

# Are Your Engines Affected by the RICE MACT?

By Megan Corrado

The USEPA has gradually expanded the scope of an air quality regulation aimed at reducing hazardous air pollutants (HAPs) from reciprocating internal combustion engines (RICE). HAPs form during the combustion process and include organic compounds such as formaldehyde or acetaldehyde. The more inefficient an engine is, the more HAPs that are produced. Inefficient engines also emit more carbon monoxide (CO), so the rule uses CO as a surrogate for inorganic HAP emissions. Another group of HAPs that form during combustion are metallic HAPs such as chromium or lead compounds. Metallic HAPs are tied to the quality of fuel being used.

The RICE MACT (a nickname) defines the maximum achievable control technology (MACT) for engines with the goal of reducing HAP emissions. You may also see the rule referred to as 40 CFR Part 63 Subpart ZZZZ, which gives the location of the rule within the Code of Federal Regulations. Control technologies vary from improved maintenance procedures to the installation of end-of-stack emission control equipment. Better maintenance leads to more efficient engines and thus, lower HAP emissions. Sometimes maintenance is not enough, and catalytic oxidizers are used to capture the HAPs from the engine exhaust before it is emitted.

First enacted in 2004, the RICE MACT targeted big engines at big facilities (major sources). Fast forward to 2010 and the rule now includes small engines at small facilities (area sources). It now impacts many operations that have never had to deal with air quality regulations before. Newly regulated entities include wastewater utilities that have backup engines to keep their pumps on during power outages.

This rule is complicated, long, and refers to three other rules. It now has over 70 different applicability combinations, which depend on multiple variables. The first variable is whether or not you already emit a lot (> 10 tons per year of a single HAP or > 25 tons per year cumulative HAPs) of HAPs. Wastewater utilities, most likely, do not emit a lot of HAPs, and so you can ignore anything that applies to a “major” source of HAPs and focus on sections of the rule that refer to “area” sources. After that, the rule breaks the engines down into “emergency” and “non-emergency” engines.

## EMERGENCY ENGINES

If you only operate your engine during power outages or for readiness testing and maintenance, then your engine meets the definition of an Emergency Stationary RICE. However, it is very important to note that if you have an interruptible rate agreement with your utility where the utility may call on you from time to time to run your engines to help them out, you do NOT have an emergency engine. The rule treats non-emergency engines differently, as you’ll see below.

When it comes to the RICE MACT, age matters. If your engine is less than five years old, then the RICE MACT tells you to comply with either the new source performance standards (NSPS) for compression ignition (CI) engines (40 CFR Part 60 Subpart IIII) or the NSPS for spark ignition (SI) engines (40 CFR Part 60 Subpart JJJJ). The easiest way to comply with these rules is to own a “Tier 2 certified” engine. Tier 2 refers to a set of emission



standards that the manufacturer designs into the engine. So, for a new emergency engine, you need to document that you have a Tier 2 certified engine, and the RICE MACT is covered.

If your emergency engine is more than five years old, then you have until mid-2013 (May 3 for diesel engines, October 13 for gas engines) to implement prescribed maintenance practices. These include oil and filter changes, and inspections of the air cleaner, hoses, and belts at predetermined frequencies. Maintenance logs are also required to document compliance with the rule.

Finally, all emergency engines are required to install non-resettable hour meters to document that they really only run during emergencies. An operations log showing the reason for running the engine must also be kept. All in all, the requirements for emergency engines are not so bad. You don’t even need to submit paperwork to the USEPA. You just keep your records on file.

## NON-EMERGENCY ENGINES

Similar to new emergency engines, new non-emergency engines that meet the NSPS requirements (i.e., are Tier 2 certified engines), comply with the RICE MACT. If your engine is more than five years old, then your engine may need to be equipped with some emission control equipment, likely a catalytic oxidizer. In order to know for sure, you need to know what type of engine you have and its size. Diesel-fired engines are compression ignition (CI) engines. Gas-fired engines (natural gas, gasoline, propane, or biogas) are spark ignition (SI) engines. SI engines are further defined as two-stroke or four-stroke and lean-burn or rich-burn engines. Horsepower (HP) is used to categorize engine size.

See the table below for a basic description of what is required for non-emergency diesel (CI) engines. Smaller engines can control HAPs through routine maintenance, but larger engines are required to install add-on emission controls. The RICE MACT recognizes that the most likely add-on control technique is oxidation catalyst, (i.e., a catalytic converter for the engine’s stack). In addition, large diesel engines emit more of the metallic HAPs, so fuel quality is regulated and emissions from the crankcase of the engine also need to be controlled.

If you have an SI engine that burns digester or biogas, then only the maintenance requirements in the RICE MACT apply. (Note: If you combust biogas, we recommend checking with a local expert to see if additional state regulations apply.) See the table below for a basic description of what is required for all other non-emergency gas-fired SI engines. Two-stroke engines and small four-stroke

## Non-Emergency Gas-Fired Spark Ignition (SI) Engines

Stroke	Lean or Rich Burn	Size	Non-Emergency Gas-Fired Engine (SI) RICE MACT Requirements
2-Stroke	Lean Burn	Any	Maintenance Requirements ONLY
4-Stroke	Lean Burn	Less than or equal to 500 HP	Maintenance Requirements ONLY
4-Stroke	Lean Burn	More than 500 HP	Emission Controls: Limit CO emissions to no more than 47 ppm <sub>vd</sub> or reduce CO emission by 93 percent or more.
4-Stroke	Rich Burn	Less than or equal to 500 HP	Maintenance Requirements ONLY
4-Stroke	Rich Burn	More than 500 HP	Emission Controls: Limit formaldehyde emissions to no more than 2.7 ppm <sub>vd</sub> or reduce formaldehyde emission by 76 percent or more.

## Non-Emergency Diesel-Fired Compression Ignition (CI) Engines

Size	Non-Emergency Diesel Engine (CI) RICE MACT Requirements
Less than or equal to 300 HP	Maintenance Requirements ONLY
Between 300 and 500 HP	Emission Controls: Through the use of catalyst, limit CO emissions to no more than 49 parts per million by volume, dry basis (ppm <sub>vd</sub> ) or reduce CO emission by 70 percent or more. Fuel quality standards kick in. Use a closed crankcase ventilation system or an open crankcase filtration system.
More than 500 HP	Emission Controls: Through the use of catalyst, limit CO emissions to no more than 23 ppm <sub>vd</sub> or reduce CO emission by 70 percent or more. Fuel quality standards kick in. Use a closed crankcase ventilation system or an open crankcase filtration system.

engines can control HAPs through routine maintenance, but larger four-stroke engines are required to install catalysts.

### OTHER REQUIREMENTS FOR ENGINES NEEDING EMISSIONS CONTROLS

Engines that fall into an "emission control" category will need to have their emissions tested after the controls are installed, and periodically thereafter, to demonstrate that the desired level of emission control is taking place. In between tests, you will be required to continuously monitor the pressure drop across the catalyst and the engine exhaust temperature to ensure that the catalyst is working properly.

There is more paperwork in store for engines that require emission controls, too. You are required to file an Initial Notification, Notification of Compliance Status, and a Notification of Intent to Source Test with your state agency. You are also required to submit semiannual monitoring summary reports and an annual certification of compliance.

### PLANNING AHEAD

New engines are the least likely to be impacted by RICE MACT. Emergency engines of any size, engines that burn digester gas, and small non-emergency engines will probably require a little more maintenance and paperwork. Large, non-emergency engines are required to have emission controls. You may be tempted to terminate your interruptible rate agreement in order to avoid operating "non-emergency" engines. However, the cost of add-on emission controls is often paid back within two years when you factor in interruptible rate agreement savings.

Now is a great time to take a closer look at how your engines will be regulated in 2013. Plan ahead and include the cost of additional maintenance or add-on emission controls into your facility's 2012 budget. While the RICE MACT is a federal rule, each state has its own rules too. If you haven't done so already, this may be a good time to look at air compliance issues in general, such as permitting requirements, emissions inventory reporting, or visible emission standards. [CS](#)

## How do national EMISSIONS STANDARDS apply to your facility?

### We can help:

- Regulatory Compliance
- Dispersion Modeling
- Energy Management Analysis
- Air Permitting
- Emissions Inventories
- Engineering Design



### Contact

**Patti Stickney**

608.216.7330

pstickney@scsengineers.com

**Megan Corrado**

608.216.7364

mcorrado@scsengineers.com



**SCS BT SQUARED**