



Federal Emission Standards for Stationary Reciprocating Internal Combustion Engines: Existing and Future

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October 25, 2007

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Overview

- Two existing and two proposed federal standards for stationary IC engines
- RICE MACT Standards (major sources, >500 HP)
- NSPS for Compression Ignition (CI) Engines
- Proposed NSPS for Spark Ignition (SI) Engines
- Proposed RICE MACT (major sources 500 hp or less and GACT standards)
- NCDAQ and SCBAQ presentations focus on permitting requirements



What is a “stationary engine”?

- In general are non-road engines used in a fixed location for at least one full year
- Mobile - portable (transportable)
- Technical Highlights Document EPA 420-F-02-034 provides good discussion of topic



Why regulate stationary internal combustion engines?



- Exhaust emissions: HAPs (e.g., formaldehyde), NO_x , PM, SO_2 , CO and VOC
- 1990 Clean Air Act Amendments
- Section 111(b) - New Source Performance Standards
- Section 112 - National Emission Standards for Hazardous Air Pollutants



Reciprocating Internal Combustion Engine (RICE) MACT - Applicability

- National Emissions Standard for Hazardous Air Pollutants (NESHAP) promulgated under 40 CFR Part 63 Subpart ZZZZ on June 15, 2004
- New and reconstructed RICE >500 HP located at a major source of HAP
- Compression ignition (CI) and spark ignition (SI)
- New sources - commenced construction (installed at the site) December 19, 2002 or later
- Existing 4SRB and all new RICE have regulatory requirements



RICE MACT - Applicability

- Existing 2SLB, existing 4SLB, and existing CI have no requirements
- Stationary RICE meeting any of the following criteria have no requirements except for an initial notification:
 - ◆ Emergency power (up to 50 hours non-emergency)
 - ◆ Limited use units (non-emergency, up to 100 hours)
 - ◆ Combust digester or landfill gas as primary fuel

RICE – Emission Limitations

- Control of CO (indicator of VOHAP destruction) or formaldehyde conc.
- CO controlled using catalyst
- CI – reduce CO by 70%, formaldehyde to 580 ppbvd
- 4SLB – CO by ~75%, 350 ppbvd
- 2SLB – 58%, 12 ppmvd or 17 ppmvd, depending upon date of mfr.
- 4SLB – 93%, 14 ppmvd



RICE – Testing/Monitoring

- CO CEMS – initial test of CEMS
RATA (inlet and outlet concentration)
- No CEMS:
 - ◆ Initial performance tests for CO destruction efficiency or formaldehyde outlet concentration + operating parameters established
 - ◆ Semi-annual performance test is required
 - ◆ Reduce to annual testing if 2 consecutive test OK



RICE – Operating Limits

- If catalyst used:
 - ◆ Catalyst pressure drop maintained near levels during testing
 - ◆ Maintain catalyst inlet operating temperature
- Catalytic system not used:
 - ◆ Comply with limits approved by Administrator (CPMS or CEMS required)





NSPS for Stationary CI Engines

- New Source Performance Standards (NSPS) promulgated on July 11, 2006 under 40 CFR 60 Subpart III
- Compression ignition (CI) engines (diesel)

NSPS for CI Engines – Applicability

- Any size (no lower cutoff)
- Owners/operators that commence construction, modification or reconstruction after July 11, 2005
- “Commence construction” is the date owner/operator orders engine
- Manufacturers beginning in 2007



NSPS for CI Engines – Emission Standards




- Hydrocarbon, NO_x, CO and PM
- Emission standards vary by size category
- Also service type: non-emergency, emergency and emergency fire pump
- Compliance for O/O is generally facilitated by requirements for certification by mfr. (2007 and later)
- Non-emergency comply with new off-road (OR) engine standards of 40 CFR 89 or 1039 (as early as 2008 for certain size engines)
- Standards vary by size/year (“tiers”)

NSPS for CI Engines – Emission Standards

- Standards for emergency generators and fire pump engines vary by size and date of mfr.
- Generally follow Part 89, 1039 or one of several tables in rule
- SO₂ regulated by fuel sulfur content
- June 1, 2007: 500 ppm low sulfur (0.05%)
- June 1, 2010: 15 ppm ULSD (0.0015%)
- Plan ahead so not stuck with higher sulfur fuel in tanks (could be especially important with tanks serving multiple engines w/different year models)





NSPS for CI Engines – Engine Selection



- Owners and operators caution in engine selection
- Pre-2007 engines are not necessarily certified
- Not all vendors and mfrs clearly understand underlying regulations
- Do not accept “EPA certified” as clear indication that engine compliant (certified to different “tiers”)



NSPS for CI Engines – Compliance Demonstration

- 2007 and later (except displacement 30 liters or greater) – maintain documentation of certification
- Pre-2007 – use one of 5 compliance options, including certification and testing
- 30 liters cylinder displacement or greater – testing is required (very few engines)



NSPS for CI Engines – Operating Standards

- Operate mfr. written procedures or those “approved by mfr.” (Will engine certification be compromised? Get in writing)
- Emergency – non-resettable hours meter, cannot exceed 100 hours/yr for non-emergency (no limit on emergency hours)



Proposed Standards

- Two proposed concurrently in same FR notice on June 12, 2006
- NSPS for spark ignition (SI) engines
- Modification to RICE NESHAP
- Court-ordered deadline to promulgate by Dec. 20, 2007

NSPS for SI Engines

- Similar in structure to CI engine NSPS, applying to manufacturers, owners and operators
- Emissions standards vary according to size/date/
service/fuel type
- No lower level cutoffs
- Distinctions made between gasoline, liquefied petroleum gas (LPG) and engines not falling in either category
- Applies to owners/operators of engines ordered June 12, 2006 or later



NSPS for SI Engines – Manufacturers




- Mfrs as early as July 1, 2007 (or later) depending upon size/service type
- Certification to nonroad SI engine standards under 40 CFR 90 if 19 KW (25 HP) or less
- Gasoline >19 KW (25 HP) certify to nonroad SI standards of 40 CFR Part 1048; if less than 40 KW (40 HP) may certify to 40 CFR 90

NSPS for SI Engines – Manufacturers

- Rich burn LPG >19 KW
(25 HP) certify to 40 CFR 1048;
if less than 40 KW (40 HP) may certify
to 40 CFR 90
- Engines not gasoline or RB LPG >19
KW that are not gasoline or RB LPG
may certify engines to specified
emission levels under a voluntary
certification program





NSPS for SI Engines – Emission Standards (Operators)

- Purchase engine certified to emission standards, or initial performance testing
- If using performance testing option, engines > 500 HP must test every 3 years
- Operate mfr. written procedures or those “approved by mfr.” (in writing, will engine certification be compromised?)



NSPS for SI Engines – Emission Standards (Operators)

- Standards maintained for “useful life” of equipment (specified in regulation)
- Emergency – non-resettable hours meter, cannot exceed 100 hours/yr for non-emergency use (no limit on emergency hours)

Proposed RICE NESHAP

- Proposed standards on June 12, 2006
- Modify 40 CFR 63 Subpart ZZZZ
- Recap: current standards apply to new CI and SI engines and existing 4SRB > 500 HP at MAJOR SOURCES
- Substantial changes to text for engines > 500 HP at major sources, but no changes to requirements



Proposed RICE NESHAP – Applicability



- Proposed rule will apply to new and reconstructed RICE:
 - ◆ 500 HP or less at major sources
 - ◆ Any size at area sources (emission of HAP <10 tpy single or <25 tpy cumulative HAP)
- New if constructed on or after June 12, 2006

Proposed RICE NESHAP – Emission Standards



- Generally follow CI and SI NSPS
- 4SRB, 2SLB: same NMHC standard as SI
- ≤500 hp 4SLB at major sources
 - ◆ 250-500 hp: oxidation catalysts (93% CO reduction or 14 ppmvd formaldehyde)
- <250 hp —same NMHC standard as SI NSPS
- CI: same PM and HC standard as CI



Proposed RICE NESHAP – Emission Standards

- LPG/DG: same NMHC standard as SI NSPS
- Emergency: same NMHC standard as SI NSPS
- Emergency RICE :
 - ◆ Non-resettable hours meter, document <100 hr/yr (Keep records of proper maintenance)



Proposed RICE NESHAP - Compliance

- Initial compliance testing for all non-certified engines
- Testing every 3 years or 8,760 hrs for non-certified engines >500 HP
- No additional testing for engines smaller than 500 HP unless rebuilt or major repair/maintenance





Proposed RICE NESHAP – Compliance

- Recordkeeping of proper maintenance for all engines < 500 HP
- Reporting – EPA attempting to reduce reporting redundancy with NSPS and clarify which General Provisions apply