Untangling the Complex Web of IC Engine Regulations

Presented by:
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### Engine Categories and Regulations

<table>
<thead>
<tr>
<th>NSPS IIII</th>
<th>NSPS JJJJ</th>
<th>MACT ZZZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Compression ignition ICE (reciprocating and rotary)</td>
<td>• Spark ignition ICE</td>
<td>• Reciprocating ICE</td>
</tr>
<tr>
<td>• Diesel</td>
<td>• Gasoline, gas, LPG</td>
<td>• Gasoline, gas, LPG, diesel, landfill gas</td>
</tr>
<tr>
<td>• New, modified, or reconstructed</td>
<td>• New, modified, or reconstructed</td>
<td>• Area and major sources</td>
</tr>
</tbody>
</table>
Timeline of Engine Regulations

2004 MACT: >500 HP Major Sources

2006 Final

2006 MACT Correction

March 2010
MACT: Expanded applicability (ex. Existing CI)

2008 MACT: Expanded applicability (ex. new at area and new <500HP at major)

2008 Final

June 2010
NSPS Proposal

June 2010 MACT: Correction

August 2010
MACT: Expanded applicability (ex. existing SI at area and existing SI <500 HP at major)
### What Pollutants are Regulated?

<table>
<thead>
<tr>
<th>Regulation</th>
<th>IIII</th>
<th>JJJJ</th>
<th>ZZZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>NOx</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Formaldehyde</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Non-methane HC</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
What Do I Need to Know to Classify My Engine?

- Stationary ICE regulatory analysis is based on the following:
  - Manufacturing and order date
  - Major vs. Area HAP sources (NESHAP)
  - “Existing” vs. “New/ Modified/ Reconstructed”
  - Brake Horsepower
  - Ignition Type (Compression vs. Spark)
  - Usage (Emergency vs. Non-Emergency)
  - Air-to-Fuel Ratio (Rich-burn vs. Lean-burn)
  - 2-stroke vs. 4-stroke
  - Fuel Type

- Very situation-specific – *hundreds of scenarios are possible*
Key Terms to Know When Evaluating Engine Rule Applicability & Requirements

**Categories:**
- Major or Area HAP Source;
- Emergency

- Stationary or “Non-Road”
- New, Modified, or Reconstructed
Simplified NSPS
(III and JJJJ) Applicability Evaluation Diagram

Start

Non-Road
- Non-Applicable

Stationary
- Review Effective Dates
  - Applicable
  - Non-Applicable
Simplified MACT ZZZZ Diagram of Major Engine Categories

Start
Assume Facility is Major Stationary Source

<500 HP

Begin construction or reconstruction before 6/12/06?

Yes
EXISTING Standards finalized for existing SI engines <500 HP at major sources in 8/2010

No
NEW Essentially all engine categories compliance w/ NSPS meets MACT

>500 HP

Begin construction or reconstruction before 12/9/2002?

Yes
EXISTING Few engine categories have requirements

No
NEW Essentially all engine categories have requirements
Key Point: Is the Engine Stationary?

- IIII, JJJJ, and ZZZZ engine regulations are subject to STATIONARY engines only
- Stationary engine = *not* a non-road engine
- The regulations define a non-road engine
- Stationary engine is defined as *not* a non-road engine.

Would these IC engines be considered stationary (not non-road) engines?
What is a Non-Road Engine?

• According to the regulations, key criteria are:
  – Portable or transportable
  – Designed to be and capable of being carried or moved from one location to another
  – Examples include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform
What is a *NOT* a Non-Road Engine?  
(per 40 CFR 1068.30)

- It is a stationary engine.
- It remains at a single location for more than 12 consecutive months.
- If a seasonal source, it remains at a single location on a permanent basis and operates at least 3 months or more each year.

Note: Any engine that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period.
LOCATION! LOCATION! LOCATION!

• Specific site within a facility
  – Chemical Company Acme is not a location – it is a facility

• Currently defined via “non-road engine”
  – “A location is any single site at a building, structure, facility, or installation”
  – Example: Docks at Acme = Location; or,
  – Any single site at a stationary source = Location

• Proposed 2010 NSPS definition:
  – “Engine placed and secured at a location where it is intended to be operated: piping and wiring… installed…..connections are made… engine capable of being started”
  – Definition has evolved to a more useful and precise
  – Comment period ended 9/8/2010 and proposal has not been promulgated.
Non-Road Engine Example

- **Quandary:** Acme Co. stores an engine on skids in its warehouse. The engine is placed at its docks for 3 months and then at the wastewater plant for 6 months.

- **Answer:** Engine would qualify as a non-road engine and would therefore, not be subject to any of the stationary engine regulations discussed in this presentation.

- Note this example meets the key criteria of the non-road engine definition:
  - Portable ✓
  - Designed to be moved (on skids) ✓
  - Not at a single location >12 months ✓
More Non-Road Engine Examples

- A 10 HP compressor is wheeled or easily lifted by a person and is relocated throughout a facility
  - Key non-road engine terms: Designed to be moved (wheeled) and does not stay in one location more than 12 months

- A 500 HP compressor is at a location for approximately one week and is then wheeled away to another location
  - The size of the engine does not make a difference in determining if it is stationary or non-road
  - Key non-road engine terms: Designed to be moved (wheeled) and does not stay in one location more than 12 months
Do Temporary Replacement Engines Qualify as Non-Road?

- EPA Rule Preamble Examples of Non-Road Engines:
  - A unit that temporarily replaces an engine that is undergoing an overhaul
  - A temporary engine that is not the identical make, model or hp used for a short-term (not to exceed 90 days) replacement
- Yes- above examples qualify as non-road
  - Portable and <12 months at a single location
- After original stationary engine returns, original engine is immediately subject to applicable stationary engine requirements
Key Point: Engine Relocation Does Not Trigger NSPS Applicability

- Per NSPS IIII and NSPS JJJJ regulations:
  - “...requirements...do not apply.. to engines that were removed from one existing location and reinstalled at a new location”

- Interpretation that relocation does not trigger NSPS applicability consistent with NSPS interpretations for relocations of other NSPS sources such as boilers.
Key Point: Applicability Dates

- **NSPS**: date of “construction“ is defined as date **engine is ordered**
- **NESHAP**: date of “construction” is defined as the date of **installation of the engine** (per rule preamble)
- For **new** engines to be subject to NSPS:
  - **Order date** must be after the NSPS construction date cutoff, and
  - **Manufacture date** must be after the NSPS manufacture date cutoff.
- For modified/reconstructed engines to be subject to NSPS:
  - **Modification or reconstruction date**, must be after the order and manufacture date thresholds.
## New – Modified – Reconstructed Trigger Dates

### NSPS IIII
- **New:** Ordered After 7/11/2005, and Manufactured After 4/1/2006
- **Modified or Reconstructed:** After 7/11/2005

### NSPS JJJJ
- **New:** Ordered After 6/12/2006 and Manufactured After
  - 7/1/2007 for >500 HP
  - 1/1/2008 for lean burn w/ >500 HP & <1,350 HP
  - 7/1/2008 for <500 HP
  - 1/1/2009 for Emergency >25 HP
- **Modified or Reconstructed:** After 6/12/2006

### MACT ZZZZ
- **New/ Modified/ Reconstructed Engines After 6/12/2006 (<500HP)**
- **New / Modified/ Reconstructed Engines After 12/19/2002 (>
  500HP)**
## NSPS Installation Deadlines

<table>
<thead>
<tr>
<th>Engine size and requirements*</th>
<th>Deadline to Stop Installing</th>
</tr>
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<tbody>
<tr>
<td>Any size CI ICE that does not meet 2007 model year engine requirements (excludes fire pump engines)</td>
<td>December 31, 2008</td>
</tr>
<tr>
<td>SI ICE &gt;500 HP that do not meet applicable JJJJ requirements</td>
<td>July 1, 2009</td>
</tr>
<tr>
<td>Stationary CI ICE less than 25 HP that does not meet 2008 requirements (excludes fire pump engines)</td>
<td>December 31, 2009</td>
</tr>
<tr>
<td>Lean burn engines &gt;500 HP and &lt;1,350 HP that do not meet applicable JJJJ requirements</td>
<td>January 1, 2010</td>
</tr>
<tr>
<td>Stationary SI ICE &lt;500 HP that do not meet applicable JJJJ requirements</td>
<td>July 1, 2010</td>
</tr>
<tr>
<td>Emergency SI ICE &gt;25 HP that do not meet applicable JJJJ requirements</td>
<td>January 1, 2011</td>
</tr>
<tr>
<td>Non-emergency stationary CI ICE &gt;175 HP that do not meet 2011 requirements</td>
<td>December 31, 2012</td>
</tr>
</tbody>
</table>

* Installation deadlines do not apply to engines that have been modified, reconstructed or relocated. Refer to regulation for a complete list of deadlines.
NSPS Installation Deadline Example: Use of Older Engines

- Can a facility install a pre-2007 engine used at other locations?
  - A facility maintains several engines for use at various locations and may opt to permanently install one of these engines.

- The NSPS rule (i.e., installation deadlines) would seem to prohibit this, even though the engine was in the company’s possession long before the rule was drafted.

- However, can use an older (pre-2007) model engine is if it is removed from one existing location and reinstalled at a new location, as stated in 60.4208(h).

- In other words, the rule allows the installation of “used” engines even if the engine does not meet NSPS standards.
  - Alternately, the rule prohibits installation of a new (i.e., un-used engine) that does not meet NSPS standards.

- Preamble: It was not EPA’s intention to restrict use of engines that had been previously used and reinstalled in a different location.
Proposed 2010 NSPS Reconstruction Definition

- Includes a specific definition for “reconstruct”: if cost is >50% of comparable new engine

- Adds provisions that require reconstructed engines to meet the emission standards for the model year in which the reconstruction occurs if the reconstructed engine meets any of the following criteria:
  - The crankshaft is removed as part of the reconstruction; or
  - The fixed capital cost of the new and refurbished components exceeds 75 percent of the fixed capital cost of a comparable new engine; or
  - The serial number of the engine is removed as part of the reconstruction; or
  - The reconstructed engine consists of a previously used engine block with all new components.
Compliance Tips: Applicability

- Track length of time engine is installed at a single location to identify non-road versus stationary engines

- The following will likely not trigger NSPS/NESHAP applicability:
  - Engine overhaul or maintenance – depending on the project, document NSPS/NESHAP economic evaluation
  - Relocation of an engine
  - Temporary or rental engines (depending on length of use)

- Review and document order dates, installation dates and manufacturing dates
Key Point: Other Engine Categories: Emergency and Limited Use Engine

- **Emergency use**: Operation limited to emergency situations and required readiness testing and maintenance
- **Emergency regulatory definition highlights**:
  - Produce power for critical networks or equipment when power source is interrupted (utility, or own power production)
  - Pump water in the case of fire or flood, etc.
- **According to EPA regulations/preamble, no time limit on the use of emergency engines in emergency situations**.
  - Per EPA rule preambles, emergency operation: Not a one-size-fits-all. Crucial for life-threatening situations...It is inappropriate to restrict the hours for supporting such equipment
- **Limited use**: Operates less than 100 hrs/yr
## Emergency Engines: Allowable Maintenance Hours of Operation

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<td>Allowable maintenance operation time</td>
<td>&lt;100 hours/yr</td>
<td>&lt;100 hours/yr with up to 50 hrs/yr for non-emergency operation of the 100 hours allowed.</td>
</tr>
</tbody>
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**2010 Proposal:** Updates IIII emergency language to allow for 50 hrs/yr for non-emergency operation of the 100 hours allowed.
Certification: The Basics for IIII/JJJJ/ZZZZ

• Certified engines that operate according to the manufacturer’s procedures:
  – No performance tests are required
  – Keep records of maintenance
  – EPA rule preamble: Most engines <100 HP will be certified

• Performance tests may be required:
  – If engine not certified; or
  – Engine is certified but manufacturer’s procedures are not followed
# Stationary IC Engine Regulation Compliance Management Areas

<table>
<thead>
<tr>
<th>Area</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| **HSE Audits**                          | • Inventory engines  
• Identify applicable engine regulations and requirements  
• Check and review quarterly                                                   |
| **Rental Company Management**           | • Review rental company contracts  
• Update contract to assure compliance                                      |
| **Operations Responsibilities**         | • Document maintenance  
• Notify Environmental via MOC if any engines are brought on-site  
• Maintain compliance system to track engines in the field  |
Engine Tag Management System

• Hang color-code tags for field identification. Examples:
  – Green tags: permanent, stationary
  – Orange tags: emergency
  – Red tags: rental or temporary

• Monthly log documentation by Operations:
  – Location, Tag ID, date, signature

• Operations to alert HSE of any engine that will be in place at a single location for more than 12 months.
Recommended Compliance Practices

• Document and track engine inventory, applicability, and requirements.
  – Applicability and requirements should be identified for each individual stationary engine.

• Manage rental engine companies and on-site contractors to assure they meet any responsibilities related to the engine compliance program
  – Review contract requirements and modify as needed

• Operations to document any required engine maintenance and emergency operations

• HSE Department should develop training

• Establish system, such as engine tags, to document non-road status (<12 months at single location)