Technical Services Group
Environmental Department

2017 Air Regulatory Update

GCA Conference

April – 2017

Standard disclaimer…

Don’t take my word for it! If you are unsure, talk to someone who does this for a living.

The content in this presentation is one interpretation of the regulations and is not guaranteed to accurately represent the intent of the authors.

Discussion Topics

- Federal Regulations
  - NSPS
    - JJJJ
    - OOOO
    - OOOOa
  - NESHAP
  - NAAQS for Ozone
- State Regulations
  - Pennsylvania GP-5/GP-5A
  - Ohio

EPA
Regulatory Alphabet Soup

NSPS

- JJJJ and OOOO/a
- 40 CFR Part 60 Subpart JJJJ and OOOO/a
- Regulates Criteria Pollutants (NOx, CO, VOC's)
- Establishes best standard for new engines and compressors going forward. Some engines and compressors are "grandfathered"

NESHAP

- ZZZZ
- 40 CFR Part 63 Subpart ZZZZ
- Regulates HAP's (carcinogens)
- "grandfathering" is limited

Where is the Focus?

- Regulations have different purposes
  - Criteria Pollutants (NOx, CO, VOC's) = Part 60
  - HAP's (HCHO, Benzene, etc…) = Part 63
- Engines are classified by several factors:
  - Existing or New (also modified or reconstructed)
  - Minor Source or Major Source (over 10/25tpy)
  - Combustion Type (2 stroke, 4 stroke, Rich Burn, Lean Burn)

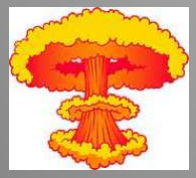
Where is the Focus?

- Upstream
  - Reciprocating Compressors
  - Pneumatic Controllers
  - Centrifugal compressors
  - Rotary Screws are exempt
- Midstream and Transmission have their own requirements.

Owner and Operator

NSPS Subpart JJJJ

- NSPS a.k.a. 40 CFR 60 subpart JJJJ
  - Targets new engines
    - Key Date June 12, 2006
    - Based on engine manufacture date/combustion type
  - Levels decrease from Tier 1 to Tier 2
    - 2007/2008 = Tier 1 = 2 g/hp-hr NOx, 4 g/hp-hr CO, 1 g/hp-hr VOC
    - 2010/2011 = Tier 2= 1 g/hp-hr NOx, 2 g/hp-hr CO, .7 g/hp-hr VOC
  - Maintenance , Testing, and Recordkeeping
    - Over 500 horsepower get tested annually
    - Under 500 horsepower must be retested after overhaul (or undergoes *major maintenance*)



NSPS Subpart JJJJ

TABLE 3.—NO_X, HC, AND CO EMISSION STANDARDS IN G/KW-HR (G/HP-HR) FOR OWNERS/OPERATORS OF STATIONARY NON-EMERGENCY SI NATURAL GAS ENGINES 19<KW<75 (25<HP<100) AND LEAN BURN LPG ENGINES 19<KW<75 (25<HP<100)

Maximum engine power	Manufacture date	Emission requirement in g/KW-hr (g/HP-hr) [a, b]	
		HC+NO_X	CO
25<HP<100 [c]	July 1, 2008	3.8 (2.8)	6.5 (4.8)
	July 1, 2008 (severe duty)	3.8 (2.8)	200.0 (149.2)

TABLE 4.—NO_X, CO, AND VOC EMISSION STANDARDS FOR STATIONARY SI ENGINES ≥100 HP (EXCEPT GASOLINE AND RICH BURN LPG), STATIONARY SI LANDFILL/DIGESTER GAS ENGINES, AND STATIONARY EMERGENCY ENGINES >25 HP

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards [a]					
			g/HP-hr			ppmvd at 15% O_2		
			NO_X	CO	VOC	NO_X	CO	VOC
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG.	100≤HP<500	7/1/2008	2.0	4.0	1.0	160	540	86
		1/1/2011	1.0	2.0	0.7	82	270	60
Non-Emergency SI Lean Burn Natural Gas and LPG.	500≥HP<1,350	1/1/2008	2.0	4.0	1.0	160	540	86
		7/1/2010	1.0	2.0	0.7	82	270	60
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≥HP<1,350).	HP≥500	7/1/2007	2.0	4.0	1.0	160	540	86
	HP≥500	7/1/2010	1.0	2.0	0.7	82	270	60
Landfill/Digester Gas (except lean burn 500≥HP<1,350).	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
		1/1/2011	2.0	5.0	1.0	150	610	80
	HP≥500	7/1/2007	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Landfill/Digester Gas lean burn	500≥HP<1,350	1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Emergency	25>HP<130	1/1/2009	[b] 10	387	N/A	N/A	N/A	N/A
	HP≥130		2.0	4.0	1.0	160	540	86

[a] Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O_2.
[b] The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NO_X+HC.

What About the Gap?

- Engines manufactured between June 12, 2006 and the Tier 1 applicability date are “gap” engines
- Have neither emissions limitations nor reporting and recordkeeping requirements
- No reconstruction/modification considerations
- Meet NESHAP ZZZZ requirements

Reconstruction and Modification

- An older engine can become subject to NSPS JJJJ if it undergoes *modification* or *reconstruction*
- Emissions requirements for modified or reconstructed engines are slightly more lenient:
  - 3.0 g/bhp-hr NOx
  - 4.0 g/bhp-hr CO
  - 1.0 g/bhp-hr VOC's

EPA NSPS - Reconstruction

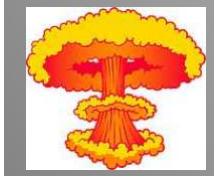
- Reconstruction is covered under 40 CFR 60.15
- The replacement of components such that the capital cost of the new components exceeds 50% of a comparable new facility.
- Engines that are reconstructed become subject to NSPS JJJJ
- In August of 2011 the EPA added language that if the cost exceeds 75%, then engine gets a new date of manufacture and must therefore meet the most recent levels (1.0/2.0/0.7)
- Reconstruction guidance and worksheet available at www.gascompressor.org

EPA NSPS - Modification

- Modification is covered under 40 CFR 60.14
- A change which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies (such as NOx, CO, VOC's, etc…)
- Examples:
  - changing an engine from a normally aspirated version to a turbocharged version or increasing compression ratio.
  - Converting a Waukesha F18GL to a GSI
  - Installing a low-NOx kit on a CAT 3516.
- Engines that are modified become subject to NSPS JJJJ

Modification Gotcha

- Usually, an engine is subject to requirements of either NSPS or NESHAP, but not both.
- However….
  - NSPS recognizes “modification” as defined under 40 CFR 60.14
  - NESHAP does not recognize “modification”
- An older engine that is modified can be subject to BOTH JJJJ and ZZZZ



NESHAP subpart ZZZZ

- Regulates HAPs
- Also known previously as RICE MACT
- December 2002 – regulated larger RICE at Major Sources
- Amended in 2006 to regulate new RICE at Area Sources (by complying with NSPS)
- Amended in 2012 to regulate existing RICE at Area sources

NESHAP subpart ZZZZ

- For Major Sources – In depth site review
- For Minor Sources:


– Under 500 Horsepower = Management Practices


– Over 500 Horsepower <u>Remote</u> = Management Practices


– Over 500 Horsepower <u>Non-Remote</u> = Controls

NESHAP - Remote

- Definition: 40 CFR 63.6675
- Offshore
- Onshore – Not on a pipeline
  - Not applicable for gas compression (except idle)
- Onshore – On a pipeline
  - Similar to DOT Class 1
  - 10 or fewer building per rolling mile
  - Not within 100 yards of *well defined outside area*

NESHAP - Remote

- Traps
  - Not strictly DOT Class I
  - Ownership is not discussed
  - Equipment that was idle on 10/19/13
  - Once Non-Remote, always Non-Remote…

Management Practices

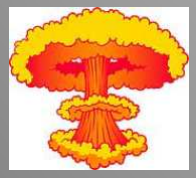
- Maintenance Items
  - Change Oil and Filter
  - Inspect spark plugs
  - Inspect belts and hoses
- 2SLB = Every 4,320 hours
- 4SLB and 4SRB $\leq$ 500HP = 1,440 hours
- 4SLB and 4SRB > 500HP Remote = 2,160 hours

Management Practices

- Oil analysis may be performed at change intervals to extend changes
- Condemning limits
  - TAN 3mg/gm potassium hydroxide (KOH) rise
  - Viscosity 20% rise
  - H2O% greater than 0.5%
- Change condemned oil within 2 days of receiving report
- Oil analysis program must be part of maintenance plan

Management Practices

- Non-remote/non-emergency >500HP Require Controls
  - 4SRB
    - Install NSCR (75% red. CO, 270ppm CO, or 30% THC red.)
    - Pre-catalyst temp kill set at 1250 F, or CPMS
  - 4SLB
    - Install oxicat (93% CO red. or 47ppm)
    - Pre-catalyst temp kill set at 1350 F, or CPMS
  - Annual performance test
    - Percent reduction requires simultaneous measurement for pre and post catalyst ($$$$$).



Recordkeeping and Reporting

- Must reevaluate remote status annually
  - Population is subject to change
- Maintain and report records of initial and annual evaluations
- Keep records of Maintenance and oil analysis
- CPMS records, if used
  - 4-hour rolling average must be between 450 and 1250 F (4SRB) or 1350 F (4SLB)
  - Periodic calibration required

EPA – Ozone NAAQS

- October 26, 2015: EPA published revised ozone standard of 70 ppbv
- 241 counties exceed new standard increased from 46 at old standard of 75 ppbv
- Another 92 counties are either at either 69 or 70 ppbv
- https://ozoneairqualitystandards.epa.gov/OAR_OAQPS/OzoneSliderApp/index.html#
- Look for upcoming State plans around 2020

Pennsylvania General Permits

- Pennsylvania has proposed an update to GP-5 and introduced GP-5A
- The GP-5 rule addresses Natural Gas Compressor Stations, Processing Plants, and Transmission Stations
- The GP-5A rule addresses Unconventional Well Site Operations
- Includes new HP ranges and lower emissions limits
- Includes requirements for reciprocating compressors
- GCA environmental committee is currently drafting comments which are due on June 5, 2017.

Pennsylvania GP-5/5A Current

Engine Type	Rated bhp	NOx	CO	NMNEHC as propane (excluding HCHO)	HCHO
Permitted Under GP-5 Prior to Feb 2, 2013					
NG-fired Lean- and Rich-Burn Engines	<1,500	2.00 g/bhp-h	2.00 g/bhp-h	2.0 g/bhp-h	
Permitted Under GP-5 On or After Feb 2, 2013 but Prior to (Insert Date)					
NG-fired Lean- and Rich-burn Engines	≤100	2.00 g/bhp-h	2.00 g/bhp-h	-	-
NG-fired Lean-burn Engines	>100 to ≤500	1.00 g/bhp-h	2.00 g/bhp-h	0.70 g/bhp-h	-
NG-fired Lean-burn Engines	>500	0.50 g/bhp-h	47 ppmvd @ 15% O_2 or 93% reduction	0.25 g/bhp-h	0.05 g/bhp-h
NG-fired Rich-burn Engines	>100 to ≤500	0.25 g/bhp-h	0.30 g/bhp-h	0.20 g/bhp-h	
NG-fired Rich-burn Engines	>500	0.20 g/bhp-h	0.30 g/bhp-h	0.20 g/bhp-h	2.7 ppmvd @ 15% O_2 or 76% reduction

Pennsylvania GP-5/5A Proposed

Engine Type	Rated bhp	NOx	CO	NMNEHC as propane (excluding HCHO)	HCHO
Permitted On or After (Insert Date)					
New NG-fired Lean-burn Engines	≤100	1.00 g/bhp-h	2.00 g/bhp-h	0.20 g/bhp-h	-
New NG-fired Lean-burn Engines	>100 to ≤500	1.00 g/bhp-h	0.70 g/bhp-h	0.30 g/bhp-h	-
New NG-fired Lean-burn Engines	>500 to <1,875	0.50 g/bhp-h	0.25 g/bhp-h	0.25 g/bhp-h	0.05 g/bhp-h
New NG-fired Lean-burn Engines	≤1,875 to <3,000	0.35 g/bhp-h Uncontrolled or 0.05 g/bhp-h with Control	0.25 g/bhp-h	0.25 g/bhp-h	0.05 g/bhp-h
New NG-fired Lean-burn Engines	≥3,000	0.05 g/bhp-h	0.25 g/bhp-h	0.25 g/bhp-h	0.05 g/bhp-h
New NG-fired Rich-burn Engines	≤100	0.60 g/bhp-h	0.60 g/bhp-h	0.10 g/bhp-h	-
New NG-fired Rich-burn Engines	>100 to ≤500	0.25 g/bhp-h	0.30 g/bhp-h	0.20 g/bhp-h	
New NG-fired Rich-burn Engines	>500	0.20 g/bhp-h	0.30 g/bhp-h	0.20 g/bhp-h	2.7 ppmvd @ 15% O_2 or 76% reduction

Pennsylvania - Reciprocating Compressors

- The State opted to mostly adopt the Federal rules as written.
- Existing - must comply with EPA NSPS OOOO
- New – must comply with EPA NSPS OOOOa
- Propose to eliminate well site exemption

Ohio

- The State opted to mostly adopt the Federal rules as written.
- The one exception is that 100% capture of emissions are required for packing leaks.(OAC rule 3745-31-05(E))
  - Must be routed to a flare, to fuel line, or back into pipeline.
  - Applies at all time that pressurized gas may be present

Environmental Committee Projects

- Comments to PADEP General Permits
- Compressor Package Blowdown Tool
- NSPS Reconstruction Spreadsheet
  - Update PPI table for 2016, last update 2013

– Update to Summary of Emissions Regualtions

Questions