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EPA regulates stationary power sources, such as diesel, natural gas or propane-powered generator sets differently to non-road rental or portable (mobile) engine/generators. In addition, emergency and non-emergency generators are also regulated differently. This Information Sheet discusses the EPA emission standards to be applicable to existing stationary diesel and spark ignition engines, actions to become compliant and applications that are exempt.

1.0 BACKGROUND OF RECIPROCATING INTERNAL COMBUSTION ENGINES (RICE) RULES:

- June 15, 2004. EPA issued rules applicable to several new and existing RICE categories, which included emission standards for certain existing spark ignition (SI) stationary engines
- Feb. 17, 2010. EPA issued a rule to reduce emissions from existing stationary diesel engines
- Aug. 20, 2010. EPA issued a rule to reduce emissions from existing stationary gaseous-fueled (SI) engines
- March 9, 2011. EPA issued a rule introducing several minor amendments and clarifications to Aug. 20, 2010 regulation

The rules, titled NESHAP for RICE, are intended to reduce toxic air pollutants such as formaldehyde (HCHO), acetaldehyde, methanol and other air toxins, from several categories of previously unregulated stationary engines. The EPA determined that carbon monoxide (CO) can be often used to an appropriate surrogate for HCHO. As CO testing has many advantages over testing emissions for hazardous air pollutants (HAP), most standards have been finalized in terms of CO as the only regulated pollutant.

TABLE 1. NESHAP Emission Requirements for Stationary Diesel (CI) Engines

Area Sources	Engine Category	Emission Standard	Alternative CO Reduction
Non-Emergency	300 <hp ≤ 500	49 ppmvd CO	70%
	> 500 hp	23 ppmvd CO	70%
Major Sources	**Engine Category**	**Emission Standard**	**Alternative CO Reduction**
Non-Emergency	100 <hp ≤ 300	230 ppmvd CO	70%
	300 <hp ≤ 500	49 ppmvd CO	70%
	> 500 hp	23 ppmvd CO	70%

TABLE 2. NESHAP Emission Requirements for Stationary Gas (SI) Engines

Area Sources	Engine Category	Emission Standard	Alternative CO Reduction
4SLB, Non-Emergency	> 500 hp	47 ppmvd CO	93% CO
4SRB, Non-Emergency	> 500 hp	2.7 ppmvd HCHO	76% HCHO
Major Sources	**Engine Category**	**Emission Standard**	**Alternative CO Reduction**
2SLB, Non-Emergency	100 <hp ≤ 500	225 ppmvd CO	-
4SLB, Non-Emergency	100 <hp ≤ 500	47 ppmvd CO	-
4SRB, Non-Emergency	100 <hp ≤ 500	10.3 ppmvd HCHO	-
Landfill/Digester Gas	100 <hp ≤ 500	177 ppmvd CO	-
4SRB, Non-Emergency	> 500 hp	350 ppmvd HCHO	76% HCHO

Key: 2S = Two Stroke; 4S = Four Stroke; LB = Lean Burn; RB = Rich Burn

Other Provisions

Diesel Fuel: The diesel rule requires the use of ultra-low sulfur diesel fuel (ULSD) for stationary non-emergency engines greater than 300 hp with a displacement of less than 30 liters per cylinder. The regulation will be fully implemented by 2013.

Crankcase Filtration: Stationary engines above 300 hp must be equipped with closed or open crankcase filtration system in order to reduce metallic HAP emissions.

2.0 EMISSIONS REGULATIONS ISSUED:

In addition to the Air Quality Management federal emission standards imposed by New Source Performance Standards (NSPS), the US Environmental Protection Agency (EPA) issues emission requirements for certain categories of new stationary engines as specified by NESHAP.

Such emission regulations for stationary diesel engines are published in Title 40, Chapter 1, Part 60 of the Code of Federal Regulations (CFR). Tier 1 standard for new, modified and reconstructed engines (existing in-use engines are exempt) apply as from April 1, 2006.

Emission regulations for stationary (SI) engines are published in Title 40, Part 1048 of the Code of Federal Regulations (CFR). EPA promulgated its final rule for NESHAP for RICE in March 2010, with requirement compliance effective May 3, 2013.

3.0 APPLICABILITY:

The NSPS standards apply to stationary compression ignition internal combustion engines (CI ICE) – see below. Emission standards depend on classification of the source of Air Toxins (AT) emissions. "Major sources" are defined as those that emit 10 short tons per year of a single AT or 25 short tons per year of a mixture of AT's. "Area sources" are those sources that are not major sources.
NESHAP rules apply to "existing" diesel and SI engines, as determined by date of construction or reconstruction:

1. Area Sources of AT emissions:
   a) Engines constructed or reconstructed before June 12, 2006
2. Major Sources of AT emissions:
   a) Engines of 500 hp or less, constructed or reconstructed before June 12, 2006
   b) Engines above 500 hp, constructed or reconstructed before December 19, 2002
3. Any stationary ICE (except combustion turbines) used for non-emergency purpose:
   An ICE that converts heat energy to mechanical work and is not mobile, nor is it a spark ignition (SI) engine fueled by gasoline, natural gas or liquefied petroleum gas. See table I overleaf. The diesel rule requires use of ultra-low sulfur diesel fuel for stationary non-emergency engines greater than 300 hp with a displacement of less than 30 liters per cylinder. The regulation will be fully implemented by May 3, 2013.
4. For spark ignition (SI) engines: – see table 2.

NESHAP standards are expressed as volumetric, dry CO concentrations ppmvd (parts per million, volumetric dry) at 15% O_2 (with the exception of standards for rich-burn SI engines, expressed as volumetric concentrations of HCHO at 15% O_2). These standards must be met during any operating conditions, except during periods of start-up (max. of 30 minutes). Emissions are tested at 100% load. Alternative compliance options are available in certain engine categories, expressed as percentage CO or HCHO emissions reductions.

4.0 AFTER-TREATMENT OPTIONS:

- Oxidation catalysts (OC): A technology that can achieve AT reductions up to 90% from diesel engines, but only reduce fine particle pollution (FPP) by about 25 – 30%.
- Catalyzed diesel particulate filters (CDPF): To reduce AT's and FPP's (including black carbon) from diesel engines by over 90%.

5.0 REQUIREMENTS OF OWNERS OR OPERATORS OF EXISTING ENGINES:

EPA states that there are over 900,000 stationary engines in the US that are affected by this ruling. Many of these however, will not be subject to this rule due to the stationary "emergency duty" exemption.

Owners or operators of existing engines that are subject to NESHAP would be required to:

- Install emission control equipment that would limit AT emissions by up to 70%
- Perform emission tests to demonstrate engine performance and compliance with rule requirements
- Use ultra-low sulfur fuel in non-emergency diesel engines with site rating greater than 300 hp

6.0 USEFUL SITES:

Users of existing generator systems should reference the appropriate governing body and/or the manufacturer of their system to verify if the impending EPA RICE NESHAP regulations requires retrofitting of equipment as described in this information sheet. The following are useful reference sites:

www.epa.gov/ttn/atw/rice/ricepg.html

http://review.em-assist.com/LMS/EPA/login.aspx?ReturnUrl=%2flms%2fepa%2fdefault.aspx

http://www.dieselforum.org/files/dmfile/NESHAP_for_RICE_Summary_FINAL.pdf

To fulfill our commitment to be the leading supplier in the power generation industry, the Buckeye Power Sales team ensures they are always up-to-date with the current power industry standards as well as industry trends. As a service, our Information Sheets are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power industry.

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