Proposed Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities

WORKING GROUP MEETING 3
DECEMBER 9, 2021

JOIN ZOOM MEETING
HTTPS://SCAQMD.ZOOM.US/J/93814044899
MEETING ID: 938 1404 4899
TELECONFERENCE DIAL-IN: 1-669-900-6833
Agenda

- Summary of Working Group Meeting #2
- Public Comment and Responses
- Rule 1178 Inspection and Monitoring
- Leak Detection Technology
- Fluxsense Study
- Next Steps
Summary of Working Group Meeting #2

At Working Group meeting #2, staff:
• Presented information on:
  • Facilities subject to Rule 1178
  • Quantity and type of tanks subject to Rule 1178
• Compared Rule 1178 requirements to storage tank requirements of other agencies
PUBLIC COMMENT AND RESPONSES
Comment #1

BAAQMD’s Regulation 8, Rule 5 – Storage of Organic Liquids allows fixed roof tanks with vapor recovery for tanks with capacity ≥ 39,626 gallons storing liquids with TVP > 0.5 psia

Response

• BAAQMD’s Regulation 8, Rule 5 – Storage of Organic Liquids requires pressure tanks or an approved emission control system that includes vapor recovery systems on fixed roof tanks
Comment #2

Enhanced monitoring is needed to detect leaks and identify degrading storage tanks

Response

• Technology assessment for PAR 1178 will include enhanced monitoring systems, including continuous monitoring systems

Comment #3

Existing monitoring should be considered when assessing additional technologies

Response

• Existing monitoring technologies at facilities will be evaluated for effectiveness of monitoring VOCs from storage tanks
RULE 1178 INSPECTION AND MONITORING
Rule 1178 Inspection Methods

• Current inspection methods:
  
  - Visual inspections for holes, tears, visible gaps in seals
  - Gap measurements of rim seals and component seals
  - EPA’s Method 21 – Determination of VOC Leaks on Components

• Inspection method and frequency dependent on roof type (next slide)
Current Inspection Requirements

Visual Inspections
Applies to: Domed external and internal floating roofs
Procedure: Visually inspect rim seal systems and roof openings for visible gaps, holes and tears
Frequency: Semi-annually

Gap Measurement Inspections
Applies to: All floating roofs
Procedure: Use probe to determine if rim seals and roof openings meet gap requirements
Frequency: Semi-annually (external floating roofs) and at least once every 10 years (domed external and internal floating roofs)
Current Inspection Requirements (continued)

EPA Method 21

Applies to: Fixed roofs (optional for external floating roofs)
Procedure: Certified person uses portable device to detect and measure VOC emissions from roof openings or performs alternative soap test method
Frequency: Quarterly (fixed roof), Semi-annually (external floating roofs - optional)
Rule 1180 – Refinery Fenceline and Community Air Monitoring

- Applies to petroleum refineries
- Requires facilities to submit plan to implement real-time fenceline air monitoring system
- Several pollutants required to be continuously monitored – VOCs included
- Air pollutant levels data collected and shared with public
  - Current data is viewable at aqmd.gov on the Rule 1180 Community Air Monitoring page or the following link:
Enhanced Leak Detection and Repair

• Staff assessing current practices
  • Rule 1178 requirements
  • Other rule requirements such as fenceline monitoring
  • Voluntary monitoring conducted by facilities
• Staff exploring technologies with potential to improve leak detection and repair timelines
LEAK DETECTION TECHNOLOGY
Leak Detection Devices

- Portable gas analyzers required by Rule 1178 to detect leaks on fixed roofs
- Other gas detection technology available with ability to detect leaks from all tank types
  - Fixed gas sensors
  - Optical gas imaging cameras
  - Open path detection devices

Fixed gas monitors

Optical gas imaging cameras

Open path detection devices
Portable Gas Analyzers

• Gas analyzers are required by EPA Method 21 to determine a VOC leak
• Advantages
  • Detection limit: <1 ppm
  • Measures concentration
  • Low equipment costs
• Limitations
  • Short range
  • Not continuous
  • Time consuming (~500 components/day)
  • Possible error in identifying leaking component
  • Not efficient for finding large leaks
  • Inability to access all sources of leaks
Optical Gas Imaging Cameras

- Advantages
  - Long range (>100 m)
  - Continuous monitoring option
  - Measures flowrate (some models)
  - Less time consuming (~10,000 components/day)
  - Ability to pinpoint leaks
  - Efficient for large leaks
  - Can identify leaks in inaccessible areas
  - Video records of leaks

- Limitations
  - Detection limit: >2,500 ppm
  - Inability to measure concentration
  - Weather may affect effectiveness
  - High equipment costs
Optical Gas Imaging Cameras

Identify Leaks

• Optical gas imaging devices produce images of vapors not seen with a naked eye
• Leak sizes estimated by vapor cloud image size

Quantifies Leaks

• Some optical gas imaging devices can measure flowrate of a leak
Optical Gas Imaging Cameras

Platform Variety

• Optical gas imaging devices can be used on different platforms to suit monitoring needs
  • Portable handheld
  • Drone
  • Stationary with pan and tilt option
Open Path Detection Devices

- Open path detection devices produce a beam across an area and alert when emissions interfere with beam.
- Advantages
  - Detectable limit: ppb level
  - Long range (300m)
  - Continuous monitoring
  - Measures gas concentrations
  - VOC speciation
- Limitations
  - Gas must reach light path
  - Cannot directly identify source of emissions
  - Weather may affect effectiveness
  - High equipment costs
Stationary Gas Sensors

• Stationary or portable devices that detect gas once in contact with sensor
• Advantages
  • Detectable limit: <1 ppm
  • Continuous monitoring
  • Measures gas concentrations
  • VOC speciation
• Limitations
  • Gas must reach sensor
  • Cannot directly identify source of emissions
  • High operating and maintenance costs
FLUXSENSE STUDY
2015 OPTICAL REMOTE SENSING DEMONSTRATION STUDY

Fugitive emissions from large refineries in Project 1

Fugitive emissions from gas stations, oil wells, and other small point sources in Project 2

http://www.aqmd.gov/ors-study
MOBILE OPTICAL REMOTE SENSING: PRINCIPLE OF OPERATION
8 days measurement study (September 28 – October 7, 2015)

24 individual tanks sampled

Average tank farm VOC emissions were approximately 50% of total measured refinery emissions

Tanks 16, 13, 502 comprised approximately 25% of total measured refinery emissions
September 1 – November 15, 2015
Sampled approximately small 60 sources

Maximum instantaneous concentrations measured during mobile measurement survey:

- VOC (Alkanes): 3320 ppb
- Benzene: 21 ppb*

*Typical benzene range: 0.1 - 1.8 ppb
Most of the measured emissions are likely from the main storage tank at this facility.
ORS techniques provide:

- Characterization and quantification of certain industrial emissions
- Fenceline monitoring
- Identification of potential leaks
- Real-time notification system
Four 2-month measurement periods distributed over July 2021 through June 2022

- Minimum of five valid measurement days for each facility
- Highly localized wind data measured near refinery
Next Steps

- Technology costs
- Rule concepts
- Working Group Meeting #4
To receive e-mail notifications for Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities, sign up at: www.aqmd.gov/sign-up