

The Power to Perform



ZZZZ and JJJ Emissions Rules

Gas Compressor Association Expo – April 2014



The problem with emissions regulations is that you don't know what you don't know.



Sometimes not knowing is better!



Agenda

Not Today....

- Mobile Sources
- CI (Diesel)
- Emergency/black start
- Landfill or Digester Gas



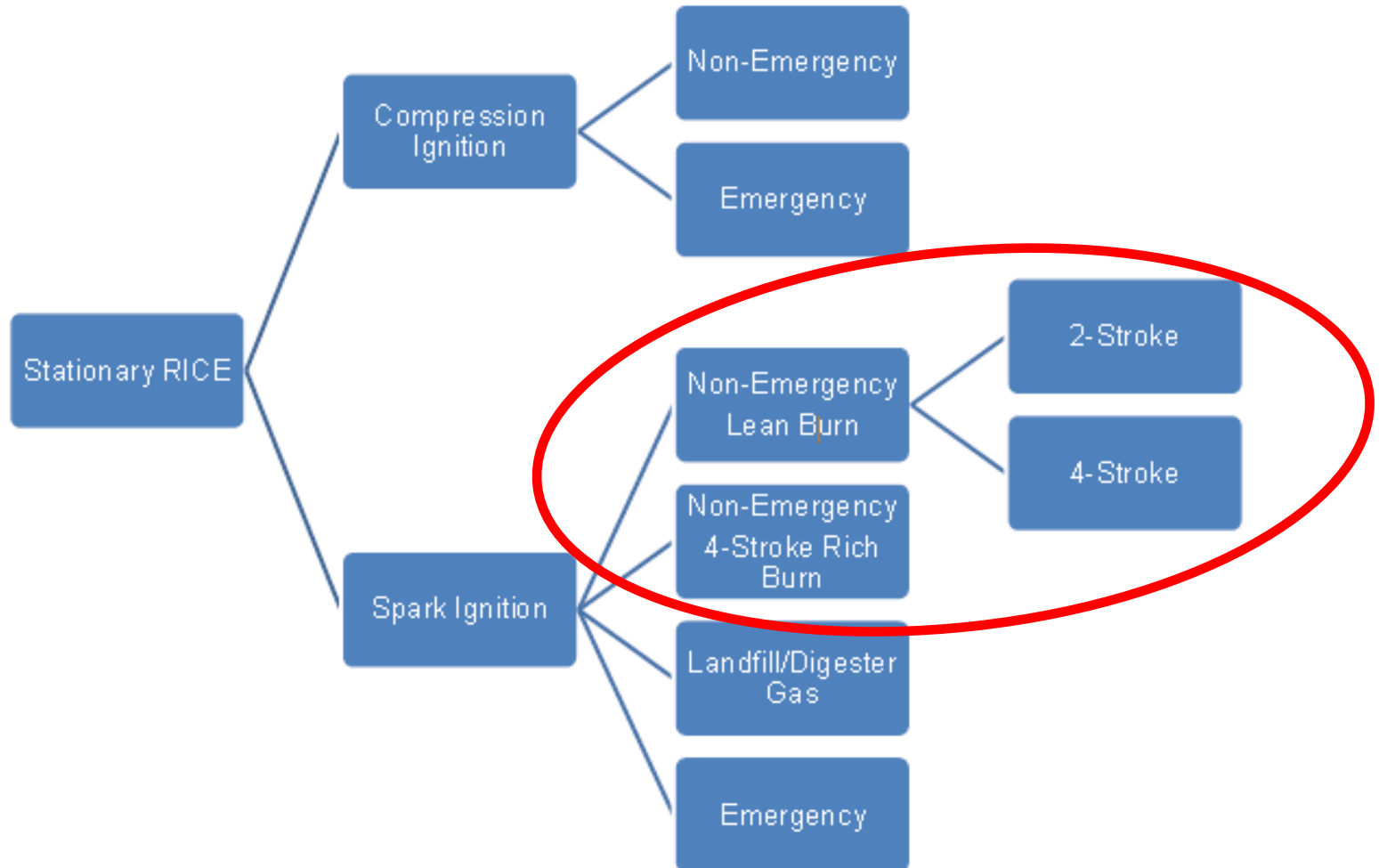


Non-emergency
Spark ignited
Burning Natural Gas

Where does it fit?

- Regulations have different purposes
 - Criteria Pollutants (NO_x, 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)
 - Area or Major Source of HAP's (over 10/25tpy)
 - Type of RICE (2 stroke, 4 stroke, Rich Burn, Lean Burn)

How the EPA classifies RICE



Regulatory Alphabet Soup

NSPS

- JJJJ and OOOO
- 40 CFR Part 60 Subpart JJJJ and OOOO
- Regulates Criteria Pollutants (NO_x, 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

OOPS

- EPA missed them
- EPA promises to “get ‘em next time”
- Ordered after 6/12/06 but manufactured before 2007/2008



NSPS = New

1972

1979



2008



NSPS Subpart JJJ

- NSPS a.k.a. 40 CFR 60 subpart JJJ
 - 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 NO_x, 4 g/hp-hr CO, 1 g/hp-hr VOC
 - 2010/2011 = Tier 2 = 1 g/hp-hr NO_x, 2 g/hp-hr CO, .7 g/hp-hr VOC
 - Maintenance , Testing, and Recordkeeping
 - Engines must have a maintenance plan
 - Over 500 horsepower get tested annually
 - Under 500 horsepower must be retested after overhaul (or undergoes *major maintenance*)

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 NO_x
 - 4.0 g/bhp-hr CO
 - 1.0 g/bhp-hr VOC's

See the GCA Website for more information and useful tools regarding reconstruction

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.
- In other words, you spend more than $\frac{1}{2}$ the cost of a new engine to overhaul the old one.
- 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
 - 0-49% = Not reconstructed
 - 50% to 74% = Reconstructed. Meet 3.0/4.0/1.0
 - 75% and over = New date of Manufacture. Meet (1.0/2.0/0.7)

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 NO_x, 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-NO_x kit on a CAT 3516.
- Engines that are modified become subject to NSPS JJJ

Modification and ZZZZ

- Usually, an engine is subject to 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 (ZZZZ)



- Regulates HAP's
- Also known previously as RICE MACT
- December 2002-2004: regulated larger RICE at Major Sources
- Amended in 2006-2008 to regulate new RICE at Area Sources (by complying with NSPS JJJJ)
- Amended in 2010-2012 to regulate existing RICE at Area sources

RICE NESHAP Timeline

MAJOR SOURCES

AREA SOURCES

	EXISTING	NEW	EXISTING	NEW
≤ 500 HP	2010 rules	2008 rule	2010 rules	2008 rule
> 500 HP	2004 rule 2010 rule (non-emergency CI)	2004 rule	2010 rules	2008 rule

Emissions Standards for EXISTING RICE at Major Sources

HP	Engine Subcategory				
	Non-emergency				
	CI	SI 2SLB	SI 4SLB	SI 4SRB	SI LFG/DG
<100	Change oil and filter and inspect air cleaner (CI) or spark plugs (SI) every 1,000 hours of operation or annually; inspect hoses and belts every 500 hours of operation or annually				
100-300	230 ppm CO	225 ppm CO	47 ppm CO	10.3 ppm CH ₂ O	177 ppm CO
300-500	49 ppm CO or 70% CO reduction				
>500	23 ppm CO or 70% CO reduction	No standards (2004 rule)	No standards (2004 rule)	350 ppb CH ₂ O or 76% CH ₂ O reduction (2004 rule)	No standards (2004 rule)

Emission Standards - New RICE Located at Major Sources

HP	Engine Subcategory					
	Non-emergency					Emergency
	CI	SI 25LB	SI 45LB	SI 45RB	SI FG/DG	
≤250	Comply with CI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with CI/SI NSPS
250-500			14 ppm CH ₂ O or 93% CO reduction			
>500	580 ppb CH ₂ O or 70% CO reduction (also comply with CI NSPS)	12 ppm CH ₂ O or 58% CO reduction (also comply with SI NSPS)	(also comply with SI NSPS)	350 ppb CH ₂ O or 76% CH ₂ O reduction (also comply with SI NSPS)	No standards (also comply with SI NSPS)	No standards (also comply with CI/SI NSPS)

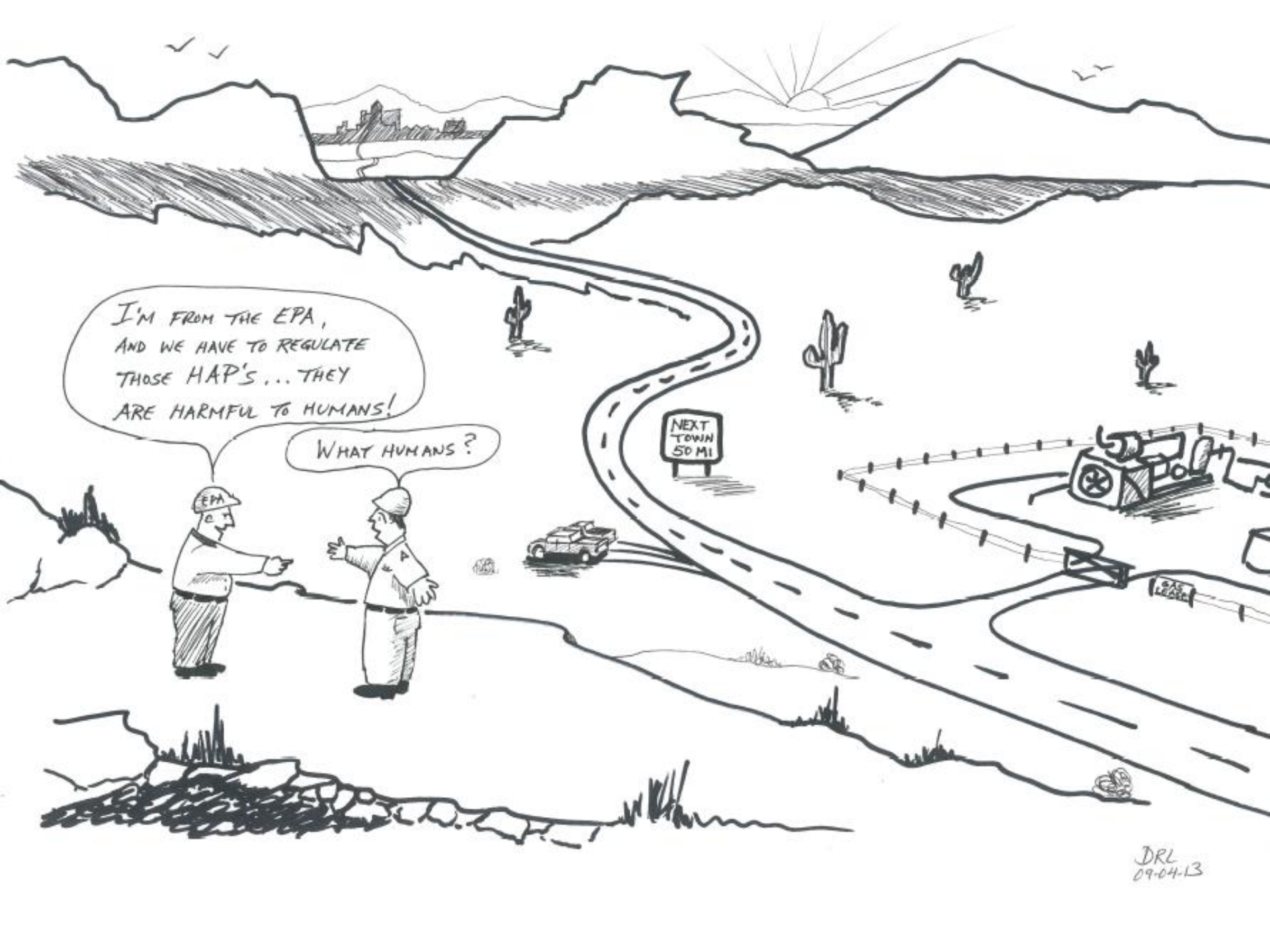
NESHAP - ZZZZ

- For Minor Sources:

 – Under 500 Horsepower = Management Practices

 – Over 500 Horsepower Remote = Management Practices

 – Over 500 Horsepower Non-Remote = Controls



I'M FROM THE EPA,
AND WE HAVE TO REGULATE
THOSE HAP'S... THEY
ARE HARMFUL TO HUMANS!

WHAT HUMANS?

NEXT
TOWN
50 MI

DRL
09-04-13

NESHAP (ZZZZ) 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





Lake Tyler Central Site

ET-1

F.M. 2607

CR 223

CR 223

7-10

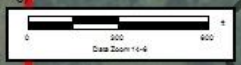
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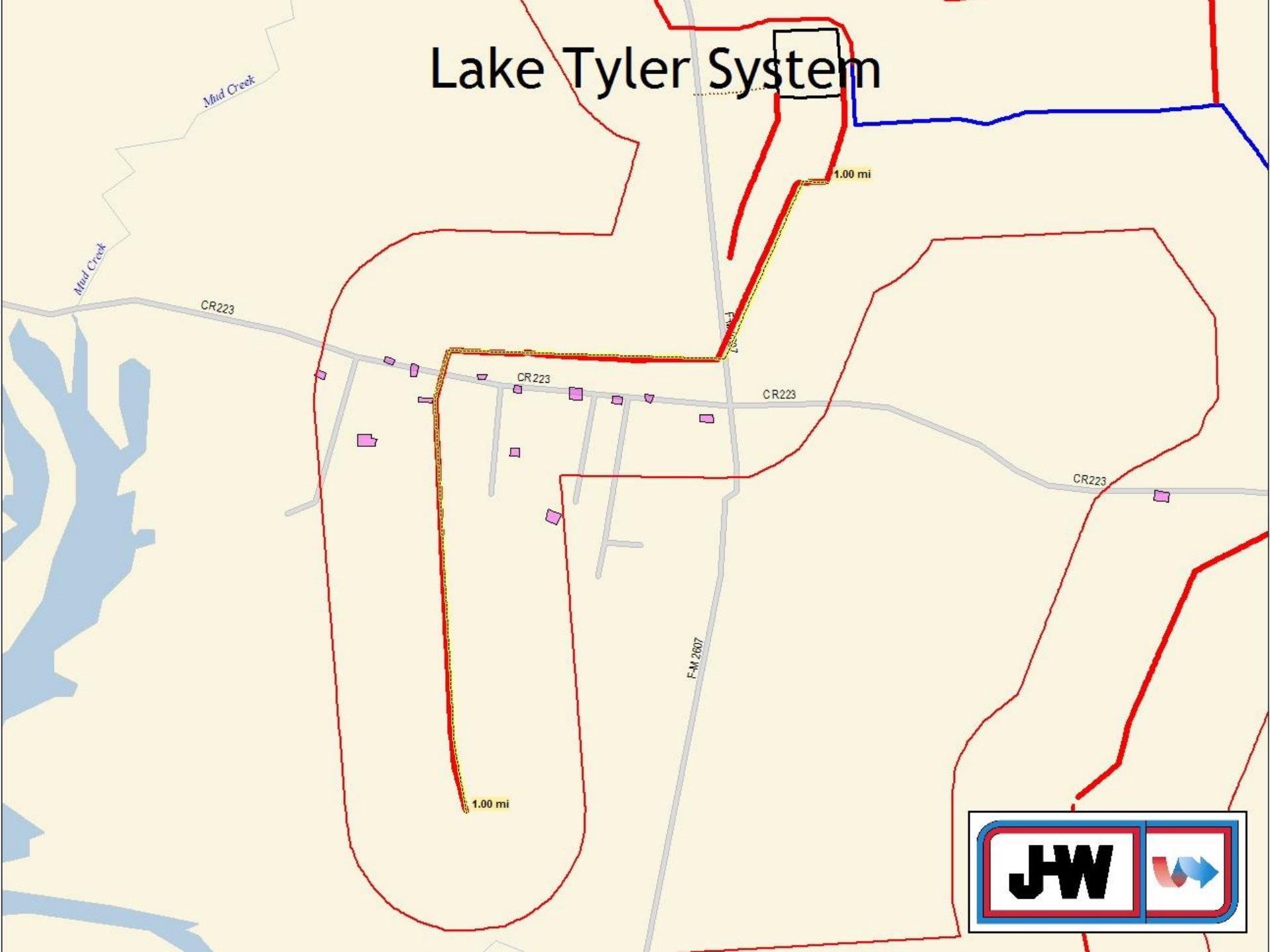
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SW-2

SW-1



Lake Tyler System



NESHAP (ZZZZ) Remote DOT- Well defined outside area

The pipeline segment does not lie within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. The days and weeks need not be consecutive. The building or area is considered occupied for a full day if it is occupied for any portion of the day.



NESHAP (ZZZZ)

Determining Remote

- Traps
 - Not strictly DOT Class I
 - Ownership is not discussed
 - Equipment that was idle on 10/19/13 is a judgment call
 - Once Non-Remote, always Non-Remote...
 - Engine specific



NESHAP (ZZZZ)

Management Practices (Area Source Under 500 HP and Remote over 500 HP)

- Maintenance Items
 - Change Oil (or analysis) 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

NESHAP (ZZZZ)

Management Practices (cont)

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

NESHAP (ZZZZ)

- 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 (\$\$\$\$'s).

NESHAP (ZZZZ)

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

NESHAP (ZZZZ)

Testing and Record Keeping

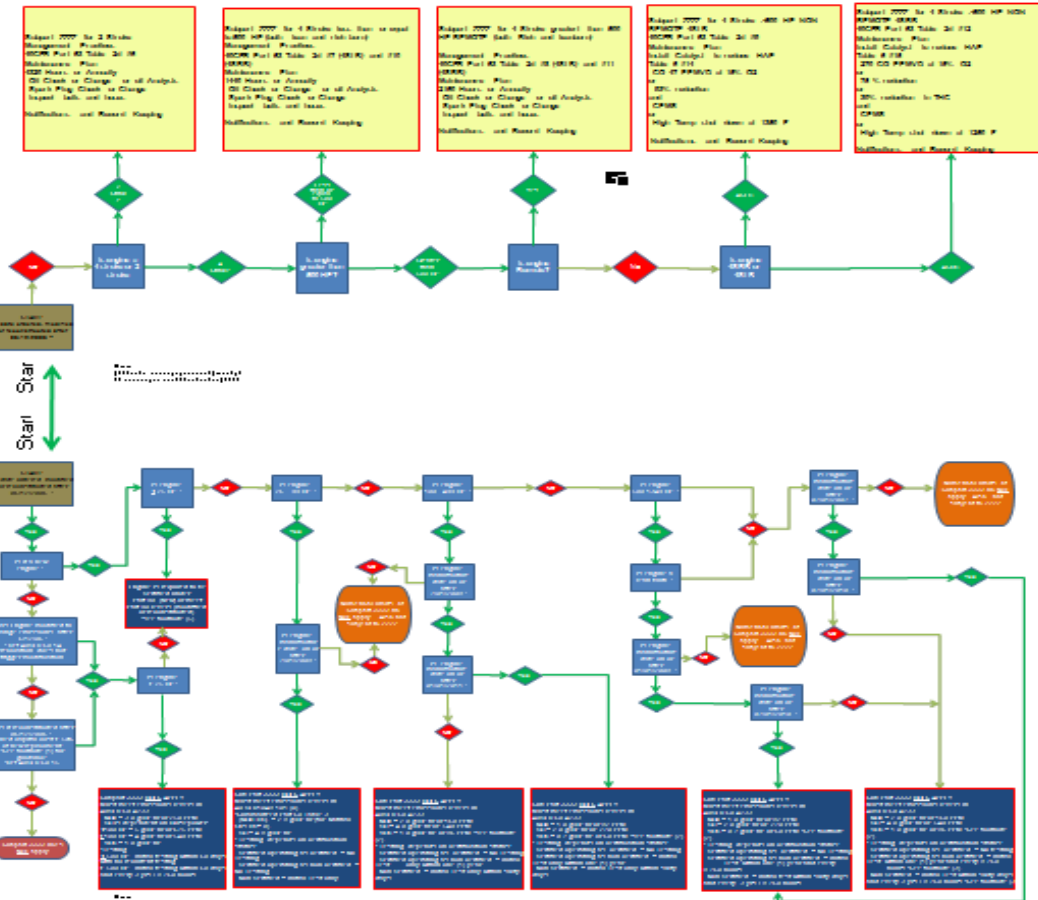
- Initial notifications for ZZZZ were due in Feb 2011
- April 17th is end of 180 days for initial emissions test
- Semi Annual compliance reports are due every Jan 31st and July 31st
 - Major sources
 - Area source (over 500 hp Non-Remote)
- State Agencies are beginning to Audit maintenance activities

EQT 0023 C5 - 1265 HP Natural Gas Compressor Engine

- 1 [40 CFR 63.6603(a)] Change oil and filter every 2,160 hours of operation or annually, whichever comes first. Subpart ZZZZ. [40 CFR 63.6603(a)]
- 2 [40 CFR 63.6603(a)] Equipment/operational data monitored by visual inspection/determination annually or every 2,160 hours of operation, whichever comes first. Inspect all hoses and belts, and replace as necessary. Subpart ZZZZ. [40 CFR 63.6603(a)]
Which Months: All Year Statistical Basis: None specified
- 3 [40 CFR 63.6603(a)] Equipment/operational data monitored by visual inspection/determination annually or every 2,160 hours of operation, whichever comes first. Inspect spark plugs, and replace as necessary. Subpart ZZZZ. [40 CFR 63.6603(a)]
Which Months: All Year Statistical Basis: None specified
- 4 [40 CFR 63.6603(a)] Install an oxidation catalyst to reduce HAP emissions. Subpart ZZZZ. [40 CFR 63.6603(a)]
- 5 [40 CFR 63.6603(a)] Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes. Subpart ZZZZ. [40 CFR 63.6603(a), 40 CFR 63.6625(h)]
- 6 [40 CFR 63.6605(a)] Be in compliance with the applicable emission limitations, operating limitations and other requirements in 40 CFR 63 Subpart ZZZZ at all times. Subpart ZZZZ. [40 CFR 63.6605(a)]
- 7 [40 CFR 63.6605(b)] Operate and maintain at all times in a manner consistent with safety and good air pollution control practices for minimizing emissions. Subpart ZZZZ. [40 CFR 63.6605(b)]
- 8 [40 CFR 63.6620(a)] Conduct each applicable performance test in 40 CFR 63 Subpart ZZZZ Tables 3 and 4. Subpart ZZZZ. [40 CFR 63.6620(a)]
- 9 [40 CFR 63.6620(b)] Conduct each performance test according to the requirements specified in 40 CFR 63 Subpart ZZZZ Table 4. Subpart ZZZZ. [40 CFR 63.6620(b)]
- 10 [40 CFR 63.6620(e)] Determine compliance with the percent reduction requirement using equation 1 in 40 CFR 63.6620. Subpart ZZZZ. [40 CFR 63.6620(e)]
- 11 [40 CFR 63.6620(i)] Determine the engine percent load during a performance test by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. Subpart ZZZZ. [40 CFR 63.6620(i)]
- 12 [40 CFR 63.6620(i)] Include a written report of the average percent load determination in the notification of compliance status. Include the following information: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, provide the model number of the measurement device, and an estimate of its accuracy in percentage of true value. Subpart ZZZZ. [40 CFR 63.6620(i)]
- 13 [40 CFR 63.6620] Petition DEQ for operating limitations to be established during the initial performance test and continuously monitored thereafter; or for approval of no operating limitations. Do not conduct the initial performance test until after the petition has been approved by DEQ. If petitioning DEQ for approval of operating limitations, include the information described in 40 CFR 63.6620(g)(1) through (g)(5). If petitioning DEQ for approval of no operating limitations, include the information described in 40 CFR 63.6620(h)(1) through (h)(7). Subpart ZZZZ.
- 14 [40 CFR 63.6630(a)] Demonstrate initial compliance with each applicable emission and operating limitation according to 40 CFR 63 Subpart ZZZZ Table 5. Subpart ZZZZ. [40 CFR 63.6630(a)]
- 15 [40 CFR 63.6640(a)] Demonstrate continuous compliance with each applicable emission limitation, operating limitation, and other requirements in 40 CFR 63 Subpart ZZZZ Tables 1a and 1b, Tables 2a and 2b, Table 2c, and Table 2d according to methods specified in 40 CFR 63 Subpart ZZZZ Table 6. Subpart ZZZZ. [40 CFR 63.6640(a)]

Useful Tools

- <http://epa.gov/region1/rice/>
- www.gascompressor.org



Gas Compressor Association

Summaries of Emissions Requirements

For

Natural Gas Fired Reciprocating Engines

Revision: 6
August 19, 2011

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The purpose of this guide is to help you gain a broad awareness of emissions regulations. Individuals should consult appropriate federal, state and local agencies and regulations for definitive information.

Questions?

