



<http://blogs.dailybreeze.com/history/files/import/27572-chevonaerial-thumb-400x262.jpg>



<https://media.gettyimages.com/videos/oil-refinery-at-dusk-drone-shot-video-id1058837302?s=640x640>

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](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 $\geq 39,626$ 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)

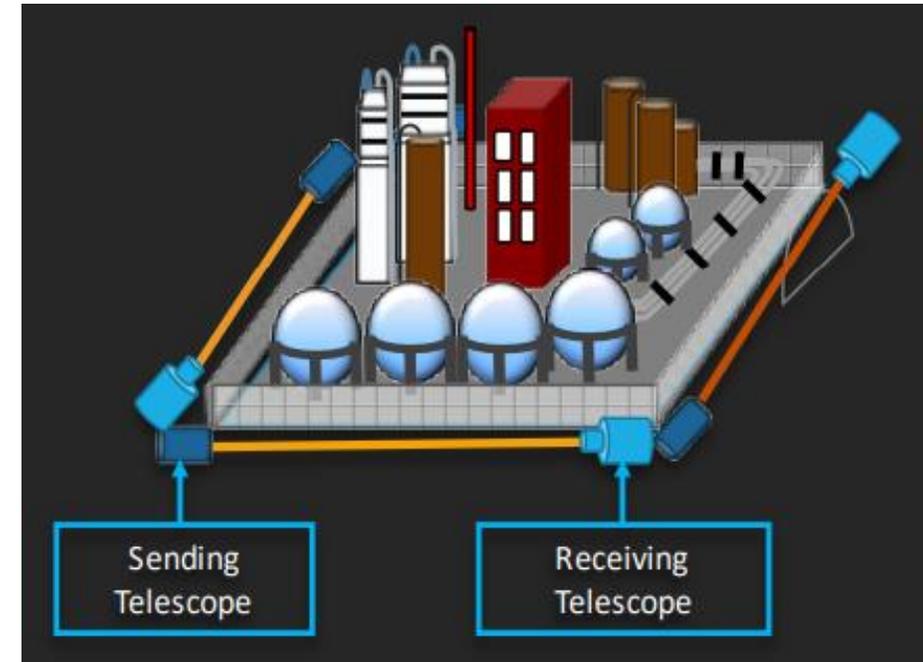
Procedure: Certified person uses portable device to detect and measure VOC emissions from roof openings or performs alternative soap test method

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](http://www.aqmd.gov) on the *Rule 1180 Community Air Monitoring* page or the following link:

<http://www.aqmd.gov/home/rules-compliance/rules/support-documents/rule-1180-refinery-fenceline-monitoring-plans/rule-1180-community-air-monitoring>



Enhanced Leak Detection and Repair

- Staff assessing current practices
 - Rule 1178 requirements
 - Other rule requirements such as fence line monitoring
 - Voluntary monitoring conducted by facilities
- Staff exploring technologies with potential to improve leak detection and repair timelines

The background of the slide is a photograph of an industrial facility, likely a refinery or chemical plant, featuring several large, cylindrical storage tanks. The image is overlaid with a semi-transparent green filter. The text 'LEAK DETECTION TECHNOLOGY' is centered in white, bold, sans-serif font.

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

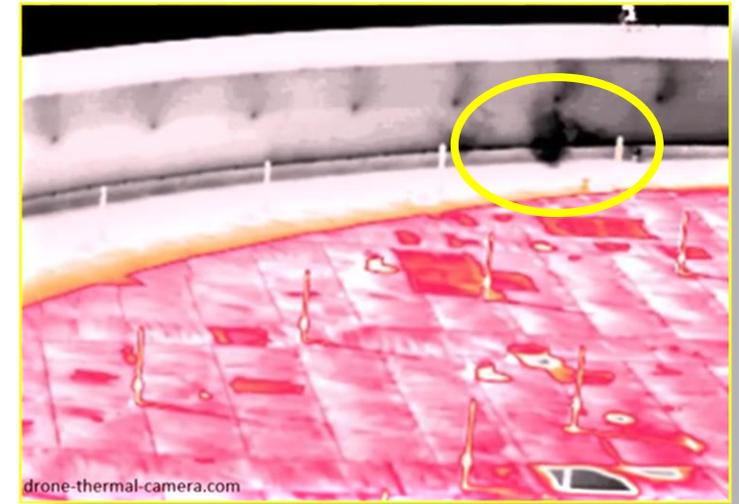
Portable Gas Analyzers

- 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

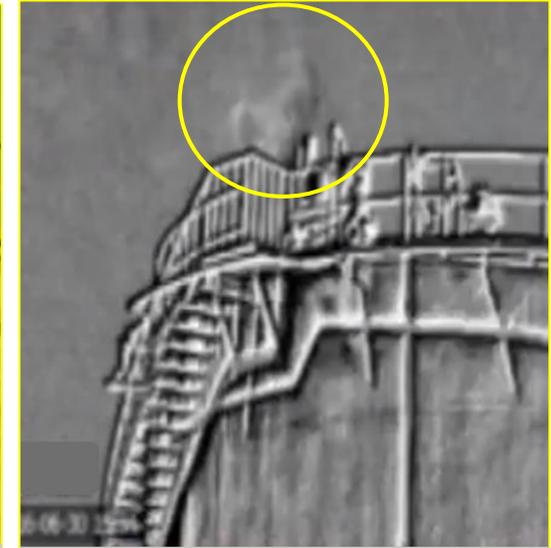
- Optical gas imaging devices produce images of vapors not seen with a naked eye
- Leak sizes estimated by vapor cloud image size

Quantifies Leaks

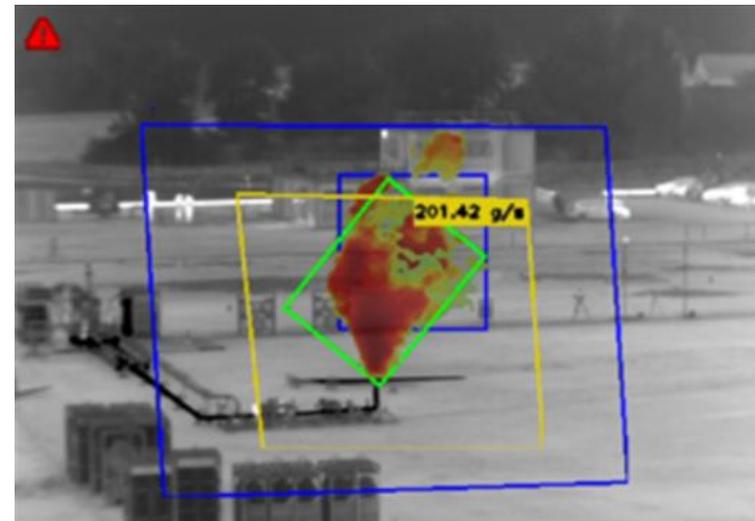
- Some optical gas imaging devices can measure flowrate of a leak



Naked Eye



OGI Camera



Optical Gas Imaging Cameras

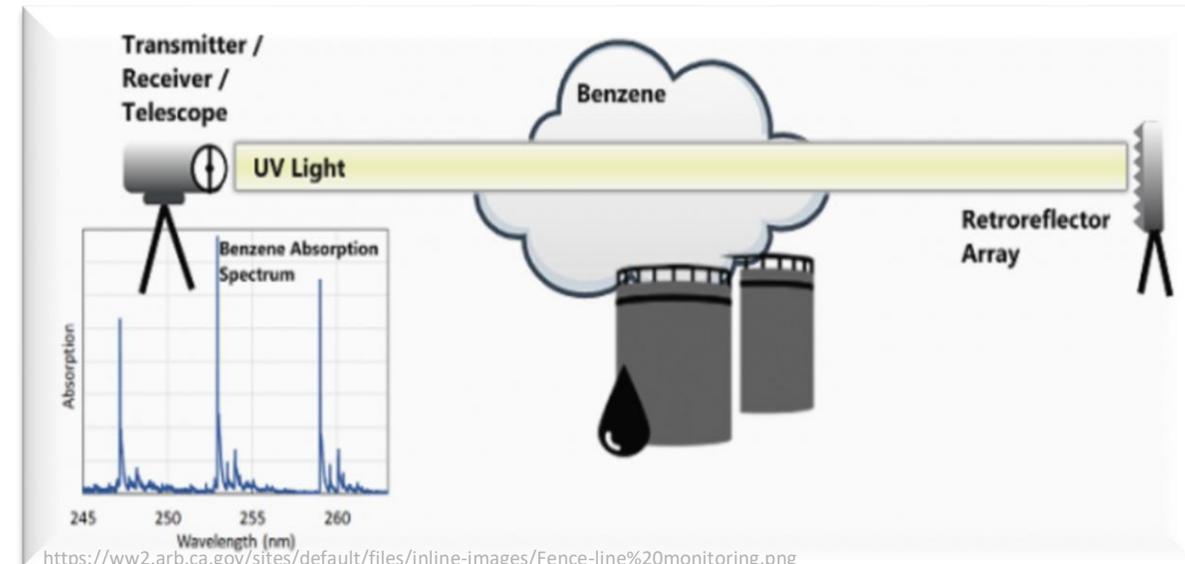
Platform Variety

- 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

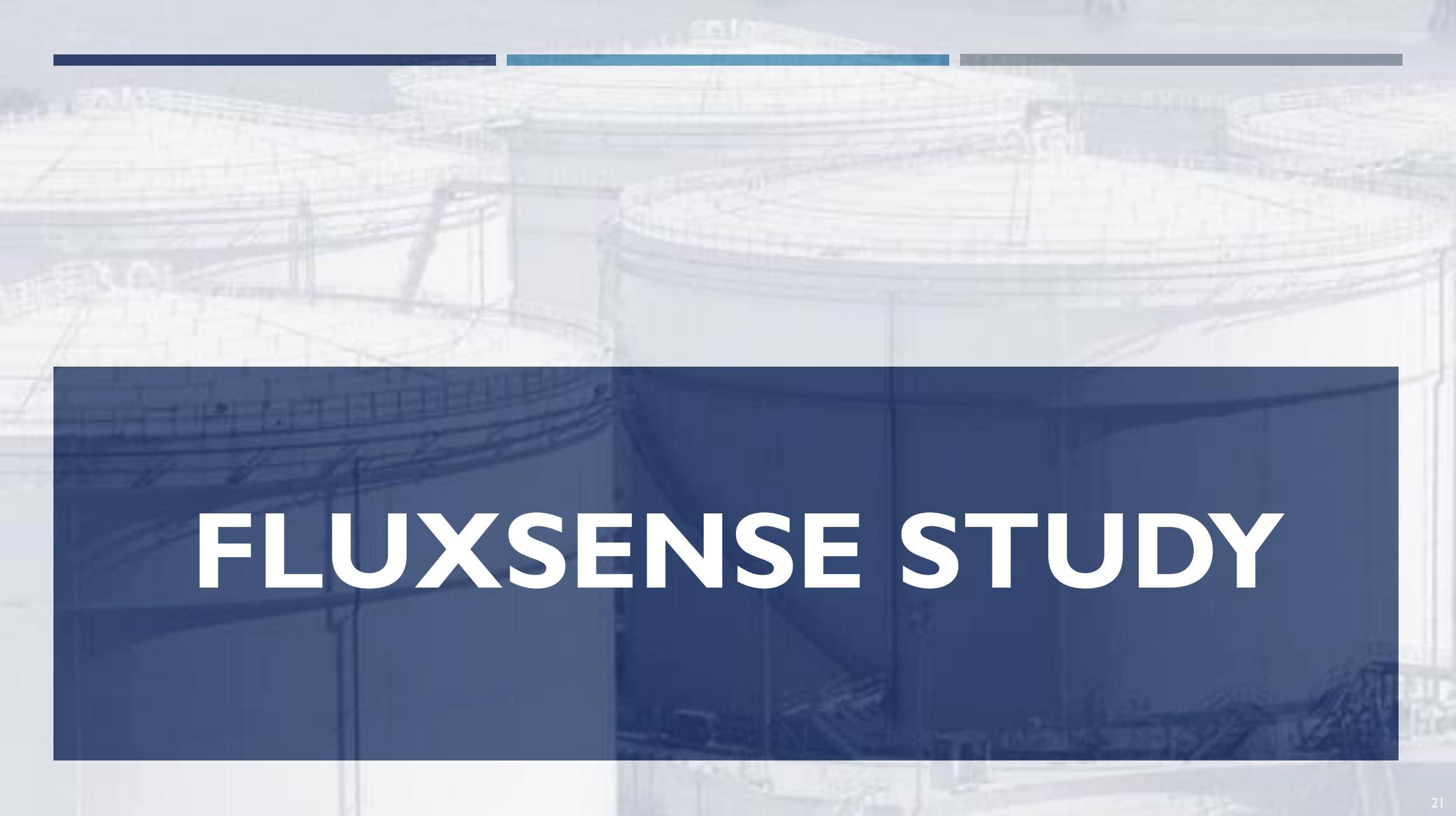
- Open path detection devices produce a beam across an area and alert when emissions interfere with beam
- Advantages
 - Detectable limit: ppb level
 - Long range (300m)
 - Continuous monitoring
 - Measures gas concentrations
 - VOC speciation
- Limitations
 - Gas must reach light path
 - Cannot directly 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

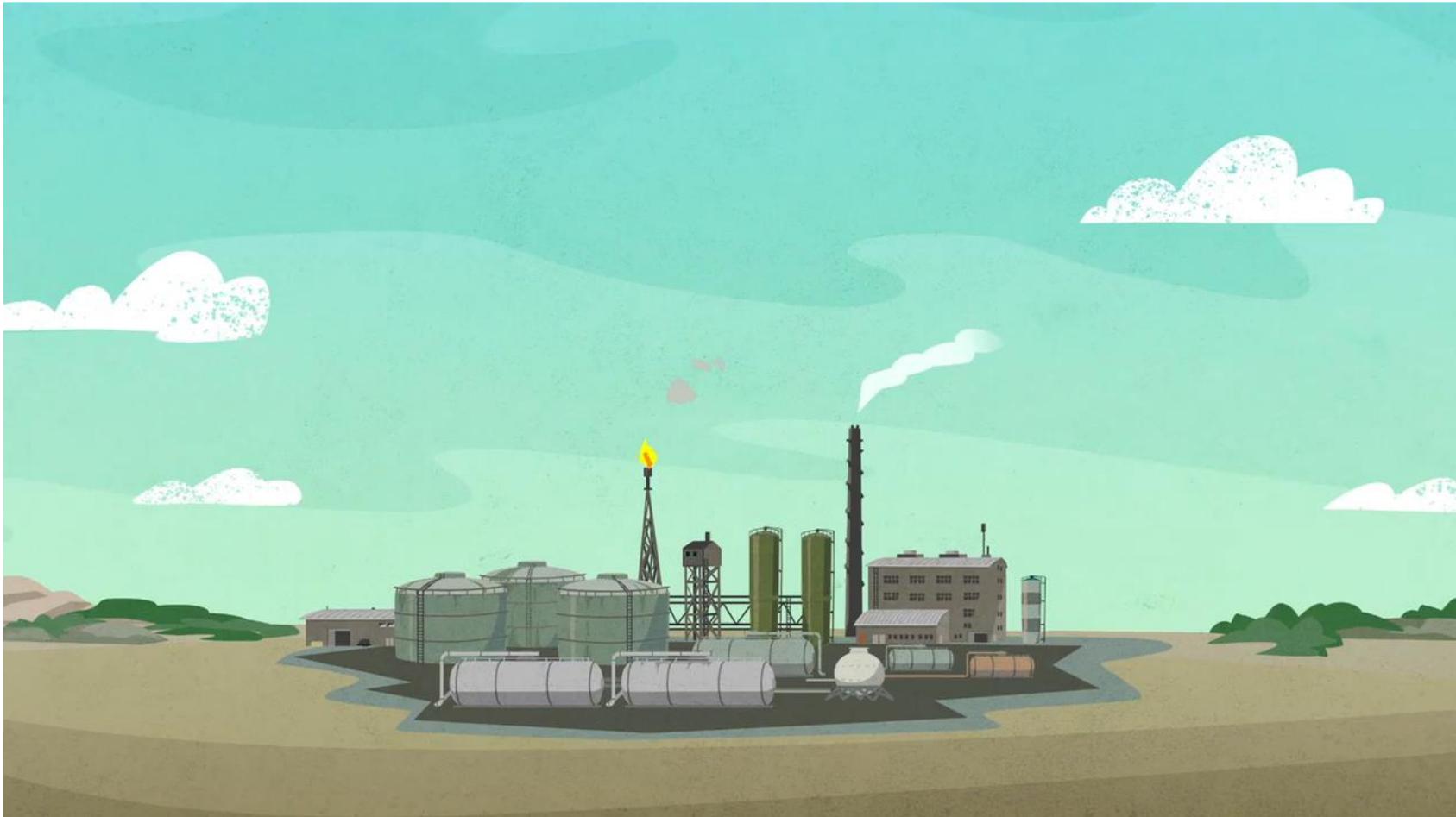
Fugitive emissions from large refineries in Project 1



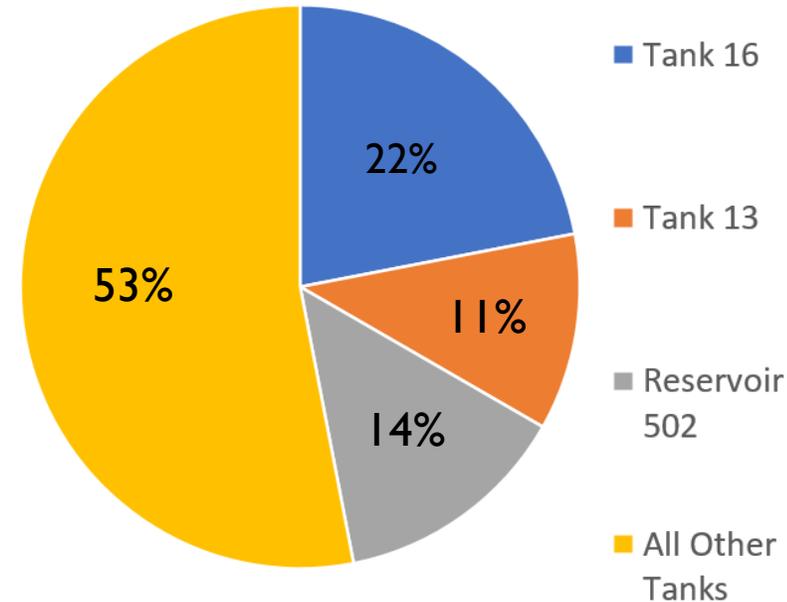
Fugitive emissions from gas stations, oil wells, and other small point sources in Project 2



MOBILE OPTICAL REMOTE SENSING: PRINCIPLE OF OPERATION



PROJECT I SUB-STUDY VOC EMISSIONS FROM A REFINERY TANK FARM



- 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

PROJECT 2 RESULTS

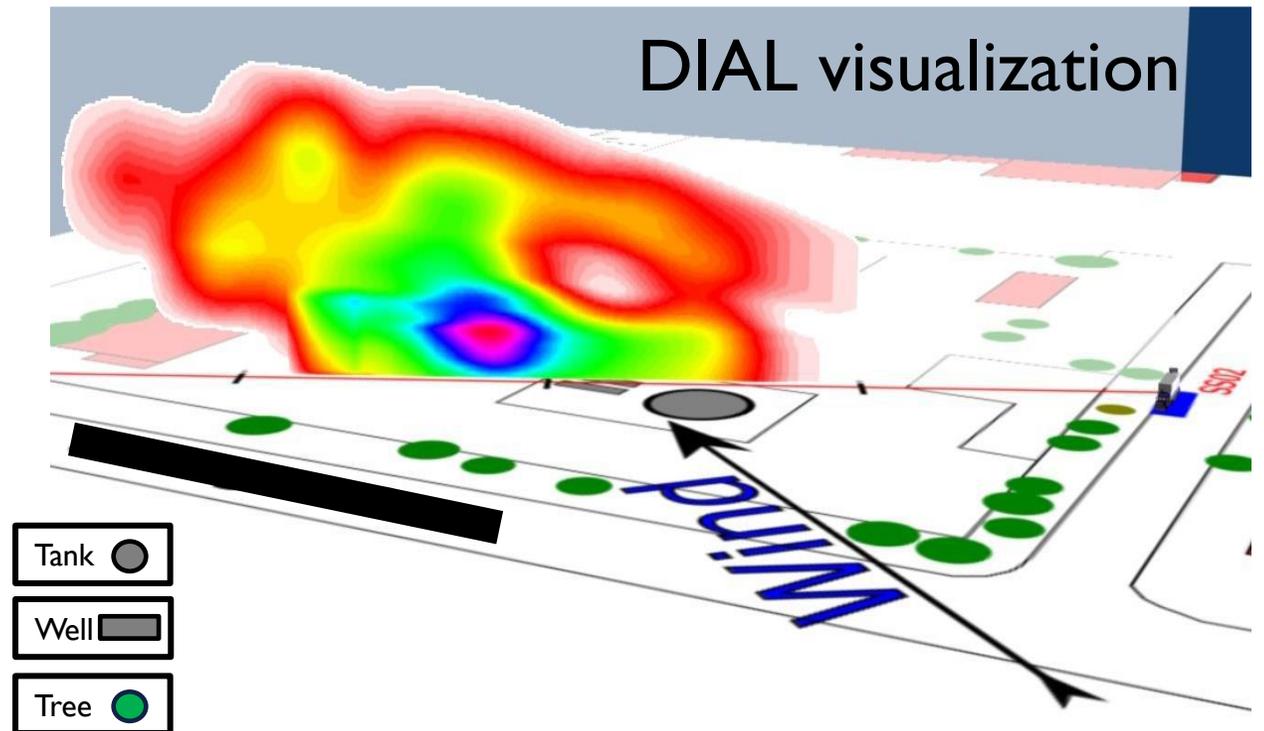
SMALL OIL TREATMENT FACILITY



- 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

PROJECT 2 RESULTS

SMALL OIL TREATMENT FACILITY



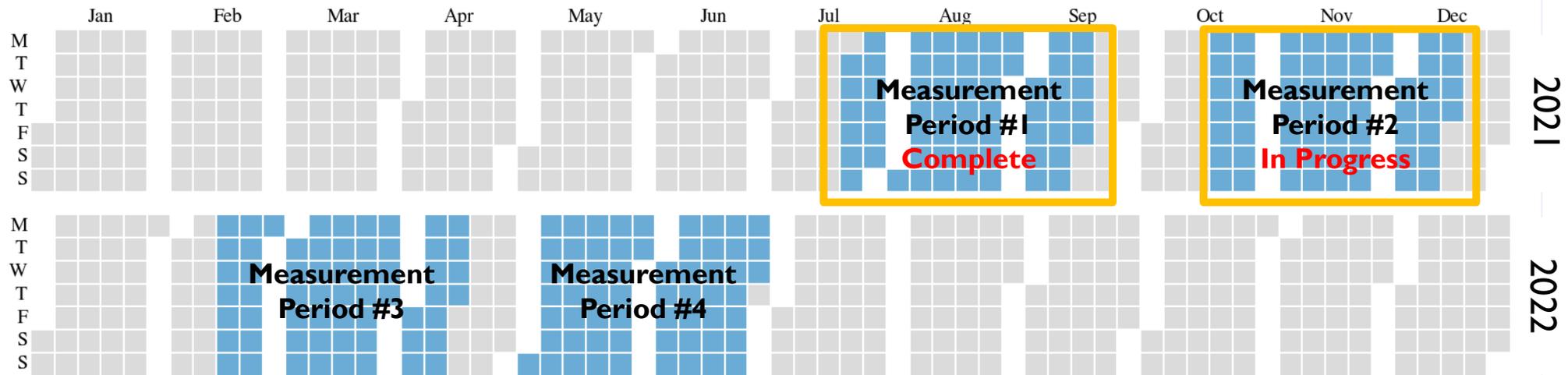
Most of the measured emissions are likely from the main storage tank at this facility

CONCLUSIONS OF ORS TECHNOLOGY

ORS techniques provide:

- Characterization and quantification of certain industrial emissions
- Fenceline monitoring
- Identification of potential leaks
- Real-time notification system

CURRENT STUDY BASELINE VOC REFINERY EMISSIONS (AB 617 PROGRAM)



- 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

Contacts

Melissa Gamoning

Air Quality Specialist

mgamoning@aqmd.gov

909-396-3115

Rodolfo Chacon

Program Supervisor

rchacon@aqmd.gov

909-396-2726

Mike Morris

Planning and Rules
Manager

mmorris@aqmd.gov

909-396-3282

Susan Nakamura

Assistant Deputy
Executive Officer

snakamura@aqmd.gov

909-396-3105

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