Engine Rules from A to ZZZZ

A high level overview of the federal NSPS and NESHAP rules as they apply to owner/operators of internal combustion engines

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Introduction

- New Source Performance Standard (NSPS) 40 CFR 60 Subpart IIII
  - Stationary Compression Ignition (CI) Internal Combustion Engines (ICE)
- NSPS 40 CFR 60 Subpart JJJJ
  - Stationary Spark Ignition (SI) ICE
- National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart ZZZZ
  - RICE at both major and area sources of HAPs

NSPS Subpart IIII

NSPS Subpart IIII Applicability

- Construction Date = Order Date
- Construction after July 11, 2005 where:
  - Manufactured after April 1, 2006 non-emergency and emergency, except fire water pumps
  - Manufactured after July 1, 2006 for NFPA approved fire water pumps
- Modified or reconstructed after July 11, 2005
- Rule focus is on SO_2, NOx, PM_{10}, and VOC

NSPS Subpart IIII Basic Requirements

- Emissions limitations based on model year, HP, and engine liters/cylinder (L/cyl)
  - For both emergency and non-emergency engines
  - Many emissions limits referenced from 40 CFR Parts 89 and 1039 (non-road engine rules)
  - Manufacturers of 2007 model year and later engines must certify emissions to applicable limit
  - Fire water pump engines are treated separately (certification year and emission limits)

NSPS Subpart IIII Basic Requirements

- Fuel Usage
  - Currently must use fuel with <500 ppm sulfur
  - October 1, 2010 engines with displacement < 30 L/cyl must use fuel <15 ppm sulfur
    - Pre 2011 model engines can petition to use remaining stock of non compliant fuel
- Importing Old Engines
  - After December 31, 2008 cannot import an engine not compliant to 2007 standards
  - Additional deadlines for installing previous model year engines for various HP ranges are listed in §60.4208
  - Does not apply to modified/reconstructed engines or engines removed from existing location and reinstalled at a new location

NSPS Subpart IIII Basic Requirements

- Monitoring Requirements
  - Install non-resettable hour meter on emergency engines prior to startup
  - If equipped with a diesel particulate filter to comply with PM standard, install a backpressure monitor that notifies the operator when high limit is approached

NSPS Subpart IIII Basic Requirements

Compliance Requirements

- All engines must operate/maintain according to manufacturer's written instructions
- Pre 2007:
  - Purchase engine certified to Part 89 or 94 or
  - Keep records of performance test of similar engine or
  - Keep records of manufacturer data indicating compliance with the standards or
  - Keep records of control device vendor data indicating compliance with the standards or
  - Conduct an initial performance test

NSPS Subpart IIII Basic Requirements

- Compliance Requirements (cont'd)
  - 2007 model and later with disp. < 30 L/cyl
    - Purchase certified engine and install per manufacturer instructions
  - 2007 model and later with disp. > 30 L/cyl
    - Conduct initial performance test
    - Establish operating parameters
    - Annual performance test for non-emergency engines
  - Must limit operation of emergency engine outside of emergency situations to 100 hr/yr

NSPS Subpart IIII Basic Requirements

- Reporting/Recordkeeping
  - Non-emergency engines >3,000 hp or disp. >10 L/cyl, or pre-2007 model >175 hp
    - Initial notification
    - Maintain records
  - Emergency engines starting with model year 2011 that do not meet applicable standards
    - No initial notification
    - Maintain records of hours of operation

NSPS Subpart IIII Basic Requirements

- Reporting/Recordkeeping
  - If equipped with a diesel particulate filter, maintain records of corrective action taken after backpressure monitor indicates the high limit is reached

NSPS Subpart JJJJ

NSPS Subpart JJJJ Applicability

- Construction Date = Order Date
- Commence construction after June 12, 2006 and manufactured:
  - After July 1, 2007 for engines > 500 HP
  - January 1, 2008 for lean burn engines >500 HP and < 1,350 HP
  - July 1, 2008 for engines < 500 HP
  - January 1, 2009 for emergency engines > 25 HP
- Commence modification/reconstruction after June 12, 2006

NSPS Subpart JJJJ Basic Requirements

- Emission Standards
  - Based on HP
  - Based on fuel type (different requirements for gasoline and rich burn LPG)
  - Standards for NO_x, CO, VOC based on manufacture date
- Cannot install engines that do not meet applicable requirements after:
  - July 1, 2010 for engines < 500 HP
  - July 1, 2009 for engines > 500 HP
  - January 1, 2011 for emergency engines > 25 HP
  - Does not apply to modified/reconstructed engines or engines removed from existing location and reinstalled at a new location

NSPS Subpart JJJJ Basic Requirements

- Emergency engines that do not meet the applicable standards must install non-resettable hour meter after:
  - July 1, 2010 for > 500 HP
  - January 1, 2011 for > 130 HP and <500 HP
  - July 1, 2008 for < 130 HP
- Must keep records of operation recorded through the meter

NSPS Subpart JJJJ Basic Requirements

- General Compliance Methods
  - Purchase a certified engine or
  - Purchase a non-certified engine
- Certified engine that is not maintained according to manufacturer's written instructions, it is treated as a non-certified engine

NSPS Subpart JJJJ Basic Requirements

- Certified engines demonstrate compliance by:
  - Maintain maintenance records
  - No performance testing required
- Non-certified engines demonstrate compliance by:
  - Keep maintenance plan and records of maintenance
  - Required performance testing:
    - No testing for engines < 100 HP
    - Initial within 1 year for engines > 100 HP and < 500 HP
    - Initial and every 3 years or 8760 hrs of operation for >500 HP

NSPS Subpart JJJJ Basic Requirements

- Emergency engines may operate up to 100 hr/yr
- Natural gas fired engines may operate up to 100 hr/yr on propane

NSPS Subpart JJJJ Basic Requirements

- Reporting/Recordkeeping required:
  - Agency notifications
  - Maintenance records
  - Certification documentation
  - If not certified, documentation that the engine meets the emission standards
- Non-certified engines > 500 HP must submit an initial notification

NESHAP Subpart ZZZZ

NESHAP Subpart ZZZZ

- Applies to RICE located at major and area sources of HAP emissions.
- Pollutants of concern:
  - CO
  - Formaldehyde
- New or reconstructed RICE at an area source meets the requirements of ZZZZ by meeting the requirements of NSPS IIII or JJJJ
  - Also applies to smaller engines located at major sources – §63.6590(c)

NESHAP ZZZZ
Basic Requirements

- ZZZZ has multiple compliance paths
- 4SRB engines
  - Can either reduce formaldehyde by 76% or
  - Limit concentration of formaldehyde in exhaust to 350 ppbvd
  - Operating limitations based on if a NSCR is used or not

NESHAP ZZZZ
Basic Requirements

- 2SLB engines
  - Either reduce CO by 58% or
  - Limit formaldehyde in exhaust to 12 ppmvd
- 4SLB engines
  - Either reduce CO by 93% or
  - Limit formaldehyde in exhaust to 14 ppmvd
- CI engines
  - Either reduce CO by 70% or
  - Limit formaldehyde in exhaust to 580 ppmvd

Operating limitations then depends on if an oxidation catalyst is used or not

NESHAP ZZZZ Basic Requirements

- Semiannual performance testing is required for all engine categories, pollutant standards, and control devices
- Assure continual compliance through the use of a Continuous Monitoring System (CMS)
  - CEMS monitors emissions
  - CPMS monitors operating parameters indicative of properly functioning control device

NESHAP ZZZZ
Basic Requirements

- Reporting Requirements
  - Semiannual compliance report
    - Identify any deviation
    - Identify any periods when CMS was out-of-control
    - Identify any SSM events which caused an exceedance
  - Immediate SSM Report if actions were inconsistent with the SSM Plan and excursion occurred
    - Notification within 2 days via telephone or fax
    - Report within 7 days after the end of the event

NESHAP ZZZZ
Basic Requirements

- Reporting Requirements Cont'd
  - Annual Report if firing landfill or digester gas greater than 10% annual gross heat input
    - Report fuel flow rates and heat input from each fuel
    - Report operating limits provided in your permit and any deviations to those limits
    - Report any problems or errors with the meters

Engine Case Study

- New Facility with eight 4,735 HP natural gas fired CAT 3616 engines (4SLB) (three installed)
- Facility is major for HAPs
- No compression ignition engines, so NSPS IIII does not apply
- Engines ordered after June 12, 2006 applicability date for NSPS JJJJ, but one of the three was manufactured before July 1, 2007 applicability date
  - Chose to treat all three as subject to JJJJ to create uniformity for compliance

Engine Case Study

- Facility chose to control CO to at least 93% by using catalytic oxidation
- Due to limited operational knowledge of CEMS units, facility chose CPMS
  - Maintain catalyst inlet temperature >450 ^{0}F and <1,350 ^{0}F on a rolling 4 hour average
  - Maintain catalyst pressure drop to < 2 inches water at 100% load plus or minus 10% from pressure drop determined during initial performance test (monitored monthly)
- Dual exhaust engines so six CPMS systems installed (two catalyst systems per engine)

Engine Case Study Operational Challenges

- Installed an add-on CPMS system to monitor inlet temperature and pressure drop – created additional data collection challenges
- Challenges demonstrating compliance with pressure drop due to irregular operating schedule and operating loads
- Subsequent performance testing schedule
  - NESHAP ZZZZ – semiannual for CO
  - NSPS JJJJ – 3 years or 8760 hrs of operation for NO_x & VOC

Engine Case Study Lessons Learned

- Future engines will have monitoring parameters pre-programmed to the control board for data capture
- Will ensure performance test company fully understands all aspects of the NSPS and NESHAP rules
- Extensive training of operators is required to maintain compliance with documentation/ recordkeeping requirements

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