Overview of Stationary RICE NESHAP

SIPRAC
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RICE NESHAP – Overview

- 40 CFR part 63 subpart ZZZZ

- Regulates emissions from stationary reciprocating internal combustion engines (RICE) at both major and area sources of hazardous air pollutants
  - All sizes of engines are covered
  - Estimate more than 1 million stationary RICE in U.S.

- Typical applications include:
  - Power generation (including emergency backup power)
  - Oil and gas production and transmission
  - Pumping water (wastewater, irrigation, fire suppression)
  - Industrial process (compressors, rock crushers, welders)
Acronyms

- CI: compression ignition (diesel)
- SI: spark ignition (gas [natural gas, landfill gas, gasoline, propane, etc.])
  - 2SLB: 2-stroke lean burn
  - 4SLB: 4-stroke lean burn
  - 4SRB: 4-stroke rich burn
  - LFG/DG: landfill gas/digester gas

Notes:
- 2-stroke: power cycle completed in 1 revolution of crankshaft
- 4-stroke: power cycle completed in 2 revolutions of crankshaft
- Lean burn: higher air/fuel ratio (fuel-lean)
- Rich burn: lower air/fuel ratio (fuel-rich)
Stationary vs. Nonroad

- Stationary means not used in a motor vehicle and not a nonroad engine
  - Nonroad engines are:
    - Self-propelled (tractors, bulldozers)
    - Propelled while performing their function (lawnmowers)
    - Portable or transportable (has wheels, skids, carrying handles, dolly, trailer, or platform)
  - Portable nonroad becomes stationary if it stays in one location for more than 12 months (shorter time period if seasonal source)
### Covered engines > 500 HP located at major sources

- **2004 rule**
  - **Existing**
  - **New**
**RICE NESHAP: 2008**

<table>
<thead>
<tr>
<th>MAJOR SOURCES</th>
<th>AREA SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXISTING</strong></td>
<td><strong>EXISTING</strong></td>
</tr>
<tr>
<td>≤ 500 HP</td>
<td>2008 rule</td>
</tr>
<tr>
<td>&gt; 500 HP</td>
<td>2004 rule</td>
</tr>
<tr>
<td><strong>NEW</strong></td>
<td><strong>NEW</strong></td>
</tr>
</tbody>
</table>

Added new engines ≤ 500 HP located at major sources, plus all new engines at area sources.
## RICE NESHAP: 2010

<table>
<thead>
<tr>
<th>Major Sources</th>
<th>Area Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td><strong>Existing</strong></td>
</tr>
<tr>
<td>≤ 500 HP</td>
<td>≤ 500 HP</td>
</tr>
<tr>
<td>2010 rules</td>
<td>2010 rules</td>
</tr>
<tr>
<td>NEW</td>
<td>NEW</td>
</tr>
<tr>
<td>2008 rule</td>
<td>2010 rules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>≥ 500 HP</th>
<th>≥ 500 HP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td><strong>Existing</strong></td>
</tr>
<tr>
<td>2004 rule</td>
<td>2010 rules</td>
</tr>
<tr>
<td><strong>New</strong></td>
<td><strong>New</strong></td>
</tr>
<tr>
<td>2004 rule</td>
<td>2008 rule</td>
</tr>
</tbody>
</table>

**2010 rule (non-emergency CI)**

Added existing engines ≤ 500 HP located at major sources, all existing engines at area sources, and existing non-emergency CI engines >500 HP at major sources.
RICE NESHAP Applicability

- Engines >500 HP at major source
  - Existing if constructed before December 19, 2002
  - New if constructed on or after December 19, 2002
  - Reconstructed if reconstruction began after December 19, 2002

- Engines ≤500 HP located at major source of HAP, and engines of all HP located at an area source of HAP
  - Existing if constructed before June 12, 2006
  - New if constructed on or after June 12, 2006
  - Reconstructed if reconstruction began after June 12, 2006

- Existing emergency engines located at residential, institutional, or commercial area sources are not covered
  - Engine must meet subpart ZZZZ definition of emergency engine
EPA Emergency Engine Requirements

- No limits on hours of operation for emergency service
- Maintenance checks & readiness testing limited to 100 hrs/yr
  - If engine is >500 HP, located at a major source, and installed prior to June 12, 2006, there is no limit on maintenance/testing hours
- 50 hrs/yr allowed for non-emergencies
  - Counts as part of the 100 hr/yr maintenance & testing limit
- Engine cannot be used for peak shaving or as part of financial arrangement with another entity, except 15 of the 50 non-emergency hrs/yr can be used for demand response in emergency situations (e.g., imminent blackout)
  - Engines that are >500 HP, located at a major source, and installed prior to June 12, 2006 do not have the allowance for 15 hours of demand response
According to Sec. 22a–174–22(a)(3) of the RCSA, “emergency engine” means a stationary reciprocating engine or a turbine engine which:

- Provides mechanical/electrical power only during periods of
  - testing and scheduled maintenance or
  - during an emergency or
  - in accordance with a contract ensuring electricity for use within the state of CT during an OP–4, Step 6 event

- Does not include an engine for which the owner/operator is party to any other agreement to sell electrical power from such engine to an electricity supplier, or otherwise receives any reduction in the cost of electrical power for agreeing to produce power during periods of reduced voltage or reduced power availability.

**Note:** Engines operating under RCSA Sections 22a–174–3b and 3c must comply with additional requirements
# Federal vs. State Requirements

<table>
<thead>
<tr>
<th>Federal Only</th>
<th>Common to Both</th>
<th>State Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maintenance checks/readiness testing: 100 hr/yr limit</td>
<td>• Emergency hrs of operation: no limit (unless subject to 22a–174–3b or 3c)</td>
<td>• Only operate during emergencies, maintenance/scheduled testing, or during an OP–4, Step 6 event</td>
</tr>
<tr>
<td>• Non-emergencies: 50 hr/yr limit</td>
<td>• Engine cannot be used as part of any other agreement or financial arrangement with another entity</td>
<td>If operating under RCSA Sec. 22a–174–3b:</td>
</tr>
<tr>
<td>• 15 of the 50 non-emergency hrs can be used for emergency demand response</td>
<td></td>
<td>• Emergency hrs of operation: 300 hr/yr limit</td>
</tr>
<tr>
<td>(e.g., imminent blackout)</td>
<td></td>
<td>• Any nongaseous fuel consumed by engine shall not exceed sulfur content of 0.0015%, dry basis</td>
</tr>
<tr>
<td>• Cannot be used for peak shaving</td>
<td></td>
<td>If operating under RCSA Sec. 22a–174–3c:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No restriction on hours of use or fuel sulfur content however total facility purchases of fuel are very extremely limited</td>
</tr>
</tbody>
</table>
## Emission Standards – Existing RICE Located at Major Sources

<table>
<thead>
<tr>
<th>HP</th>
<th>Engine Subcategory</th>
<th>Non–emergency</th>
<th>Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>Work practice standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100–300</td>
<td>230 ppm CO</td>
<td>225 ppm CO</td>
<td>47 ppm CO</td>
</tr>
<tr>
<td></td>
<td>or 70% CO reduction</td>
<td></td>
<td>10.3 ppm CH₂O</td>
</tr>
<tr>
<td>300–500</td>
<td>49 ppm CO or 70% CO reduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;500</td>
<td>23 ppm CO or 70% CO reduction</td>
<td>No standards (2004 rule)</td>
<td>No standards (2004 rule)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>350 ppb CH₂O or 76% CH₂O reduction (2004 rule)</td>
<td>No standards (2004 rule)</td>
</tr>
</tbody>
</table>

- Limits in yellow are expected to require emissions control retrofit

Note: Existing limited use engines >500 HP at major sources do not have to meet any emission standards. Existing black start engines ≤500 HP at major sources must meet work practice standards.
# Emission Standards – New RICE Located at Major Sources

<table>
<thead>
<tr>
<th>HP</th>
<th>Engine Subcategory</th>
<th>Non–emergency</th>
<th>Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤250</td>
<td>CI</td>
<td>Comply with CI NSPS</td>
<td>Comply with CI/SI NSPS</td>
</tr>
<tr>
<td></td>
<td>SI 2SLB</td>
<td>Comply with SI NSPS</td>
<td>Comply with SI NSPS</td>
</tr>
<tr>
<td></td>
<td>SI 4SLB</td>
<td>Comply with SI NSPS</td>
<td>Comply with SI NSPS</td>
</tr>
<tr>
<td></td>
<td>SI 4SRB</td>
<td>Comply with SI NSPS</td>
<td>Comply with SI NSPS</td>
</tr>
<tr>
<td></td>
<td>SI LFG/DG</td>
<td>Comply with SI NSPS</td>
<td>Comply with SI NSPS</td>
</tr>
<tr>
<td>250–500</td>
<td>14 ppm CH₂O or 93% CO reduction (also comply with SI NSPS)</td>
<td>14 ppm CH₂O or 93% CO reduction (also comply with SI NSPS)</td>
<td>14 ppm CH₂O or 93% CO reduction (also comply with SI NSPS)</td>
</tr>
<tr>
<td>&gt;500</td>
<td>580 ppb CH₂O or 70% CO reduction (also comply with CI NSPS)</td>
<td>350 ppb CH₂O or 76% CH₂O reduction (also comply with SI NSPS)</td>
<td>No standards (also comply with SI NSPS)</td>
</tr>
<tr>
<td></td>
<td>12 ppm CH₂O or 58% CO reduction (also comply with SI NSPS)</td>
<td>350 ppb CH₂O or 76% CH₂O reduction (also comply with SI NSPS)</td>
<td>No standards (also comply with CI/SI NSPS)</td>
</tr>
</tbody>
</table>

Notes: New limited use engines >500 HP at major sources do not have to meet any emission standards under the NESHAP. New engines may also be subject to the NSPS.

Limits in yellow are expected to require emissions control retrofit.
# Emission Standards – Existing RICE Located at Area Sources

<table>
<thead>
<tr>
<th>HP</th>
<th>Engine Subcategory</th>
<th>Non–emergency</th>
<th>Emergency or Black start</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CI</td>
<td>SI 2SLB</td>
<td>SI 4SLB</td>
</tr>
<tr>
<td>≤300</td>
<td>Mgmt practice standards</td>
<td>Mgmt practice standards</td>
<td>Mgmt practice standards</td>
</tr>
<tr>
<td>300–500</td>
<td>49 ppm CO or 70% CO reduction*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;500</td>
<td>23 ppm CO or 70% CO reduction*</td>
<td>47 ppm CO or 93% CO reduction**</td>
<td>2.7 ppm CH₂O or 76% CH₂O reduction**</td>
</tr>
</tbody>
</table>

Limits in yellow are expected to require emissions control retrofit.

*Except engines in rural Alaska
**If engine used >24 hrs/yr
Emission Standards – New RICE Located at Area Sources

- Meet Stationary Engine NSPS
  - CI: part 60 subpart IIII
  - SI: part 60 subpart للاال
## Compliance Requirements

<table>
<thead>
<tr>
<th>Engine Subcategory</th>
<th>Compliance Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXISTING NON-EMERGENCY ENGINES</strong></td>
<td></td>
</tr>
</tbody>
</table>
| At Major Source | • Initial emission performance test  
• Subsequent performance testing every 8,760 hours of operation or 3 years for engines >500 HP (5 years if limited use)  
• Operating limitations – catalyst pressure drop and inlet temperature for engines >500 HP  
• Notifications  
• Semiannual compliance reports (annual if limited use)  |
| • CI ≥100 HP  
• SI 100–500 HP |  |
| At Area Source |    |
| • CI >300 HP  
• SI >500 HP (4SLB or 4SRB and used >24 hrs/year) |  |
| Existing non-emergency CI >300 HP: |  |
| • Ultra low sulfur diesel (except rural Alaska)  
• Crankcase emission control requirements |
## Compliance Requirements

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>EXISTING ENGINES</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **At Major Source**      | **<100 HP**  
  • Emergency/black start ≤500 HP                                                                                                               |
| **At Area Source**       | **Emergency/black start**  
  **Non-emergency CI ≤300 HP**  
  **Non-emergency SI ≤500 HP**  
  **Non-emergency SI 2SLB >500 HP**  
  **Non-emergency SI LFG/DG >500 HP**  
  **Non-emergency SI >500 HP**  
  (4SLB or 4SRB and used ≤24 hrs/year)                                                                 |
|                          | **Change oil/filter, inspect air cleaner or spark plugs, hoses/belts on prescribed schedule**  
  **Operate/maintain engine & control device per manufacturer’s instructions or owner-developed maintenance plan**  
  **May use oil analysis program instead of prescribed oil change frequency**  
  **Emergency engines must have hour meter and record hours of operation**  
  **Keep records of maintenance**  
  **Notifications not required** |
Compliance Requirements

<table>
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<tbody>
<tr>
<td>NON-EMERGENCY ENGINES</td>
<td></td>
</tr>
<tr>
<td>At Major Source</td>
<td></td>
</tr>
<tr>
<td>• Existing/new 4SRB &gt;500 HP</td>
<td>• Initial emission performance test</td>
</tr>
<tr>
<td>• New SI 2SLB &gt;500 HP</td>
<td>• Subsequent performance testing semianually (can reduce frequency to annual)*</td>
</tr>
<tr>
<td>• New SI 4SLB &gt;250 HP</td>
<td>• Operating limitations – catalyst pressure drop and inlet temperature</td>
</tr>
<tr>
<td>• New CI &gt;500 HP</td>
<td>• Notifications</td>
</tr>
<tr>
<td></td>
<td>• Semiannual compliance reports</td>
</tr>
</tbody>
</table>

*Subsequent testing required for 4SRB engine complying with CH2O % reduction only if engine is ≥5,000 HP
## Compliance Requirements

<table>
<thead>
<tr>
<th>Engine Subcategory</th>
<th>Compliance Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• New emergency/limited use &gt;500 HP at major source</td>
<td>• Initial notification only</td>
</tr>
</tbody>
</table>
| • New non-emergency LFG/DG >500 HP at major source | • Initial notification  
  • Monitor/record fuel usage daily  
  • Annual report of fuel usage |
Notifications and Reporting

Notifications
- Applicability—120 days after effective date or construction/reconstruction
- Actual startup—15 days after actual startup
- Performance test—60 days prior to test
- Initial Notification of Compliance—60 days after compliance demonstrated

Compliance Reports
- Semiannual or annual depending on engine

When are these required?
- Notifications/reports generally required for engines subject to numeric CO or formaldehyde limits
- Exception—Initial notification only for new engines >500 HP at major sources that are emergency, limited use, or LFG/DG
Startup, Shutdown, Malfunction: Response to Court Decision

- Emission standards apply during shutdowns and malfunctions
- Startup and idling time must be kept to 30 minutes or less, after which, normal standards apply [40 CFR 63.6625(h)]
- Also applies to engines covered by 2004 and 2008 RICE NESHAP
Key Dates

- Initial applicability notifications for engines subject to 2010 amendments were due by:
  - August 31, 2010 for existing CI RICE
  - February 16, 2011 for existing SI RICE

- Compliance dates:
  - June 15, 2007
    - Existing RICE >500 HP at major sources (except non-emergency CI >500 HP at major sources)
  - May 3, 2013
    - Existing CI RICE (except emergency CI >500 HP at major sources)
  - October 19, 2013
    - Existing SI RICE ≤500 HP at major sources and all HP at area sources
  - Upon startup for new engines
RICE NESHAP – Next Steps

- Petitions for reconsideration and review
  - 15 hours for emergency demand response
  - Final determination has not been made

- Implementation materials
  - [http://www.epa.gov/ttn/atw/rice/ricepg.html#IMP](http://www.epa.gov/ttn/atw/rice/ricepg.html#IMP)
    - Example notifications
    - Example compliance reports
    - Applicability flow chart
    - Summary table with applicable requirements
    - Implementation software
Stationary CI Engine NSPS

- 40 CFR part 60 subpart III
- Affects new, modified, and reconstructed stationary CI engines
- Initially promulgated on July 11, 2006
- Amendments signed June 28, 2011
Who is Subject to the CI NSPS?

- Manufacturers of 2007 model year or later stationary CI engines <30 liters/cylinder displacement
  - Model years differ for fire pump engines

- Owners/operators of engines
  - modified/reconstructed after 7/11/2005
Emission Standards

- Phased in over several years and have Tiers with increasing levels of stringency
- Output-based, units of g/KW–hr (g/HP–hr)
- Pollutants: NOx, PM, CO, NMHC
- Smoke standards as a %
- SOx reduced through use of low sulfur fuel
- Modeled after EPA’s standards for nonroad and marine engines
CI Engine NSPS – Compliance

- Engine manufacturers must certify 2007 model year and later engines with a displacement <30 liters/cylinder
  - Certification = EPA Certificate of Conformity
- Owner/operator complies by:
  - Purchasing certified engine
  - Install, configure, operate and maintain engine per manufacturer’s instructions or manufacturer-approved procedures
  - Owner/operator performance testing not required
Stationary SI Engine NSPS

- 40 CFR part 60 subpart JJJJ
- Affects new, modified, and reconstructed stationary SI engines
- Initially promulgated on January 18, 2008
- Amendments signed June 28, 2011
Who is Subject to the SI NSPS?

Manufacturers of stationary SI engines:
- ≤25 HP and manufactured on/after 7/1/2008
- >25 HP, gasoline or rich burn LPG, manufactured on/after 7/1/2008 (on/after 1/1/2009 for emergency engines)
- voluntarily certified engines manufactured on/after
  - 7/1/2007 >500 HP (except lean burn 500≤HP<1,350)
  - 1/1/2008 lean burn 500≤HP<1,350
  - 7/1/2008 <500 HP
  - 1/1/2009 emergency engines
Who is Subject to the SI NSPS? (cont’d)

Owners/operators of engines:

- constructed after 6/12/2006 and
  - >500 HP manufactured on/after 7/1/2007 (except lean burn 500≤HP<1,350)
  - lean burn 500≤HP<1,350 manufactured on/after 1/1/2008
  - <500 HP manufactured on/after 7/1/2008
  - emergency >25 HP manufactured on/after 1/1/2008
- modified/reconstructed after 6/12/2006
Emission Standards

- Phased in over several years and have Tiers with increasing levels of stringency
- Output-based, units of g/KW-hr (g/HP-hr)
- ppmvd@15% O_2 standards for some engines
- Pollutants: NOx, CO, VOC
- Sulfur limit on gasoline
- Some standards modeled after EPA’s standards for nonroad SI engines
SI Engine NSPS – Compliance

- Engine manufacturers must certify engines $\leq 25$ HP, gasoline engines, and rich burn LPG engines
- Engine manufacturers can elect to certify other engines
- Owner/operator complies by either:
  - If certified engine, install, configure, operate and maintain engine per manufacturer’s instructions or manufacturer-approved procedures
  - If uncertified, conduct performance test (requirements vary depending on engine size)
Contact Information

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