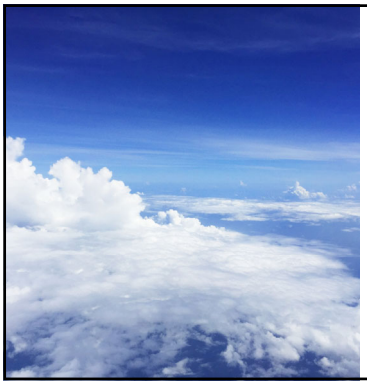

NSPS OOOO and OOOOa Regulation Workshop

September 15,2022

Presenter: Georgette Reeves
Principal Consultant
ERM

The business of sustainability

ERM

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Agenda

- Introductions and Opening Remarks
- Section 1: Overview of Air Quality Terminology and NSPS
  - Key concepts: construction, modification and re-construction
- Section 2: NSPS Subpart OOOO and OOOOa
  - Overview and comparison
  - Requirements by source
    - Proposed requirements (b, c) by source
- Section 3: Case Studies and Discussion
  - Prepared case studies
  - Think about specific cases to add…

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Introductions and Opening Remarks

Georgette Reeves – Principal Consultant

- Based in ERM's Austin office, supports O&G operators throughout Texas and beyond
- Worked with the regulated industry since 2007
- Focus on air quality rules for O&G operators including OOOO, OOOOa and GHG
- Participates with industry trade groups in commenting on proposed rules
- Work extensively with the regulated community

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Participant Introductions

- Name
- Current position / responsibility
- Environmental and air quality experience
- Other experience

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Housekeeping Items

- We will take at least one 15 minute break before lunch
- 1 hour for lunch
- At least one 15 minute break after lunch
- Goal is to wrap by 4
- Please ask any questions! There is a wide range of experience in the room, and it's OK!
- This is intended to spur dialogue – let's do the best we can in this virtual platform

5

Expectations for Today's Workshop

What to expect from today?

- Engaging discussion
- Lively debate
- Clarification of potentially vague items based on historical interpretations

What not to expect?

- Absolute answers to everything – particularly given that some things are in "flux"

6

Air Quality is a Dynamic, Changing Field

Always be certain to obtain the latest forms, policies, and regulations from the appropriate regulatory authority before determining permitting and compliance needs for your site. The information provided in this presentation, while up-to-date when presented, is subject to change as regulatory authorities update forms, policies and regulations. Please use this as reference material, but it is not a substitute for independent research and verification, and the application of sound professional judgment and analysis in real-time permitting and compliance situations.

UTILIZE THE EXPERTS AVAILABLE TO YOU!

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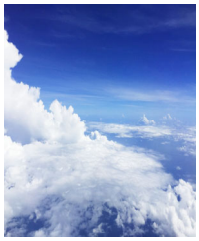
Living with the New OOOOa

Timeline of Events

- August 23, 2011 – September 17, 2015: NSPS OOOO
- September 18, 2015 – November 16, 2020: NSPS OOOOa
- September 14, 2020 (eff. November 16, 2020) – June 30 2021: New NSPS OOOOa
- June 30, 2021: Congressional Review Act, reverts (mostly) to September 18, 2015 version of NSPS OOOOa (rule text does not change)
- November 2, 2021: 577 pages
  - Proposed NSPS OOOOb and OOOOc
  - Still no new language on technical amendments



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OOOOa Whip-lash

- On June 30, the Biden Administration disapproved the 2020 version of OOOOa through the Congressional Review Act
- While the impression may be that the September 2020 revisions were significantly less stringent, not all changes were particularly favorable to industry
- As a result, now we are to operate as if those changes did not happen
  - CEDRI form did not account for changes, so reports were incomplete
  - Transmission compressor stations which did not conduct surveys between September 14, 2020 and June 30,2021 were technically out of compliance (but EPA will take the circumstances into consideration)
  - Compressor stations which reverted to semiannual surveys (instead of quarterly) were also out of compliance during that timeframe

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Air Quality is a Dynamic, Changing Field

AGENCY: EPA-OAR
RIN: 2060-AV15
Status: Pending Review
TITLE: Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review
STAGE: Proposed Rule
ECONOMICALLY SIGNIFICANT: Yes
RECEIVED DATE: 08/15/2022
LEGAL DEADLINE: None

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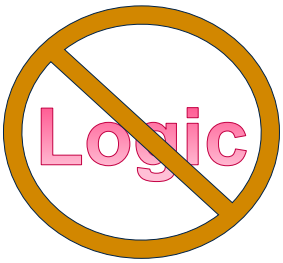
Something to keep in mind…



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Regarding Executive Orders

Executive Orders direct agencies to take action – they do not, in and of themselves, rescind, revise, replace, suspend or modify any existing regulations.

Any changes to existing regulations must undergo the full rulemaking process OR must already be stayed through judicial review.

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Regulatory Rulemaking

Regulatory rulemaking takes time.

- Boiler MACT took more than TEN years to finalize!
- NSPS OOOO took a full year from proposed to final, which is *quite fast*.
- OOOOa took 10 months to update an existing regulation.

Regulatory rulemaking requires stakeholder input.

The public seems more involved than ever in the rulemaking process.

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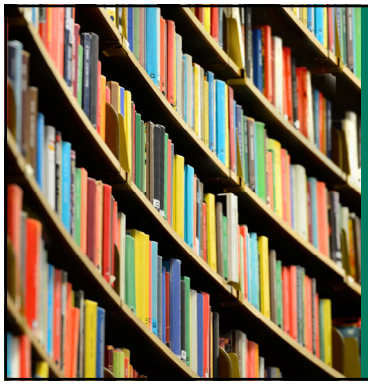

Overview of Air Quality Terminology and NSPS

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Air Quality Terminology

- Criteria Pollutants
  - NOx, CO – Combustion
  - VOC – tanks, loading
- Hazardous Air Pollutants (HAP)
  - 187 in all, BTEX most common in O&G
- Potential to Emit (PTE)
  - Maximum "worst case" operations
  - Only take credit for federally enforceable controls
- Commence Construction
- Construction/Modification and Reconstruction

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Air Quality Terminology

- New Source Performance Standards (NSPS)
  - Regulates criteria pollutant
  - Applies to new, modified or reconstructed sources
  - Applicability date is based on date of proposed standard
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
  - Regulates Hazardous Air Pollutants (HAPs)
  - Applies to new and existing sources
- Maximum Achievable Control Technology (MACT)
  - Applies to new and existing sources

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Definitions in Air Quality

- EPA provides definitions; they don't always make a lot of sense for real world operations.
  - What is "natural gas processing"? [critical for this topic!]
  - What is "natural gas"?
  - What is a "facility"? [critical for this topic!]
  - What is "new"? [critical for this topic!]
  - What is "modified" or "reconstructed"? [critical for this topic!]
  - What is "stationary" versus "mobile" versus "portable"

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General NSPS Requirements

Applies only to "new, modified or reconstructed sources". Not existing.

- We will focus on these terms throughout today!

Requirements typically consist of:

- Emission limitations
- Performance testing
- Parametric and/or emissions monitoring
- Recordkeeping
- Notifications
- Reporting

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Subpart A in NSPS

- Construction, modification and re-construction are defined within Subpart A
- These definitions remain in place throughout all subsequent subparts unless specifically defined in a specific subpart
- This concept is key when evaluating applicability under NSPS OOOO and OOOOa

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Subpart A Definitions - Construction

Construction - fabrication, erection, or installation of an affected "facility"

Affected facility - with reference to a stationary source, any apparatus to which a standard is applicable

- e.g., an engine vs. a compressor
- e.g., a storage tank vs. gas well completion

Relocating an affected facility is <u>not</u> construction, modification, or reconstruction under NSPS and does not trigger the rule

- Permitting may be required at the new site

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Subpart A Definitions - Modification

Modification

Any physical or operational change to an existing *facility* (e.g., the engine) which results in an increase in the emission rate of any pollutant to which a standard applies (40 CFR 60.14)

Definitions and concepts of "modification" in other subparts can be different if defined within another subpart

- And they are in OOOO and OOOOa for some affected facilities

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Subpart A Definitions - Modification

"increases the amount of any air pollutant"

HOURLY emissions rate change
(40 CFR §60.14(b))

Increasing hours of operation alone without an increase in hourly emissions rate does not constitute a modification
(40 CFR §60.14(e)(3))

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Subpart A Definitions - Modification

"to which a standard applies"

An increase in emissions of a pollutant ***not*** regulated by the NSPS Subpart is ***not*** a modification

Applicability is *pollutant-specific*: The only applicable sections of an NSPS Subpart are those which regulate the pollutant whose emissions increased due to the modification. (40 CFR 60.14(a))

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Subpart A Definitions – Exemptions to "Modification"

- Routine maintenance, repair and replacement (RMRR)
- An increase in production rate without a capital expenditure
  - Examples – tanks, engines, compressors
  - We will talk about this multiple times today
- An increase in hours of operation
- Use of an alternative fuel or raw material if source could accommodate it prior to the standard
- Addition of air pollution control device
- Change in ownership

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Capital Expenditure

Capital expenditure means an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable “annual asset guideline repair allowance percentage” specified in the latest edition of Internal Revenue Service (IRS) Publication 534 and the existing facility's basis, as defined by section 1012 of the Internal Revenue Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any “excluded additions” as defined in IRS Publication 534, as would be done for tax purposes.

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NSPS VVa Applicability through NSPS OOOO/a

NSPS Subpart OOOO gas processing plant fugitives are addressed through Subpart VVa

Addition or replacement of equipment for the purpose of *process improvement* which is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart

Process improvement means routine changes

- Safety and occupational health requirements,
- Energy savings,
- Ease of maintenance and operation,
- Correction of design deficiencies,
- Bottleneck removal,
- Changing product requirements, or
- Environmental control

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Reconstruction Definition

The replacement of components of an existing facility…

…to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility, and it is technologically and economically feasible to meet applicable standards

It’s about the spend $$, not about the emissions.

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Reconstruction and Timing Issues

- Do a series of projects at a given unit need to be aggregated together for reconstruction cost calculations?
  - Over what period?
- General guidance: under the current wording of Section 60.15, costs for non-routine renovations must be aggregated stemming from what may be viewed objectively as a single planning decision
- Some subparts (e.g., NSPS Subparts J and Ja) specify a specific period over which projects are to be aggregated
- Continue to review EPA guidance on this issue as specific projects arise
  - Some EPA guidance is contradictory on this issue

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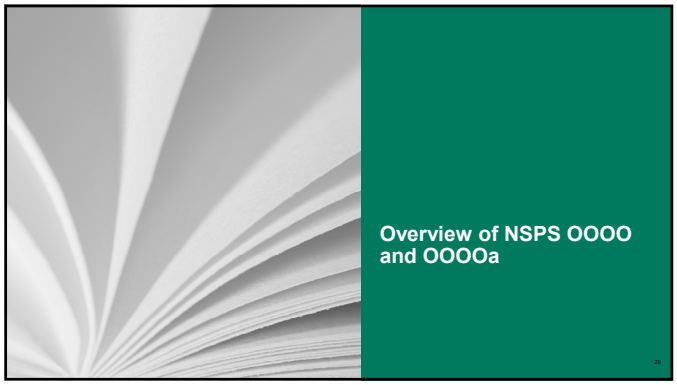

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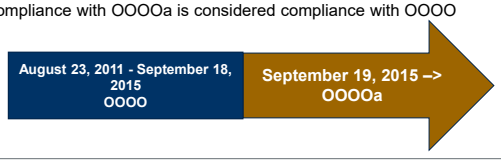
OOOO versus OOOOa

- NSPS OOOO covers new, modified and reconstructed sources between 8/23/2011 and on or before 9/18/2015
- NSPS OOOOa covers new, modified and reconstructed sources after 9/18/2015
- Compliance with OOOOa is considered compliance with OOOO



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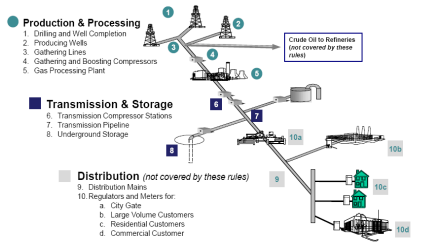
Oil and Natural Gas Operations

Oil and natural gas systems encompass wells, gas gathering and processing facilities, storage, as well as transmission and distribution pipelines. These components are all important aspects of the process of getting natural gas out of the ground and to the end user.



Source: Adapted from American Gas Association and EPA Natural Gas STAR Program

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OOOO Affected Facilities

- **NSPS OOOO covers new, modified and reconstructed sources between 8/23/2011 and on or before 9/18/2015**
  - Each natural gas well that is hydraulically fractured
  - Each centrifugal compressor using wet seals
  - Each reciprocating compressor
  - Each continuous bleed natural-gas driven pneumatic controller
  - Each storage vessel with a >6 tpy VOC PTE
  - Group of equipment (pump, pressure relief device, open-ended valve or line, valve, and flange or other connector in VOC or wet gas service), within a process unit located at onshore natural gas processing plants
  - Sweetening units located at onshore natural gas processing plants

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OOOO Affected Facilities - Exemptions

- Pneumatic controllers with a natural gas bleed rate ≤6 scfh not at gas processing plants are not affected
- Intermittent pneumatic controllers are not affected
- Centrifugal compressors using dry seals are not affected
- Centrifugal and reciprocating compressors located at a well site are not affected
  - *Well site means one or more areas that are directly disturbed during the drilling and subsequent operation of, or affected by, production facilities directly associated with any oil well, gas well, or injection well and its associated well pad.*

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NSPS OOOO Applicability

NSPS OOOO Affected Facility	Exploration & Production	Gathering	Gas Processing	Natural Gas Transmission
Gas Well	X			
Centrifugal Compressors		X	X	
Reciprocating Compressors		X	X	
Pneumatic Controller	X	X	X	
Storage Vessels	X	X	X	X
Equipment Leaks			X	
Sweetening Units			X	

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NSPS OOOO Affected Facility	Standard	Compliance Date
Hydraulically fractured wildcat and delineation wells	Completion combustion	October 15, 2012
Hydraulically fractured low pressure non-wildcat and non-delineation wells	Completion combustion	October 15, 2012
Other hydraulically fractured wells	Completion combustion	Before 1/1/2015
Other hydraulically fractured wells	REC and completion combustion	After 1/1/2015
Centrifugal compressors with wet seals	95% reduction	October 15, 2012
Reciprocating compressors	Change rod packing	October 15, 2012
Pneumatic controllers at NG processing plants	Zero bleed rate	October 15, 2012
Pneumatic controllers between wellhead and NG processing plants	6 scfh bleed rate	October 15, 2013
Group 2 and 1 Storage Vessels	95% reduction	April 15, 2014/2015
Equipment Leaks	LDAR program	October 15, 2012
Sweetening Units	Reduce SO_2 as calculated	October 15, 2012

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NSPS OOOOa – Definition of the Source Category

This subpart establishes emission standards and compliance schedules for the control of ~~[GHG]~~, volatile organic compounds (VOC) and sulfur dioxide (SO2) emissions from affected facilities in the crude oil and natural gas source category that commence construction, modification or reconstruction after September 18, 2015.

Crude oil and natural gas source category means:

1. Crude oil production, which includes the well and extends to the point of custody transfer to the crude oil transmission pipeline or any other forms of transportation; and
2. Natural gas production, processing, transmission, and storage, which include the well **and extend to, but do not include, the local distribution company custody station.**

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NSPS OOOOa – Definition of the Source Category from Technical Amendments 11/2020

- **Transmission and Storage**
  - Removed from the Crude Oil and Natural Gas Source Category definition in 60.5430a from September 14, 2020, but will be pulled back in (and more)

Crude Oil and Natural Gas Production source category means:

(1) Crude oil production, which includes the well and extends to the point of custody transfer to the crude oil transmission pipeline or any other forms of transportation; and

(2) Natural gas production and processing, which includes the well and extends to, but does not include, the point of custody transfer to the natural gas transmission and storage segment.

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Definition of Custody Transfer from 60.5430a

Custody transfer means the transfer of crude oil or natural gas after processing and/or treatment in the producing operations, or from storage vessels or automatic transfer facilities or other such equipment, including product loading racks, to pipelines or any other forms of transportation.

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NSPS OOOOa Affected Facility	Production (Well Site)	Gathering	Gas Processing	Transmission & Storage
Hydraulically Fractured Wells	X			
Centrifugal Compressors		X	X	X
Reciprocating Compressors		X	X	X
Pneumatic Controller	X	X	X	X
Pneumatic Pumps	X		X	
Storage Vessels	X	X	X	X
Equipment Leaks	X	X	X	X
Sweetening Units	X	X	X	?

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NSPS OOOOa Affected Facility	Standard	Compliance Date
Hydraulically fractured wildcat wells, delineation wells, or low pressure wells	Completion combustion	August 2, 2016
Other hydraulically fractured wells	REC, completion combustion unless GOR < 300 scf/bbl	August 2, 2016 November 30, 2016 for REC standard for non-gas wells
Centrifugal compressors with wet seals (not on well sites, up to the LDC)	95% reduction (P.E. Certification if equipped with CVS)	August 2, 2016
Reciprocating compressors (not on well sites, up to the LDC)	Change rod packing or route emissions to process (P.E. Certification if equipped with CVS)	August 2, 2016
Pneumatic controllers at NG processing plants	Zero bleed rate	August 2, 2016
Continuous bleed pneumatic controllers between wellhead and the LDC (not at gas processing plants)	≤6 scfh bleed rate	August 2, 2016

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NSPS OOOOa Affected Facility	Standard	Compliance Date
Pneumatic pumps at gas processing plants	Zero bleed rate	November 30, 2016
Pneumatic pumps at well sites	95% reduction if control or process available onsite (P.E. Certification if equipped with CVS)	November 30, 2016
Storage vessels	95% reduction (P.E. Certification if equipped with CVS)	August 2, 2016
Equipment leaks at gas processing plants	Leak Detection and Repair (LDAR) program	August 2, 2016
Equipment leaks at well sites and compressor stations	LDAR program	June 3, 2017
Sweetening units at gas processing plants	Reduce SO_2 as calculated	August 2, 2016

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NSPS OOOO and OOOOa by Equipment and Activity Type

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Hydraulically Fractured Wellheads

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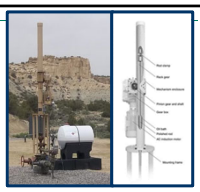
About Wellheads

1. Plunger unit wellheads
   - Can have mounted linear rod pump
2. Pumping unit wellheads
   - Electric engine
   - Gas engine
3. Free-flowing wellhead

Plunger unit wellhead with linear rod pump



Exhaust stack for engine

Plunger unit wellhead

Pumping unit wellhead with gas engine

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Standards for Hydraulically Fractured Wellheads [60.5375a]

Hydraulically Fractured Well Operation	Control Option 1 REC	Control Option 2 Combust	Control Option 3 General Duty
Wildcat and delineation wells		X	X
Low pressure non-wildcat and non-delineation		X	X
All other wells with a GOR ≥300 scf/bbl	X	X (if REC is infeasible)	X
Wells with a GOR < 300 scf/bbl	Recordkeeping and Reporting Requirements Only		

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Low Pressure Wells

- Calculation methods to determine if well is "low pressure" are in 60.5432a
- *Low pressure well* means a well that satisfies at least one of the following conditions:
  - (1) The static pressure at the wellhead following fracturing but prior to the onset of flowback is less than the flow line pressure at the sales meter;
  - (2) The pressure of flowback fluid immediately before it enters the flow line, as determined under § 60.5432a, is less than the flow line pressure at the sales meter; or
  - (3) Flowback of the fracture fluids will not occur without the use of artificial lift equipment.

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Wellhead Requirements – 3 in all

1. **REC** - Perform reduced emissions completions/green completions:
   - During the initial flowback stage, route the flowback into one or more well completion vessels or storage vessels and commence operation of a separator unless it is technically infeasible for a separator to function. Any gas present in the initial flowback stage is not subject to control under this section.
   - During the separation flowback stage, route all recovered liquids from the separator to one or more well completion vessels or storage vessels, re-inject the liquids into the well or another well or route the recovered liquids to a collection system. Route the recovered gas from the separator into a gas flow line or collection system, re-inject the recovered gas into the well or another well, use the recovered gas as an on-site fuel source, or use the recovered gas for another useful purpose that a purchased fuel or raw material would serve. If it is infeasible to route the recovered gas as required above, route gas to combustion device. If, at any time during the separation flowback stage, it is not technically feasible for a separator to function, you must comply with requirements for initial flowback.
   - A separator must be on-site for entirety of flowback period [**NSPS OOOOa only**]

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Separator Exceptions

- Separator exceptions not required to be on-site if:
  - Well is not hydraulically fractured or refractured with liquids; or
  - Well does not generate condensate, intermediate hydrocarbon liquids, or produced water.
- If liquid collection starts, operator must stop the well completion operation and install a separator.

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Wellhead Requirements – 3 in all

2. Completions Combustion - Capture and direct recovered gas that cannot be directed to the flow line to a completion combustion device (unless risk of fire or explosion). It must be equipped with a reliable continuous ignition source.

3. General Duty - Maximize resource recovery and minimize releases to the atmosphere during flowback and subsequent recovery.

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Completion Combustion Device

Completion combustion device means any ignition device, installed horizontally or vertically, used in exploration and production operations to combust otherwise vented emissions from completions. Completion combustion devices include pit flares.

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Wellhead Requirements- Controlling Flowback

- Once enough gas is present to operate a separator, route the recovered gas to:
  - A gas flow line or collection system;
  - Re-inject the gas into the well or another well; or
  - Use as on-site fuel source or other useful purpose that you would purchase fuel for.
- If these options are technically infeasible, then you may combust

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Technically Infeasible

If the operator assesses all four options for use of recovered gas, and still finds it technically infeasible to route the gas as described, the operator must route the gas to a completion combustion device with a continuous pilot flame and document the technical infeasibility assessment according to § 60.5420a(c) of this final rule, which describes the specific types of information required to document that the operator has exercised due diligence in making the assessment. [p. 35845]

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Technically Infeasible

(1) Detailed documentation of the reasons for the claim of technical infeasibility with respect to all four options provided in section 60.5375a(a)(1)(ii), including but not limited to, names and locations of the nearest gathering line; capture, reinjection, and reuse technologies considered; aspects of gas or equipment prohibiting use of recovered gas as a fuel onsite; and

(2) technical considerations prohibiting any other beneficial use of recovered gas onsite. We emphasize that the exemption is limited to "technical" infeasibility (*e.g.*, lack of infrastructure, engineering issues, safety concerns). [p. 35853]

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Flowback - Definitions

Flowback means the process of allowing fluids and entrained solids to flow from a natural gas well following a treatment, either in preparation for a subsequent phase of treatment or in preparation for cleanup and returning the well to production.

The term flowback also means the fluids and entrained solids that emerge from a natural gas well during the flowback process.

The flowback period begins when material introduced into the well during the treatment returns to the surface following hydraulic fracturing or refracturing. The flowback period ends when either the well is shut in and permanently disconnected from the flowback equipment or at the startup of production. The flowback period includes the initial flowback stage and the separation flowback stage.

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Flowback Stages - Definitions

EPA Definitions:

Initial flowback stage means the period during a well completion operation which begins at the onset of flowback and ends at the separation flowback stage.

Separation flowback stage means the period during a well completion operation when it is technically feasible for a separator to function. The separation flowback stage ends either at the startup of production, or when the well is shut in and permanently disconnected from the flowback equipment.

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Reduced Emission Completions (REC) - Definitions

Reduced emissions completion means a well completion following fracturing or refracturing where gas flowback that is otherwise vented is captured, cleaned, and routed to the gas flow line or collection system, re-injected into the well or another well, used as an onsite fuel source, or used for other useful purpose that a purchased fuel or raw material would serve, with no direct release to the atmosphere.

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Recovered Gas/Liquids - Definitions

Recovered gas means gas recovered through the separation process during flowback.

Recovered liquids means any crude oil, condensate or produced water recovered through the separation process during flowback.

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Well Completion "To-Do"

- Submit advance notification to the Administrator at least 2 days prior to the commencement of completion of an affected well.
  - Anticipated date of well completion
  - Contact information for owner/operator
  - U.S. well number
  - Latitude and longitude
  - Planned date of the beginning of flowback
- States that already require advance notifications satisfy this requirement

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Well Completion "To-Do"

During completion, keep a daily log book with:

- Location
- API Well Number
- Date and Time of Flowback
- Date(s) and Time(s) to Attempt Separation
- Date and Time of Startup of Production
- Duration of Venting and Justification (or Deviation)
- Duration and Method of Recovery
- Duration of Combustion
- Deviations and Justification

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Well Completion "To-Do"

- For wellheads subject to both REC and completion combustion equipment, a digital photograph must be taken that contains:
  - Date of photograph
  - Longitude and latitude of the well site embedded within or stored with the photograph (or separate GIS device visible in frame)
  - Picture of equipment for storing or re-injecting recovered liquid, equipment for routing recovered gas to gas flow line, and the completion combustion device connected to and operating at each completion operation

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Wellhead Construction, Modification or Reconstruction

- Construction triggered by hydraulically fracturing a wellhead;
- Modification and reconstruction do not really apply since this is more of an activity-based trigger

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Notification and Reporting Requirements - Wellheads

- Well ID for each hydraulically fractured during the reporting period;
- Location;
- GOR less than or more than 300 scf/bbl;
- Flowback duration (date/time);
- How recovered gas was used;
- Duration of combustion;
- Duration of venting;
- Justification for venting;
- Wildcat or delineation well status;
- Exceptions
- Notification Requirements: (at least) 2 day notification to Agency

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Compressors

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Standards for Centrifugal Compressors

- Centrifugal compressors equipped with wet seals (not at a well site facility) constructed, modified or reconstructed >8/23/2011 but before 9/18/2015:
  - Reduce VOC emissions from each wet seal fluid degassing system by ≥95.0 percent
  - If using a control device, equip with specified cover and connect through a closed vent system to a control device
  - Conduct initial inspection
  - Install and operate continuous parameter monitoring system (CPMS)
  - Initial performance test required

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Standards for Centrifugal Compressors

- Centrifugal compressors equipped with wet seals (not at a well site facility) constructed, modified or reconstructed >9/18/2015:
  - Reduce VOC emissions from each wet seal fluid degassing system by ≥95.0 percent
  - Equipment with P.E. certified closed vent system to a control device
  - Conduct initial inspection
  - Install and operate continuous parameter monitoring system (CPMS)
  - Initial performance test required

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Standards for Reciprocating Compressors

- Applies to reciprocating compressors not located at a well site constructed, modified, reconstructed >8/23/2011
- Primary requirement is to replace the rod packing or otherwise collect vapors
- You can choose to replace rod packing before either of the following occur:
  - The compressor has operated for 26,000 hours; **or**
  - 36 months from the last replacement.

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Reciprocating and Centrifugal Compressors – Potential Future

- Reciprocating and Centrifugal Wet Seal Compressors (new and existing)
  - Reciprocating: Monitor rod packing emissions annually using flow measurement
    - >2 standard cubic feet per minute (scfm) flow will require replacement
  - Centrifugal: Unchanged, but EPA seeks comments on whether to also apply to dry seal compressors
  - Compressors at wellsites continue to be exempt, BUT compressors at "centralized facilities" would NOT be exempt
    - EPA is proposing a clarification that centralized sites, even those with compressors, are not "Compressor Stations" for leaks; but are not "Wellsites" for purposes of compressor exemption

67

Centrifugal and Reciprocating Compressor Construction, Modification or Reconstruction

- Construction triggered by date of manufacture on the compressor nameplate
- Modification: default to Subpart A definition

  Any physical or operational change to an existing facility (e.g., the engine) which results in an increase in the emission rate of any pollutant to which a standard applies (40 CFR 60.14)
- Reconstruction: default to Subpart A definition

The replacement of components of an existing facility…

…to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility, and it is technologically and economically feasible to meet applicable standards

68

Reporting Requirements – Wet Seal Centrifugal Compressors

- Compressor ID;
- Constructed, Modified or Reconstructed status;
- Control device;
- Performance test data; and
- Data if control device is returned to service following maintenance.

69

Notification and Reporting Requirements – Reciprocating Compressors

Because there is an hour of operation component, the reported list of compressors will continue to grow over the years, and some compressors may "fall out" because they are removed.

- Site record number;
- Compressor ID;
- Whether emissions are sent to a closed vent system; and
- The number of hours or months since last rod packing replacement.
- Notification requirements: None.

70

Storage Tanks

71

About Tanks: Types of Tanks

- Fixed Roof Tanks
  - Vertical
  - Horizontal
- Floating Roof Tanks
  - External
  - Domed (or covered) external
  - Internal
- Variable Vapor Space Tanks
- Pressure Tanks

Typical Vertical Fixed Roof Tanks

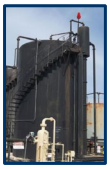
Floating Roof Tanks

72

About Tanks: Common Terminology

- Crude oil/condensate tank
- Produced water tank
- Gunbarrel
  - Separate crude oil/condensate and produced water
- Overflow tanks
- Water injection facility tanks
  - Skim tanks
  - Settling tanks
  - Suction tanks
- Combination or slop tanks
- PSV (pressure safety valve) tanks
  - Accept fluids if safety valve pops to avoid fluids spraying across site

Vertical fixed roof tanks are the most common tanks @ upstream facilities



Gunbarrel Tank

Crude Oil Storage Tanks

73

Storage Tanks

- Tanks are typically the largest source of VOC emissions @ an upstream facility

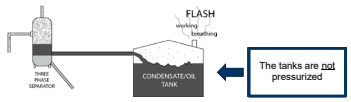
Flash + Working + Breathing = Total Uncontrolled Tank Emissions

Roof vents on a fixed roof vertical storage tank

74

Storage Tanks - Flash Losses

Remember that the separators are pressurized



The tanks are not pressurized

- Flash losses occur when the pressure of a liquid is decreased or the temperature is increased so volume expands

PV = nRT

- Process simulation software – ProMax, HYSIS or Similar
- API & GRI E&P Tank software
- Gas-to-Oil Ratio (GOR) and/or Gas-to-Water Ratio (GWR)
- Vasquez-Beggs Equation (very limited, often disallowed by agencies)
- Griswold and Ambler GOR Chart

75

Storage Tanks - Standing Losses

- Standing (or breathing) losses results from evaporation when the liquid is storing liquid.
- Fixed-Roof Tanks
  - Standing losses occur through tank vapor expansion and contraction.
  - Proportional to vapor space volume and vapor density.
- Floating-Roof Tanks
  - Rim seal losses occur primarily from wind induced evaporation.
  - Fitting losses occur from various fittings passing through or attached to the floating roof deck.
  - Deck seam losses occur only for non-welded decks for internal floating roof tanks
  - Proportional to vapor pressure and type of rim seal/fittings/deck seam.

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Storage Tanks - Working Losses

- Working losses occur when the liquid level changes.
- Fixed-Roof Tanks
  - Working losses occur when filling the tank displaces tank vapors.
  - Proportional to throughput (turnovers) and vapor pressure.
- Floating-Roof Tanks
  - Withdrawal losses occur when emptying liquid from the tank exposes liquid clinging to the side of the tank.
  - Proportional to throughput (turnovers) and liquid density.
- Estimation Methods
  - AP-42, Chapter 7
  - TANKS 4.09d

77

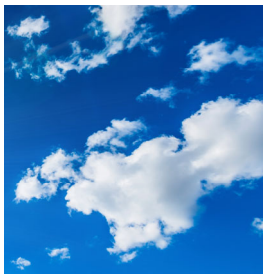
Storage Tanks Subject to OOOO and OOOOa

- NSPS OOOO/a applies to individual tanks that emit >6 tpy VOC PTE that:
  - Were constructed, modified, or reconstructed after August 23, 2011;
  - Are located in the:
    - oil and natural gas production segment;
    - natural gas processing segment; and
    - natural gas transmission and storage segment.
  - Contain crude oil, condensate, produced water or intermediate hydrocarbon liquids.
- (Generally) install controls within 60 days of commencing operation.

78

Storage Vessels from the Technical Amendments 11/2020

- Addition of calculation methodology for "batteries" constructed, modified or reconstructed after November 16, 2020 [60.56365a(e)(3)]
  - Allows operators to **divide** emissions across the entire tank battery under specific circumstances
- *Clarification* that tanks constructed, modified or reconstructed after September 18, 2015 and before November 16, 2020 VOC emissions must be calculated on a **per-tank basis** [60.5365a(e)(2)]



79

Storage Vessels

- A storage vessel with the potential to emit 6 tpy VOC or more based on the maximum average daily throughput determined for a 30-day period of production prior to the applicable emission determination deadline specified in this section.
  - Take into account legally and practicably enforceable limits in a permit or other requirement.
  - Take credit for vapor recovery as long as the cover and closed vent system requirements are followed.
- A storage vessel >100,000 gallons (2,380 bbl) used to recycle water that has been passed through two stage separation is not a storage vessel affected facility.

80

Storage Vessels

Legally and practicably enforceable limits include:

- Enforceable limit in an operating permit or other requirement established under Federal, state, local, or tribal authority;
- Enforceable standards in a permit or established under Federal, state, local, or tribal authority.

What does that mean in Texas?

- Texas offers many ways to obtain federally enforceable conditions through registered PBRs, NRSP, Standard Permit and case-by-case NSRs

81

Storage Vessel Definition – NSPS OOOO and OOOOa

Storage vessel means a tank or other vessel that contains an accumulation of crude oil, condensate, intermediate hydrocarbon liquids, or produced water, and that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provide structural support. A well completion vessel that receives recovered liquids from a well after startup of production following flowback for a period which exceeds 60 days is considered a storage vessel under this subpart. A tank or other vessel shall not be considered a storage vessel if it has been removed from service in accordance with the requirements of § 60.5395(f) [60.5395a(c)(1)] until such time as such tank or other vessel has been returned to service.

82

Storage Vessel Definition

- Storage vessels that contain oil, condensate or "intermediate hydrocarbon liquid"
- For the purposes of this subpart, the following are NOT considered storage vessels:
  - Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If you do not keep or are not able to produce records, as required by § 60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.
  - Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
  - Pressure vessels designed to operate in excess of 204.9 kilopascals (29.7 psi) and without emissions to the atmosphere.

83

Standards for Storage Vessels

- Tanks with emissions >6 tpy per tank:
  - Reduce VOC emissions by ≥ 95.0 percent through use of a control device or floating roof
  - If using a control device, equip with specified cover and connect through a closed vent system to a control device
  - If constructed, modified or reconstructed after 9/18/2015, P.E. certification on CVS
- Tanks have 30 days from startup to calculate emissions and 60 days from startup to meet control requirements

84

NSPS Subpart OOOO and OOOOa Storage Vessel Exit Ramp

- Once uncontrolled emissions drop <4 tpy, the control device can be removed from the storage vessel;
  - Must be demonstrated through 12 consecutive month demonstration of emissions less than 4 tpy
- Must re-calculate emissions monthly to ensure not >4 tpy
- Must take into account anything that could increase emissions (e.g., fracking of a nearby well)

85

P.E. Certification and CVS

- Ensure CVS is appropriately designed by approval from a qualified P.E. certification
  - Keep on file, submit with annual report
- ***EPA Definition from rule:*** *Qualified Professional Engineer* means an individual who is licensed by a state as a Professional Engineer to practice one or more disciplines of engineering and who is qualified by education, technical knowledge and experience to make the specific technical certifications required under this subpart. Professional engineers making these certifications must be currently licensed in at least one state in which the certifying official is located

86

Storage Vessel Cover Requirements

- The tank must be equipped with a cover.
- Each cover opening must be secured in a closed, sealed position.
- Each thief hatch must be weighted and properly seated.
- Conduct monthly olfactory, visual and auditory (OVA) inspections. Repair leaks and defects. Keep records.

87

Storage Vessel Closed Vent Systems

- Route emissions from the tank to a control device via a CVS.
- Design and operate the CVS with no detectable emissions.
- Conduct monthly OVA inspections of the CVS. Keep records.
- If the CVS contains any bypass devices, you must:
- Install a flow indicator with an alarm at inlet to the bypass.
  - Secure the bypass device valve using a car-seal or a lock-and-key.
  - ≤9/18/2015: Monthly visual inspection of the bypass car seal or lock. Keep records.
  - >9/18/2015: All above plus keep records of all instances of alarm.
- 9/18/2015: P.E. Certification of CVS.

88

Storage Vessel Control Devices

- For each enclosed combustion device (except for manufacturer-tested units), the owner/operator must:
  - Install and operate a continuous burning pilot;
  - Conduct the following monthly inspections and keep records:
    - OVA inspection of the control device to ensure integrity;
    - Visual inspection to confirm the pilot is lit; and
    - Method 22 (observe for 15 min., smoke not to exceed 1 minute).

89

Storage Vessel Control Devices

- For each manufacturer-tested combustion control device, the manufacturer must conduct certification tests and be approved by EPA.
- For manufacturer certified control devices, the owner/operator must:
  - Measure inlet gas flow rate and ensure it is within the maximum limit established during manufacturer's test;
  - Ensure a pilot flame is present at all times of operation;
  - ≤9/18/2015: Perform quarterly Method 22 observations (observe for 1 hour, smoke not to exceed 2 minutes); and
  - >9/18/2015: Monthly Method 22 (observe for 15 min., smoke not to exceed 1 minute).

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Storage Vessels – *Proposed* New and Existing

- **Storage Vessels**
  - New tank batteries subject if battery-wide VOC emissions ≥ 6 tpy VOC (NSPS OOOOb)
  - Existing sources: battery-wide PTE ≥ 20 tpy METHANE, control by 95% (NSPS OOOOc)

91

Storage Tank Construction, Modification and Reconstruction

- Construction: nameplate on the storage tank or construction date at the site if nameplate is not available

  Discussion

- Modification: default to Subpart A definition

  Any physical or operational change to an existing facility (e.g., the engine) which results in an increase in the emission rate of any pollutant to which a standard applies (40 CFR 60.14)

- Reconstruction: default to Subpart A definition

The replacement of components of an existing facility…

…to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility, and it is technologically and economically feasible to meet applicable standards

92

Storage Tank Construction, Modification and Reconstruction

Additional exemptions under "Modification" from Subpart A:

- Addition or replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure is not a modification (§60.5365(f)(1))
- Increase in production rate accomplished without a capital expenditure is not a modification (§60.14(e))

93

Notification and Reporting Requirements – Storage Tanks

Each subject tank is reported each year; much like with reciprocating compressors, this portion of the report will get longer each year. Unlike reciprocating compressors, there is a way to specifically identify tanks that are no longer going to be reported.

- Tank ID
- Whether it was constructed, reconstructed or modified during the period;
- Location;
- If requirements were met during the period;
- If the storage vessel was removed from service;
- Documentation of VOC emission rate;
- Control device testing results.
- Notification Requirements – None.

94

Pneumatic Controllers and Pumps

95

Definitions

- Natural Gas-Driven Pneumatic Controller
  - OOOO: An automated instrument powered by pressurized natural gas and used for maintaining a process condition such as liquid level, pressure, delta-pressure and temperature.
  - OOOOa (added): A pneumatic controller powered by pressurized natural gas

96

Definitions

- Continuous Bleed
  - OOOO: A continuous flow of pneumatic supply natural gas to the process control device (e.g., level control, temperature control, pressure control) where the supply gas pressure is modulated by the process condition, and then flows to the valve controller where the signal is compared with the process set-point to adjust gas pressure in the valve actuator.
  - OOOOa: A continuous flow of pneumatic supply natural gas to a pneumatic controller.
- Intermittent / Snap-action Pneumatic Controller
  - OOOO: Means a pneumatic controller that vents non-continuously.
  - OOOOa: Means a pneumatic controller that is designed to vent non-continuously.

97

Continuous Bleed Pneumatic Controllers

- Each continuous bleed pneumatic controller at natural gas processing plants must have a bleed rate of zero
  - Applies to those pneumatic controllers that are new, modified, or reconstructed after August 23, 2011
  - Effective October 15, 2012
- Each new continuous bleed pneumatic controller must be tagged with month/year of installation.

98

Continuous Bleed Pneumatic Controllers

- Each continuous bleed pneumatic controller between the wellhead and the natural gas transmission segment ***(excluding natural gas processing plants)*** must have a bleed rate of ≤6 scfh.
  - Anything modified, constructed or reconstructed on or after October 15, 2013 *between the wellhead and a natural gas processing plant.*
- Each new continuous bleed pneumatic controller must be tagged with month/year of installation.
- Must have records of bleed rate of each tagged device.
- Higher bleed rate devices can be used if determined “functionally necessary.”

99

Definition: Natural Gas Driven Diaphragm Pump [60.5430a]

- Natural gas-driven diaphragm pump means a positive displacement pump powered by pressurized natural gas that uses the reciprocating action of flexible diaphragms in conjunction with check valves to pump a fluid. A pump in which a fluid is displaced by a piston driven by a diaphragm is not considered a diaphragm pump for purposes of this subpart. A lean glycol circulation pump that relies on energy exchange with the rich glycol from the contactor is not considered a diaphragm pump.

100

Pneumatic Pumps [60.5430a]

- Pneumatic pumps constructed, modified or reconstructed at an existing site after September 18, 2015 must control emissions or determine (via PE certification) that control is not feasible; or
- New sites constructed after September 18, 2015 with pneumatic pumps must be controlled, or submit reports of deviations BUT the November 2020 amendments allow these to be on site without a deviation.

101

Pneumatic Pumps [60.5365a(h), 60.5393a]

- Natural gas pneumatic diaphragm pumps located at a gas processing facility must have a bleed rate of 0 scf/h.
- Natural gas pneumatic pumps at greenfield well sites must reduce emissions by 95%.
  - If control device cannot meet 95% reduction, must still connect to the control device & report reduction efficiency; or
  - If no control device is on-site and unable to route to a process, maintain records and "report." **BUT**
  - November 2020 amendments allows for these pumps to be onsite without being a deviation.
- **Well site exemption for limited-use pumps** (operation < 90 days per year).

102

Pneumatic Pumps [60.5365a(h), 60.5393a]

- Natural gas pneumatic diaphragm pumps at non-greenfield well sites must reduce emissions by 95%
  - If control device cannot meet 95% reduction, must still connect to the control device & report reduction efficiency; or
  - If no control device is on-site and unable to route to a process, maintain records and report; or
  - If infeasible to route to control or process, submit P.E. certification to support claim of infeasibility; or
  - Infeasibility could be based on safety, distance, pressure losses/differentials, or the ability of the control to handle pump emissions.

103

Pneumatic Controllers – Potential Future

- **Continuous Bleed Pneumatic Controllers – November 2020**
  - Allows use of OGI instead of M21
  - Allows for technical infeasibility claim even if a control device is on-site
- **Pneumatic Controllers (Regardless of Bleed Rate) – NSPS OOOOb and OOOOc**
  - Must have methane and VOC bleed rate of zero
  - No longer allows use of high bleed devices if functionally necessary
  - Exceptions for Alaska sites

104

Pneumatic Pumps – Potential Future

- **Pneumatic Pumps**
  - Extend to pumps in transmission and storage segment
  - Expands to new (not existing) NG driven piston pumps (currently only regulates natural gas driven diaphragm pumps)
  - Must control emissions by at least 95% if existing device on-site
    - Technical infeasibility is an option
  - No mention on the whether the current <90 day use exemption will remain in place

105

Construction, Modification or Reconstruction - Pneumatic Pumps and Controllers

- Construction: date of manufacture on nameplate or date of installation.
- Modification: Defer to Subpart A
- Reconstruction: Defer to Subpart A

106

Reporting and Notification Requirements – Continuous Bleed Pneumatic Controllers

Only report continuous bleed pneumatic controllers constructed, modified or reconstructed during the reporting period.

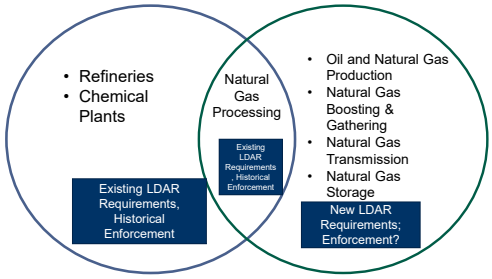
- Site name;
- Traceable pneumatic controller identification;
- Month of installation, reconstruction or modification
- Bleed rate either above or less than 6 sch/hr; and
- Justification
- Notification requirements: none

107

Fugitives at Wellsites, Compressor Stations and Gas Plants

108

Leak Detection and Repair – Then and Now



109

Natural Gas Processing Plant

- What is a "Natural Gas Processing Plant?"
  - "any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas to NGL products, or both. A JT valve, a dew point depression valve, or an isolated or standalone JT skid is not a natural gas processing plant."

110

Standards for VOC Leaks at Gas Processing Plants

- Applies to equipment, except compressors, in VOC or wet gas service within a process unit at a natural gas processing plant
- Process Unit - Components assembled for the extraction of natural gas liquids from field gas, the fractionation of the liquids into natural gas products, or other operations associated with the processing of natural gas products. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the products.
- Comply with NSPS Subpart VVa
- **Requires both detection AND quantification**

111

Equipment Leaks at Gas Plants

Component	Leak Definition (ppm)	
	KKK	OOOO
Pumps in light liquid service	10,000	2,000
Valves in gas/vapor service	10,000	500
Valves in light liquid service	10,000	500
Connectors	Not subject	500
Pumps, valves and connectors in heavy liquid service; pressure relief devices in light liquid or heavy liquid service	AVO/ 10,000	AVO/ 10,000

112

NSPS KKK - Applicability

- Equipment at onshore natural gas processing plants…
  - …constructed, reconstructed or modified after January 20, 1984 and before August 23, 2011
  - After August 23, 2011, NSPS Subpart OOOO/a is potentially applicable
- Covered equipment:
  - Compressors
  - Groups of pumps, pressure relief devices, open-ended valves and lines, valves, flanges and other connectors within a process unit

113

NSPS LLL - Applicability

- Each sweetening unit at onshore natural gas processing plants…
  - …constructed, reconstructed or modified after January 20, 1984 and before August 23, 2011
  - After August 23, 2011, NSPS Subpart OOOO is applicable
- Sweetening unit: Process device that removes H_2S and CO_2 from sour natural gas
- Sour natural gas: $H_2S > 0.25$ gr/100 scf

114

Fugitives at Well Sites and Compressor Stations

- Monitor fugitive emission components with an optical gas imaging (OGI) device or using Method 21 at all new, modified or reconstructed well sites and compressor stations after 9/18/2015.
- Conduct surveys semi-annually at new or modified well sites.
- Conduct surveys quarterly at new or modified compressor stations.
  - Stations located in an area where average monthly temperature is <0 degrees for two consecutive months of a quarterly period can be waived – but not for two consecutive quarterly periods.

115

Fugitives at Well Sites and Compressor Stations – Technical Amendments November 2020

- One area of the November 2020 amendments that was unilaterally "relaxed"
- Clarified the definition of "wellhead only" site in November 2020 amendments by providing list of "major equipment"
- Removed all OGI requirements (all OOOOa requirements) from natural gas transmission compressor stations
- Clarified that repair is first attempt in 30 days, final repair no later than 30 days after first attempt
- Reduced compressor station monitoring requirements to semi-annual (rather than quarterly)
- Exemption for well sites <15 BOE per day for first 30 days
- Provision for well site production decline below 15 BOE per day

116

Fugitives – Technical Amendments from 11/2020 and Potential Future

- **Leaks at Gas Processing Plants**
  - Require bi-monthly OGI or M21
- **Leaks at Wellsites (and "Centralized Production Facilities") – New and Existing**
  - <3 tpy METHANE or wellhead only sites: exempt
  - ≥3 tpy: Quarterly OGI/M21, or
    - ≥3 tpy and < 8 tpy: Semiannual OGI/M21
    - ≥8 tpy: Quarterly
  - Exemption for low production sites (<15 boe/day) proposed to be removed
  - First attempt at repair within 30 days, completed within 30 days after 1st attempt
  - Optional alternative bimonthly screening with advanced measurement technology with a methane detection of 10 kg/hr

117

Fugitives – Technical Amendments from 11/2020 and Potential Future

- **Leaks at Compressor Stations – New and Existing**
  - Quarterly OGI/M21
  - Alaska North Slope: Semiannual
  - Exemption for low production sites (<15 boe/day) proposed to be removed
  - First attempt at repair within 30 days, completed within 30 days after 1st attempt
  - Optional alternative bimonthly screening with advanced measurement technology with a methane detection of 10 kg/hr

118

"Modification" to a Well Site

- A "modification" occurs to a well site when:
  - A new well is drilled at an existing well site after 9/18/2015; or
  - A well at an existing well site has been hydraulically fractured or refractured after 9/18/2015.
- A wellsite that contains only wellheads is not affected.
- Tank batteries could be included – note the definition of "well site".

119

Definition of Well Site

Well site means one or more surface sites that are constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well. For purposes of the fugitive emissions standards at §60.5397a, well site also means a separate tank battery surface site collecting crude oil, condensate, intermediate hydrocarbon liquids, or produced water from wells not located at the well site (e.g., centralized tank batteries).

120

"Modification" to a Compressor Station

- A compressor station is modified if:
  - An additional compressor is constructed at an existing compressor station; or
  - One or more compressors are replaced by one or more compressors of greater total horsepower.

121

Definition: Compressor Station

Compressor station means any permanent combination of one or more compressors that move natural gas at increased pressure through gathering or transmission pipelines, or into or out of storage. This includes, but is not limited to, gathering and boosting stations and transmission compressor stations. The combination of one or more compressors located at a well site, or located at an onshore natural gas processing plant, is not a compressor station for purposes of §60.5397a.

122

Fugitives at Well Sites and Compressor Stations

- Conduct leak surveys within 60 [90 days in Technical Amendments] days of startup of production or modification.
- Conduct surveys quarterly for Compressor Stations (semiannual in Technical Amendments)
- Conduct surveys semiannually for Wellsites
- Conduct surveys at least four ("but no more than 7" was added in the Technical Amendments) apart
- Leaks are:
  - Any visible emission from a component using OGI; or
  - Reading of 500 ppm or more using Method 21.

123

Fugitives at Well Sites and Compressor Stations [60.5397a]

- What is a "visible emission"?
  - Anything visible in the camera is a "visible emission" – BUT
  - Not everything visible in the camera is a "leak" – we need your help to make this determination!
  - Fugitive emissions component means any component that has the potential to emit fugitive emissions of methane or VOC at a well site or compressor station, including but not limited to valves, connectors, pressure relief devices, open-ended lines, flanges, covers and closed vent systems not subject to § 60.5411a, thief hatches or other openings on a controlled storage vessel not subject to § 60.5395a, compressors, instruments, and meters. Devices that vent as part of normal operations, such as natural gas-driven pneumatic controllers or natural gas-driven pumps, are not fugitive emissions components, insofar as the natural gas discharged from the device's vent is not considered a fugitive emission. Emissions originating from other than the vent, such as the thief hatch on a controlled storage vessel, would be considered fugitive emissions.

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Fugitives at Well Sites and Compressor Stations

- Repair leaks within 30 days
  - Exceptions for repairs that would require a blowdown, shutdown, shut-in and other exceptions; and
  - Documentation requirements for such exceptions called Delay of Repair (DOR)
- Re-survey within 30 days of repair using Method 21, OGI, or alternative screening procedure.
- Technical Amendments clarified that the first attempt at repair be made in 30 days, and fixed no later than 30 days after the first attempt

125

LDAR Monitoring Plans – Wellsites and Compressor Stations

- LDAR Monitoring Plan must cover well sites and compressor stations within each company-defined area.
  - Company-defined area is not defined by EPA, but EPA expects them to be similar facilities in a similar geographic region.
- Plans are not required to be submitted, but must be provided upon request.
- Historically, EPA has asked for plans and audited operators to ensure plans are followed.

126

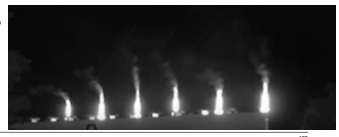
Centralized Production Facilities – Potential Future

- *where a "centralized tank battery" is "one or more permanent storage tanks and all equipment at a single stationary source used to gather, for the purpose of sale or processing to sell, crude oil, condensate, produced water, or intermediate hydrocarbon liquid from one or more offsite natural gas or oil production wells. This equipment includes, but is not limited to, equipment used for storage, separation, treating, dehydration, artificial lift, combustion, compression, pumping, metering, monitoring, and flowline. Process vessels and process tanks are not considered storage vessels or storage tanks. A centralized production facility is located upstream of the natural gas processing plant or the crude oil pipeline breakout station and is a part of producing operations."*
- A centralized production facility is a wellsite for purposes of LDAR, but is not eligible for the wellsite exemption for reciprocating and centrifugal compressors

127

About Optical Gas Imaging

- Still images from an Earthworks OGI video
- These images depict heat from operating engines, but not gas releases
- Without knowledge of the technology, these images can look alarming



128

Leaks at Wellsites and Compressor Stations – Reporting and Notification Requirements

Like reciprocating compressors and tanks, report both sites that become subject during the reporting period AND all other sites already subject.

- Well and compressor station names
- Date of startup/modification
- Did the site produce <15 boe/day in the first 30 days?
- Survey date
- Whether fugitives were found, and fugitive type/counts
- Whether there were deviations from the monitoring plan
- Date of planned shutdown for components on DOR
- Notification: None

129

Liquids Unloading (Potential Future)

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Liquids Unloading (Potential Future)

- **Perform liquids unloading with zero methane and VOC emissions to atmosphere**
- **Two potential options for regulation:**
  - Every well unloaded for liquids is an affected facility; OR
  - Only wells that are unloaded and vented to atmosphere are affected facilities.
  - Either way - the recordkeeping requirements will be extensive.
- **What are the permitting implications for this change here in Texas?**

131

Sweetening Units

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Acid Gas Removal - Definitions

- NSPS KKK: Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.
- NSPS LLL: Not defined, see NSPS KKK.
- NSPS OOOO: Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both. A Joule-Thompson valve, a dew point depression valve, or an isolated or standalone Joule-Thompson skid is not a natural gas processing plant.

133

Standards for Sweetening Units at Gas Plants

- Applies to each onshore sweetening unit ~~at a natural gas processing plant~~:
  - Emission limits remain the same as proposed rule (comply with percent reduction requirements based on sulfur feed rate and hydrogen sulfide [H2S] content of acid gas)
  - Initial performance test required
  - Monitoring of sulfur product accumulation, H2S content, and acid gas flow rate
- Facilities with design capacities less than 2 long tons per day of H2S in the acid gas are subject to recordkeeping and reporting only

134

Sweetening Units Potential Future

- **Sweetening Units**
  - Addition of units constructed, modified or reconstructed after November 16, 2020 across the source category (not just gas processing plants)
  - "This final rule revises the applicability criteria for the SO2 standards for sweetening units to *correctly* define an affected facility as any onshore sweetening unit that processes natural gas produced from either onshore or offshore wells."
  - EPA is proposing to keep this change in place

135

Sweetening Units – Construction, Modification, and Reconstruction

- Construction: Construction or nameplate of the amine unit
- Modification: Defer to Subpart A
- Reconstruction: Defer to Subpart A
- Notification: Defer to Subpart A, 60.7
  - Notification 30 days after commencing construction
  - Notification of startup within 15 days after startup
  - Notification within 60 days (or as soon as practicable) of a modification

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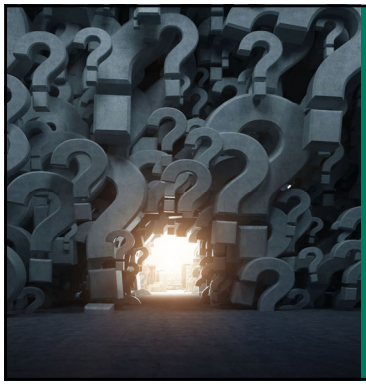

Case Studies and Discussion

137

Modifying a Wellsite

- Wells are drilled at a pad after 9/18/2015
- Oil production is low, and tank emissions are less than 6 tpy VOC per tank
- Are the tanks subject to storage tank control requirements under OOOOa?
- Is the pad subject to LDAR requirements under OOOOa?

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Modifying a Wellsite

- Tanks subject to control requirements under OOOOa?
  - No. emissions are below 6 tpy VOC per tank.
- Is well site subject to LDAR requirements?
  - Yes.
  - Based on these considerations and, in particular, the large number of low production wells and the similarities between well sites with production greater than 15 boe per day and low production well sites in terms of the components that could leak and the associated emissions, we are not exempting low production well sites from the fugitive emissions monitoring program. [p. 35856]

139

Wellsite Modification and Reconstruction

- A wellsite is completed before 9/18/2015.
- After 9/18/2015, the operator adds a screw compressor, two heaters, and two separators.
- What is the NSPS OOOOa applicability for the site?

140

Wellsite Modification and Reconstruction

- Wellheads:
  - No requirements- wells drilled <9/18/2015
- Compressors:
  - No requirements- well site compressors have no requirements
  - No requirements for screw compressors
- Heaters and separators:
  - No requirements under NSPS OOOOa

141

Wellsite Modification and Reconstruction

- LDAR Requirements?
  - Site is not modified- remember definition of "wellsite modification".
  - Reconstruction – are the addition of the components >50% of the fixed capital cost of the original group of components?
  - This is going to be an evolving issue.

142

Modifying a Wellsite

- A well is drilled after 9/18/2015 on a pad with wellheads and separators.
- The well feeds into a centralized tank battery.
- Where should the LDAR surveys be performed?

143

Modifying a Wellsite

- A wellsite that contains only wellheads is not affected – but this facility includes a wellheads and separators.
- Technical amendments specify that separators are considered "equipment"
- LDAR is required at the BOTH the wellpad and the tank battery.

144

Modifying a Wellsite

- A well is drilled after 9/18/2015 on a pad with only wellheads.
- The well feeds into a centralized tank battery.
- Where should the LDAR surveys be performed?

145

Modifying a Wellsite

- A wellsite that contains only wellheads is not affected.
- Well site means one or more surface sites that are constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well. For purposes of the fugitive emissions standards at §60.5397a, well site also means a separate tank battery surface site collecting crude oil, condensate, intermediate hydrocarbon liquids, or produced water from wells not located at the well site (e.g., centralized tank batteries).
- LDAR is required at the tank battery only.

146

Reciprocating Compressor Requirements

An electrically driven reciprocating compressor is constructed at a wellsite after August 23, 2011.

Is the compressor subject to rod packing replacement and reporting requirements in NSPS OOOO or OOOOa?

147

Reciprocating Compressor Requirements

Because the compressor is not driven by a gas fired engine, there are no combustion emissions associated with the compressor.

No. Because the compressor is located at a wellsite, the compressor IS NOT subject to NSPS OOOO or OOOOa.

148

Reciprocating Compressor Requirements

A reciprocating compressor is constructed at a centralized tank battery after August 23, 2011.

Is the compressor subject to rod packing replacement and reporting requirements in NSPS OOOO or OOOOa?

Is the tank battery subject to LDAR requirements for compressor stations?

149

Reciprocating Compressor Requirements

Is the facility a "well site"?

Well site means one or more surface sites that are constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well. For purposes of the fugitive emissions standards at §60.5397a, well site also means a separate tank battery surface site collecting crude oil, condensate, intermediate hydrocarbon liquids, or produced water from wells not located at the well site (e.g., centralized tank batteries).

No. The compressor is located at a well site – but, this may change (next slide).

150

Reciprocating Compressor Requirements

Is the tank battery subject to LDAR requirements for compressor stations?

Is the site a compressor station?

Compressor station means any permanent combination of one or more compressors that move natural gas at increased pressure through gathering or transmission pipelines, or into or out of storage. This includes, but is not limited to, gathering and boosting stations and transmission compressor stations. The combination of one or more compressors located at a well site, or located at an onshore natural gas processing plant, is not a compressor station for purposes of §60.5397a.

Per the 2020 technical amendments: *A centralized production facility is a wellsite for purposes of LDAR, but is not eligible for the wellsite exemption for reciprocating and centrifugal compressors*

151

Modification to Compressor Station

- A compressor station is constructed before 9/18/2015
- In October 2015, an engine (compressor driver) is removed and replaced with an engine of higher horsepower
- Is the compressor station modified in a way that requires LDAR?

152

Modification to Compressor Station

- A compressor station is modified if:
- An additional compressor is constructed at an existing compressor station; or
- One or more compressors are replaced by one or more compressors of greater total horsepower.
- Response to comments (p. 4-224): an engine is replaced with a smaller horsepower engine. EPA agreed that this does not constitute a modification.
- Response to comments (p. 4-227-228): We agree that an increase in the compression capacity that is not due to the addition of a compressor that would result in an increase of the overall design capacity of the compressor station is not a modification.

153

Compressor Station – OOOOa Applicability

- Compressor station constructed after 9/18/2015
  - Installation of screw compressors manufactured after 9/18/2015
  - Installation of a pneumatic pump manufactured after 9/18/2015
  - Installation of storage tanks with a PTE <6 tpy VOC per tank

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Compressor Station – OOOOa Applicability

- Compressors have no requirements
  - OOOO and OOOOa only apply to reciprocating and centrifugal compressors
- No requirement for pneumatic pump
  - Only pumps at well sites and gas processing plants have requirements
- Limited requirements for the tanks
  - Emissions <6 tpy/tank, but PE Cert for CVS may be required
- Site subject to LDAR because construction commenced after 9/18/2015

155

Compressor Station

- Existing natural gas transmission compressor station
- Addition of reciprocating compressor unit after 9/18/2015 that was manufactured <8/23/2011
- No compressors were removed as part of the project

156

Compressor Station

- Only evaluate "new" sources
  - Compressor and driver (if applicable)
- Site installed a compressor that is new to the facility, but not new for purposes of NSPS
- Compressor has no rod packing replacement requirements because of manufacture date before 9/18/2015
- Site is subject to LDAR because the addition of a compressor triggers "modification"

157

Compressor Station

- In January 2017, an operator constructs a site with two reciprocating compressors that collect natural gas from wellhead separators and compress the natural gas for use in gas lift.
- Is the facility a compressor station subject to LDAR?

158

Compressor Station

- Compressor station means any permanent combination of one or more compressors that move natural gas at increased pressure through gathering or transmission pipelines, or into or out of storage. This includes, but is not limited to, gathering and boosting stations and transmission compressor stations. The combination of one or more compressors located at a well site, or located at an onshore natural gas processing plant, is not a compressor station for purposes of § 60.5397a.
- No: the compressors do not move natural gas at increased pressure through gathering or transmission pipelines, or into or out of storage.
- Is the facility a "well site?"

159

Compressor Station

- Well site means one or more surface sites that are constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well. For purposes of the fugitive emissions standards at § 60.5397a, well site also means a separate tank battery surface site collecting crude oil, condensate, intermediate hydrocarbon liquids, or produced water from wells not located at the well site (e.g., centralized tank batteries).
- Yes: the site was constructed for the drilling and subsequent operation of any oil well, natural gas well, or injection well.
- The site is subject to the well site provisions of LDAR (not Compressor Station provisions).

160

Compressor Case Study

- Existing compressor is equipped with larger driver.
- Increase in combustion product emissions from the engine based on higher horsepower and fuel usage.
- No physical changes to the compressor itself.
- Is this a modification or reconstruction subjecting the compressor to NSPS Subpart OOOO or OOOOa?
- Is this a modification subjecting the station to LDAR?

161

Compressor Case Study

- Affected facility means, with reference to a stationary source, any apparatus to which a standard is applicable. (§60.2)
- Addition or replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure is not a modification (§60.5365(f)(1))
- Increase in production rate accomplished without a capital expenditure is not a modification (§60.14(e))

162

Reconstruction

- Remember…Only review the cost of the affected facility, not the "package"
  - Engine versus compressor
  - Tank versus berm
  - Pneumatic versus separator unit package
- No- the **compressor** was not modified as part of this change
  - The engine must be evaluated under NSPS for rules for engines
- Was the station modified for purposes of LDAR?

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Modification for LDAR

- A compressor station is modified if:
- An additional compressor is constructed at an existing compressor station; or
- One or more compressors are replaced by one or more compressors of greater total horsepower.
- No, but this is an evolving issue.
- Response to Comments, pp. 4-227 and 4-228: "We agree that an increase in compression capacity **that is not due to the addition of a compressor** that would result in an increase of the overall design capacity of the compressor station is not a modification."

164

Compressor Case Study

- A compressor manufactured and installed in 2008 is sold to another company.
- Upon receipt of compressor on October 15, 2012, new company simply installs and commences operation.
- Is this compressor subject to NSPS OOOO?
- Is the station subject to LDAR?

165

Relocation

- As found in existing NSPS, the following actions (by themselves) are not considered modifications [§60.14(e)]:
  - The relocation or change in ownership of an existing facility.
- How can relocation be proven?
  - Tracking life of a piece of equipment; and
  - Manufacture date may not provide total protection.

166

Compressor Case Study

- No- the compressor is not subject to requirements under NSPS OOOO or OOOOa for compressors.
- Is the station subject to LDAR?
  - No, even if the addition of the compressor results in a net compression horsepower increase, the date of installation was <9/18/2015

167

Reconstruction Case Study

- A compressor is manufactured before 8/23/2011
- In 2013, the compressor is damaged
- In 2016, the damaged compressor is sold to another company
- The company repairs the compressor to get the unit functioning again
- Is this unit subject to NSPS OOOO?

168

Routine Repair and Maintenance

- Routine Repair and Maintenance is not a Modification
- "Maintenance, repair, and replacement which the Administrator determines to be routine for a source Category." [§60.14(e)(1)]
- How should a company demonstrate "routine maintenance, repair, and replacement"?

169

Reconstruction…

- 50% Rule: how much $$ was spent?
- Is it cumulative? EPA is not consistent.
- Is it back to promulgation of NSPS, or back to birth?
- Reference Documents!
  - "when the extent of repairs goes beyond the normal maintenance activity necessary to maintain a boiler's useful life, resulting in substantial life extension, the costs should be aggregated to determine if the repairs constitute re-construction." (12/28/1992, Reconstruction of Subpart Dc Boiler)… or….
  - Conclusion: Amending Section 60.15 to authorize unlimited aggregation would best advance the purposes of Section 111. The current wording of Section 60.15 permits only the more limited policy of aggregating replacement costs stemming from what may be viewed objectively as a single planning decision.

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Demonstrating "Routine"

- Document, document, document
  - Manufacturer's Data
- Check the ADI
  - Tricky because sources are previously un-regulated
- Industry Trade Groups
  - API, local O&G associations
  - May be difficult to reach consensus
- Individual Company Case-by-Case
  - May be unpalatable/unreasonable across large geographic areas
  - May be difficult to reach consensus

171

Storage Tank Modification

- A tank battery is constructed before 8/23/2011.
- On 9/30/2015, one tank is struck by lightning and **replaced**.
- Is the new tank subject to NSPS OOOO or OOOOa?

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Storage Tank Modification

- What is the tank's date of manufacture?
  - Is it after 8/23/2011? How do you know?
- What is the tank's PTE?
  - Based on the first 30 days of production
  - Take into account federally enforceable limits
- If >6 tpy VOC, the new tank is subject to NSPS OOOOa
  - Reduce emissions by 95% within 60 days after startup

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Storage Tank Modification

- Routine Repair and Maintenance is not a Modification
- "Maintenance, repair, and replacement which the Administrator determines to be routine for a source Category." [§60.14(e)(1)]
- How should a company demonstrate "routine maintenance, repair, and replacement"?

174

Demonstrating "Routine"

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  - May be difficult to reach consensus
- Individual Company Case-by-Case
  - May be unpalatable/unreasonable across large geographic areas
  - May be difficult to reach consensus

175

Storage Tank Re-Construction

- A tank battery is constructed before 8/23/2011
- On 9/30/2015, one tank is struck by lightning and **repaired**
- Is the repaired tank subject to NSPS OOOO or OOOOa?

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Storage Tank Re-Construction

- What was done to the tank to repair it?
  - Parts
  - Labor
  - Engineering/design
- How much money was spent on the tank?
  - Was it greater than 50% of the fixed capital cost of an entirely new tank?
- What is the tank's PTE?
- If BOTH 50% has been exceeded AND emissions >6 tpy, the new tank is NSPS OOOOa.

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Other Examples?

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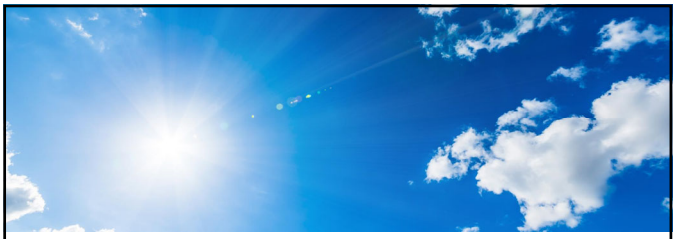

Thank you

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