Proposed Amended Rule 1118: Control of Emissions from Refinery Flares

Working Group Meeting #1
July 21, 2022

Join Zoom Webinar

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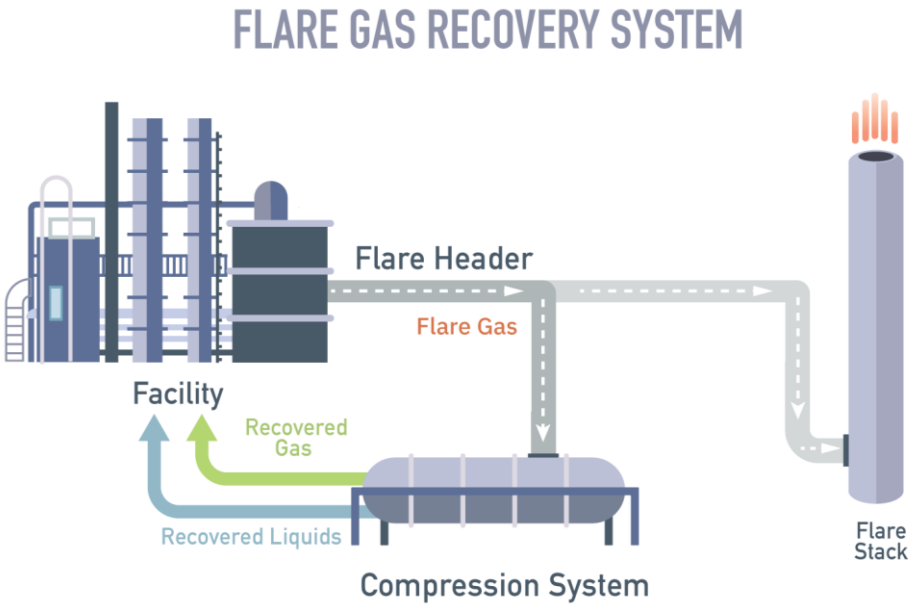
Agenda

- Background
- Proposed Amendments to Rule 1118
- Assembly Bill 617 Commitments
- Flare Event Notification System (FENS)
- Refinery Scoping Plans
- Remote Optical Sensing
- Next Steps

Background

Flaring Events Background

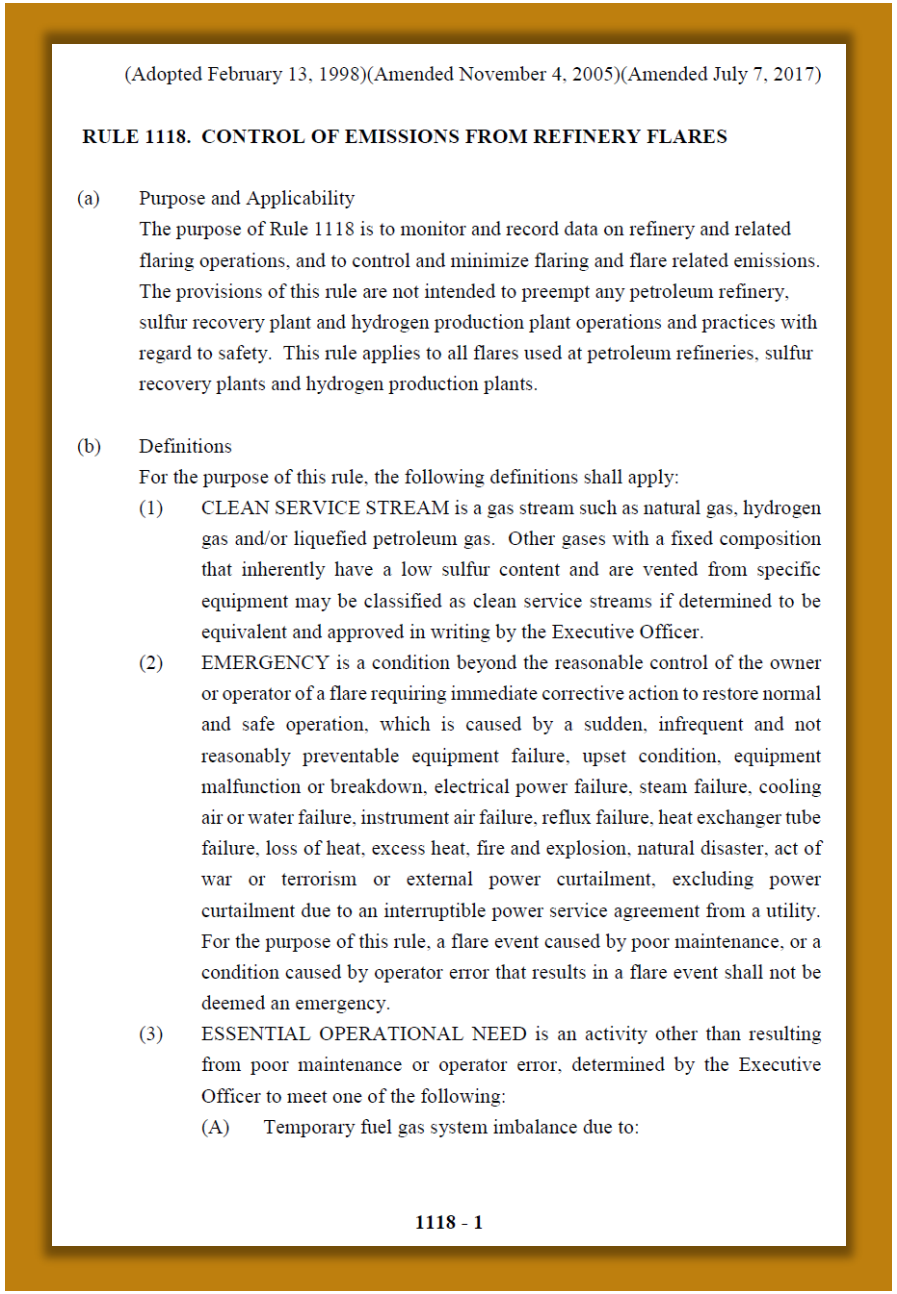
- Vent gases generated during the refining process (typically hydrocarbons) are often sent to the Flare Gas Recovery (FGR) system
  - Gases recovered by injecting them into the refinery's fuel gas system for use in other processes, e.g., steam boiler
- Flaring occurs when the FGR system is unable to handle the amount or type of gases being directed into the system
  - Gases routed to the flare to avoid unsafe over-pressurization
  - Combusted at flare tip to reduce emissions and the potential buildup of combustible gases
- Flaring events are caused by a variety of issues
- Each refinery has varying abilities to prevent and/or handle excess flare gas



Courtesy: GLIMAR REFINERY

Rule 1118 Background

- Rule 1118 was adopted on February 13, 1998, and was amended in 2005 and 2017
- Eight petroleum refining facilities, three hydrogen plants, and one sulfur recovery plant within Los Angeles County operate a total of 31 flares subject to Rule 1118
- Rule 1118 requires facilities to submit notifications and reports, monitor emissions, meet emissions targets, and maintain a public inquiry hotline



(Adopted February 13, 1998)(Amended November 4, 2005)(Amended July 7, 2017)

RULE 1118. CONTROL OF EMISSIONS FROM REFINERY FLARES

(a) Purpose and Applicability

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 this rule are not intended to preempt any petroleum refinery, sulfur recovery plant and hydrogen production plant operations and practices with regard to safety. This rule applies to all flares used at petroleum refineries, sulfur recovery plants and hydrogen production plants.

(b) Definitions

For the purpose of this rule, the following definitions shall apply:

(1) 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.

(2) EMERGENCY is a condition beyond the reasonable control of the owner or operator of a flare requiring immediate corrective action to restore normal and safe operation, which is caused by a sudden, infrequent and not reasonably preventable equipment failure, upset condition, equipment malfunction or breakdown, electrical power failure, steam failure, cooling air or water failure, instrument air failure, reflux failure, heat exchanger tube failure, loss of heat, excess heat, fire and explosion, natural disaster, act of war or terrorism or external power curtailment, excluding power curtailment due to an interruptible power service agreement from a utility. For the purpose of this rule, a flare event caused by poor maintenance, or a condition caused by operator error that results in a flare event shall not be deemed an emergency.

(3) ESSENTIAL OPERATIONAL NEED is an activity other than resulting from poor maintenance or operator error, determined by the Executive Officer to meet one of the following:

(A) Temporary fuel gas system imbalance due to:

1118 - 1

Most Recent Rule 1118 Amendment

- 2017 Rule 1118 amendment:
  - Required facilities to prepare a Scoping Document to assist staff gathering information
  - Harmonized rule with key updates from U.S. EPA's recent Refinery Sector Rule
  - Removed the $4 million annual cap on mitigation fees that facilities may pay
  - Updated emission factors based on EPA's updated AP-42 guidance
  - Updated and clarified notification and reporting requirements for facilities:
    - Submit flaring notification via web-based Flare Event Notification System
    - New notification requirement if daily cumulative flare vent gas exceeds 100,000 standard cubic feet

Regulatory Actions to Reduce Refinery Flaring

- Staff included a two-phase approach to achieve emission reductions from refinery flares:

Phase I:	2017 rule amendments required facilities to submit information on flare reduction
Phase II:	Initiate another rule amendment to require further flare reduction strategies based on the information refineries provided and any technologies staff identifies

Assembly Bill 617 (AB 617)

AB 617 Background

- AB 617 signed into law in 2017
  - Statewide strategy to reduce toxic air contaminants and criteria pollutants in designated environmental justice communities
  - Establishes community-focused and community-driven actions to reduce air pollution and improve public health
- Currently six designated AB 617 communities in South Coast AQMD:

Wilmington/Carson/West Long Beach (WCWLB)	San Bernardino/Muscoy (SBM)	East Los Angeles/Boyle Heights/West Commerce (ELABHWC)
Southeast Los Angeles (SELA)	South Los Angeles (SLA)	Eastern Coachella Valley (ECV)

- Most of the refineries located in Wilmington/Carson/West Long Beach

AB 617 Community Emissions Reduction Plans (CERPs)

WCWLB CERP included the following action items for Rule 1118:

- Lower performance targets and/or increased mitigation fees
- Increase capacity of vapor recovery systems to store gases during shutdowns
- Header modifications for gas diversion with process controls
- Back-up power systems for key process units
- Remote optical sensing for flare emission characterization
- Lower-emission flaring technologies
- Additional flare minimization plans

WCWLB CERP: http://www.aqmd.gov/docs/default-source/ab-617-ab-134/steering-committees/wilmington/cerp/final-cerp-wcwlb.pdf?sfvrsn=8

Proposed Amended Rule 1118 (PAR 1118)

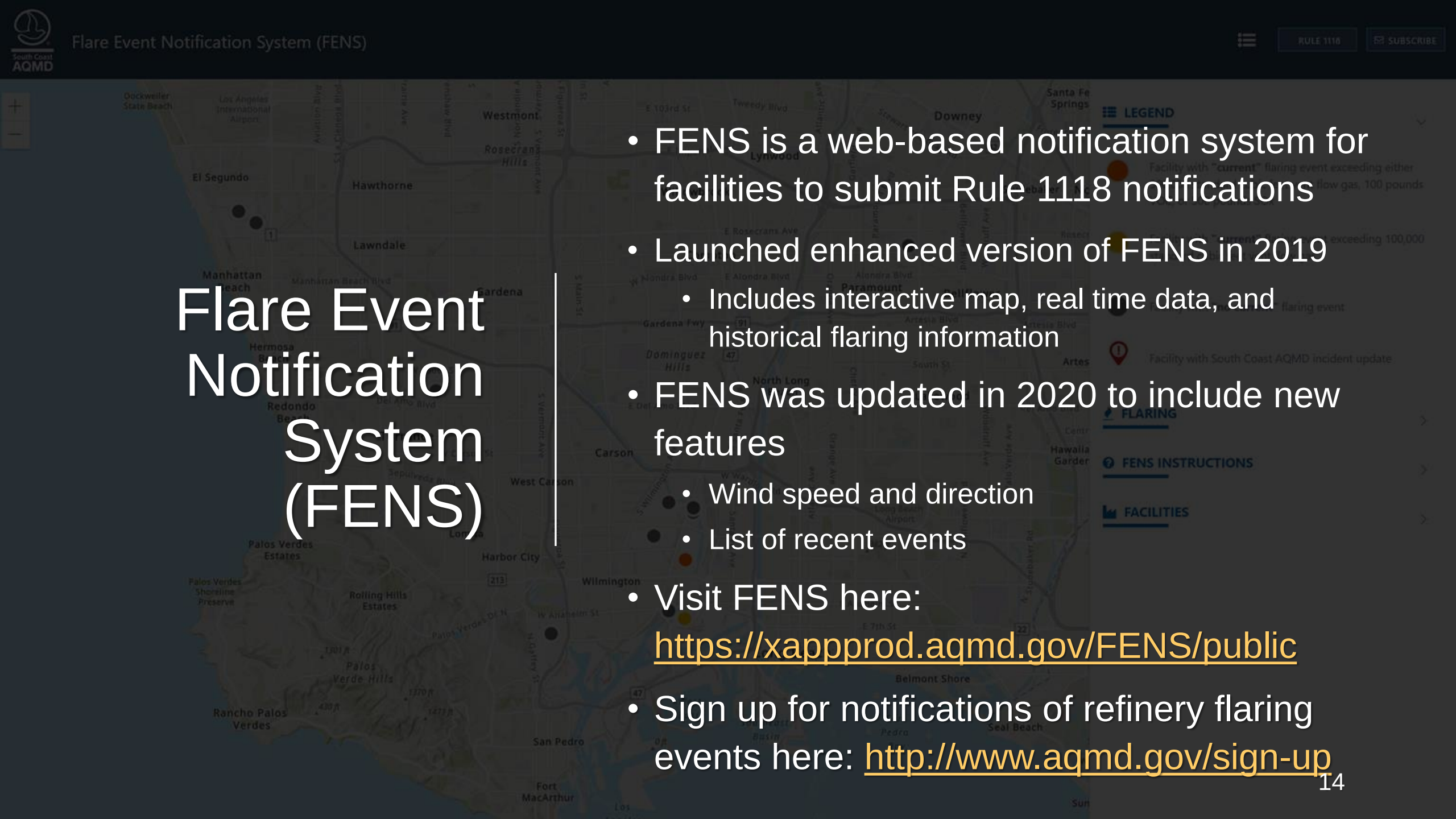
PAR 1118 will align with CERP Goal by:

- Reducing flaring and/or emissions by 50 percent, if feasible
- Contributing to 50 percent reduction in *overall* refinery emission
  - NOx (~19 tpy)
  - VOCs (~1 tpy)
  - SOx (~11 tpy)

Progress Since Last Rule Amendment

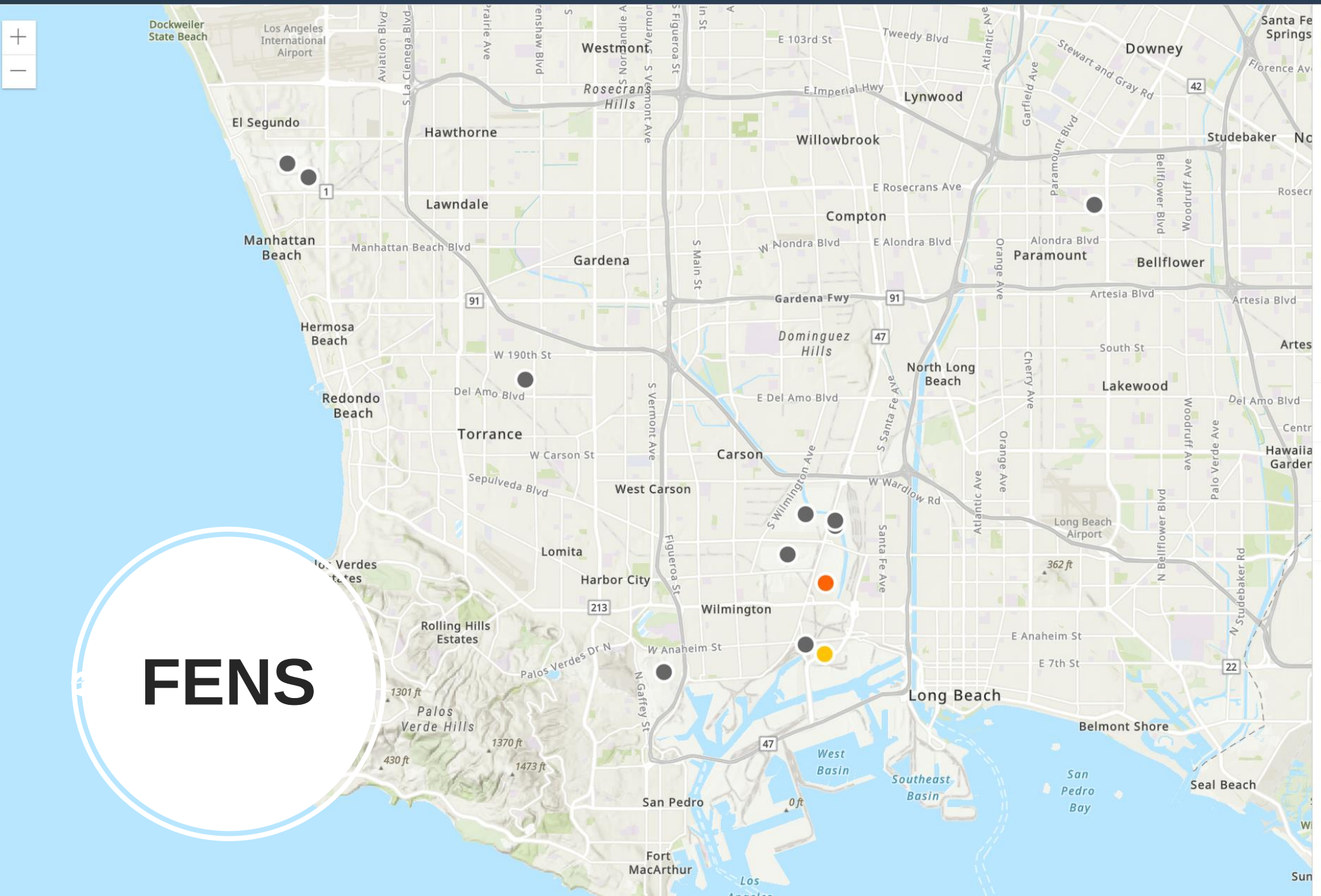
- ❑ Launch of enhanced Flare Event Notification System (FENS)
- ❑ Submittal and Review of Facility Scoping Documents
- ❑ Optical Remote Sensing Technology Review

Flare Event Notification System (FENS)



Flare Event Notification System (FENS)

- FENS is a web-based notification system for facilities to submit Rule 1118 notifications
- Launched enhanced version of FENS in 2019
  - Includes interactive map, real time data, and historical flaring information
- FENS was updated in 2020 to include new features
  - Wind speed and direction
  - List of recent events
- Visit FENS here: https://xappprod.aqmd.gov/FENS/public
- Sign up for notifications of refinery flaring events here: http://www.aqmd.gov/sign-up



FENS

LEGEND

- Facility with **"current"** flaring event exceeding either 500,000 standard cubic feet vent flow gas, 100 pounds VOC, or 500 pounds SOx
- Facility with **"current"** flaring event exceeding 100,000 standard cubic feet vent flow gas
- Facility with **"no current"** flaring event
- Facility with South Coast AQMD incident update

FLARING

FENS INSTRUCTIONS

FACILITIES

Potential Future Enhancements to FENS

Considering requiring all Rule 1118 data reporting, e.g., quarterly emission reporting, to be submitted through the FENS online portal

- Standardize reports
- Allow for quicker analysis and vetting of data
- Allow data to be made publicly available in a more timely manner and in a more user-friendly format

Emissions and Flare Events

- During next Working Group Meeting, staff will include data summarizing:
  - Number of planned and non-planned flare events
  - Emissions from flare events

Scoping Documents

Scoping Documents - Background

- Each facility is unique in arrangement, complexity, and operation with many potential ways to reduce flaring emissions
- The cause of a flare event varies, and each refinery has differing abilities to mitigate or handle a flaring event based
- Operators of facilities are the most knowledgeable of their process and were required to submit a Scoping Document within 12 months of last rule amendment
- Scoping Document evaluates the feasibility of minimizing or avoiding planned and unplanned flaring events at each facility

Rule 1118 Scoping Documents – Requirements

- Rule 1118 paragraph (c)(13) requires operators to evaluate the feasibility of minimizing flaring emissions
- Facilities required to submit a description of the components of the flare system
- For Planned Flare Events, facilities had to evaluate two potential alternatives that reduce emissions to meet the following performance targets
  - 0.10, 0.05, and ≤0.01 tons of SOx per million barrels of crude processing capacity
  - 0.1 tons of VOC per year from clean service flares
- Analyses must include potential controls, technical feasibility, approximate cost, and timing constraints to implementing each of these alternatives

Rule 1118 Scoping Documents – Requirements for Unplanned Flare Events

For Unplanned Flare Events, facilities had to evaluate how they would reduce flaring emissions based on four scenarios:

1. Sudden influx of vent gas into the flare gas header
2. Sudden loss of the process unit with the highest fuel gas consumption rate of recovered flare gas
3. Sudden loss of all externally generated electrical power
4. Sudden loss of internally generated electrical power

Scoping Documents Summary

- Refineries were required to submit Scoping Documents by July 7, 2018
  - All facilities submitted scoping plans which
    - Evaluated emission reduction alternatives
    - Provided Phase II rulemaking options to reduce flaring
  - Proposed alternatives similar between facilities
  - Cost and time dependent on turnaround schedule
    - Cost of controls from facilities ranged between $16,000 to $100,000,000

Initial Conclusion from Scoping Documents

- Reduced flaring emissions through planning, maintenance, and turnaround is most cost-effective
- Most common engineering alternative is increase of vapor recovery capacity
- Power generation and transmission is least cost-effective
- Procedural or engineering changes require hazard and operability study

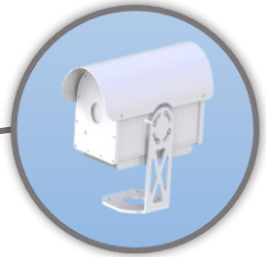
Optical Remote Sensing Technology

Optical Remote Sensing Technology

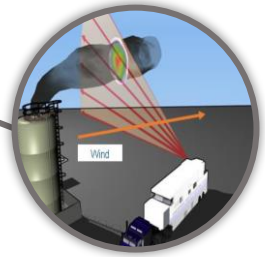
- Flaring from refineries typically occurs from elevated stacks that do not allow placement of monitoring instruments in the combustion zone
  - Emissions currently estimated by measuring the inputs into the flare stack prior to combustion, assuming high combustion efficiency and using default emission factors
- Emerging optical remote sensing technologies show promise in estimating emissions in real time and providing better quantification of emissions
- Staff released a Request for Information (RFI) to solicit information on the availability and feasibility of optical remote sensing technologies to evaluate and monitor flare emissions
  - Information received was presented to the South Coast AQMD Stationary Source Committee on June 21, 2019
  - Presentation is available at: http://www.aqmd.gov/docs/default-source/Agendas/ssc/ssc-agenda-6-21-19.pdf

Optical Remote Sensing Options from RFI

Infrared Flare Pyrometer
- Real-time feedback on combustion efficiency
- Can automate flows to maximize destruction efficiency/lower emissions
- $10,000 for sensor – not including automated controls



Video Imaging Spectral Radiometry (VISR)
- Real-time feedback on combustion efficiency
- EPA currently testing VISR as enforcement tool
- $40,000/week for demonstration



Differential Absorption Lidar (DIAL)
- Quantitative analysis
- Potential to measure toxics as well as hydrocarbons and VOCs
- Mini-DIAL (size of a van) could be developed (two years /$3.5 million)

Other Technologies
- Quantum Cascade Laser (QCL)
- Imaging Differential Absorption Spectroscopy (I-DOAS)
- Fourier-Transform Infrared spectroscopy (FTIR)

Additional Optical Remote Sensing Studies

- In 2015, South Coast AQMD conducted a comprehensive ORS technology demonstration study
  - Demonstrated leak detection capabilities of Optical Remote Sensing (ORS) techniques
  - Quantified emissions of methane, non-methane VOC, NOx, and SOx
- Additional comparative measurement study was conducted using following ORS instruments:
  - Solar Occultation Flux (SOF)
  - Differential Absorption Lidar (DIAL) system
  - Open Path Fourier Transform Infra-Red Spectroscopy (OP-FTIR)
- Studies determined that ORS techniques:
  - Allow for characterization and quantification of certain industrial emissions
  - Suggests measured emissions of SOx and NOx are in reasonable agreement with inventory
  - Could provide real-time alarm system for communities
  - Conduct reliable fenceline measurements
  - Potential to further characterize emissions from flaring events

Initial Conclusion on Remote Sensing

2019 Request For Information revealed promising technologies

Staff will reach out to technology vendors to assess further progress on commercializing new remote sensing technology

Consider including some remote sensing requirements in rule to:

- Better characterize flare emissions
- Reduce emissions from flare events

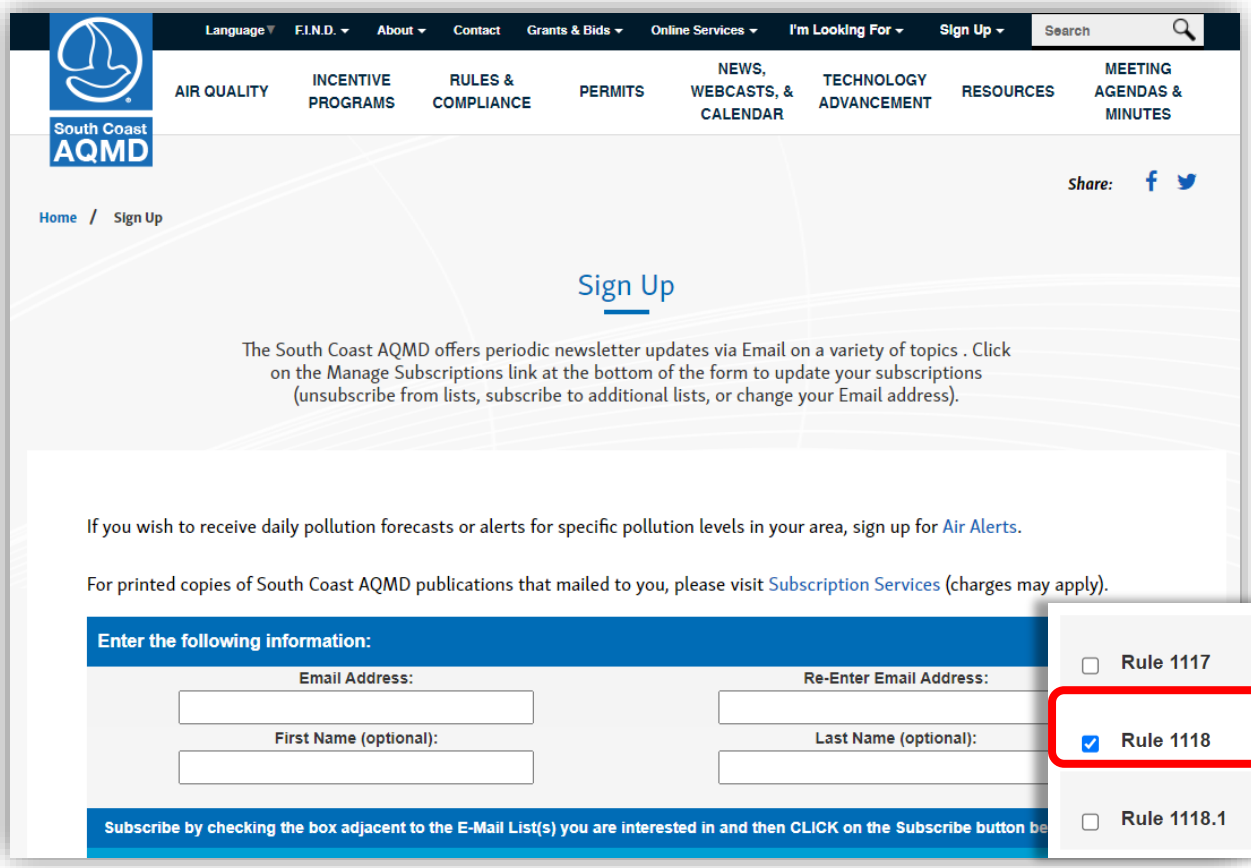
Next Steps

- Further Evaluate Alternatives Discussed in Scoping Plans
- Meet with Stakeholders and Schedule Site Visits
- Meet with Technology Vendors
- Meet with Community Groups and AB-617 Communities Impacted By Refinery Flaring
- Continue with Working Group Meetings

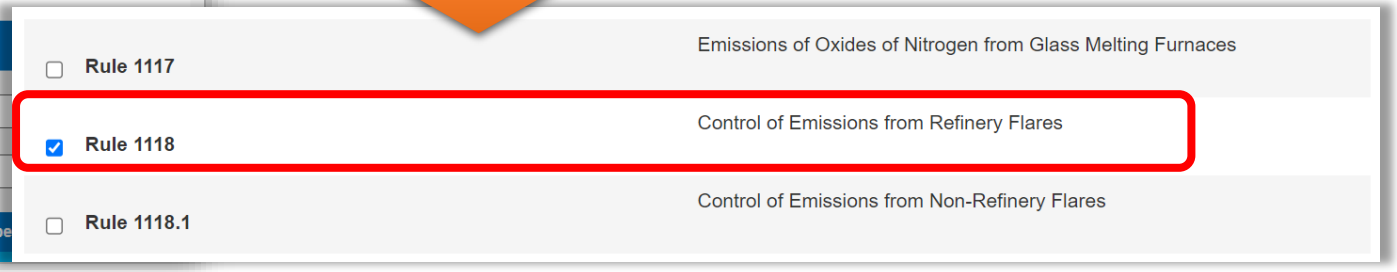
Image Courtesy: POLITICO

Staying Updated with PAR 1118

- Sign up and receive email updates via: http://www.aqmd.gov/sign-up



Subscribe by scrolling down the page and checking off the box for Rule 1118 to receive future meeting notices and links to documents



Additional Information on Rule 1118

- South Coast AQMD website has further information on Rule 1118 including:
  - Links to FENS
  - Contact information at the Rule 1118 facilities
  - Information on community notifications where you can sign up to receive information via email
  - Support documents including files from past rule amendments
  - Frequently asked questions
- Access through the following link:
  http://www.aqmd.gov/home/rules-compliance/compliance/r1118

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