Public Workshop

Revised Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities

California Air Resources Board

Sacramento, California

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Agenda

- Background
- Gas Storage Facilities Update
- Revised Draft Regulation
- Emissions, Reductions, and Costs
- Next Steps

Background

Background

- This draft regulation addresses fugitive and vented emissions from new and existing oil and gas facilities.
- ARB working with air districts to develop control strategies and to craft ways to implement and enforce the new standards.
- ARB also working with US EPA, industry, environmental groups, and other stakeholders to quantify emissions and evaluate different control strategies.

Background

- **August 2014 workshop**
  - Background and kick off
- **December 2014 workshop**
  - Source category proposals
  - Standardized Regulatory Impact Assessment (SRIA)
  - Environmental Analysis (EA)
- **April 2015 workshops (Sacramento & Bakersfield)**
  - Draft regulatory language

Gas Storage Facilities Update

- Aliso Canyon leak
- DOGGR emergency regulations
  - ARB working with DOGGR on evaluating monitoring plans
- This regulation will address early detection and emission reductions for future large leaks

Revised Draft Regulation

Revised Draft Regulation

Overview

- Staff received 13 feedback letters in response to the April 22, 2015 draft regulation.
- Staff has also been working with the local air districts on the requirements and on the implementation and enforcement provisions.
- Feedback submitted is reflected in this revised draft regulation.

Revised Draft Regulation

- Separator and Tank Systems
- Flash Analysis Testing
- Vapor Collection Systems & Vapor Control Devices
- Circulation Tanks for Well Stimulation Treatments
- Reciprocating Compressors
- Centrifugal Compressors
- Pneumatic Devices and Pumps
- Liquids Unloading of Gas Wells
- Leak Detection and Repair
- New Requirements for Natural Gas Storage Facilities
- Implementation & Enforcement

Separator and Tank Systems

Basic Requirements:

- Applies to separators and tank systems without a vapor collection system.
- Requires flash analysis testing to determine annual methane emissions.
- Systems tested above 10 MT CH4/Yr required to add a vapor collection system.

Separator and Tank Systems

Major Revisions:

- Clarified terms to better describe separators, tanks, and sumps subject to the vapor collection system requirements.
- Added exemption for systems already controlled using a vapor collection system or that do not contain oil, condensate, or produced water.

Separator and Tank Systems

Major Revisions (continued):

- Clarified that separators, tanks, or covered sumps subject to these vapor collection requirements must comply with LDAR requirements.
- Clarified when flash testing is required.

Flash Analysis Testing

Basic Requirements

- Requires crude oil, condensate, and produced water sampling to determine annual methane emissions.

Major Revisions:

- Clarified the two different sampling methods.
- New proposed quality control/assurance requirements for laboratories.
- New proposed equipment specifications and flash analysis procedure for laboratories.

Vapor Collection Systems and Vapor Control Devices

Basic Requirements:

- Collected vapors required to go to one of the following:
  - Existing sales gas system
  - Existing fuel gas system
  - Existing underground injection well
- Facilities without one of the existing systems are required to install a new vapor control device.

Vapor Collection Systems and Vapor Control Devices

Major Revisions:

- In non-attainment areas, new proposed NOx standard for any vapor control device receiving vapors related to requirements of this regulation
  - Proposed standard allows for the use of a microturbine or a low-NOx incinerator
- Proposal designed to control methane and lower overall NOx emissions while allowing facilities to operate normally.

Circulation Tanks for Well Stimulation Treatments

Basic Requirements:

- Applies to tanks used for well stimulation treatments only.
- Requires tanks to be controlled for vapors.

Major Revisions:

- New proposed LDAR requirements to demonstrate that tanks comply with leak standards.

Reciprocating Compressors

Basic Requirements:

- Production field units subject to LDAR testing and 1000 ppmv leak standard per US EPA Method 21 test method.
- All other units also subject to LDAR, but must also measure annual flow rate, and are subject to a 2 scfm replacement standard.

Reciprocating Compressors

Major Revisions:

- Replaced horsepower rating with type of facility where compressor is used:
  - Production facilities
  - Gathering and boosting stations, underground storage facilities, processing plants, transmission compressor stations
- Rod packing/seal testing requirements clarified.
- Clarified that all components are subject to LDAR testing requirements.

Centrifugal Compressors

Basic Requirements:

- Compressors with wet seals required to collect vent gas or install a dry seal system.

Major Revisions:

- New proposed wet seal emissions standard and testing requirements.
- New proposed deadline to replace wet seals with dry seals if emissions are not controlled.
- Clarified that components are subject to LDAR.

Pneumatic Devices & Pumps

Basic Requirements:

- No bleed or no vent devices required for continuous bleed devices, or required to use a vapor collection system.

Major Revisions:

- New proposal to allow for low-bleed devices installed before January 1, 2015.
  - Low-bleed devices must be tagged/identified
- All devices subject to testing requirements.

Liquids Unloading of Gas Wells

Basic Requirements:

- Applies to natural gas wells that are vented to remove accumulated liquids.
- Facilities must capture gas or report emissions.

Major Revisions:

- Added option to use ARB Mandatory Reporting calculation method to estimate emissions.
- New requirement to report equipment used to automatically perform liquids unloading.

Leak Detection and Repair

Basic Requirements:

- Designed to integrate methane components into existing local district LDAR programs.
- Applies to all oil and gas facilities regardless of size or annual throughput:
  - Quarterly testing required
  - US EPA Method 21 test method required
- 1000 ppmv minor leak threshold.

Leak Detection and Repair

Major Revisions:

- Modified testing frequency and test procedure requirements from:
  - Annual Method 21 testing; or,
  - Quarterly Optical Gas Imaging with Method 21 measurements.
- Clarified that requirements do not apply to components already subject to a local district LDAR program.
- Added new audio-visual inspection requirement.

Leak Detection and Repair

Major Revisions (continued):

- New proposal to allow facilities that comply with standards to go to annual testing.
- New proposed phase-in standard provides time for facilities to comply with minimum standard.
- Critical component definition and requirements modified.
- Clarified that casing leaks are subject to LDAR.

New Proposed Natural Gas Storage Facility Requirements

- DOGGR emergency regulations require a monitoring plan. Need for permanent requirement for early detection of leaks both at wellhead and surface.
- Coordinating with DOGGR
- Requesting stakeholder feedback

New Leak Emission Reduction Concept

- Require emission reductions if there is a large methane leak at any facility covered by this regulation.
- Options include:
  - Specific emission reduction projects
  - Development of an emission reduction plan
  - Other ideas?
- Requesting feedback

Implementation and Enforcement

Basic Requirements:

- All equipment subject to the proposed regulation must be registered or permitted to ensure compliance with the regulation.
- Only equipment types now under permit must amend their permits.
- All facilities must register with ARB, unless district permit or registration program collects and shares information with ARB.
- Each facility is subject to enforcement action.

Implementation and Enforcement

Major Revisions:

- Permit section modified to allow facilities and districts to update permits during next renewal cycle.
- Registration section modified to require registration by January 1, 2019.
- New proposed enforcement section that creates separate violation for each metric ton of methane emitted.

Emissions, Reductions, and Costs

Summary

Category	Methane Emission Reductions (MTCO2e, GWP=72)	Cost per Ton with Natural Gas Savings ($/MTCO2e)
Separator & Tank Systems	538,000	$7
Circulation Tanks	5,000	$34
Reciprocating Compressors	67,000	($0)
Centrifugal Compressors	3,000	($2)
Pneumatic Devices and Pumps	319,000	$0
LDAR	220,000	$37
Total	1,152,000	$11

General Approach

- Used best available data for the source category.
- Costs from ICF's report (Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries), EPA, and industry.
- Annual costs include one-time costs annualized over lifetime of equipment and annual recurring costs (O&M, labor, etc.).
- Still finalizing.

Separator and Tank Systems

- Used ARB survey data and ARB and industry flash emission results
- Costs from ICF, EPA Natural Gas Star, and equipment manufacturers
- Vapor recovery added to over 300 uncontrolled tanks over 10 MT CH4/yr at about 20 facilities
- About 10 flares removed and replaced by low-NOx incinerators at about 10 facilities

Separator and Tank Systems

Methane emissions (MTCO2e, GWP = 72)	566,000
Methane reductions (MTCO2e, GWP = 72)	538,000
Total annual costs	$4,674,000
Total annual savings	$653,000
Cost per Ton ($/MTCO2e reduced)	$9
Cost per Ton with natural gas savings ($/MTCO2e reduced)	$7

Circulation Tanks

- Used recent industry source testing data for emissions.
- Used DOGGR data for counts
- Used costs from ICF and equipment manufacturer
- Estimated would need eight control systems statewide

Circulation Tanks

Methane emissions (MTCO2e, GWP = 72)	5,200
Methane reductions (MTCO2e, GWP = 72)	4,900
Total annual costs	$186,000
Total annual savings	$17,000
Cost per Ton ($/MTCO2e reduced)	$38
Cost per Ton with natural gas savings ($/MTCO2e reduced)	$34

Reciprocating Compressors

- Used ARB survey data for counts, utility data reported to ARB for emissions, and ICF for costs
- Estimating replacement of about 90 rod packings per year for the over 1,000 cylinders on more than 300 non-production field compressors
- Production field compressors' component counts added to LDAR

Reciprocating Compressors

Methane emissions (MTCO2e, GWP = 72)	426,000
Methane reductions (MTCO2e, GWP = 72)	67,000
Total annual costs	$203,000
Total annual savings	$230,000
Cost per Ton ($/MTCO2e reduced)	$3
Cost per Ton with natural gas savings ($/MTCO2e reduced)	($0)

Centrifugal Compressors

- Follow up on ARB survey data showed only one remaining centrifugal compressor with wet seals
- Emissions estimated from operator data
- Costs come from ICF report, which matched operator estimates

Centrifugal Compressors

Methane emissions (MTCO2e, GWP = 72)	3,600
Methane reductions (MTCO2e, GWP = 72)	3,450
Total annual costs	$4,000
Total annual savings	$12,000
Cost per Ton ($/MTCO2e reduced)	$1
Cost per Ton with natural gas savings ($/MTCO2e reduced)	($2)

Pneumatic Devices and Pumps

- ARB surveys for counts and API and EPA for emission factors
- ICF and Natural Gas Star for costs
- Estimate replacing about 1,300 pneumatic devices and pumps with no bleed

Pneumatic Devices and Pumps

Methane emissions (MTCO2e, GWP = 72)	319,000
Methane reductions (MTCO2e, GWP = 72)	319,000
Total annual costs	$1,153,000
Total annual savings	$1,043,000
Cost per Ton ($/MTCO2e reduced)	$4
Cost per Ton with natural gas savings ($/MTCO2e reduced)	$0

Leak Detection and Repair

- Used ARB survey data for counts of components not already being inspected by districts
- Used API component emission factors and “high leaker” emission factors
- Used ICF report for costs and emission reductions, and LDAR contractors for labor hours

Leak Detection and Repair

Methane emissions (MTCO2e, GWP = 72)	366,000
Methane reductions (MTCO2e, GWP = 72)	220,000
Total annual costs	$8,902,000
Total annual savings	$756,000
Cost per Ton ($/MTCO2e reduced)	$40
Cost per Ton with natural gas savings ($/MTCO2e reduced)	$37

Next Steps

Next Steps

- Requesting feedback on this revised draft regulation by **February 18, 2016.**
- 45-day comment period with Staff Report and Environmental Analysis begins **April 1, 2016.**
- Board Meeting **May 19, 2016.**
- Second Board Meeting tentatively scheduled for **September 2016.**

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