Public Workshop

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

> California Air Resources Board Sacramento, California

February 4, 2016

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

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.

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.

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.

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.

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.

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.

- 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

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

- 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

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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