of the upcoming Request for Information being released for this study, staff will include criteria that responses should include what their instrument's capabilities are with regard to detecting toxics emissions, such as hydrogen cyanide.

PWS-3 Comment Rule 1118 should be extended to all petroleum related facilities.

PWS-3 Response PAR 1118 does not propose to extend the applicability of the rule to other facilities, however Proposed Rule 1118.1 is being developed now and will apply to other facilities.

PWS-4 Comment A Specific Cause Analysis is different than a root cause analysis. Rule 1118 should require root cause analyses like is required for other regulations (see scanned OSHA fact sheet from commenter in following pages).

PWS-4 Response Root cause analyses from different regulations may have different requirements because they serve different purposes from Specific Cause Analyses (SCAs). The purpose of SCAs within PAR 1118 is to investigate the cause of a flare event, identify corrective measures and prevent recurrence of a similar event. The analysis contained within a SCA required in PAR 1118 is equal to the root cause analyses required in the EPA Refinery Sector Rule (RSR), but more flare events require SCAs due to PAR 1118 requirements than are required from the EPA RSR.

PWS-5 Comment Rule 1118 should require facilities to replace equipment throughout the refinery following the manufacturer's recommended schedule.

PWS-5 Response PAR 1118 already prohibits flaring if it is caused by poor maintenance. This suggestion and others will be considered in the second phase of rulemaking that is designed to take a more comprehensive look at measures to reduce flaring emissions even further.

PWS-6 Comment The definition for Essential Operational Needs should be tightened with regard to the sudden shutdown of refinery fuel gas combustion devices.

PWS-6 Response This definition has been revised so that shutdowns caused by a breakdown or emergency are no longer allowed as an Essential Operational Need.

PWS-7 Comment Monitoring should be required of the emitted flare plume, either with a crane or with drones.

PWS-7 Response Even with cranes or other mechanical collection devices there are inherent hazards and logistical challenges in physically attempting to collect flare emissions directly from the flare plume where temperatures exceed 1000 degrees Fahrenheit at heights well above 100 hundred feet. In parallel with the proposed rulemaking, staff is proposing to initiate an Optical Remote Sensing pilot study to evaluate the ability of emerging technologies to monitor flaring emissions at the combustion zone. This approach is believed to be the most promising and feasible for directly evaluating flaring emissions as an alternative to using emission factors.

PWS-8 Comment Flaring emissions affect public health. When asked about a flaring event, personnel from a refinery didn't provide the information requested by the commenter. The commenter also stated that refineries can't be trusted to monitor themselves, or to hire consultants to conduct analyses of health impacts from their facilities due to financial conflicts of interest. The commenter further stated that District staff is unable to conduct independent evaluation of refineries because an SCAQMD Board Member has received financial benefit from refineries.

PWS-8 Response One of the purposes of PAR 1118 is to control and minimize flaring and flare related emissions which could affect public health. Since Rule 1118 was

adopted in 1998, and amended in 2005, flaring has reduced substantially. Although the requirements in PAR 1118 require refineries to conduct many analyses, these are conducted under the strict oversight of the District, and must adhere to guidelines from the District and other agencies, such as the state or federal EPA. Staff is unaware of any conflict of interest that would impact the compliance and enforcement activities of District staff as these activities are conducted independently of our Board. The proposed amendments will place new limits on flaring and flare emissions, and a second phase of rulemaking is being proposed to reduce flaring emissions further.

PWS-9 Comment Flare Minimization Plans should be conducted for all refineries.

PWS-9 Response See Response 5-2 in response to the same comment in writing from the same commenter.

PWS-10 Comment Flaring is a short term event, and long term annual thresholds should not be the only means of limiting flaring emissions.

PWS-10 Response The commenter is correct that flaring is typically a short term activity, however there are many provisions within PAR 1118 and the existing Rule 1118 to limit flaring besides annual thresholds. This includes newly proposed prohibitions on smoking flaring events, requirements for Specific Cause Analysis and corrective actions based on thresholds for individual flare events, notification thresholds for individual flare events, and monitoring and reporting of every flare event, regardless of size. Additional measures to reduce individual flare events is being pursued in a second phase of rulemaking that will be based on detailed feasibility studies that facilities will be required to prepare by PAR 1118.

PWS-11 Comment The ROG emission factor for clean service streams such as propane and butane is too low.

PWS-11 Response See Responses 5-3 and 7-1 in response to the same comment in writing from the same commenter.

PWS-12 Comment An assumption that flaring always occurs with 98% destruction efficiency is not appropriate and should not be assumed in PAR 1118.

PWS-12 Response The US EPA investigated destruction efficiency when updating its emission factor guidance and when developing its updates to the Refinery Sector Rule (RSR). PAR 1118 incorporates many of the key elements of the EPA RSR that are designed to improve the destruction efficiency of flaring, including limits on flare tip velocity and on the net heating value of the combustion zone. There are currently no feasible methods that have been found to directly measure destruction efficiency continuously at a refinery, so PAR 1118 relies on emission factors based on tests that have been conducted in a more controlled environment. In order to pursue more direct methods of evaluating the destruction efficiency and emissions from flaring, staff is proposing to initiate an Optical Remote Sensing pilot study to determine if new emerging technologies are able to provide continuous measurement of flaring emissions, including destruction efficiency.

PWS-13 Comment All flaring data should be placed online by flare event.

PWS-13 Response No changes are proposed in PAR 1118 as the placement of flaring data online is an activity that is not governed by Rule 1118. Staff is exploring how to enhance the release of and access to flaring data and will continue to work with all stakeholders on this issue.

PWS-14 Comment Flaring from Essential Operational Needs should not be allowed as it isn't allowed by the Bay Area AQMD.

PWS-14 Response See Response 5-5 in response to the same comment in writing from the same commenter.

PWS-15 Comment PAR 1118 should focus on prevention rather than restricting activities post-emissions.

PWS-15 Response PAR 1118 includes a requirement that facilities conduct a forward looking Scoping Document that analyzes the feasibility of implementing measures to reduce flaring further. There are also existing limits within Rule 1118 that prevent flaring through disincentives (such as Mitigation Fees) or prohibitions (such as limits on smoking flaring).

PWS-16 Comment The community should be engaged more by the District on flaring notifications, including through community groups, and on who the 3rd party consultant should be that will assist in reviewing Scoping Documents.

PWS-16 Response District staff will engage local community groups on flaring notifications and activities, as well as the selection of consultants to review Scoping Documents submitted by refineries.

PWS-17 Comment The proposed rule amendments are very technical, and have the potential to create conflicts with existing federal rules. Staff should consider pushing the date back for adoption of this rule.

PWS-17 Response See Response 10-1 in response to the same comment in writing from the same commenter.

PWS-18 Comment The Ringelmann chart should be updated for determining visible emissions as it is based on old methods for determining opacity.

PWS-18 Response Compliance staff is trained in methods to determine plume opacity, and the Ringelmann chart is not the only method that is relied upon to determine if flaring emissions exceed visibility limits.

Proposed Rule-1118 Additions

Proposed Additions to Rule-1118 page 32 of 39:

5. **Continuous and Semi-continuous Gaseous Stream Total Sulfur, *SOx, H2S, and Hydrogen Cyanide (HCN)* Monitoring Systems**

The following is intended to ensure that verifiable, meaningful, and representative data are collected from continuous and semi-continuous gaseous stream *total* sulfur, *SOx, H2S, and HCN* monitoring systems. All procedures are subject to Executive Officer review and approval.

General Requirements

a. The monitoring system must be capable of measuring total sulfur, *SOx, H2S, and HCN* concentration*s* within the requirements of the rule.

b. The monitoring system must be capable of adjusting to rapid changes in *total* sulfur, *SOx, H2S and HCN* concentration*s* within a reasonable time as defined in the applicable rule and as approved by the Executive Officer.

c. Monitoring system in contact with sample gas must be inert to sulfur, *SOx, H2S, and HCN* gases, and resistant to corrosion.

Submitted 11 May 2017 by: Dr. Genghmun Eng, 5215 Lenore St. Torrance, CA 90503

HCN Details in Support of Rule 1118 Changes

- ***Hydrogen Cyanide (HCN)*** is already under SCAQMD control as a qualified U.S. EPA Reactive Organic Gas (ROG)
  - Proposal does not add new compounds to SCAQMD control. It only asks for better monitoring
- ***Hydrogen Cyanide (HCN)*** emissions have been increasing nearly exponentially over the last 15-20 years, as cataloged by the U.S. EPA Toxic Release Inventory (TRI)
- Rule 1118 revisions are only done intermittently, and the proposed change supports Public Health and Safety
- ***Hydrogen Cyanide (HCN)*** is extremely toxic, even in low concentrations. It was the gas of choice used in Hitler's Nazi Concentration Camp extermination program against Jews, Gypsies, and other deemed "undesirables".

Hydrogen Cyanide (HCN) is a qualified ROG (Reactive Organic Gas)

Reactive Organic Gases (ROG) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding the following:

		CAS *	(TAC) **
(1)	methane;	[74-82-8]	
	methylene chloride (dichloromethane);	[75-09-2]	TAC
	1,1,1-trichloroethane (methyl chloroform);	[71-55-6]	TAC
	trichlorofluoromethane (CFC-11);	[75-69-4]	
	dichlorodifluoromethane (CFC-12);	[75-71-8]	
	1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);	[76-13-1]	
	1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114);	[76-14-2]	
	chloropentafluoroethane (CFC-115);	[76-15-3]	
	chlorodifluoromethane (HCFC-22);	[75-45-6]	
	1,1,1-trifluoro-2,2-dichloroethane (HCFC-123);	[306-83-2]	
	2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);	[2837-89-0]	
	1,1-dichloro-1-fluoroethane (HCFC-141b);	[1717-00-6]	
	1-chloro-1,1-difluoroethane (HCFC-142b);	[75-68-3]	
	trifluoromethane (HFC-23);	[75-46-7]	
	pentafluoroethane (HFC-125);	[354-33-6]	
	1,1,2,2-tetrafluoroethane (HFC-134);	[359-35-3]	
	1,1,1,2-tetrafluoroethane (HFC-134a);	[811-97-2]	
	1,1,1-trifluoroethane (HFC-143a);	[420-46-2]	
	1,1-difluoroethane (HFC-152a);	[75-37-6]	
	cyclic, branched, or linear completely methylated siloxanes;	[various]	
	the following classes of perfluorocarbons:	[various]	
	(A) cyclic, branched, or linear, completely fluorinated alkanes;		
	(B) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;		
	(C) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and		
	(D) sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds only to carbon and fluorine; and		
(2)	the following low-reactive organic compounds which have been exempted by the U.S. EPA:		
	acetone;	[67-64-1]	
	ethane;	[74-84-0]	
	methyl acetate;	[79-20-9]	
	perchloroethylene; and	[127-18-4]	TAC
	parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene).	[98-56-6]	

Attachment to PWS-2 Comment

Rule-1118 (p. 35 of 39) Already Controls ROG Amounts

1. Emission Calculation Procedures

Petroleum refinery, sulfur recovery plant or hydrogen production facility operators shall use the following equations and emission factors to calculate emissions from vent gas, natural gas, propane and butane:

Effective January 30, 2019

Vent Gas

Air Pollutant	Equation	Emission Factor
ROG	E = V x ~~H~~NHV x EF	~~0.063~~ 0.66 lb/mmBTU
NOx	E = V x HHV x EF	0.068 lb/mmBTU
CO	E = V x ~~H~~NHV x EF	~~0.370~~ 0.31 lb/mmBTU
PM10	E = V x EF	21 lb/mmSCF
SOx	E = V x Cs x 0.1662	Note (1)

Effective Until January 30, 2019

Air Pollutant	Equation	Emission Factor
ROG	E = V x HHV x EF	0.063 lb/mmBTU
NOx	E = V x HHV x EF	0.068 lb/mmBTU
CO	E = V x HHV x EF	0.37 lb/mmBTU
PM10	E = V x EF	21 lb/mmSCF
SOx	E = V x Cs x 0.1662	Note (1)

Where:

E = Calculate vent gas emissions (lbs)

V= Volume flow of vent gas, as measured in million standard cubic foot at 14.7 psia and 68^0 Fahrenheit

HHV = Higher Heating Value, as measured in British Thermal Unit per standard cubic foot

NHV = Net Heating Value, as measured in British Thermal Units per standard cubic foot

EF = Emission Factor

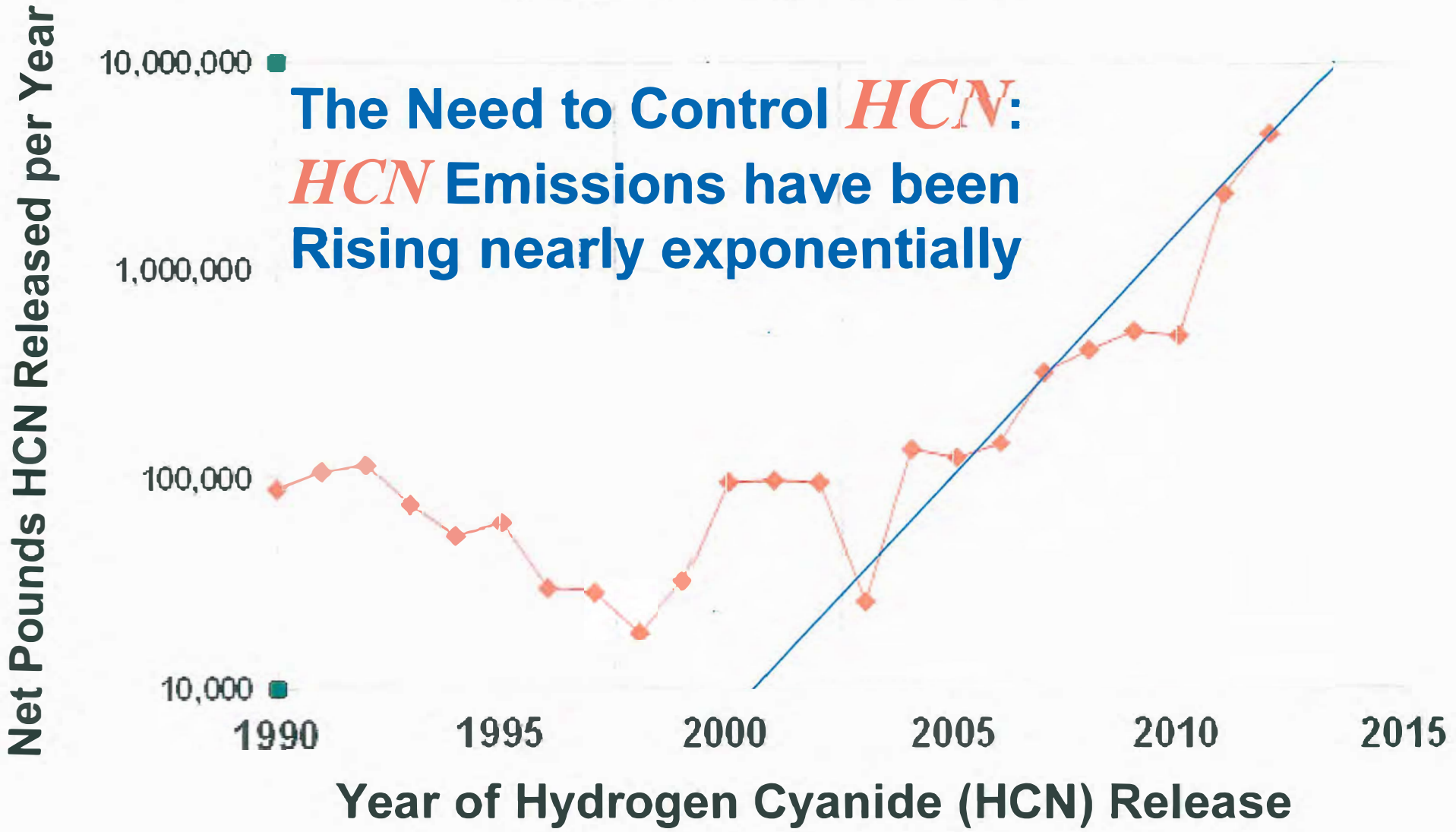
Cs = The concentration of total sulfur in the vent gas, expressed as sulfur dioxide, as measured in part per million by volume using the methods specified in this rule.

HCN Refinery Emissions by Year

Total lbs/year reported to US EPA Toxic Release Inventory, 1990-2012

Data compiled by Jesse A. McAngus and Erin Valley, Spirit Environmental, LLC

"Refinery Air Emission Metrics" 2012



http://ww...spiritenvironmental.com/assets/img/...iages/files/Refinery_Air_Emission_Metrics.pdf

Attachment to PWS-2 Comment

H2S Details in Support of Rule 1118 Changes

- ***Hydrogen Sulfide (H2S)*** **is already under SCAQMD control as a portion of the Refinery released Total Sulfur**
  - **Proposal does not add new compounds to SCAQMD control. It only asks for better monitoring**
- ***Hydrogen Sulfide (H2S)*** **TRI reporting was only first required in 201**
  - **In that first year, it already ranked 16th out if 181 compound in total amount released**
- **Rule 1118 revisions are only done intermittently, and the proposed change supports Public Health and Safety**
- ***Hydrogen Sulfide (H2S)*** **has a noxious "*rotten egg*" smell, which strongly affects nearby residents' Quality of Life.**
- ***Hydrogen Sulfide (H2S)*** **exposure has been associated with Respiratory Symptoms and Eye Irriation***

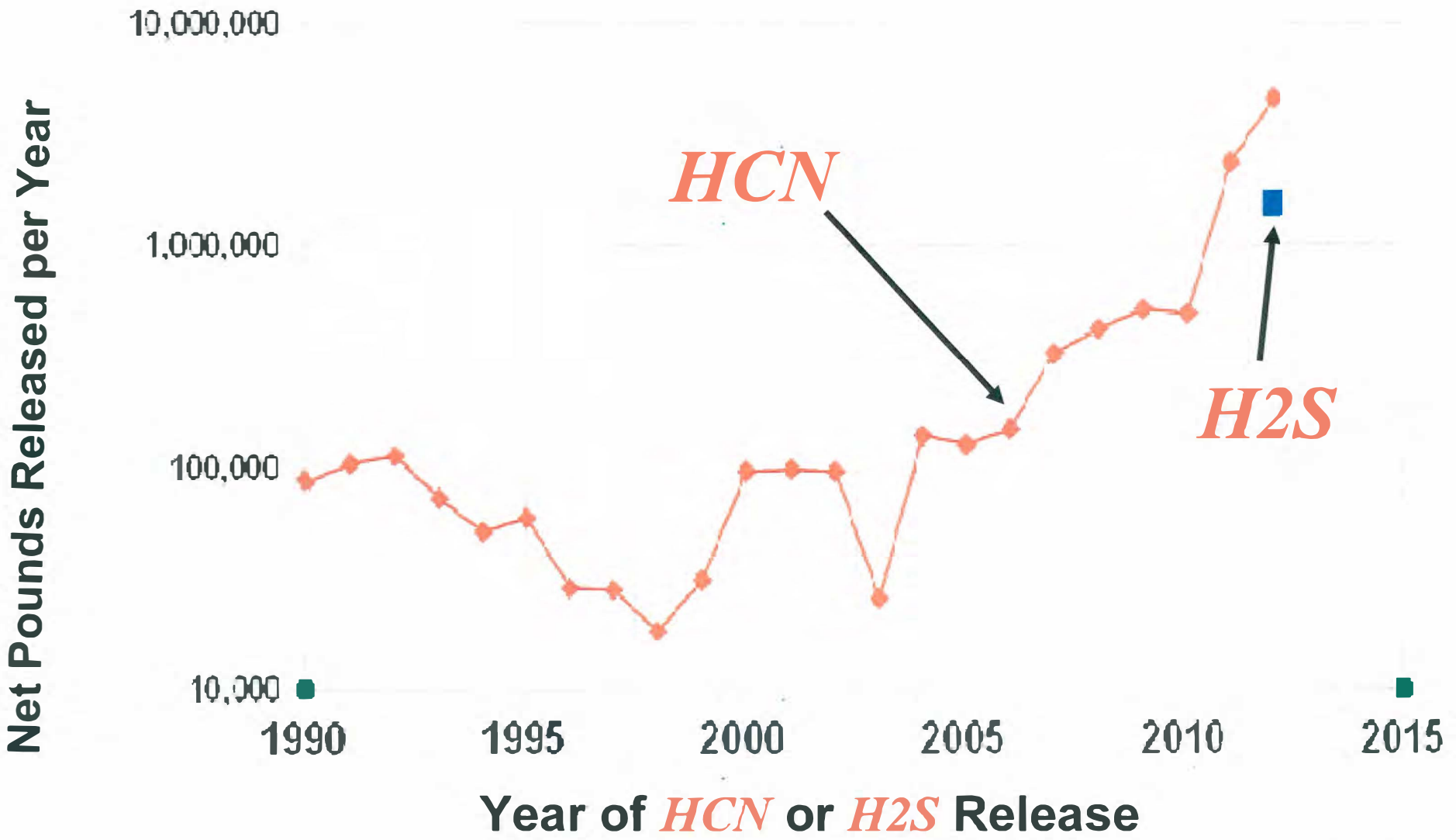
* Agency for Toxic Substances and Disease Registry (ATSDR) Oct. 2012 Report: "*Addendum to the Toxicological Profile for Hydrogen Sulfide*"

Comparison of *H2S* and *HCN* Refinery Emissions

Total lbs/year reported to US EPA Toxic Release Inventory, 1990-2012

Data compiled by Jesse A. McAngus and Erin Valley, Spirit Environmental, LLC

"Refinery Air Emission Metrics" 2012



http://ww_.spiritenvironmental.com/assets/img/_ages/files/Refinery_Air_Emission_M_.rics.pdf

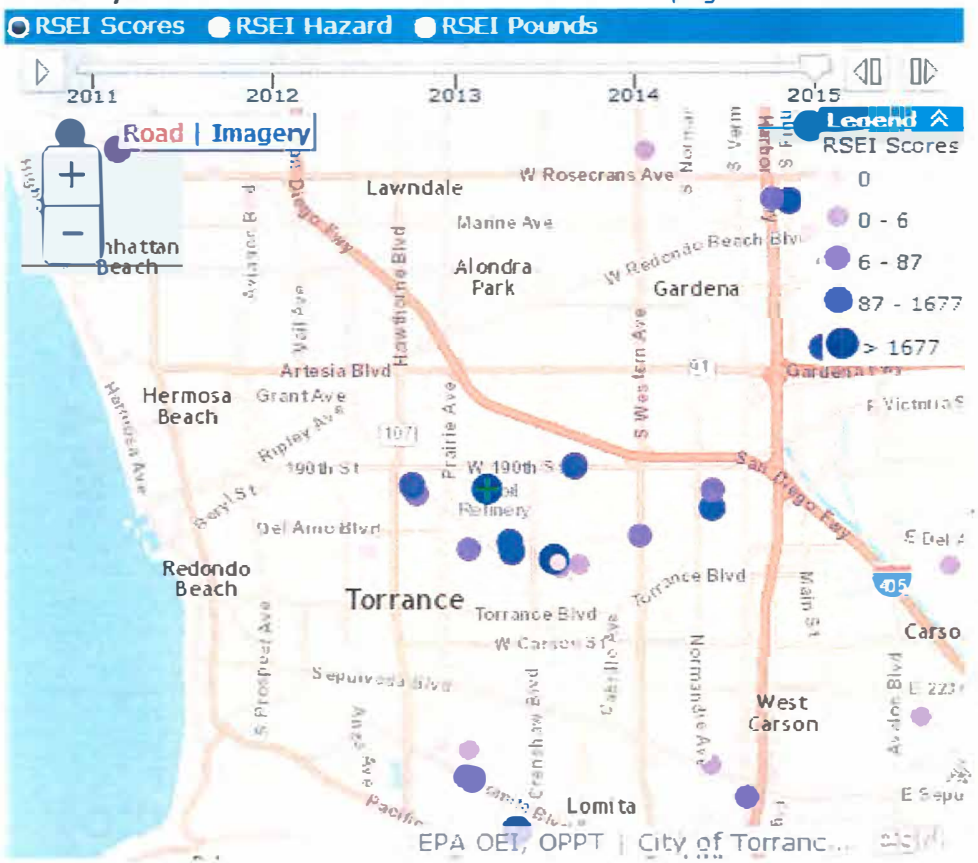
Attachment to PWS-2 Comment

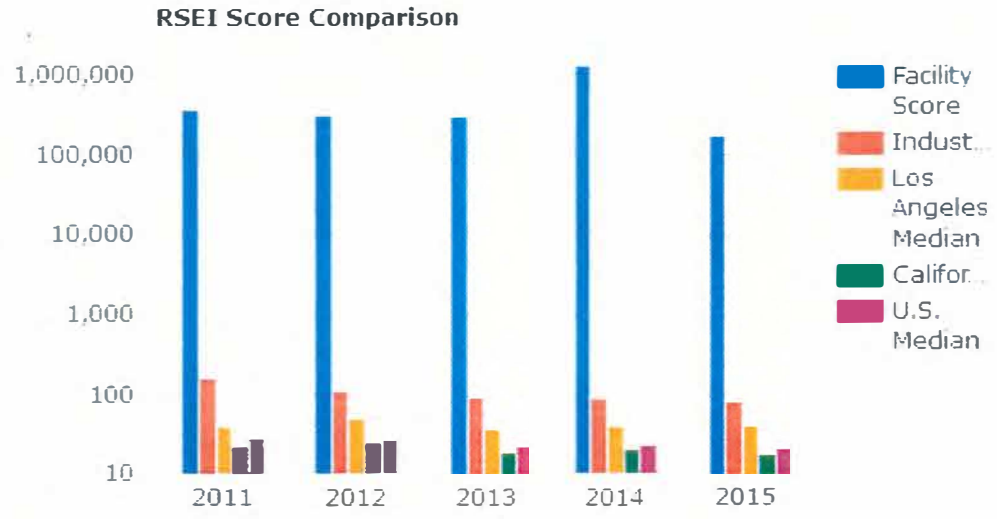
US EPA Toxic Release Inventory (TRI) Score Shows Torrance Refinery as Highest Risk

• RSEI Score—risk-related results combine surrogate dose with toxicity weight and population estimate, producing a unit-less value or score. Risk-related results are not independen meaningful and should only be used comparatively in relation to other model results.

Name: EXXONMOBIL OIL CORP - TORRANCE REFINERY
Address: 3700 W 190TH ST
TORRANCE, CA 90509
Industry: Petroleum

How to use this page





Year	Facility Score	Industry Median (Petroleum)	County Median	State Median	U.S. Median
2011	352,837	154	37	22	27
2012	306,301	104	46	24	25
2013	296,015	95	37	19	23
2014	1,206,445	84	38	19	21
2015	169,537	84	42	18	21

Data Submitted by: Dr. Genghmun Eng, 5215 Lenore St. Torrance, CA 90503

FactSheet

OSHA EPA

The Importance of Root Cause Analysis During Incident Investigation

The Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) urge employers (owners and operators) to conduct a root cause analysis following an incident or near miss at a facility.[1] A root cause is a fundamental, underlying, system-related reason why an incident occurred that identifies one or more correctable system failures.[2] By conducting a root cause analysis and addressing root causes, an employer may be able to substantially or completely prevent the same or a similar incident from recurring.

OSHA Process Safety Management and EPA Risk Management Program Requirements

Employers covered by OSHA's Process Safety Management (PSM) standard are required to investigate incidents that resulted in, or could reasonably have resulted in, catastrophic releases of highly hazardous chemicals.[3] Similarly, owners or operators of facilities regulated under EPA's Risk Management Program (RMP) regulations must conduct incident investigations.[4]

During an incident investigation, an employer must determine which factors contributed to the incident, and both OSHA and the EPA encourage employers to go beyond the minimum investigation required and conduct a root cause analysis. A root cause analysis allows an employer to discover the *underlying* or *systemic*, rather than the *generalized* or *immediate*, causes of an incident. Correcting only an immediate cause may eliminate a symptom of a problem, but not the problem itself.

How to Conduct a Root Cause Analysis

A successful root cause analysis identifies all root causes—there are often more than one.

Consider the following example: A worker slips on a puddle of oil on the plant floor and falls. A traditional investigation may find the cause to be "oil spilled on the floor" with the remedy limited to cleaning up the spill and instructing the worker to be more careful.[5] A root cause analysis would reveal that the oil on the floor was merely a symptom of a more basic, or fundamental problem in the workplace.

An employer conducting a root cause analysis to determine whether there are systemic reasons for an incident should ask:

- Why was the oil on the floor in the first place?
- Were there changes in conditions, processes, or the environment?
- What is the source of the oil?
- What tasks were underway when the oil was spilled?
- Why did the oil remain on the floor?
- Why was it not cleaned up?
- How long had it been there?
- Was the spill reported?[6]

It is important to consider all possible "what," "why," and "how" questions to discover the root cause(s) of an incident.

In this case, a root cause analysis may have revealed that the root cause of the spill was a failure to have an effective mechanical integrity program—that includes inspection and repair—that would prevent or detect oil leaks. In contrast, an analysis that focused only on the immediate cause (failure to clean up the spill) would not have prevented future incidents because there was no system to prevent, identify, and correct leaks.

Properly framing and conducting a root cause investigation is important for a PSM or RMP-related incident. Take, for example, an incident involving an overfill and subsequent leak of hydrocarbons from a relief valve system that ignites and kills multiple workers. Prior to this fatal incident, there were multiple flammable releases from the relief valve system, but none ignited. The employer previously performed

incident investigations on the non-lethal incidents and determined that operator error was the cause of the overfills and subsequent leaks. However, a proper root cause investigation would have looked deeper into the incident, and determined that funding cuts—which resulted in a deficient mechanical integrity program and malfunctioning instrumentation—led to a dangerous situation that operators could not have prevented. Had these root causes been previously identified, the employer could have taken action to improve the mechanical integrity program and repair the instrumentation system, preventing the fatal incident.

Benefits of Root Cause Analysis for Employers

Conducting a thorough investigation that identifies root causes will help to prevent similar events from happening again. In this way, employers will reduce the risk of death and/or injury to workers or the community or environmental damage.

By using root cause analysis to prevent similar events, employers can avoid unnecessary costs resulting from business interruption, emergency response and clean-up, increased regulation, audits, inspections, and OSHA or EPA fines. Regulatory fines can become costly, but litigation costs can often substantially exceed OSHA and EPA fines. Employers may find that they are spending money to correct immediate causes of incidents that could have been prevented, or reduced in severity or frequency, by identifying and correcting the underlying system management failure.

Finally, when an employer focuses on prevention by using root cause analysis, public trust can be earned. Employers with an incident free record may be more likely to attract and retain high performing staff. A robust process safety program, which includes root cause analysis, can also result in more effective control of hazards, improved process reliability, increased revenues, decreased production costs, lower maintenance costs, and lower insurance premiums.

Root Cause Analysis Tools

Below is a list of tools that may be used by employers to conduct a root cause analysis. The tools are not meant to be used exclusively. Ideally, a combination of tools will be used.

- Brainstorming
- Checklists
- Logic/Event Trees
- Timelines
- Sequence Diagrams
- Causal Factor Determination

For simpler incidents, brainstorming and checklists may be sufficient to identify root causes. For more complicated incidents, logic/event trees should also be considered. Timelines, sequence diagrams, and causal factor identification are often used to support the logic/event tree tool.

Regardless of the combination of tools chosen, employers should use these tools to answer four important questions:

- **What** happened;
- **How** did it happen;
- **Why** it happened; and
- **What** needs to be corrected.

Interviews and review of documents, such as maintenance logs, can be used to help answer these questions. Involving employees in the root cause investigative process, and sharing the results of those investigations, will also go a long way toward preventing future similar incidents.

OSHA and EPA encourage employers to consult the resources below for more information about how to use these tools.

Resources

- *The Guidelines for Investigating Chemical Process Incidents*, Center for Chemical Process Safety, 2nd Edition, 2003.
- *DOE Guideline-Root Cause Analysis Guidance Document,* U.S. Department of Energy, Washington, DC, February 1992. http://energy.gov/sites/prod/files/2013/07/f2/nst1004.pdf
- *DOE Handbook-Accident and Operational Safety Analysis*, Volume I: Accident Analysis Techniques, July 2012, pp. 2-40–2-86. http://energy.gov/sites/prod/files/2013/09/f2/DOE-HDBK-1208-2012_VOL1_update_1.pdf

- *Quality Basics-Root Cause Analysis for Beginners*, James L. Rooney and Lee N. Vanden Heuvel, Quality Progress, July 2004, pp. 45–53. https://www.env.nm.gov/aqb/Proposed_Regs/Part_7_Excess_Emissions/NMED_Exhibit_18-Root_Cause_Analysis_for_Beginners.pdf
- *Incident [Accident] Investigations, A Guide for Employers, A Systems Approach to Help Prevent Injuries and Illnesses*, U.S. Department of Labor, Occupational Health and Safety Administration (OSHA), December 2015. www.osha.gov/dte/IncInvGuide4Empl_Dec2015.pdf
- OSHA's Incident Investigation Topics Page. www.osha.gov/dcsp/products/topics/incidentinvestigation
- OSHA's On-site Consultation Program offers free and confidential occupational safety and health services to small and medium-sized businesses in all states and several territories, with priority given to high-hazard worksites. On-site consultation services are separate from enforcement and do not result in penalties or citations. To locate the OSHA On-Site Consultation Program nearest you, call 1-800-321-6742 (OSHA) or visit www.osha.gov/dcsp/smallbusiness/index.html
- *The Business Case for Process Safety*, 2nd ed., Center for Chemical Process Safety, 2006. www.aiche.org/ccps/documents/business-case-process-safety. This resource describes how a strong PSM program has helped businesses succeed.
- *Mini Guide to Root Cause Analysis*, Geoff Vorley, Quality Management and Training Limited, Guilford, Surrey, UK, 2008. www.root-cause-analysis.co.uk/images/Green%20RCA%20mini%20guide%20v5%20small.pdf
- *Root Cause Analysis*, Washington State Department of Enterprise Services, Olympia, WA, 2016. www.des.wa.gov/services/Risk/AboutRM/enterpriseRiskManagement/Pages/rootCauseAnalysis.aspx. This resource describes additional root cause tools and training opportunities.
- *How to Conduct an Incident Investigation*, National Safety Council, 2014. http://www.nsc.org/JSEWorkplaceDocuments/How-To-Conduct-An-Incident-Investigation.pdf
- Accident Investigation Basics, Washington State Department of Labor & Industries, 2009. http://www.lni.wa.gov/safety/trainingprevention/online/courseinfo.asp?P_ID=145
- NFPA 921: *Guide for Fire and Explosion Investigations*. http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards?mode=code&code=921

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[1] The statements in this document are intended as guidance only. This document does not substitute for EPA and OSHA statutes or regulations, nor is it a regulation itself. It cannot and does not impose legally binding requirements on the agencies, states, or the regulated community, and the measures it describes may not apply to a given situation based upon the specific circumstances involved. This guidance does not represent final agency action and may change in the future.

[2] *Guidelines for Investigating Chemical Process Incidents*, Center for Chemical Process Safety, 2nd ed., p. 179.

[3] 29 CFR 1910.119.

[4] 40 CFR 68.

[5] *Guidelines for Investigating Chemical Process Incidents*, Center for Chemical Process Safety, 2nd ed., p. 180.

[6] Id.

This is one in a series of informational fact sheets highlighting OSHA programs, policies, or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

U.S. Department of Labor

For assistance, contact us. We can help. It's confidential.

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

DOC FS-3895 10/2016

REFERENCES

South Coast AQMD Rule 1118 Implementation Guidelines August 2007 Version 2.0. http://www.aqmd.gov/docs/default-source/compliance/rule-1118/r1118igd.pdf

South Coast AQMD 2012 Air Quality Management Plan Stationary Source Control Measures http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/appendix-iv-(a)-final-2012.pdf

South Coast AQMD Technical Support Document 2012 AQMP Control Measure (MSC)-03 http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/appendix-iv-(a)-final-2012.pdf

US EPA AP-42 Emission Factors, 5th Edition, Volume 1, Chapter 13.5 https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf

US EPA Petroleum Refinery Sector Risk & Technology Review & New Source Performance Standards (NSPS) & (NESHAPS) https://www.epa.gov/stationary-sources-air-pollution/petroleum-refinery-sector-risk-and-technology-review-and-new-source

40 Code of Federal Regulations Part 60 Subpart Ja

40 Code of Federal Regulations Part 63 Subpart UUU

40 Code of Federal Regulations Part 63 Subpart CC