Emissions and Air Permitting Requirements for Standby Generator Sets

PowerHour webinar series for consulting engineers
Experts you trust. Excellence you count on.

May 25th 1PM CST / 11 AM PST
(1 PDH issued by Cummins Inc.)
Welcome!

Cummins PowerHour webinar series is designed to help our engineer partners to...

- Keep up to date on products, technology, and codes and standards development
- Interact with Cummins experts and gain access to ongoing technical support
- Participate at your convenience, live or on-demand
- Earn Professional Development Hours (PDH)

Technical tips:
- Audio is available through teleconference or Zoom application.
- Attendees are in “listen only” mode throughout the event.
- Use the Zoom Q&A Panel to submit questions, comments, and feedback throughout the event. Time is allotted at the end of the PowerHour to address Q&A.
- If the audio connection is lost, disconnected or experiences intermittent connectivity issues, please check your audio connection through the "Join Audio" or "Audio Connectivity" button at the bottom left of the Zoom application.
- Report technical issues using the Zoom Q&A Panel.
Disclaimer

The views and opinions expressed in this course shall not be considered the official position of any regulatory organization and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Participants are encouraged to refer to the entire text of all referenced documents. In addition, when in doubt, reach out to the Authority Having Jurisdiction.
Meet your panelists

Cummins instructors:

- Michael Sanford
  Product Strategy and Sales Enablement Leader
  Cummins Inc.

- Brian Pumphrey
  Director of Sales Application Engineering Wester USA
  Cummins Inc.

- Scott Thomas
  Director of Sales Application Engineering – Southern USA
  Cummins Inc.

- Mandy Memari
  Emissions Compliance Leader
  Cummins Inc.

Cummins facilitator:

- Chad Hale
  Technical Marketing Specialist
  Cummins Inc.

Your local Cummins contacts

- WA, OR, AK: Dennis Tarr (dennis.tarr@cummins.com)
- CA, HI: Brian Pumphrey (brian.pumphrey@cummins.com)
- CA: Donald Sosa (donald.sosa@cummins.com)
- AZ, ID, NM, NV: Carl Knapp (carl.knapp@cummins.com)
- CO, MT, ND, UT, WY: Christopher Scott (christopher.scott@cummins.com)
- NE, SD, KS: Earnest Glaser (earnest.glaser@cummins.com)
- OK, AR: Wes Ruebman (wes.ruebman@cummins.com)
- TX: Scott Thomas (m.scott.thomas@cummins.com)
- DE, MN, ND, OH, WI, WV: Michael Munson (michael.s.munson@cummins.com)

- Northern IL, MI, IA: John Kilinski (john.a.kilinski@cummins.com)
- IL, IN, KY, MO: Jeff Yates (jeffrey.yates@cummins.com)
- TN, GA: Mariano Rojas (mariano.rojas@cummins.com)
- LA, MS, AL: Trina Casbon (trina.casbon@cummins.com)
- NC, SC, VA: Bill Morris (william.morris@cummins.com)
- FL: Bob Kelly (bob.kelly@cummins.com)
- MA, ME, NH, RI, VT: Jim Howard (james.howard@cummins.com)
- CT, MD, NJ, NY: Charles Attisani (charles.attisani@cummins.com)
- PA, MD: Brian Cathcart (brian.cathcart@cummins.com)
- Canada: Ian Lindquist (ian.lindquist@cummins.com)
Course Objectives

Emissions and Air Permitting Requirements for Standby Generator Sets

Air permitting for standby generator sets can vary wildly from site to site and when misunderstood can have a major impact on project success. Although EPA regulations have stabilized and are thought to be well understood, ever-increasing local requirements are changing the criticality of air permitting for engine-driven generator sets.

This course will provide a brief overview of regulated emissions constituents and their formation in order to provide a foundational understanding of engine emissions. Next, the EPA’s New Source Performance Standards (NSPS) will be reviewed as it relates to both compression ignited (diesel) and spark ignited (natural gas or propane) engine equipped generator sets. Participants will gain an awareness of common pitfalls related to emissions permitting and will be introduced to various strategies employed to meet local emissions regulations.

After completing this course, participants will be able to:

• Recognize commonly regulated exhaust emissions constituents.
• Describe EPA emissions requirements for diesel and gaseous standby generator sets.
• Identify common requirements for permitting engine-driven generator sets.
What are some common air quality permitting requirements that apply to stationary emergency generator sets?
Exhaust Emissions Formation

\[ C_xH_yS_z + O_2+N_2 = CO_2+H_2O+O_2+N_2 \]

Fuel + Air = Major Exhaust Constituents

\[ NO_x+HC+CO+SO_x+C \]

Trace Exhaust Components
# Exhaust Emissions Formation

<table>
<thead>
<tr>
<th>What is it?</th>
<th>How is it formed?</th>
<th>CI</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO\textsubscript{x}</td>
<td>Oxides of nitrogen (NO and NO\textsubscript{2})</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Forms at high in-cylinder temperatures, most prominent during high engine load.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>Over 100 different types of hydrocarbons</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Product of incomplete combustion, most prominent during low engine load.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMHC</td>
<td>Non-methane hydrocarbons, subset of total hydrocarbons</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Product of incomplete combustion, dependent on fuel composition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile organic compounds</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primarily hydrocarbons but may include other compounds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td>Anything that is trapped on or condenses onto a filter</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Most prominent during low load operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Product of imperfect combustion, most prominent during low engine load.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO\textsubscript{x}</td>
<td>Oxides of sulfur (SO and SO\textsubscript{2})</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Product of combustion process when sulfur is present. Increases linearly with fuel consumption.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
New Source Performance Standards (NSPS) for Compression-Ignited and Spark-Ignited engines
What is NSPS?

New Source Performance Standards
What is NSPS?

New Source Performance Standards

Emissions limits, operational guidelines and test methodologies
What is NSPS?

New Source Performance Standards

Emissions limits, operational guidelines and test methodologies

Source of emissions, when manufactured or installed
Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
## Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
- Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0-10</td>
<td>(7.5) / 8.0 / 0.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-18</td>
<td></td>
<td>(7.5) / 6.6 / 0.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-36</td>
<td>25-48</td>
<td>(7.5) / 5.5 / 0.30</td>
<td>(4.7) / 5.5 / 0.03</td>
<td>Emergency: Stay at previous tier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37-55</td>
<td>49-74</td>
<td>Optional T4i 0.30 PM</td>
<td>(4.7) / 5.0 / 0.03</td>
<td>Emergency: Stay at previous tier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56-129</td>
<td>75-173</td>
<td>Tier 3</td>
<td>3.4 / 0.19 / 5.0 / 0.02 Tier 3</td>
<td>0.40 / 0.19 / 5.0 / 0.02 Tier 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130-560</td>
<td>174-751</td>
<td>Tier 3</td>
<td>2.0 / 0.19 / 3.5 / 0.02 Tier 3</td>
<td>0.40 / 0.19 / 3.5 / 0.02 Tier 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 560</td>
<td>&gt; 751</td>
<td>Tier 2</td>
<td>3.5 / 0.40 / 3.5 / 0.10 Tier 2</td>
<td>3.5 / 0.19 / 3.5 / 0.04 Tier 2</td>
<td>0.67 / 0.40 / 3.5 / 0.10 (a)</td>
<td>0.67 / 0.19 / 3.5 / 0.03 (b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T2 T3</td>
<td>Tier 4 Interim</td>
<td>Tier 4 Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Requirements for EPA Certified Engines

• Engines are certified, not generator sets.
• Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.
• Emissions levels are evaluated on a standardized test cycle including engine load and pollutant weighting following a specific test method in a test-cell environment.

![Engine Load Diagram]
Requirements for EPA Certified Engines

- Engines are certified, not generator sets.
- Engines are required to meet emissions levels based on their date of manufacture, usage and brake horsepower rating.
- Emissions levels are evaluated on a standardized test cycle including engine load and pollutant weighting following a specific test method in a test-cell environment.
- Engines and emissions control devices must be certified as a complete solution by the engine manufacture (field upfit or third-party installations cannot meet certification requirements).
Stationary and Nonroad Engines

Stationary
- On site for at least 12 consecutive months.
- Unable to be mounted on a trailer or be mobilized.

Nonroad
- No movement or operation restrictions.
- Must comply most stringent emissions requirements.
Stationary Emergency Operation

• Emergency standby (safe evacuation, life support)
• Legally required standby (fire-fighting operations)
• Optional standby (could cause an economic loss)
Stationary Emergency Operation

• Unlimited use during emergencies.
Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)
Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)
  - Emergency Demand Response (EDR) allowance vacated in May 2015
Stationary Emergency Operation

- Unlimited use during emergencies.
- Up to 100 hours per year allowed for:
  - Maintenance and testing
  - Up to 50 hours per year for non-emergency operation (restrictions apply)
  - Emergency Demand Response (EDR) allowance vacated in May 2015

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with applicable limits of U.S. EPA New Source Performance Standards for stationary emergency engines.
Stationary Non-Emergency Operation

Remote mining site including two DQGAS (1500 kWe) generator sets.

Combined heat and power project producing steam with one C2000 N5C (2000 kWe) generator set.
Stationary Non-Emergency Operation

• Demand Response
• Peak shaving (reduce or flatten peak electricity use)
• Rate curtailment (favorable energy rates)
• Interruptible rate programs (favorable energy rates)
• Continuous base load (constant power to utility grid)
• Co-generation, combined heat and power (capture and use waste heat)
• Prime power generator set (to be used as a primary source of power)
Stationary Non-Emergency Operation

• Demand Response
• Peak shaving (reduce or flatten peak electricity use)
• Rate curtailment (favorable energy rates)
• Interruptible rate programs (favorable energy rates)
• Continuous base load (constant power to utility grid)
• Co-generation, combined heat and power (capture and use waste heat)
• Prime power generator set (to be used as a primary source of power)

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with applicable limits of U.S. EPA New Source Performance Standards for stationary non-emergency engines.
The EPA designates certification requirements for ______ based on ______ and ________.

a) Generator Sets, Electrical Output, NEC Load Type
b) Engines, Brake Power, Usage
c) Power production equipment, Alternator rating, ISO 8528 rating
Concept Check

The EPA designates certification requirements for ________ based on ________ and _________.

a) Generator Sets, Electrical Output, NEC Load Type
b) Engines, Brake Power, Usage

c) Power production equipment, Alternator rating, ISO 8528 rating
New Source Performance Standards (NSPS) for Stationary CI engines

Title 40, Part 60: Subpart I III
Evolution of NSPS CI Engine Regulations

EPA Non-Road / Stationary Non-Emergency Engines >751 HP

<table>
<thead>
<tr>
<th>Tier</th>
<th>NOx (g/kW-hr)</th>
<th>PM (g/kW-hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 (2000)</td>
<td>9.20</td>
<td>0.03</td>
</tr>
<tr>
<td>Tier 2 (2006)</td>
<td>6.40</td>
<td>0.10</td>
</tr>
<tr>
<td>Tier 4 (2015)</td>
<td>0.67</td>
<td>0.20</td>
</tr>
<tr>
<td>Tier 4i (2011)</td>
<td>0.03</td>
<td>0.54</td>
</tr>
</tbody>
</table>
# EPA NSPS for CI Engines

## Regulated Emissions Levels

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>0-10</td>
<td>(7.5) / 8.0 / 0.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-18</td>
<td>11-24</td>
<td>(7.5) / 6.6 / 0.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-36</td>
<td>25-48</td>
<td>(7.5) / 5.5 / 0.30</td>
<td>(4.7) / 5.5 / 0.03</td>
<td>Emergency: Stay at previous tier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37-55</td>
<td>49-74</td>
<td>Optional T4i 0.30 PM</td>
<td>(4.7) / 5.0 / 0.03</td>
<td>Emergency: Stay at previous tier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56-129</td>
<td>75-173</td>
<td>Tier 3</td>
<td>3.4 / 0.19 / 5.0 / 0.02 Tier 3</td>
<td>0.40 / 0.19 / 5.0 / 0.02 Tier 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130-560</td>
<td>174-751</td>
<td>Tier 3</td>
<td>2.0 / 0.19 / 3.5 / 0.02 Tier 3</td>
<td>0.40 / 0.19 / 3.5 / 0.02 Tier 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 560</td>
<td>&gt; 751</td>
<td>Tier 2</td>
<td>3.5 / 0.40 / 3.5 / 0.10 Tier 2</td>
<td>3.5 / 0.19 / 3.5 / 0.04 Tier 2</td>
<td>0.67 / 0.40 / 3.5 / 0.10 (a)</td>
<td>0.67 / 0.19 / 3.5 / 0.03 (b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>T3</td>
<td>Tier 4 Interim</td>
<td>Tier 4 Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Applies to non-emergency power gen engines > 900kW (> 1207hp).
(b) Applies to non-emergency power gen engines > 560kW (> 751hp).

Emergency engine tier levels shown in **RED**

NOx / NMHC / CO / PM (g/kW-hr)

(NOx+NMHC) / CO / PM (g/kW-hr)

Certified product follows ISO 8178 D2 - 5 Mode Test Cycle for constant speed engines
EPA NSPS for CI Engines

Pollutant and Engine Load Weighting

Engine Load

Weighting

10%  25%  50%  75%  100%

0.10  0.30  0.30  0.25  0.05
EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)
EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)
EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)

CI Engine may only operate as certified by engine manufacturer (e.g. Stationary Emergency).
EPA NSPS for CI Engines

Mandatory Manufacturer Certification

CI Engines including exhaust aftertreatment must be certified as a complete solution by engine manufacturer.

- Stationary Emergency (e.g. Tier 2)

CI Engines certified Stationary Emergency may be upfit with aftertreatment provided by the engine manufacturer or third-party to meet targeted emissions levels.

- Stationary Emergency certified with third-party provided aftertreatment meeting Stationary Non-Emergency limits (e.g. Tier 4)

CI Engine may only operate as certified by engine manufacturer (e.g. Stationary Emergency).

**COMPLIANCE ≠ CERTIFICATION**
New Source Performance Standards (NSPS) for Stationary SI engines
Title 40, Part 60: Subpart JJJJJ
## EPA NSPS for SI Engines

### Regulated Emissions Levels

<table>
<thead>
<tr>
<th>Mandatory or Voluntary</th>
<th>NG / LPG: Non-emergency</th>
<th>Natural Gas / LPG: Emergency</th>
<th>Landfill / Digester Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong> LPG RB</td>
<td>26-99 &gt;100</td>
<td>26-129 &gt;130</td>
<td>All 26-129 &gt;130</td>
</tr>
<tr>
<td><strong>V</strong> NG RB</td>
<td>26-99 &gt;100</td>
<td>90.103 phase 1 class II cert: (10) / 387</td>
<td>2.0 / 5.0 / 1.0</td>
</tr>
<tr>
<td><strong>V</strong> NG LB</td>
<td>26-99 &gt;100</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>V</strong> LPG LB</td>
<td>26-99 &gt;100</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>V</strong> All LB &amp; RB</td>
<td>All</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOx/CO/VOC (g/bhp-hr)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(NOx + HC) / CO (g/bhp-hr)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notes</td>
<td>1. Gasoline engine requirements are same as those for RB LPG.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. All new engines &lt; 25 hp must be certified to Part 90 on July 1, 2008.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Engines ≤ 40 hp that are ≤ 1000 cc may instead comply with Part 90.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Emergency engines limited to 100 hours per year for maintenance and testing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. O/O of new non-emergency LB SI engines ≥250hp at a major source complying with</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 CFR 63 ZZZZ Table 2a do not have to comply with CO emissions of above table</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# EPA NSPS for SI Engines

## Regulated Emissions Levels

<table>
<thead>
<tr>
<th>Mandatory or Voluntary</th>
<th>NG / LPG: Non-emergency</th>
<th>Natural Gas / LPG: Emergency</th>
<th>Landfill / Digester Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>NG RB 26-99 &gt;100 1048 or for on-site ver. use 1048.101(c) for in-field test 1.0 / 2.0 / 0.7</td>
<td>NG &amp; LB LPG 26-129 &gt;130 90.103 phase 1 class II cert: (10) / 387 2.0 / 4.0 / 1.0</td>
<td>All LB &amp; RB All 2.0 / 5.0 / 1.0</td>
</tr>
<tr>
<td></td>
<td>NG LB 26-99 &gt;100 1048 or for on-site ver. use 1048.101(c) for in-field test 1.0 / 2.0 / 0.7</td>
<td>LPG LB 26-99 &gt;100 1048 or for on-site ver. use 1048.101(c) for in-field test 1.0 / 2.0 / 0.7</td>
<td>All LB &amp; RB All 2.0 / 5.0 / 1.0</td>
</tr>
<tr>
<td></td>
<td>LPG RB &gt;25 1048 cert: (2.7)/4.4</td>
<td>LPG RB 26-129 &gt;130 90.103 phase 1 class II cert: (10) / 387 2.0 / 4.0 / 1.0</td>
<td>All LB &amp; RB All 2.0 / 5.0 / 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>NOx/CO/VOC (g/bhp-hr)</th>
<th>(NOx + HC) / CO (g/bhp-hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>V</td>
<td>M</td>
</tr>
</tbody>
</table>

### Notes
1. Gasoline engine requirements are same as those for RB LPG.
2. All new engines < 25 hp must be certified to Part 90 on July 1, 2008.
3. Engines ≤ 40 hp that are ≤ 1000 cc may instead comply with Part 90.
4. Emergency engines limited to 100 hours per year for maintenance and testing.
5. O/O of new non-emergency LB SI engines ≥ 250 hp at a major source complying with 40 CFR 63 ZZZZ Table 2a do not have to comply with CO emissions of above table.
EPA NSPS for SI Engines

Certification Summary

• Mandatory factory certification of rich burn propane engines
• Optional factory certification of all natural gas engines and lean burn propane engines
• If not factory certified, the owner/operator must perform certain tasks:

<table>
<thead>
<tr>
<th>Engine Power</th>
<th>Maintenance plan and records, maintain/operate engine in a way to minimize emissions</th>
<th>Initial performance testing within 1 year of engine startup</th>
<th>Subsequent performance testing every 8,760 hours or 3 years, whichever comes first</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100 hp</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-500 hp</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>&gt; 500 hp</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Air Permitting for Standby Generator Sets

“State and local agencies are not prevented from providing additional regulations beyond these regulations and such agencies may institute additional testing requirements independent of EPA related actions.”

Response to Public Comments on Proposed Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
Air Permitting for Standby Generator Sets

“State and local agencies are not prevented from providing additional regulations beyond these regulations and such agencies may institute additional testing requirements independent of EPA related actions.”

Response to Public Comments on Proposed Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Air permitting for standby generator sets can vary wildly from site to site and when misunderstood can have a major impact on project success. Although EPA regulations have stabilized and are thought to be well understood, ever-increasing local requirements are changing the criticality of air permitting for engine-driven generator sets.
Air Permitting for Standby Generator Sets

National Ambient Air Quality Standards (NAAQS)

- Identifies pollutants that are harmful to human health.
- Establishes criteria pollutant limits for geographical areas:
  - CO, Pb, NO₂, O₃, PM and SO₂

Source: https://www3.epa.gov/airquality/greenbook/mapnpoll.html
Air Permitting for Standby Generator Sets

State / City / County Requirements

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set’s standby rated capacity, unless multiple load band testing is approved by DEQ.
Air Permitting for Standby Generator Sets

State / City / County Requirements

a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set’s standby rated capacity, unless multiple load band testing is approved by DEQ.
a. Emissions testing for each selected emergency engine-generator set shall consist of three one-hour test runs under load. The average of the three runs shall be reported as the short-term emission rate for that emergency engine-generator set.

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set’s standby rated capacity, unless multiple load band testing is approved by DEQ.
b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set’s standby rated capacity, unless multiple load band testing is approved by DEQ.
Air Permitting for Standby Generator Sets

State / City / County Requirements

Engine Load

<table>
<thead>
<tr>
<th>10%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>0.30</td>
<td>0.30</td>
<td>0.25</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Weighting

b. Testing shall be conducted while operating at greater than ninety percent of the engine-generator set’s standby rated capacity, unless multiple load band testing is approved by DEQ.
Air Permitting for Standby Generator Sets

State / City / County Requirements

Spec Note Generator set manufacturer shall provide documentation demonstrating compliance with specific emissions level requirement and applicable test methodology.
Air Permitting for Standby Generator Sets

Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits
Air Permitting for Standby Generator Sets

Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits

Permit may require monitoring of run time or fuel consumption to demonstrate compliance

- Run hour monitoring typically assumes all generator sets are always operating at 100% of rated load
- Fuel consumption monitoring gives a more accurate representation of load profile and emissions and may allow for more flexibility in operation

**Monitoring:**

a. Each engine-generator set shall be equipped with either a (1) non-resettable hour metering device to continuously monitor the operating hours OR (2) fuel flow meter to continuously monitor the fuel throughput. The meter for each engine-generator set shall
Air Permitting for Standby Generator Sets

Site Air Permitting Requirements

Permits are written to limit genset operation to keep site emissions within the limit

- Running hours and/or fuel consumption may be specified to make sure that genset operation stays within permitted limits

Permit may require monitoring of run time or fuel consumption to demonstrate compliance

- Run hour monitoring typically assumes all generator sets are always operating at 100% of rated load
- Fuel consumption monitoring gives a more accurate representation of load profile and emissions and may allow for more flexibility in operation

“Exceedance of operating limits may be considered credible evidence of the exceedance of emission limits”
Air Permitting for Standby Generator Sets
Best Available Controls Technology (BACT)

“Emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems and techniques.” – EPA NSR Fact Sheet
Air Permitting for Standby Generator Sets

Best Available Controls Technology (BACT)

“Emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems and techniques.” – EPA NSR Fact Sheet

- Local air quality boards have discretion in defining BACT
  - Exhaust aftertreatment may be considered not available due to its economic impact
Air Permitting for Standby Generator Sets
Best Available Controls Technology (BACT)

“Emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems and techniques.” – EPA NSR Fact Sheet

- Local air quality boards have discretion in defining BACT
  - Exhaust aftertreatment may be considered not available due to its economic impact
  - 6 g/hp-hr NOx at 100% generator set rated load is becoming a common BACT target
    - This target is typically considered “Guaranteed” or “Maximum Potential to Emit”
    - Most generator set manufacturer data sheets present Nominal values
    - Consult generator set manufacturer for potential to emit values
Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:
Site requires 25 generator sets
Max NOx to be allowed = 80 tons per year

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>1/4 Standby</th>
<th>1/2 Standby</th>
<th>3/4 Standby</th>
<th>Full Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHP @ 1800 RPM (60 Hz)</td>
<td>1145</td>
<td>2185</td>
<td>3225</td>
<td>4308</td>
</tr>
<tr>
<td>Fuel Consumption L/Hr (US Gal/Hr)</td>
<td>254 (67)</td>
<td>443 (117)</td>
<td>602 (159)</td>
<td>787 (208)</td>
</tr>
<tr>
<td>Exhaust Gas Flow m³/min (CFM)</td>
<td>282 (9963)</td>
<td>45 (15921)</td>
<td>55 (19592)</td>
<td>662 (23369)</td>
</tr>
<tr>
<td>Exhaust Gas Temperature °C (°F)</td>
<td>331 (628)</td>
<td>354 (670)</td>
<td>377 (711)</td>
<td>443 (830)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhaust Emission Data</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HC (Total Unburned Hydrocarbons)</td>
<td>0.3 (114)</td>
<td>0.18 (76)</td>
<td>0.1 (48)</td>
<td>0.07 (33)</td>
</tr>
<tr>
<td>NOx (Oxides of Nitrogen as NO₂)</td>
<td>3.4 (1290)</td>
<td>3.3 (1350)</td>
<td>4.2 (1900)</td>
<td>5.2 (2440)</td>
</tr>
</tbody>
</table>
Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:
Site requires 25 generator sets
Max NOx to be allowed = 80 tons per year

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>1/4 Standby</th>
<th>1/2 Standby</th>
<th>3/4 Standby</th>
<th>Full Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHP @ 1800 RPM (60 Hz)</td>
<td>1145</td>
<td>2185</td>
<td>3225</td>
<td>4308</td>
</tr>
<tr>
<td>Fuel Consumption L/Hr (US Gal/Hr)</td>
<td>254 (67)</td>
<td>443 (117)</td>
<td>602 (159)</td>
<td>787 (208)</td>
</tr>
<tr>
<td>Exhaust Gas Flow m³/min (CFM)</td>
<td>282 (9963)</td>
<td>45 (15921)</td>
<td>55 (19592)</td>
<td>662 (23369)</td>
</tr>
<tr>
<td>Exhaust Gas Temperature °C (°F)</td>
<td>331 (628)</td>
<td>354 (670)</td>
<td>377 (711)</td>
<td>443 (830)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhaust Emission Data</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HC (Total Unburned Hydrocarbons)</td>
<td>0.3 (114)</td>
<td>0.18 (76)</td>
<td>0.1 (48)</td>
<td>0.07 (33)</td>
</tr>
<tr>
<td>NOx (Oxides of Nitrogen as NO₂)</td>
<td>3.4 (1290)</td>
<td>3.3 (1350)</td>
<td>4.2 (1900)</td>
<td>5.2 (2440)</td>
</tr>
</tbody>
</table>

Nominal
Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets
Max NOx to be allowed = 80 tons per year

Each generator set has a potential to emit 6.7 g/hp-hr at full standby load

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>1/4 Standby</th>
<th>1/2 Standby</th>
<th>3/4 Standby</th>
<th>Full Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHP @ 1800 RPM (60 Hz)</td>
<td>1145</td>
<td>2185</td>
<td>3225</td>
<td>4308</td>
</tr>
<tr>
<td>Fuel Consumption L/Hr (US Gal/Hr)</td>
<td>254 (67)</td>
<td>443 (117)</td>
<td>602 (159)</td>
<td>787 (208)</td>
</tr>
<tr>
<td>Exhaust Gas Flow m³/min (CFM)</td>
<td>282 (9963)</td>
<td>45 (19592)</td>
<td>55 (19592)</td>
<td>662 (23369)</td>
</tr>
<tr>
<td>Exhaust Gas Temperature °C (°F)</td>
<td>331 (628)</td>
<td>354 (670)</td>
<td>377 (711)</td>
<td>443 (830)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhaust Emission Data</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HC (Total Unburned Hydrocarbons)</td>
<td>0.3 (114)</td>
<td>0.18 (76)</td>
<td>0.1 (48)</td>
<td>0.07 (33)</td>
</tr>
<tr>
<td>NOx (Oxides of Nitrogen as NO₂)</td>
<td>3.4 (1290)</td>
<td>3.3 (1350)</td>
<td>4.2 (1900)</td>
<td>5.2 (2440)</td>
</tr>
</tbody>
</table>

Note: Use Potential to Emit value
Air Permitting for Standby Generator Sets

Site Air Permit Example

Project Considerations:

Site requires 25 generator sets
Max NOx to be allowed = 80 tons per year
Each generator set has a potential to emit 6.7 g/hp-hr at full standby load

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>1/4 Standby</th>
<th>1/2 Standby</th>
<th>3/4 Standby</th>
<th>Full Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHP @ 1800 RPM (60 Hz)</td>
<td>1145</td>
<td>2185</td>
<td>3225</td>
<td>4308</td>
</tr>
<tr>
<td>Fuel Consumption L/Hr (US Gal/Hr)</td>
<td>254 (67)</td>
<td>443 (117)</td>
<td>602 (159)</td>
<td>787 (208)</td>
</tr>
<tr>
<td>Exhaust Gas Flow m³/min (CFM)</td>
<td>282 (9963)</td>
<td>45 (15921)</td>
<td>55 (19592)</td>
<td>662 (23369)</td>
</tr>
<tr>
<td>Exhaust Gas Temperature °C (°F)</td>
<td>331 (628)</td>
<td>354 (670)</td>
<td>377 (711)</td>
<td>443 (830)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exhaust Emission Data</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HC (Total Unburned Hydrocarbons)</td>
<td>0.3 (114)</td>
<td>0.18 (76)</td>
<td>0.1 (48)</td>
<td>0.07 (33)</td>
</tr>
<tr>
<td>NOx (Oxides of Nitrogen as NO₂)</td>
<td>3.4 (1290)</td>
<td>3.3 (1350)</td>
<td>4.2 (1900)</td>
<td>5.2 (2440)</td>
</tr>
</tbody>
</table>

Note: Use Potential to Emit value

Resulting permit allowance:

- To meet 80 tons per year generator set operation is limited to 100 hours per year
- 25 generators running for 100 hours at full standby rating consume 520,000 gallons of fuel per year
- Permit would limit operation to 100 hours of operation or 520,000 gallons of fuel per year
Air Permitting for Standby Generator Sets
Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = 80 tons per year
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

### Phase 1
- 20 gens – Total NOx emissions = **32 tons per year**

### Phases 1 & 2
- 40 gens – Total NOx emissions = **64 tons per year**
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = **80 tons per year**
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- **Phase 1**
  - 20 gens – Total NOx emissions = 32 tons per year
- **Phases 1 & 2**
  - 40 gens – Total NOx emissions = 64 tons per year
- **Phase 1 through 3**
  - 60 gens – Total NOx emissions = 96 tons per year

Expansion after the second phase would not have been permitted
Air Permitting for Standby Generator Sets
Application of Exhaust Aftertreatment

Selective Catalytic Reduction (SCR) can reduce NOx by up to 90%
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Selective Catalytic Reduction (SCR) can reduce NOx by up to 90%

Diesel Particulate Filter (DPF) can reduce Particulate Matter

- Enables passive regeneration of PM
- Engine ECM detects when PM accumulation exceeds oxidation
- Periodic active regeneration is initiated to prevent filter plugging
- A small quantity of fuel is injected into the exhaust stream to momentarily raise temperature
- This ensures sufficient oxidation to remove PM
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = 80 tons per year
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- Phase 1
  - 20 gens – Total NOx emissions = 32 tons per year
- Phases 1 & 2
  - 40 gens – Total NOx emissions = 64 tons per year
- Phase 1 through 3
  - 60 gens – Total NOx emissions = 96 tons per year

Expansion after the second phase would not have been permitted
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = 80 tons per year
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

- Phase 1
  - 20 gens – Total NOx emissions = 32 tons per year

- Phases 1 & 2
  - 40 gens – Total NOx emissions = 64 tons per year

- 90% SCRs added to phase 3, 4 and 5 gens
- Limits NOx to 3.2 tons/year for 20 gens
Air Permitting for Standby Generator Sets

Application of Exhaust Aftertreatment

Project Considerations:

- Hyperscale project requires 100 X 3MW generator sets when fully built
- Built in 5 phases of 20 gens each
- Max NOx allowed = 80 tons per year
- Permit written for 50 hours per year
- Each generator set has a potential to emit 1.6 tons per year

<table>
<thead>
<tr>
<th>Phase</th>
<th>Gen Set Count</th>
<th>NOx Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>20 gns</td>
<td>32 tons per year</td>
</tr>
<tr>
<td>Phases 1 &amp; 2</td>
<td>40 gns</td>
<td>64 tons per year</td>
</tr>
<tr>
<td>Phase 1 through 3</td>
<td>60 gns</td>
<td>67.2 tons per year</td>
</tr>
<tr>
<td>Phase 1 through 4</td>
<td>80 gns</td>
<td>70.4 tons per year</td>
</tr>
<tr>
<td>Phase 1 through 5</td>
<td>100 gns</td>
<td>73.6 tons per year</td>
</tr>
</tbody>
</table>

- 90% SCR added to phase 3, 4 and 5 gens
- Limits NOx to 3.2 tons/year for 20 gens
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks

- Test methodology and permit data must be approved by equipment manufacturer.

- Applicable environmental correction factors allowable by AHJ must be identified.

- Costs and time associated with on-site testing requirements must be considered.

- Review air permit requirements early in the project in order to accommodate lead times.

- Leverage experience of third-party testing companies and engine manufacturers.

- Review implications of failing on-site test including penalties and project delays.

- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks

- Test methodology and permit data must be approved by equipment manufacturer.

- Applicable environmental correction factors allowable by AHJ must be identified.

- Costs and time associated with on-site testing requirements must be considered.

- Review air permit requirements early in the project in order to accommodate lead times.

- Leverage experience of third-party testing companies and engine manufacturers.

- Review implications of failing on-site test including penalties and project delays.

- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

- Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  - Fuel flow meter(s)
  - Pollutant monitor(s)
  - Exhaust sample port(s)
  - Load banks
- Test methodology and permit data must be approved by equipment manufacturer.
- Applicable environmental correction factors allowable by AHJ must be identified.
- Costs and time associated with on-site testing requirements must be considered.
- Review air permit requirements early in the project in order to accommodate lead times.
- Leverage experience of third-party testing companies and engine manufacturers.
- Review implications of failing on-site test including penalties and project delays.
- Permitted emissions values may need to be “guaranteed” by the engine manufacturer.
Air Permitting for Standby Generator Sets

On-Site Testing Considerations

• Non-standard equipment may be needed to secure air-permit / conduct on-site testing:
  • Fuel flow meter(s)
  • Pollutant monitor(s)
  • Exhaust sample port(s)
  • Load banks
• Test methodology and permit data must be approved by equipment manufacturer.
• Applicable environmental correction factors allowable by AHJ must be identified.
• Costs and time associated with on-site testing requirements must be considered.
• Review air permit requirements early in the project in order to accommodate lead times.
• Leverage experience of third-party testing companies and engine manufacturers.
• Review implications of failing on-site test including penalties and project delays.
• Permitted emissions values may need to be "guaranteed" by the engine manufacturer.

CONSULT THE ENGINE MANUFACTURER
Facility owners with stationary engines installed on-site are obligated to meet which of the following:

a) EPA guidelines for engine operation, as applicable
b) State guidelines for engine operation, as applicable
c) Local air permitting requirements, as applicable
d) All of the above
Facility owners with stationary engines installed on-site are obligated to meet which of the following:

a) EPA guidelines for engine operation, as applicable
b) State guidelines for engine operation, as applicable
c) Local air permitting requirements, as applicable
d) All of the above
Compliance Documentation

EPA Compliance Statement
Manufacturer statement certifying the generator set’s engine compliance with EPA regulations for a specific model year
Compliance Documentation

EPA Compliance Statement
Manufacturer statement certifying the generator set’s engine compliance with EPA regulations for a specific model year

Exhaust Emission Data Sheet
Factory data sheet with recorded emissions and performance values at different load levels.
Compliance Documentation

**EPA Compliance Statement**
Manufacturer statement certifying the generator set's engine compliance with EPA regulations for a specific model year.

**Exhaust Emission Data Sheet**
Factory data sheet with recorded emissions and performance values at different load levels.

**EPA Certificate of Conformity**
EPA statement certifying conformity of the engine with EPA regulations for a specific model year.
Compliance Documentation

EPA Compliance Statement
Manufacturer statement certifying the generator set’s engine compliance with EPA regulations for a specific model year.

Exhaust Emission Data Sheet
Factory data sheet with recorded emissions and performance values at different load levels.

EPA Certificate of Conformity
EPA statement certifying conformity of the engine with EPA regulations for a specific model year.

Spec Note
Generator set manufacturer shall provide documentation of engine EPA certification including EPA Family name and generator set model.
Emissions and Air Permitting Requirements for Standby Generator Sets

- Recognize commonly regulated exhaust emissions constituents.
- Describe EPA emissions requirements for diesel and gaseous standby generator sets.
- Identify common requirements for permitting engine-driven generator sets.

Specify:

- Generator set shall include engine which complies with U.S. EPA New Source Performance Standards (NSPS) for **Stationary Emergency** engines under the provisions of [40 CFR Part 60 Subpart IIII or 40 CFR Part 60 Subpart JJJJ] when tested per ISO 8178 D2.

- Engine shall meet emissions limits as defined for **Stationary Emergency** engines in [40 CFR Part 60 Subpart IIII or 40 CFR Part 60 Subpart JJJJ] when tested per ISO 8178 D2.
Additional Resources

Cummins White Papers

• EPA Emission Regulations: What they mean for diesel powered generating systems

• The Impact of Tier 4 Emission Regulations on the Power Generation Industry

• Understanding RICE NESHAP regulations and their impact on stationary diesel generator sets

• Understanding EPA NSPS Emissions Regulations For Stationary Spark Ignited Engines

Cummins PowerHour On-Demand Webinars

• Emissions Requirements for Compression Ignition Engines in EPA Non-Emergence Operation
Q&A

Please type your questions, comments and feedback in the Zoom Q&A window.

PDH certificate, copy of the presentation, and link to the recording will be provided in a follow up email within a 1-2 business days.

Please complete the brief survey upon exiting the webinar!

Michael Sanford
Product Strategy and Sales Enablement Leader
Cummins Inc.

Brian Pumphrey
Director of Sales Application Engineering Western USA
Cummins Inc.

Scott Thomas
Director of Sales Application Engineering – Southern USA
Cummins Inc.

Mandy Memari
Emissions Compliance Leader
Cummins Inc.
Closing

Watch out for a follow-up email including:

- A link to the webinar recording and copy of the presentation
- A certificate issuing one professional development hour (1 PDH)

Visit powersuite.cummins.com for:

- Sizing and specification development tools
- PowerHour webinar recordings, presentations and FAQ
- Additional Cummins continuing education programs

Visit cummins.com/energy-iq and sign-up for communications to:

- Receive energy insights
- Read about energy technologies and trends

Upcoming PowerHour Webinars:

**05/27/21** - ASHE Lunch and Learn Webinar: NFPA 110 Testing and Service Requirements for Standby Power Systems

**07/01/21** - Ask the Experts Session

**07/29/21** - Considerations for Generator Set Selection

**08/26/2021** - Transfer Switches: What to Specify and Why

Please contact Michael Sanford if you have any questions related to the PowerHour webinar (michael.sanford@cummins.com)