



Providing for the future

REFINERY SECTOR RULE: FINAL FLARE REQUIREMENTS

**Mindi Faubion, PE
Providence Engineering and
Environmental Group LLC**

September 26, 2018



REGULATORY BACKGROUND

Risk and Technology Review (RTR) for the Petroleum Refinery Sector, also known as the Refinery Sector Rule (RSR)

- Refinery Sector Rule –
 - Refinery MACT I – NESHAP From Petroleum Refineries (40 CFR 63 Subpart CC)
 - Refinery MACT II - NESHAP for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units (40 CFR 63 Subpart UUU)

- DC Circuit Court Rulings, *Sierra Club v. EPA* (2008) and *NRDC v. EPA* (2014):
 - MACT 112(d) standards apply at all times, including SSM
 - MACT 112(d) affirmative defenses to liability for excess emission events in state implementation plans (SIP) are not allowed
- EPA Response:
 - SIP call, 36 states must remove SSM exemptions in SIPs
 - Clarifies policy on SSM exemptions
 - Revises NSPS and NESHAP standards, creating limits that apply at all times



APPLICABILITY

- MACT CC (Refinery MACT I):
 - Delayed Coking Units (DCUs)
 - Miscellaneous Process Vents (MPVs)
 - Flares as control devices
 - Storage tanks
 - Fugitive equipment leaks (fenceline monitoring)
 - Marine vessel loading
 - Heat exchange systems

APPLICABILITY

- MACT UUU (Refinery MACT II):
 - Catalytic Reformer Units (CRUs)
 - Fluid Catalytic Units (FCCUs)
 - Sulfur Recovery Units (SRUs)

TIMELINE

June 30, 2014	Proposed Rule (79 FR 36880)
December 1, 2015	Final Rule (80 FR 75178)
February 1, 2016	Effective Date
February 9, 2016	Proposed Amendments (81 FR 6814)
July 13, 2016	Final Amendments (81 FR 45232)
October 18, 2016	Proposed Reconsideration (81 FR 71661)
March 19, 2018	Proposed Amendments (81 FR 76550)
January 30, 2019	Compliance Deadline - Flares

REGULATION OVERVIEW

- Continuous fenceline monitoring for benzene
- Comprehensive program of process changes and pollution prevention targeted at:
 - Reduction of visible flare emissions
 - Reduction of releases by pressure release devices (PRDs)

REGULATION OVERVIEW: FLARES

- NSPS and NESHAP General flare requirements (40 CFR 60.18 and 40 CFR 63.11) are insufficient to ensure 98% control requirements are met
- RSR ensures that the 98% control requirements are met through use of:
 - Work practice requirements
 - Flare monitoring system requirements
 - Recordkeeping and reporting requirements

REGULATION OVERVIEW: FLARE

SSM What does this mean for flares:

- Eliminates the exemption to emission limits for uncontrolled releases during startup, shutdown, and malfunction (SSM) events

FLARE OPERATING REQUIREMENTS

Pilot Flame Presence

- Requirement:
 - operate with a pilot flame present at all times when regulated material is routed to the flare
- Deviation:
 - Operating with no flame present ≥ 1 min / 15 min block
- Monitoring:
 - Continuously monitor using device (thermocouple, infrared sensor, *etc.*)

FLARE OPERATING REQUIREMENTS

Visible Emissions

- Requirement:
 - Specify the smokeless design capacity of each flare
 - Operate with no VE
- Deviation:
 - VE observed > 5 min / 2 hour block
- Monitoring:
 - 1 / daily M22; or
 - Continuous video surveillance



FLARE OPERATING REQUIREMENTS

- Proposed Amendments
 - Clarification that the initial 2-hour VE demonstration should be conducted the first time regulated materials are routed to the flare
 - Clarification that daily 5-minute observations only required on days the flare receives regulated material
 - Clarification that additional visible emissions monitoring is specific to cases when visible emissions are observed while regulated material is routed to the flare



FLARE OPERATING REQUIREMENTS

Flare Tip Velocity (Non-Emergency Flaring)

- Requirement:
 - Tip velocity < 60 fps or
 - Tip velocity < 400 fps and $< V_{\max}$
- Monitoring:
 - CMS (for compliance with $V_{\text{tip}} < 60$ fps) or
 - Continuous monitoring, or
 - 8-hour grab sampling, or
 - Calorimeter



FLARE OPERATING REQUIREMENTS

Combustion Zone Operating Limits (Non-Emergency Flaring)

- Requirement:
 - $NHV_{cz} \geq 270 \text{ Btu/scf}$ and
 - $NHV_{dil} \geq 22 \text{ Btu/ft}^2$ (if perimeter-assisted)
- Monitoring:
 - Continuous monitoring of gas flow rates
 - Calculation equations in §63.670(l), (m), and (n)



FLARE OPERATING REQUIREMENTS

- Proposed Amendments
 - Air-Assisted Flares: tip diameter ≥ 9 inches
 - Comply only with the NHVcz operating limit
 - Air-Assisted Flares - tip diameter < 9 inches
 - Remain subject to the requirement to comply with NHVcz **and** NHVdil operating limits; or
 - Can use the steam flow rate and the maximum design air-to-steam ratio of the steam tube's air entrainment system for determining the flow rate of this assist air



FLARE OPERATING REQUIREMENTS

- Proposed Amendments
 - Incorporate specific provisions for continuously monitoring fan speed or power and using fan curves for determining assist air flow rates

EMERGENCY FLARING

- Flare Management Plan
- Minimization
- Root cause
- Corrective action analysis
- Violations
- Reporting

EMERGENCY FLARING: FLARE MANAGEMENT PLAN

- Purpose - minimize flaring during periods of startup, shutdown, or emergency releases
- Due - January 30, 2019
- Components –
 - List of all refinery process units, ancillary equipment, and fuel gas systems connected to the flare for each affected flare
 - Quantification of all flows (purge, sweep, pilot, stream flows, *etc.*)

EMERGENCY FLARING: FLARE MANAGEMENT PLAN

- Components, cont'd –
 - Assessment of discharge minimization alternatives
 - General flare description
 - Smokeless capacity
 - Max vent gas flow rate (hydraulic load capacity)
 - Max supplemental gas flow rate
 - Min/max assist steam rates
 - Assist air fixed speed rate (or design fan curve)
 - Flare map (PFD)

EMERGENCY FLARING: FLARE MANAGEMENT PLAN

- Components, cont'd –
 - For PRDs to flare:
 - Number
 - Type
 - Diameter
 - Set pressure
 - Prevention measures
 - Procedures to minimize/eliminate discharges during planned SU/SD

EMERGENCY FLARING: MINIMIZATION

Must consider *at least*:

- Modification in SU/SD procedures to reduce quantity of vent gas to flare
- Implementation of prevention measures for PRDs to flare
- Installation of flare gas recovery system or flare gas recovery system and a co-generation unit or combined heat and power unit

EMERGENCY FLARING: MINIMIZATION

Pressure Relief Devices to Flares

- Must be equipped with a monitoring device that identifies a pressure release, records the time and duration, and notifies operators that a release is occurring
- Must apply a minimum of 3 prevention measures to each PRD (ex. flow, temperature, level and/or pressure indicator meters), documented routine inspection and maintenance programs, or safety instrumentation systems

EMERGENCY FLARING: FLARE MANAGEMENT PLAN

- Identify minimization alternatives that cannot be implemented by January 30, 2019
- Identify SU/SD procedures that cannot be implemented by January 30, 2019
- Periodically review and update Startup and Shutdown procedures and Flare Management Plan

EMERGENCY FLARING: ROOT CAUSE AND CORRECTIVE ACTION

- Triggered by exceeding the smokeless capacity and:
 - Visible emissions are present for > 5 min / 2 hours or
 - Exceeding maximum flare tip velocity
- Complete analysis within 45 days of event
- Implement corrective action(s) within 45 days of event

EMERGENCY FLARING: DEVIATIONS AND REPORTING

- Emergency flaring work practice standard is violated if:
 - root cause is operator error or poor maintenance;
 - 2 repeat root cause in 3 years;
 - 3 emergency flaring events in 3 years regardless of cause
- Violations of emergency flaring work practice standards are considered deviations and must be reported in semiannual compliance reports

EMERGENCY FLARING: DEVIATIONS AND REPORTING

Deviation Examples:

- When there is least a one 1-min period in the 15-min block with no pilot flame indication = 1 deviation
 - Subsequent 15-min blocks = separate deviations
- Smoking occurring above smokeless capacity, if there is a 2nd release from a PRD or an event due to the same root cause within a 3 year period
- A 3rd smoking event/release for any reason

EMERGENCY FLARING: ROOT CAUSE AND CORRECTIVE ACTION

- Proposed Amendments
 - Smokeless capacity for 15-min block average

EMERGENCY FLARING: DEVIATIONS AND REPORTING

Semi-Annual Reports

- Due: No later than 60 days after the end of each 6-month period
- Include:
 - Each 15-min block during which there was at ≥ 1 min when regulated material is routed to a flare and no pilot flame is present
 - Each 2 consecutive hours block with $VE > 5$ min

EMERGENCY FLARING: DEVIATIONS AND REPORTING

- Include, cont'd:
 - Each 15-min block during which operating limits (flare tip velocity, NHVcz, NHVdil) were exceeded
 - For each event that triggered a root cause analysis and corrective action
 - Event start/stop times
 - Length of time emissions were visible
 - Periods of time max tip velocity exceeded and max tip velocity recorded
 - Results of root cause and corrective action analyses and implementation schedule

EMERGENCY FLARING: DEVIATIONS AND REPORTING

- Proposed Amendments:
 - Allow for extension of deadline for a force majeure event if such an event occurs or is still occurring or if there are still lingering effects of the event in the 5 business days prior to a submission deadline
 - Must submit written request and describe the measures taken or to be taken to minimize the delay in reporting; and identify a date by which you propose to report

RECORDKEEPING

Standards

- Pilot flame monitoring – 2 years / 5 years (deviation)
- Daily VE – 3 years
- Flow and flare gas compositions – 2-5 years (options)

Additional

- Periods when there is flow of vent gas to the flare, but when there is no flow of regulated material to the flare, including the start and stop time and dates of periods of no regulated material flow

PROPOSED AMENDMENTS: DEFINITIONS

- *Flare Purge Gas*
 - Revised to clarify that purge gas can include gases introduced to the flare for safety reasons
- *Flare Supplemental Gas* –
 - Revised to clarify that supplemental gas is limited to gas that increases the heating value of the flare gas (specifically excludes steam or air assist)
 - Revised to clarify that natural gas is not the only option for flare supplemental gas

PROPOSED AMENDMENTS: DEFINITIONS

- *Pressure Relief Device*
 - Added to mean any valve, rupture disk, or similar device in addition to *relief valves*
- *Relief Valve*
 - Removed and replaced with *Pressure Relief Device*

THANK YOU

Mindi Faubion, PE
Air Quality Director

Providence Engineering and Environmental Group LLC
225-766-7400

mindifaubion@providenceeng.com

