

National Emission Standards for Hazardous Air Pollutants for
Reciprocating Internal Combustion Engines (RICE Rule) Training Module
40 CFR 63 Subpart ZZZZ
Script- Area Source Existing Non-Emergency Compression Ignition
Engine >500 Horsepower

NARRATOR:

[Slide 2:]

Welcome to the Connecticut Department of Energy & Environmental Protection's Online Training for the National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines, also known as the RICE Rule!

This tool is designed to help owners and operators of reciprocating internal combustion engines, also known as RICE, determine their requirements under 40 CFR Section 63, subpart ZZZZ. By answering the successive questions, your specific requirements have been estimated. Please note that they may not be complete, and refer any questions to your local authority.

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We have determined that your engine is an existing non-emergency compression ignition engine at an area source with a site rating of greater than 500 horsepower.

Let's begin by discussing your applicable emission standards.

- If your engine was certified to meet the Tier 3 emission standards, which are listed in Table 1 of 40 CFR 89.112, you are only required to comply with the New Source Performance Standards for compression ignition engines, 40 CFR 60 Subpart IIII. In this case, you need documentation of engine certification and to adhere to the manufacturer's specifications for the engine.

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Tier 1 and Tier 2 certified RICE that are subject to state and local requirements that call for replacement of the engine can meet management practices until January 1st, 2015, or 12 years after the engine installation date, whichever is later, but not later than June 1st, 2018, after which time the carbon monoxide emission standards specified in this module apply.

- Management practices are described in Table 2d.1 of the rule and include the items specified here.
 - If you plan to fulfill management practices rather than meeting emission limits, you must submit a notification by the date specified indicating your intent to exercise this provision and identifying the state or local regulation that the engine is subject to.

[Slide 5:]

If your engine is located on an offshore drilling vessel on the Outer Continental Shelf, you must meet the management practices listed here.

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If your engine is located on an offshore drilling vessel on the Outer Continental Shelf, you must develop a maintenance plan stating how the management practices will be fulfilled and you must keep supporting documentation and records.

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If your engine was not certified and required to be replaced, and is not located on an offshore drilling vessel, you must limit the concentration of carbon monoxide in the engine exhaust to 23 parts per million at 15% oxygen **or** reduce carbon monoxide emissions by 70% or more. Compliance with this limit must be determined based on the results of testing the average of three 1-hour runs.

Engines located in remote areas of Alaska are not required to meet the limits; however, they must meet management practices.

Engines subject to the emission limits will probably require an emissions control retrofit in order to achieve the standard. For compression ignition engines, this is an oxidation catalyst. You can use the equations listed here to estimate the capital and annual cost of a catalyst.

Your engine must comply with the emission limits and operating limits at all times. Furthermore, you must operate and maintain all equipment safely, and in accordance with good air pollution control practices for minimizing emissions. If you have already achieved the limits required by this rule, you need not make any additional efforts to lessen emissions.

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Next, we will be exploring your fuel requirements. If your engine has a displacement of less than 30 liters per cylinder, you are required to use ultra low sulfur diesel that meets the following criteria:

- Sulfur content cannot exceed 15 parts per million
- The fuel must have a minimum Cetane index of 40 or a maximum aromatic content of 35 volume percent.
- Take note that engines located in Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, areas of Alaska that are not accessible by the Federal Aid Highway System, remote areas of Alaska, or on offshore vessels are exempt from the requirements of this section.

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Now, let's take a look at your operating limits. If your engine is using an oxidation catalyst, you must sustain the catalyst so that the pressure drop across the catalyst does not vary by more than 2 inches of water from the pressure drop across the catalyst that was measured during the initial performance test. You must also maintain the engine exhaust temperature so that the catalyst inlet temperature is within the range of 450 to 1,350 degrees Fahrenheit. Take note that pressure drop and temperature limits do not have to be met during startup.

If your engine does not use an oxidation catalyst, you must comply with any operating limits approved by EPA.

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Here is a brief overview of your testing and monitoring requirements.

[Slide 11:]

Detailed information regarding these requirements will be discussed now, starting with your testing requirements. You are required to conduct an initial performance test no later than 180 days after the date shown. You do not need to conduct an initial test if a test has previously been conducted on the unit; however, the test *must* meet the conditions listed here:

- The test must have been conducted less than two years ago
- The test must have been performed using the required test methods, and these methods must have been followed correctly
- The test must be evaluated and accepted by EPA

- Either no process or equipment changes must have been made since the test was conducted, **or** you must be able to demonstrate that the results of the test, with or without adjustments, reliably show compliance regardless of process or equipment changes.
- The test must be performed at a load condition within plus or minus 10% of 100% load.

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In addition to performing an initial test, you are required to conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first. If your engine is for limited use, meaning it operates for less than 100 hours per year, subsequent performance testing must be conducted every 8,760 hours of operation or 5 years, whichever comes first.

If your engine is currently not in operation, do not startup the engine for the sole purpose of conducting the performance test. You may conduct the test when the engine is started up again.

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Please review this table to determine your testing requirements, which will differ depending on whether you are complying with the requirement to reduce carbon monoxide emissions or limit the concentration of carbon monoxide in the engine exhaust.

[Slide 14:]

Now we will be discussing the required testing procedures. You must conduct three separate test runs for each performance test required. Each run will last at least 1 hour.

Use the equation shown here to determine compliance with the percent reduction requirement.

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You will need to normalize the carbon monoxide concentrations at the inlet and outlet of the control device to a dry basis and to 15% oxygen, or an equivalent percent carbon dioxide. If pollutant concentrations are to be corrected to 15% oxygen and carbon dioxide concentration is measured in lieu of oxygen concentration measurement, a carbon dioxide correction factor is needed. Calculate the carbon dioxide correction factor as described here.

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If you comply with the emission limitation to reduce carbon monoxide and you are not using an oxidation catalyst, you must petition EPA for operating limitations to be established during the initial performance test and continuously monitored thereafter; or for approval of no operating limitations. You cannot conduct the initial performance test unless the petition has been approved by EPA.

If you petition EPA for approval of operating limitations, your petition must incorporate the items listed here.

[Slide 17:]

If you petition EPA for approval of **no** operating limitations, your petition must incorporate the information specified here.

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The engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of

the average percent load determination must be included in the Notification of Compliance Status. The written report must include the information specified here.

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Next, we will discuss how to demonstrate initial compliance with the emission limits and operating limits. If you are complying with the requirement to reduce carbon monoxide emissions and you are using an oxidation catalyst and a continuous parameter monitoring system, you have demonstrated initial compliance if:

- The average reduction of carbon monoxide emissions, determined from the initial performance test, fulfills the required carbon monoxide percent reduction; and
- You have installed a continuous parameter monitoring system to monitor catalyst inlet temperature; and
- You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

If you are complying with the carbon monoxide limit and are using an oxidation catalyst and a continuous parameter monitoring system, you have demonstrated initial compliance if:

- The average carbon monoxide concentration determined using the initial performance test does not exceed the limit; and
- You have installed a continuous parameter monitoring system to monitor catalyst inlet temperature; and
- You have recorded catalyst pressure drop and catalyst inlet temperature during the initial test.

If you are complying with the requirement to reduce carbon monoxide emissions and you are not employing an oxidation catalyst, you have demonstrated compliance if:

- The average reduction of carbon monoxide emissions, as determined during the initial performance test, fulfills the required percent reduction; and
- A continuous parameter monitoring system is installed to monitor operating parameters approved by EPA, if any; and
- You have recorded the approved operating parameters, if any, during the initial test.

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If you are complying with the requirement to limit the concentration of carbon monoxide and you are not employing an oxidation catalyst, you have demonstrated initial compliance if:

- The average carbon monoxide concentration, as determined from the initial performance test, is less than or equal to the emission limit; and
- A continuous parameter monitoring system has been installed to monitor operating parameters approved by EPA, if any; and
- You have recorded the approved operating parameters, if any, during the initial test.

If you are complying with the requirement to reduce carbon monoxide emissions and you are using a continuous emissions monitoring system, also known as CEMS, you have demonstrated initial compliance if:

- You have installed a CEMS to monitor carbon monoxide and either oxygen or carbon dioxide at the inlet and outlet of the oxidation catalyst; and
- You have completed a performance evaluation of your CEMS using the specified methods; and
- The average reduction of carbon monoxide calculated using the procedures in 40 CFR 63.6620 equals or exceeds the required percent reduction. Please note that the initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is determined based on the average percent reduction reached during the 4-hour period.

If you are complying with the carbon monoxide limit and you are utilizing a CEMS, you have demonstrated initial compliance if:

- A CEMS has been installed to monitor carbon monoxide and either oxygen or carbon dioxide at the outlet of the oxidation catalyst; and
- You have completed a performance evaluation of your CEMS using the methods specified; and
- The average carbon monoxide concentration determined using 40 CFR 63.6620 is less than or equal to the limit. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is determined based on the average concentration measured during the 4-hour period.

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During the initial performance test, you must meet one of the following limits: Either reduce carbon monoxide emissions by at least 70%, or limit the concentration of carbon monoxide in the engine exhaust to 23 parts per million at 15% oxygen.

You must submit a Notification of Compliance Status detailing the results of the initial compliance demonstration. A sample Notification of Compliance Status, shown at right, can be found on the EPA RICE Compliance Page. The web address for this site will be provided at the end of this module. The Notification of Compliance Status must be sent before the close of business on the 60th day following completion of the initial performance test and again before the close of business on the 60th day after completion of any subsequent performance tests.

You are permitted to combine separate notifications into one notification, as long as the due dates for all notifications are met.

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Now, let's discuss your monitoring requirements. If you install a CEMS, you must install, operate and maintain the CEMS to monitor carbon monoxide and either oxygen or carbon dioxide at both the inlet and outlet of the control device according to the following requirements:

- You must install, operate, and maintain each CEMS according to the applicable performance specifications in 40 CFR part 60, appendix B.
- You must conduct an initial performance evaluation and an annual relative accuracy test audit of each CEMS according to the requirements in 40 CFR 63.8 and according to the applicable performance specifications of 40 CFR 60, appendix B in addition to daily and periodic data quality checks according to 40 CFR 60 appendix F, procedure 1.
- Each CEMS must complete a minimum of one cycle of operation, consisting of sampling, analyzing, and data recording, for each successive 15-minute period. You need at least two data points, each representing a different 15-minute period, to have a valid hour of data.
- CEMS data recorded must be reduced according to the procedures in 40 CFR 63.8(g)(2) and recorded in parts per million at 15% oxygen or the equivalent carbon dioxide concentration.

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If you are required to install a continuous parameter monitoring system, you must install, operate, and maintain each continuous parameter monitoring system according to the following:

- Develop a monitoring plan that addresses the monitoring system design, data collection, and the quality assurance and quality control elements outlined in (1)(i) through (v) of this section and in 40 CFR 63.8(d). You can request approval of monitoring system quality assurance and quality control procedures alternative to those specified in (1) through (6) of this section in your site-specific monitoring plan.
 - The performance criteria and design specifications for the monitoring system equipment, including the sample interface, detector signal analyzer, and data acquisition and calculations;

- The sampling interface location, such that the monitoring system will provide representative measurements;
- The equipment performance evaluations, system accuracy audits, or other audit procedures;
- Ongoing operation and maintenance procedures in accordance with provisions in the sections specified here; and
- Ongoing reporting and recordkeeping procedures in accordance with provisions in the sections specified here.

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- You must install, operate, and maintain each continuous parameter monitoring system in continuous operation according to the procedures in your monitoring plan.
- The continuous parameter monitoring system must collect data at least once every 15 minutes.
- For a continuous parameter monitoring system for measuring temperature range, the temperature sensor must have a minimum tolerance of 2.8 degrees Celsius, equivalent to 5 degrees Fahrenheit, or 1% of the measurement range, whichever is greater.
- You must conduct the continuous parameter monitoring system equipment performance evaluation, system accuracy audits, or other audit procedures identified in your monitoring plan at least annually.
- You must conduct a performance evaluation of each continuous parameter monitoring system in accordance with your monitoring plan.

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If your engine is not equipped with a closed crankcase ventilation system, you must either install a closed crankcase ventilation system *or* install an open crankcase filtration emission control system. You must adhere to the manufacturer's instructions for operating and maintaining the crankcase ventilation systems and replacing the filters, or you can request that EPA approve alternate maintenance practices that are equally as protective as the manufacturer's requirements. Please note that if your engine is located in a remote area of Alaska, you do not need to install a crankcase system.

Additionally, you must minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine; this period cannot exceed 30 minutes. After the 30 minute period, emission standards applicable to all times other than startup apply.

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Note that an oil analysis program can be used to extend the oil change requirement; however, the oil analysis program must meet the following requirements:

- The oil analysis must at a minimum analyze the following parameters: Total Base Number, viscosity, and percent water content.
- The condemning limits for these parameters are as follows: Total Base Number is less than 30% of the Total Base Number of the oil when new, viscosity of the oil has changed by greater than 20% from the viscosity of the oil when new; or percent water content, by volume, is greater than 0.5.
- If none of the condemning limits are exceeded, you do not have to change the oil.
- If any limit is exceeded, you must change the oil within two business days of receiving the results of the analysis. If the engine is not in operation when the results are received, change the oil within 2 days or before commencing operation, whichever is later.
- You must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine.

- The analysis program must be incorporated in the engine maintenance plan.

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The following constitute your continuous compliance requirements:

- You must monitor continuously at all times the engine is operating, *except* during monitor malfunctions, repair of monitor malfunctions, required performance evaluations, and required quality assurance or quality control activities. Monitoring failures brought on by poor maintenance or careless operation are not malfunctions.
- You cannot use any data gathered during monitoring malfunctions, monitoring malfunction repairs, and required quality assurance or quality control activities in data averages and calculations used to report emission or operating levels. You must, however, use all valid data recorded during all other periods.

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Here are some additional continuous compliance requirements. If you are complying with the requirement to reduce carbon monoxide emissions or you are complying with the requirement to limit carbon monoxide and you are using a CEMS, you must demonstrate compliance by:

- Gathering the monitoring data as specified in 40 CFR 63.6625(a), reducing the measurements to 1-hour averages, calculating the percent reduction or concentration of carbon monoxide emissions according to 40 CFR 63.6620; and
- Showing that the catalyst reaches the necessary percent reduction of carbon monoxide emissions over the 4-hour averaging period, or that the emissions remain at or below the carbon monoxide concentration limit; and
- Conduct an annual RATA of your CEMS using the methods and procedures specified here.

If you are complying with the requirement to reduce carbon monoxide emissions or the requirement to limit the concentration of carbon monoxide in the engine exhaust, and you are using an oxidation catalyst, you must demonstrate continuous compliance by:

- Completing performance testing every 8,760 hours or 3 years, whichever comes first, to prove that the required percent reduction is fulfilled or that your emissions do not exceed the limit. If your engine is for limited use, conduct these performance tests every 8,760 hours or 5 years, whichever comes first.
- You must gather the catalyst inlet temperature data according to 40 CFR 63.6625(b); and
- Reduce the data to 4-hour rolling averages; and
- Keep the 4-hour rolling averages within the operating limits for the catalyst inlet temperature; and
- Measure the pressure drop across the catalyst each month and show that the pressure drop across the catalyst is within the operating limit established during the performance test.

If you are complying with the requirement to reduce carbon monoxide emissions or the requirement to limit the carbon monoxide concentration in the engine exhaust, and you are **not** using an oxidation catalyst, you must demonstrate continuous compliance by:

- Completing performance testing every 8,760 hours or 3 years, whichever comes first, to demonstrate that the carbon monoxide reduction requirement is met or that your emissions remain within the carbon monoxide limit. If your engine is for limited use, testing must be performed every 8,760 hours or 5 years, whichever comes first.
- You must gather the approved operating parameter data, if any, as specified in 40 CFR 63.6625(b); and
- Reduce the data to 4-hour rolling averages; and
- Maintain the 4-hour rolling averages within the operating limits for the operating parameters established during the performance test.

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Next, let's discuss the records you are required to keep.

- You must keep records of each notification and report that you submit, and all supporting documents for these notifications and reports
- You must keep records of the occurrence and duration of each malfunction
- You must keep records of performance testing and evaluations
- You must keep records of the required maintenance conducted on air pollution control and monitoring equipment.
- You must keep records of actions taken during malfunctions to minimize emissions and all corrective actions taken
- You must keep records of the maintenance conducted on the engine to show that it was operated and maintained in accordance with the maintenance plan.

If you have a Continuous Emissions Monitoring System or a Continuous Parameter Monitoring System, you must keep the following:

- Records of each period during which a continuous monitoring system is malfunctioning, inoperative, or out of control.
- Records of all required measurements needed to demonstrate compliance with an applicable standard.
- Records of all continuous monitoring system performance test results
- Records of all measurements as may be necessary to determine the conditions of performance tests and evaluations
- Records of all continuous monitoring system calibration checks
- Records of all adjustments and maintenance conducted on the continuous monitoring system
- Also, keep previous versions of the performance evaluation plan, and any requests for alternatives to the RATA

All records must be kept for 5 years from the date of creation.

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Here is a summary of the notifications you are required to submit:

- You must submit a Notification of Applicability or Construction/Reconstruction 120 days after the effective date of this rule.
- Submit a Notification of Intent to Conduct a Performance Test 60 days prior to the test.
- Submit a Notification of Compliance Status within 60 days after compliance has been demonstrated.

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In addition to the notifications, you must submit Semi-Annual Compliance Reports on January 31st and July 31st of every year.

The semi-annual report will cover the period from January 1st through June 30th or July 1st through December 31st. Please review the information on the next two screens to determine what information your Compliance Reports must contain.

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Your semi-annual compliance report must indicate each instance in which you did not meet each emission limit or operating limit. If you change your catalyst, you must reestablish the values of the operating parameters measured during the initial performance test. When reestablishing the values of your operating parameters, you will need to conduct a performance test to show compliance with the applicable emission limit.

Additionally, you must report each instance in which you did not meet the requirements of any of the General Provisions.

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All notifications and reports should be sent to EPA Region 1 at the address shown here.

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You must comply with all requirements of this rule by the date shown on the screen.

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If you would like more information about the RICE rule, please visit the EPA RICE Compliance web page at the address shown. This site provides resources such as Q and A documents, fact sheets, sample notification forms, and recordings of webinars, all of which are designed to help you comply with this rule.

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Let's summarize the requirements for your existing non-emergency compression ignition engine at an area source with a site rating of greater than 500 horsepower.

- If your engine was certified to meet Tier 3 emission standards, or Tier 2 emission standards for engines greater than 560 kilowatts, your engine is considered to be in compliance with the rule. You need only to maintain documentation of engine certification and to follow the manufacturer's specifications.
- Tier 1 and Tier 2 certified engines subject to state and local requirements that call for replacement of the engine can meet management practices until January 1st, 2015, or 12 years after the installation date, whichever is later, but not later than June 1st, 2018, after which time the carbon monoxide emission limits apply.
- If your engine is located on an offshore drilling vessel on the Outer Continental Shelf, you must follow the specified management practices.
- All other engines must limit the concentration of carbon monoxide in the engine exhaust to 23 parts per million at 15% oxygen *or* reduce carbon monoxide emissions by 70% or more
- Most engines will require an oxidation catalyst to meet these emission standards.
- Engines with a displacement less than 30 liters per cylinder are required to use ultra low sulfur diesel.
- Your engine is required to undergo initial emission performance testing within 180 days after the date specified.
- You must also conduct subsequent performance testing
- If you install a CEMS, you must install, operate, and maintain a CEMS to monitor carbon monoxide and either oxygen or carbon dioxide at both the inlet and outlet of the control device.
- If you are required to install a continuous parameter monitoring system, you must install, operate, and maintain each continuous parameter monitoring system according to the requirements listed in this module.
- If your engine is not equipped with a closed crankcase ventilation system, either install a closed crankcase ventilation system or install an open crankcase filtration emission control system.
- You must minimize the engine's time spent at idle during startup and minimize the engine's startup time
- You may use an oil analysis program in order to extend the specified oil change requirement

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- You must keep records of all notifications submitted, testing and maintenance performed, malfunction and corrective actions taken, etc.
- You must retain all records for 5 years.
- Submit notifications of Applicability, Intent to Conduct Performance Test, and Compliance Status
- If your engine is Tier 1 or Tier 2 certified, submit Notification of Intent to Use Management Practices, including the applicable state/local regulation
- You must submit a Semi-Annual Compliance Report
- You must be in compliance with all requirements of the rule by the date specified.