



National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

REGULATORY SUMMARY

Final Rule

National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE)

This information was prepared by NASA's Principal Center for Regulatory Risk Analysis and Communication (RRAC PC). If you have further questions or need assistance with this matter, please contact the RRAC PC Manager, Sharon Scroggins (256-544-7932, sharon.scroggins@nasa.gov).

Executive Summary

On 3 March 2010, the U.S. Environmental Protection Agency (EPA) issued a final rule ([75 FR 9648](#)) amending the National Emission Standards for Hazardous Air Pollutants (NESHAP) for stationary reciprocating internal combustion engines (RICE). The rule sets emission limits for certain RICE located at area sources and major sources of hazardous air pollutants (HAPs). A major source of HAP emissions ("major source") is a stationary source that emits or has the potential to emit any single HAP at a rate of 10 tons or more per year or any combination of HAPs at a rate of 25 tons or more per year. An area source of HAP emissions ("area source") is a source that is not a major source. The final rule includes requirements for RICE located at area sources that have site ratings ≤ 500 brake horsepower (bhp) and are located at major sources. In addition, EPA is promulgating requirements for existing non-emergency stationary compression ignition (CI) engines > 500 bhp that are located at major sources. EPA also revised the startup, shutdown, and malfunction (SSM) requirements for the engines included in the existing RICE NESHAP requirements.

The final rule requires operators of existing stationary diesel engines to do the following:

- Install emissions control equipment that would limit HAP emissions by up to 70 percent for stationary non-emergency engines with a site rating > 300 bhp.
- Perform emissions tests to demonstrate compliance with rule requirements.
- Burn ultra-low sulfur fuel in stationary non-emergency engines with a site rating > 300 bhp.

The final rule will become effective on 3 May 2010. In addition, EPA will issue final emissions standards by 10 August 2010 for stationary spark ignition (SI) engines at area sources of HAPs and those at major sources of HAPs with a site rating of ≤ 500 bhp.

Applicability to NASA

The RICE NESHAP applies to existing stationary RICE operated onsite at NASA Centers as well as offsite at contractor and vendor facilities that are major or area sources of HAP emissions. Such facilities are affected by the new requirements if they are:

- Area sources of HAPs and operate RICE, or
- Major sources of HAPs and operate RICE with site ratings ≤ 500 bhp or CI engines with site ratings ≥ 500 bhp

Summary of the Final Rule

Background

EPA promulgated the first requirements for engines under the RICE NESHAP in 2004. Subsequent final rules were issued in 2008 and 2010 to include additional types of engines located at both area sources and major sources of HAPs. Exhibit 1 outlines the rulemakings for the RICE NESHAP and the types of engines regulated.

EXHIBIT 1 RICE NESHAP Rulemakings

Final Rule Citation and Date	RICE
15 June 2004 (69 FR 33473)	Existing, new, and reconstructed stationary RICE >500 horsepower (hp) located at major sources of HAPs
18 January 2008 (73 FR 4136)	New and reconstructed stationary RICE located at area sources New and reconstructed stationary RICE that have a site rating of ≤ 500 hp located at major sources
3 March 2010 (75 FR 9648)	<ul style="list-style-type: none"> • Existing stationary RICE with a site rating of ≤ 500 hp located at major sources. A stationary RICE is considered existing if construction or reconstruction began before 12 June 2006. • Existing stationary RICE of any power rating located at area sources. A stationary RICE is considered existing if construction or reconstruction began before 12 June 2006. • Existing non-emergency CI engines with a site rating >500 hp at major sources. A stationary RICE is existing if construction or reconstruction of the stationary RICE began before 19 December 2002.

The final rule also addresses the following:

- EPA also has amended the previously promulgated regulations regarding operation of stationary RICE at major sources during periods of SSM.
- EPA previously proposed to limit HAP emissions by establishing emissions standards for formaldehyde at major and area sources for non-emergency four-stroke rich burn (4SRB) engines, emergency SI engines, and engines <50 hp (major sources only); and by establishing emission standards for carbon monoxide (CO) for all other engines. In the 3 March 2010 final rule, EPA instead is requiring compliance with a work practice. In addition, EPA received several comments that the level at which it subcategorized small engines at major sources was inappropriate. EPA finalized a work practice standard for engines <100 hp.

Final Standards

Existing Stationary RICE at Major Sources

Exhibit 2 provides the emission standards for existing stationary RICE located at major sources as outlined in the final rule.

EXHIBIT 2

Emission Standards for Existing Stationary RICE Located at Major Sources

Subcategory	Emission Standards (parts per million by volume on a dry basis (ppmvd)) and Management Practices
Non-Emergency CI 100≤hp≤300	230 ppmvd CO at 15% oxygen (O ₂)
Non-Emergency CI 300<hp≤500	49 ppmvd CO at 15% O ₂ or 70% CO reduction
Non-Emergency CI >500 hp	23 ppmvd CO at 15% O ₂ or 70% CO reduction
Emergency CI ≤500hp	<ul style="list-style-type: none"> • Change oil and filter every 500 hours of operation or annually, whichever comes first, except that sources can extend the period for changing the oil if the oil is part of an oil analysis program. • Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first. • Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.
Non-emergency CI RICE <100hp	<ul style="list-style-type: none"> • Change oil and filter every 1,000 hours of operation or annually, whichever comes first, except that sources can extend the period for changing the oil if the oil is part of an oil analysis program. • Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first. • Inspect all hoses and belts every 500 hours or annually, whichever comes first, and replace as necessary.

Additional requirements for existing stationary RICE at major sources include the following:

- Capture and collection requirements to reduce inorganic HAP emissions. Owners and operators of existing stationary non-emergency CI engines >300 hp located at major sources must do one of the following if the engine is not already equipped with a closed crankcase ventilation system:
 - Install a closed crankcase ventilation system that prevents crankcase emissions from being emitted to the atmosphere.
 - Install an open crankcase filtration emission control system that reduces emissions from the crankcase by filtering the exhaust stream to remove oil mist, particulates, and metals.
- Fuel requirements. Owners and operators of existing stationary non-emergency diesel-fueled CI engines >300 hp with a displacement of <30 liters per cylinder located at major sources must use only diesel fuel that has a maximum sulfur content of 15 parts per million

(ppm) and either a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.

Existing Stationary RICE at Area Sources

Exhibit 3 provides the emission requirements for existing stationary RICE located at area sources.

EXHIBIT 3

Emission Standards and Requirements for Existing Stationary RICE Located at Area Sources

Subcategory	Except during Periods of Startup or Malfunction
Non-Emergency CI ≤ 300 hp and Emergency CI	Perform the following management practices (based on whichever comes first): <ul style="list-style-type: none"> • Change the oil and filter every 1,000 hours of operation or annually. • Inspect air cleaner every 1,000 hours of operation or annually. • Inspect all hoses and belts every 500 hours of operation or annually and replace as necessary.
Non-Emergency CI $300 < \text{hp} \leq 500$	49 ppmvd CO at 15% O ₂ or 70% CO reduction
Non-Emergency CI hp > 500	23 ppmvd CO at 15% O ₂ or 70% CO reduction

Additionally, owners and operators of existing stationary non-emergency diesel-fueled CI RICE >300 hp with a displacement of <30 liters per cylinder located at area sources must only use diesel fuel that has a maximum sulfur content of 15 ppm and either a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.

With respect to the required management practices, EPA has added an option for sources to use an oil change analysis program to extend the oil change frequencies. The analysis program must, at a minimum, evaluate the following three parameters and the associated thresholds for determining if the oil must be changed:

- Total Base Number is <30 percent of the Total Base Number of the oil when new; or
- Viscosity of the oil has changed by more than 20 percent from the viscosity of the oil when new; or
- Percent water content (by volume) is >0.5.

If any of the limits are exceeded, the engine owner or operator must change the oil before continuing to use the engine.

Owners and operators of all engines subject to management practices also have the option to work with state permitting authorities pursuant to EPA's regulations at 40 *Code of Federal Regulations* (CFR) Subpart E for alternative maintenance practices to be used instead of the specific maintenance practices promulgated in this rule. The maintenance practices must be at least as stringent as those specified in the final rule.

The final rule also specifies that in situations where an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the work or management practice requirements on the schedule required in the final rule, or if performing the work or management practice on the required schedule would otherwise pose an unacceptable risk under federal, state, or local law, the maintenance activity can be delayed. The maintenance should be performed as soon as practicable. Sources must report any failure to perform the work practice to the regulatory agency.

Startup, Shutdown, and Malfunction Limits

EPA is not setting separate standards for malfunctions in this rule. Therefore, the standards that apply during normal operation also apply during malfunction. EPA believes that any emissions occurring during a malfunction would be of such a short duration compared to the emissions averaged during overall testing time (three 1-hour runs) that the engine would still be able to comply with the emission standard.

Operating Limitations

Exhibit 4 provides the operating limitations for existing stationary non-emergency CI RICE that are >500 hp.

EXHIBIT 4

Operating Limitations for Non-emergency RICE >500 hp

For each...	You Must Meet the Following Operating Limitation...
Existing stationary non-emergency CI RICE that are >500 hp and using an oxidation catalyst	<ul style="list-style-type: none"> • Maintain the catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water from the pressure drop across the catalyst that was measured during the initial performance test. • Maintain the temperature of the stationary RICE exhaust so that the catalyst inlet temperature is between 450 and 1350 degrees Fahrenheit (°F). Owners and operators may petition for a different temperature range; the petition must demonstrate why it is operationally necessary and appropriate to operate below the temperature range specified in the rule (see 40 CFR 63.8(f)).
Existing stationary non-emergency >500 hp and not using an oxidation catalyst	Comply with any operating limitations approved by the Administrator.
Existing stationary non-emergency RICE that are >300 hp meeting the requirement to use open or closed crankcases	Follow the manufacturer's specified maintenance requirements for operating and maintaining the open or closed crankcase ventilation systems and replacing the crankcase filters, or request the Administrator to approve different maintenance requirements that are as protective as the manufacturer requirements.

Demonstrating Compliance

Existing Stationary RICE at Major Sources

Exhibit 5 provides requirements for demonstrating compliance for existing stationary RICE located at major sources.

EXHIBIT 5

Requirements for Demonstrating Compliance for Existing Stationary RICE Located at Major Sources

Subcategory	To Demonstrate Compliance Owners or Operators...
Non-Emergency RICE <100 hp and Emergency RICE	<ul style="list-style-type: none"> • Must operate and maintain stationary RICE and after-treatment control device (if any) according to the manufacturer's emission-related written instructions or develop own maintenance plan. • Do not have to conduct performance testing.
Non-Emergency RICE $100 \geq \text{hp} \leq 500$	<ul style="list-style-type: none"> • Must conduct an initial performance test to demonstrate that they are achieving the required emission standards.
Non-Emergency RICE >500 hp	<ul style="list-style-type: none"> • Must conduct an initial performance test and test every 8,760 hours of operation or 3 years, whichever comes first, to demonstrate that they are achieving the required emission standards.
Non-Emergency CI RICE >500 hp	<ul style="list-style-type: none"> • Must continuously monitor and record the catalyst inlet temperature if an oxidation catalyst is being used. • Must measure the pressure drop across the catalyst monthly. • Must continuously monitor and record the operating parameters (if any) approved by the Administrator if an oxidation catalyst is not being used.

Existing Stationary RICE at Area Sources

Exhibit 6 provides requirements for demonstrating compliance for existing stationary RICE located at area sources.

EXHIBIT 6

Requirements for Demonstrating Compliance for Existing Stationary RICE Located at Area Sources

Subcategory	To Demonstrate Compliance Owners or Operators...
RICE subject to management practices as determined from Exhibit 2	<ul style="list-style-type: none"> • Must develop a maintenance plan that specifies how the management practices will be met. • Do not have to conduct any performance testing.
Non-Emergency RICE >300 hp	<ul style="list-style-type: none"> • Must conduct an initial performance test to demonstrate that they are achieving the required emission standards.
Non-Emergency RICE >500 hp	<ul style="list-style-type: none"> • Must conduct an initial performance test and must test every 8,760 hours of operation or 3 years, whichever comes first, to demonstrate that they are achieving the required emission standards. • Must continuously monitor and record the catalyst inlet temperature if an oxidation catalyst or non-selective catalytic reduction (NSCR) is being used. • Must measure the pressure drop across the catalyst monthly. • Must continuously monitor and record the operating parameters (if any) approved by the Administrator if an oxidation catalyst or NSCR is not being used.

Subcategory	To Demonstrate Compliance Owners or Operators...
Non-E, limited use RICE >500 hp	<ul style="list-style-type: none"> • Must conduct an initial performance test and must test every 8,760 hours of operation or 5 years, whichever comes first, to demonstrate that they are achieving the required emission standards. • Must continuously monitor and record the catalyst inlet temperature if an oxidation catalyst or NSCR is being used. • Must measure the pressure drop across the catalyst monthly. • Must continuously monitor and record the operating parameters (if any) approved by the Administrator if an oxidation catalyst or NSCR is not being used.

Record Keeping

Exhibit 5 outlines the record-keeping requirements for the RICE NESHAP final amendments.

EXHIBIT 7

Record-keeping Requirements

Subcategory	Recordkeeping Requirements
Existing stationary emergency RICE that do not meet the requirements for non-emergency engines	<p>Must install a non-resettable hour meter on the engines to record the hours of operation of the engine.</p> <p>Must maintain records of the number of hours operated and reason for operation to ensure that the 100-hours-per-year limit for maintenance and testing operation is not exceeded.</p>
Owners and operators of existing stationary CI RICE located at area sources that are subject to management practices	<p>Must maintain records demonstrating that required management practices are being met. These records must include the following, at a minimum:</p> <ul style="list-style-type: none"> • Oil and filter change dates and corresponding hour on the hour meter • Inspection and replacement dates for air cleaners, hoses • Belts • Records of other emission-related repairs and maintenance performed
Owners and operators of existing non-emergency stationary CI RICE >300 hp	<p>Must maintain the following:</p> <ul style="list-style-type: none"> • Manufacturer's recommended maintenance procedures for the closed crankcase ventilation system or open crankcase filtration system • Records of the maintenance performed on the system

Reporting Requirements

Owners and operators of existing stationary RICE, except stationary RICE that are <100 hp, existing emergency stationary RICE, and existing stationary RICE that are not subject to numerical emission standards, must submit all of the notifications listed in the NESHAP General Provisions (40 CFR Part 63, Subpart A), including an initial notification, notification of performance test, and notification of compliance for each stationary RICE that must comply with the specified emission limitations.