Technical Bulletin

EPA Regulations for Reciprocating Internal Combustion Engines (RICE)

The U.S. Environmental Protection Agency (USEPA) has established a complicated set of regulations affecting reciprocating internal combustion engines (RICE) under the National Emission Standards for Hazardous Air Pollutants (NESHAPs).

The goal of the RICE rule is to reduce hazardous air pollutants (HAPs) from fuel combustion in engines. The more inefficient an engine is, the more HAPs are produced. Inefficient engines emit more carbon monoxide (CO), so the rule uses CO as a surrogate for some HAP emissions.

Requirements in the rule intended to reduce HAP emissions range from maintenance practices to installing control technology. Better maintenance leads to more efficient engines and thus, lower HAP emissions. Sometimes maintenance is not enough, and devices like catalytic oxidizers are used to reduce the HAPs from the engine exhaust.

A wide range of industries, as well as commercial and institutional operations (e.g., malls, hospitals, local government), may have to meet the RICE rule. The rule has over 70 different applicability combinations, which depend on multiple variables. The first variable is whether or not a facility emits a high level of HAPs, which is called "major" and means you have over 10 tons per year of a single HAP or over 25 tons per year of cumulative HAPs. Many smaller entities like hospitals and wastewater treatment plants generally do not emit a lot of HAPs, and so would not be considered a "major" source of HAPs. If not a major source, then a facility falls into the "area" source category.

After that, the rule breaks the engines down into "emergency" or "non-emergency" engines, and "diesel-fired" or "gas-fired". Diesel-fired are also called compression ignition (CI) engines and gas-fired (natural gas, gasoline, propane, or biogas) are also called spark ignition (SI) engines. SI engines are further broken out by two-stroke or four-stroke and lean-burn or rich-burn engines. Horsepower is used to categorize engine size. It is a good idea to review these aspects of each of your engines before reviewing rule requirements.

The only exemption to the RICE rule is for existing emergency engines at an area source that is residential, commercial, or institutional. An existing engine under this rule is one ordered before June 12, 2006.

Emergency Engines

If an engine is only operated during power outages and for up to 100 hours for readiness testing and maintenance, then the engine meets the definition of an emergency engine. However, it is important to note that whether an engine is an emergency engine or not is affected by whether or not the engine is part of a financial arrangement. Engines which are part of a financial arrangement will no longer be considered emergency engines as of May 3, 2014. At that time, engines operating under an interruptible rate agreement will have to meet the requirements for non-emergency engines. Up until May 3, 2014, an engine may operate up to 50 hours per year under a financial arrangement and still be considered an emergency engine.

When it comes to the RICE rule, age matters. If an engine is new (i.e., it was ordered on or after June 12, 2006), then new source performance standards (NSPS) apply: for CI engines, 40 CFR Part 60 Subpart IIII; for SI engines, 40 CFR Part 60 Subpart JJJJ. The easiest way to comply with the NSPS is to own a "Tier 2 certified" engine. Tier 2 refers to a set of emission standards that the manufacturer designs into the engine. Owners of new emergency engines may comply by simply documenting the engine is Tier 2 certified and maintain it in accordance with the manufacturer's recommendations.

If an emergency engine was ordered before June 12, 2006, then an owner has until 2013 (May 3 for diesel engines, October 13 for gas engines) to implement maintenance practices. These include oil and filter changes, and inspections of the air cleaner, hoses, and belts at predetermined frequencies. Maintenance logs are required to document compliance.

Finally, all emergency engines are required to install non-resettable hour meters. Facilities must document the reason for the emergency along with the hours operated. The owner should keep all of the required 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 rule. If an engine was ordered before June 12, 2006, then it may need to be equipped with emission control equipment. These controls can cost on the order of roughly $20,000 to $30,000 per engine.

Smaller engines can control HAPs through routine maintenance, but larger engines are required to install add-on emission controls. The most likely add-on control is oxidation catalyst (i.e., a catalytic converter for the engine's stack). For large diesel engines, fuel quality is regulated and crankcase emissions also need to be controlled. Two-stroke engines and small four-stroke engines can comply through routine maintenance, but larger four-stroke engines require controls.

For an SI engine that burns digester or biogas, only the maintenance requirements apply. If your facility combusts biogas, there may be additional state regulations that apply.

Engines Requiring Emissions Controls

Engines that require emission controls will also need to have their emissions tested, both initially and at regular periods thereafter, to demonstrate that the required emissions reductions are achieved. In between tests, the rule requires that the pressure drop across the catalyst and the engine exhaust temperature are monitored continuously to ensure the catalyst is working properly.

For engines that require controls, there is more paperwork to submit to USEPA, or the state agency, if delegated: Initial Notification; Notification of Compliance Status; Notification of Intent to Source Test; semiannual monitoring summary reports; and annual certification of compliance.

How SCS Can Help

We help owners assess how state and federal regulations apply to their facility. We also provide our clients with forms to assist with required documentation, and prepare required notices, monitoring summaries, and permit applications, if needed.

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