



South Coast
AQMD

Proposed Amended Rule 1148.1 - Oil and Gas Production Wells




Public Workshop
February 1, 2024 – 3:00 PM

Zoom URL: <https://scaqmd.zoom.us/j/91059546550>

Dial In: 1 669 900 6833

Webinar ID: 910 5954 6550 (applies to all)

Agenda

- 
- Rule 1148.1 Regulatory History
 - Focus of Rulemaking Activity
 - Rule 1148.1 Proposed Amended Rule Language
 - Impact Assessment
 - Ongoing Effort and Next Steps

Rule 1148.1 Regulatory History



Adopted March 5, 2004

Purpose is to reduce VOC emissions from wellheads, well cellars, and handling of produced gas

Additional regulatory requirements for components of produced gas handling equipment located within 100 feet of a sensitive receptor



Amended on September 4, 2015

Amendments focused on improving work practices and established odor mitigation procedures

Purpose and Applicability

Purpose

- To reduce emissions of volatile organic compounds (VOCs) from the operation and maintenance of wellheads, well cellars, and the handling of produced gas at oil and gas production facilities

Applicability

- Applies to onshore oil producing wells, well cellars and produced gas handling operation and maintenance activities



Current Rule 1148.1 Requirements

- Limits emissions from a well cellar
- More stringent limits for components of produced gas handling equipment located near a sensitive receptor
- Amended in 2015 to minimize environmental impacts on neighboring communities and sensitive receptors by additions such as an Odor Mitigation Plan



Focus of Rulemaking Activity

The background of the slide is a faded, grayscale image of a large stadium. In the center of the stadium, a large satellite dish antenna is mounted on a tall, dark metal structure. The stadium seating and various structures are visible in the background, but they are all faded to a light gray tone. The overall scene is captured from a low angle, looking across the stadium.

Assembly Bill 617

Requires air districts to create Community Emissions Reduction Plans (CERPs) for designated communities

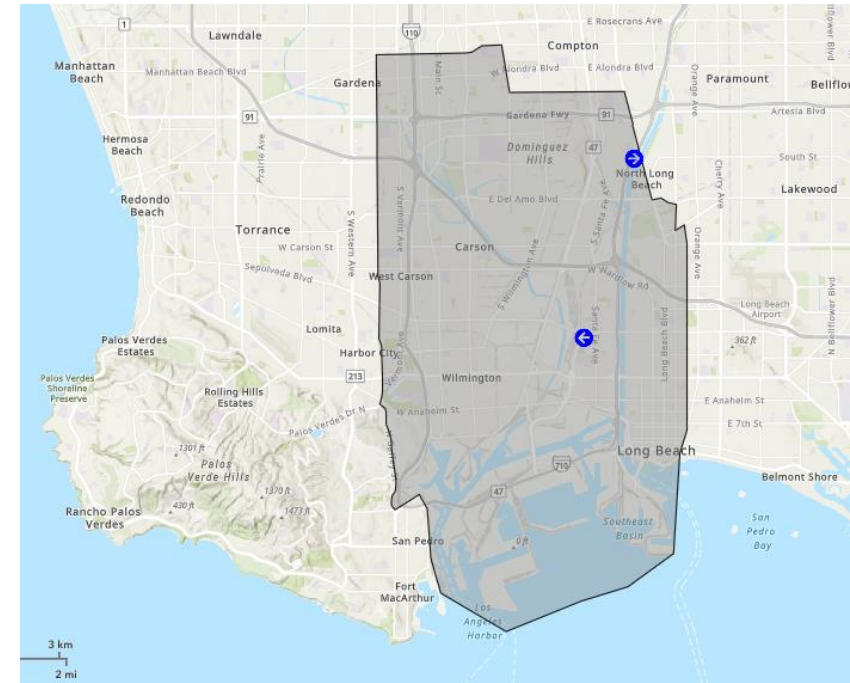
Requires strategies to reduce toxic air contaminants and criteria air pollutants in disadvantaged communities

Two Communities w/ CERPs for Oil/Gas Sites

- * South Los Angeles (SLA)
- * Wilmington, Carson, & West Long Beach (WCWLB)



South LA



Wilmington, Carson and West Long Beach

AB 617 and CERP

- AB 617 Community Steering Committee (CSC) meetings held in South Los Angeles (SLA) and Wilmington, Carson, and West Long Beach (WCWLB) areas
- Communities provided input to address local concerns
- WCWLB CERP was adopted in 2019 and the SLA CERP was adopted in June 2022
- Both WCWLB and SLA identified oil and gas production emissions as an area of concern

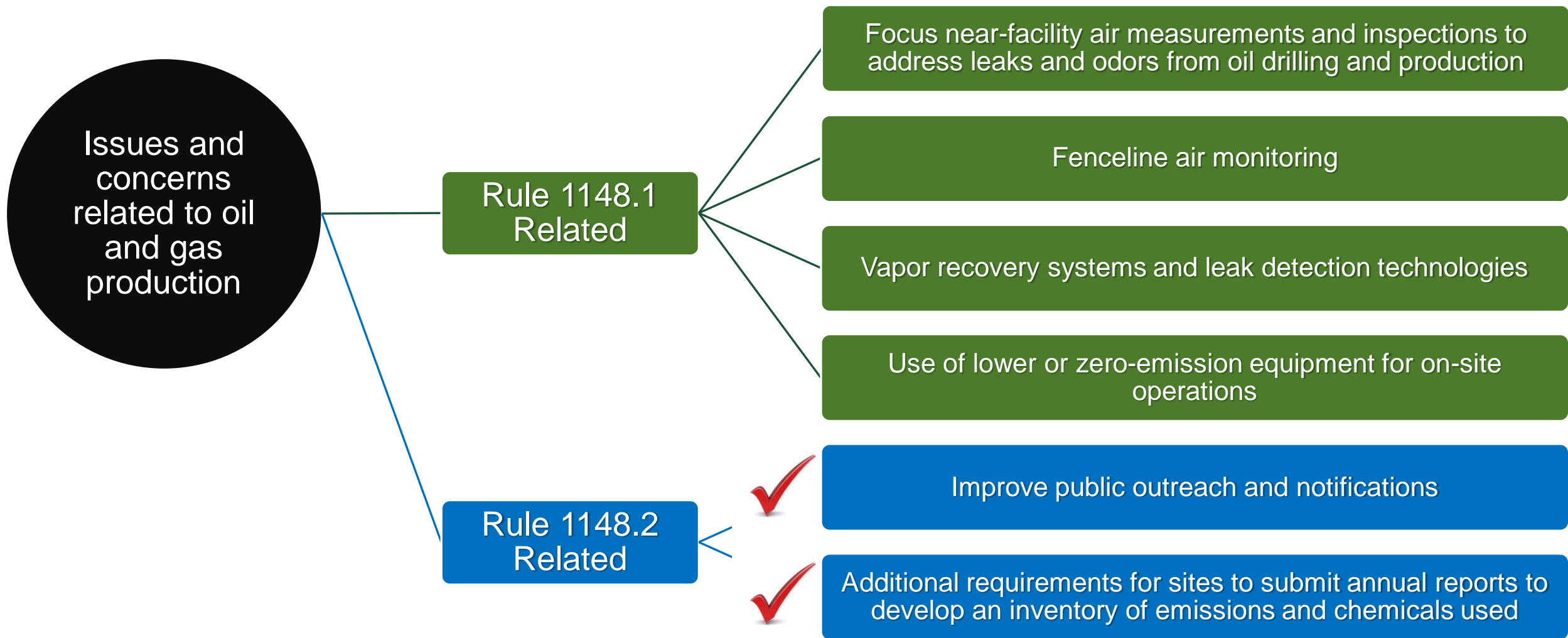
ASSEMBLY BILL (AB) 617
COMMUNITY AIR INITIATIVES

COMMUNITY EMISSIONS REDUCTION PLAN

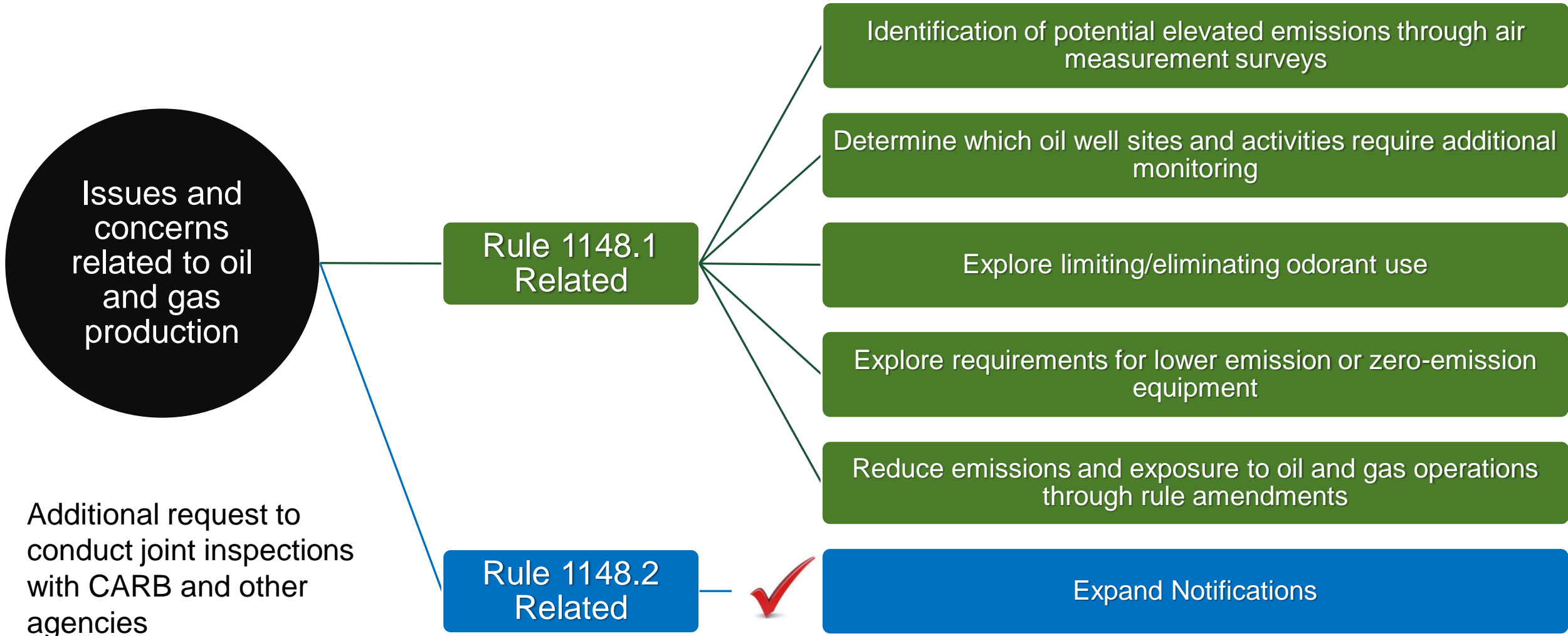
WILMINGTON, CARSON,
WEST LONG BEACH

SEPTEMBER 2019
FINAL

WCWLB CERP - Chapter 5E



SLA CERP - Chapter 5F





Rule 1148.1 Proposed Amended Rule Language

Summary



Summary of Proposals

- Adding new definitions to clarify amendments being proposed
- Update signage requirements
- Require the use of enhanced leak detection technology
- Require equipment that uses produced gas to meet specific NOx limits and verify compliance via source tests
- Require workover rigs to use Tier 4 Final diesel engines
- Ban use of odorants used to mask odors emanating from oil and gas production facilities

Definitions (c)

Staff has added 10 new definitions to the rule to clarify new provisions:

- Engine
- Fuel Cell
- Gas Handling
- Neutralizing Agents
- Odorant
- Optical Gas Imaging Device
- Stationary Gas Turbine
- Tier 4 Final Engine
- Visible Vapors
- Workover Rig



OGI camera



Fenceline sensors



Microturbine



Workover/Drilling rigs



Non-electric engine

Signage Update (d)(13)

Effective six (6) months after rule adoption, paragraph (d)(13) will include additional requirements:

- Sign to be installed within 50 feet of main entrance and be visible to public
- Measure at least 30 inches wide by 30 inches tall
- Display lettering at least 4 inches tall with text contrasting with sign background
- Located at least 4 feet above grade from bottom of sign
- Instructions expanded to include a link to sign up for notifications for Rule 1148.2

Referenced signage requirements from *Rule 1460 - Control of Particulate Emissions from Metal Recycling and Shredding Operations*



Enhanced Leak Detection Technology (d)(14)

Effective six (6) months from rule adoption, paragraph (d)(14) will require:

- Inspections with OGI cameras of wellheads and well cellars
- Additional requirements found in paragraph (e)(6)

OGI cameras are part of the next generation of enhanced leak detection technologies and assist in finding leaks faster



Spark Ignition Engines at Oil and Gas Site Requirements (d)(15)

- Staff found engines with no emission controls at different oil and gas sites near sensitive receptors
- Effective two (2) years from rule adoption, paragraph (d)(15) requires:
 - Any engine that is powering a well to meet NOx emission standards of 11 ppmv
 - Periodic source tests to prove compliance with emission limit
 - ❖ 1st Source test within twenty-four (24) months of rule amendment
 - ❖ Subsequent source test every five (5) years

Microturbine Requirements (d)(16)



- Effective two (2) years from rule adoption, paragraph (d)(16) will require:
- Microturbines to meet 9 ppmv NO_x
 - Covers microturbines under 0.3 MW operated at oil and gas sites irrespective of rating
 - Will require periodic source tests to prove emission limits pursuant to paragraph (i)(2)

Tier 4 Final Engines on Workover Rigs (d)(17)



- Effective three (3) years from rule adoption, paragraph (d)(17) will require:
 - Use of Tier 4 Final diesel engines for workover rigs
- Tier 4 Final diesel engines have the most stringent emission standards
- Staff determined that requiring electrified workover rigs is not cost-effective
- Some oil and gas operators have already upgraded their workover rigs to Tier 4 Final standards

Ban on Odorant Use (d)(18)



- Upon rule adoption, paragraph (d)(18) will require:
 - A ban on odorant use
- Staff found that some oil and gas production site operators used odorants in an attempt to mask odors which led to additional complaints
- Neutralizing agents used to remove odors are allowed provided they do not contain toxic compounds as listed in Rule 1401
- Does not apply to mercaptans used on gas lines to identify leaks

Optical Gas Imaging Inspections (e)(6)



Effective six (6) months from rule adoption, paragraph (e)(6) requires:

- Person conducting OGI inspection to be trained/certified
- Monthly inspections
- Report visible vapors detected within 24 hrs of quantification

Note that paragraph (h)(2) applies for OGI recordkeeping requirements despite no revision to that section

Testing Requirements - Subdivision (i)

Effective twenty-four (24) months from rule adoption, subdivision (i) requires:

- Source tests for internal combustion engines used to power wells at oil and gas sites and five (5) years thereafter
- Source tests for microturbines used at oil and gas sites and five (5) years thereafter
 - Exemption, paragraph (k)(5), for microturbines certified through CARB's Distributed Generation



Other Revisions

Paragraph (j)(6) added due to emission limits for equipment

- Requires testing for NOx emission to be conducted per South Coast AQMD Method 100.1

Other miscellaneous revisions including:

- Updated DOGGR references to CalGEM
- Updated South Coast AQMD's name for consistency
- Updated references within rule due to new subdivision (i)
- General clarifications and grammatical consistency

An aerial photograph showing an oil field with several pumpjacks in the foreground and middle ground. In the background, there is a residential area with houses and trees. The sky is clear and blue. The text "Impact Assessment" is overlaid in the center of the image.

Impact Assessment

Cost-Effectiveness Analysis

- Cost-effectiveness is based on Present Worth Value calculation
- Measured in cost per ton of pollutant reduced
- Factors and assumptions include:
 - Total Installed Cost
 - Annual Costs
 - Assumes 4% interest rate
 - 3-year, 10-year, or 20-year equipment life (can vary)
 - Emission reductions



Cost Effectiveness

Cost-Effectiveness Analysis

- Cost-effectiveness to be calculated for controls and leak detection methods
- Threshold of \$36,000 per ton of VOC reduced, adjusted annually, established in 2022 Air Quality Management Plan
- Threshold of \$325,000 per ton of NO_x, adjusted annually
- Data collected from site visits and vendors
 - Optical Gas Imaging (OGI) cost
 - Fenceline monitoring cost
 - Engine upgrade cost
 - Microturbine installation cost
 - Workover rig electrification cost
 - Oil well electrification cost



Assumptions for Emission Reductions and Cost-Effectiveness

- Due to expected emission reductions, cost-effectiveness done for proposed amendments
- Approximately 330 oil & gas sites within AQMD's jurisdiction, ~80 companies
- 1 in 10 facilities have one major leak per year
- Leak emits 200 lbs/day of VOCs
- 98% less than leak rate established under Rule 1178
- A leak occurs at the midpoint in time between quarterly inspections ~ 45-day interval
- Following slides show emission reductions and cost-effectiveness
- Staff report has more details regarding calculations

Cost-Effectiveness on OGI Devices

- Cost to purchase an OGI camera = \$120,000 per unit
- Equipment expected to have a 10-year lifespan
- 1 camera per company, 80 cameras
- \$1,500 annual maintenance/training cost
- Labor cost = \$400/day to conduct OGI inspection
- Emissions reductions = 99 tons/year of VOC reduced
- Cost-effectiveness = \$13,800/ton of VOC reduced



Cost-Effectiveness for Fenceline Monitoring



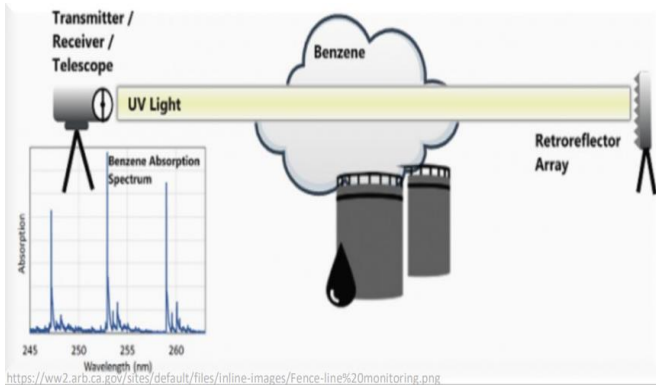
Stationary gas sensor

- Fenceline monitors observed at several oil production sites:
 - Stationary gas sensors detect gas and/or VOC emissions once it makes contact with its sensor
- 330 facilities affected by this proposal
- Assuming fenceline monitor will find leak on first day
 - 150 tons/yr of VOC emissions reduced
- Staff received data for cost of monitor device as \$3,115 per sensor with \$30,000 installation cost
- Maintenance and monitoring cost of \$10,000/yr
- Equipment expected to have a 10-year lifespan
- Cost-effectiveness = \$34,100/ton VOC reduced

Cost-Effectiveness for Fenceline Monitoring



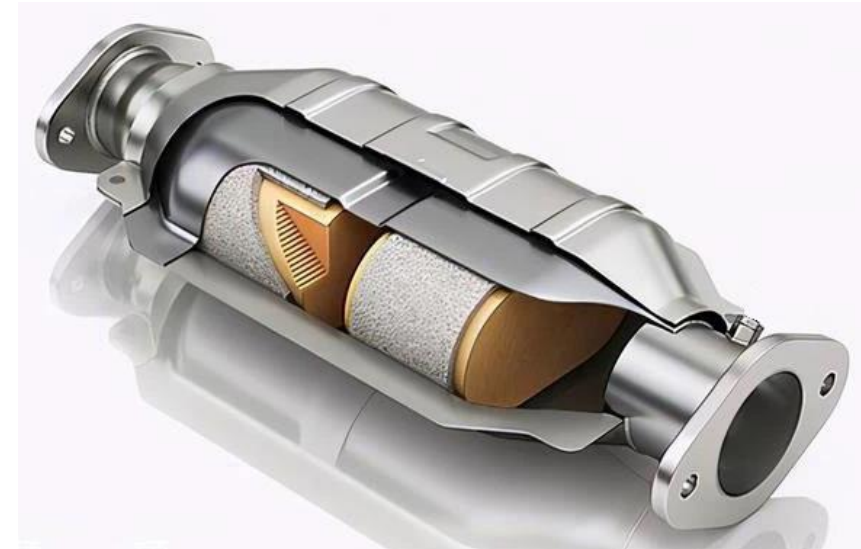
- Used costs from 2023 amendment to Rule 1178
- Assuming 4 open path devices at \$190,000 each
- Assuming installation cost equal to equipment cost
- Assuming fenceline monitor will find leak on first day
 - 150 tons/yr of VOC emissions reduced
- Equipment expected to have a 20-year lifespan
- 330 facilities required to install
- Maintenance and monitoring cost = \$5,000/yr,
- Cost-effectiveness = \$168,200/ton VOC reduced



Open path sensor

Cost-Effectiveness for Catalyst

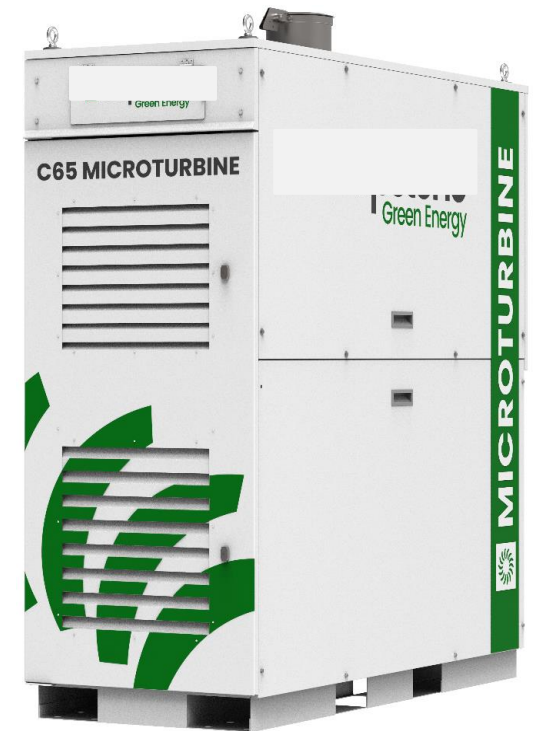
- Assumptions:
 - Emissions from gas engine to be equivalent to spark-ignition engine requirements from CARB's PERP Regulation
 - Engines operate 24 hrs/day, 365 days/year
- Cost of 3-way catalyst is \$5,000
- Cost of air/fuel ratio controller is \$1,000
- Annual maintenance of \$1,000
- 3-year lifespan for 3-way catalyst
- Each engine at 50 hp
 - 1.97 tons/yr of NO_x reduced for 3 engines at 50 hp
- Cost-effectiveness is \$7,000/ton of NO_x reduced for 3 engines at 50 hp



3-Way Catalyst

Cost-Effectiveness for Microturbines

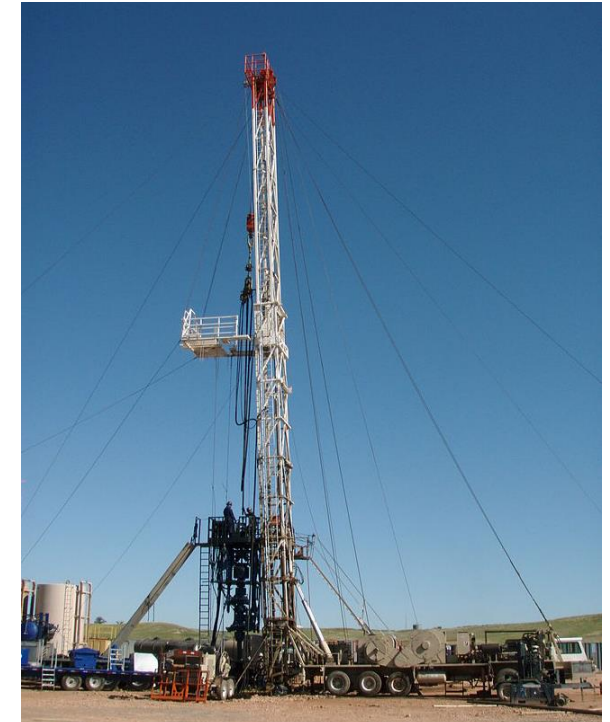
- Assumptions:
 - Emissions from gas engine to be equivalent to spark-ignition engine requirements from CARB's PERP Regulation
 - Engines operate 24 hrs/day, 365 days/year
- Cost of microturbine obtained from a local vendor
 - Costs approximately \$150,000 per microturbine
 - \$300,000 for installation & infrastructure
- Cost of electric motor: ~\$5,000
 - A microturbine is expected to replace three 50-hp engines
 - ❖ 1.825 tons/yr of NOx reduced
- Equipment expected to have a 10-year lifespan
- Cost-effectiveness is \$30,700/ton of NOx reduced



Microturbine

Cost-Effectiveness for Workover Rig Upgrade

- Assumptions:
 - Baseline emissions from a Tier 2 engine
 - Engines operate 8 hrs/day, 4 days/ week
 - Rig life expected to have a 20-year lifespan
 - Rig powered by 600 hp engine
 - 40 rigs to be used within South Coast AQMD's jurisdiction
 - ❖ 186 tons/yr of NOx reduced
- Cost of Tier 4 Final workover rig
 - Costs approximately \$1,000,000 per rig
 - Maintenance cost of \$20,000 per year
- Cost-effectiveness is \$13,700/ton of NOx reduced



Workover Rig

Cost-Effectiveness for Workover Rig Electrification

- Staff identified two electrified workover/drilling rigs operated in the South Coast AQMD and obtained cost data from operators
 - Assuming workover rig operates 8 hrs/day, operates 4 days/week
 - Assuming workover rig at each site 4/year, 330 sites, 40 rigs
 - Workover rigs equipped with tier 2 engines at 600 hp
 - ❖ 197 tons/yr of NOx reduced
 - Equipment expected to have a 20-year lifespan
 - Estimated cost of \$10 million for electric rig + \$5 million for upgrades to each facility
- Cost-effectiveness = \$521,080/ton NOx reduced



Sub-station

Incremental Cost-Effectiveness

California Health and Safety Code section 40920.6 requires an incremental cost-effectiveness analysis for BARCT rules or emission reduction strategies when there is more than one control option which would achieve the emission reduction objective of the proposed amendments

$$\text{Incremental Cost-Effectiveness} = \frac{\text{Cost of Option 2} - \text{Cost of Option 1}}{\text{Benefit of Option 2} - \text{Benefit of Option 1}}$$

Staff conducted an incremental cost-effectiveness analysis comparing:

- OGI camera use versus stationary gas sensor monitoring
- Tier 4 Final workover rigs versus electrified workover rigs

Incremental Cost-Effectiveness Analysis

Incremental cost-effectiveness for OGI camera versus stationary gas sensor monitoring:

$$\text{Incremental Cost-Effectiveness} = \frac{\$51,057,600 - \$13,688,000}{1,496 \text{ tons} - 990 \text{ tons}} = \$73,900/\text{ton VOC reduced}$$

Incremental cost-effectiveness for this option was calculated to be greater than \$36,000/ton VOC reduced and therefore, the use of stationary gas sensors relative to OGI technology was not incrementally cost-effective. Staff recommends the use of OGI technology versus stationary gas monitoring.

Incremental cost-effectiveness for Tier 4 Final workover rigs versus electrified workover rigs:

$$\text{Incremental Cost-Effectiveness} = \frac{\$2,050,000,000 - \$50,872,000}{3,942 \text{ tons} - 3,723 \text{ tons}} = \$9,100,000/\text{ton NOx reduced}$$

Incremental cost-effectiveness for this option was calculated to be greater than \$325,000/ton NOx reduced and therefore, the use of electrified workover rigs relative to Tier 4 Final workover rigs was not incrementally cost-effective. Staff recommends the use of Tier 4 Final workover rigs versus electrified workover rigs.

Socio-Economic Impact



- California Health and Safety Code section 40440.8 requires a socio-economic impact assessment for proposed and amended rules resulting in significant impacts to air quality or emission limitations.
- A socio-economic impact assessment will be conducted and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing.

California Environmental Quality Act (CEQA)

The South Coast AQMD, as a lead agency, is reviewing PAR 1148.1 to determine if it will result in any potential adverse environmental impacts

Appropriate CEQA documentation will be prepared based on the analysis



Ongoing Efforts and Next Steps

Next Steps for PAR 1148.1

Comments due February 15, 2024



Stationary Source Committee – February 16, 2024



Set Public Hearing – March 1, 2024



Tentative Public Hearing – April 5, 2024

Staff Contacts

The following South Coast AQMD staff is available to assist you with any questions or comments.



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