

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

NARRATOR:

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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 established that you own or operate an existing non-emergency compression ignition engine greater than 500 horsepower, located at a major source. Now, let's discuss your requirements.

To comply with this rule you must limit the concentration of carbon monoxide in your engine's exhaust to less than or equal to 23 parts per million, corrected to 15% oxygen, or reduce carbon monoxide emissions by 70% or more. The test results shall be based on the average of three 1-hour runs using specified requirements and procedures.

Your engine will probably require an oxidation catalyst to achieve the emission limits. Formulas for the estimated capital and annual cost to retrofit your engine based on its horsepower rating are shown here.

You must comply with the emission and operating limits at all times, and operate and maintain all equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions does not require you to make any further efforts to reduce emissions if levels required by this standard have been achieved.

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If the engine's displacement is less than 30 liters per cylinder, then you must use diesel fuel with a maximum sulfur content of 15 ppm and either a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.

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If your engine uses an oxidation catalyst, then you must maintain the catalyst so that the pressure drop across the catalyst does not change by more than two inches of water from the pressure drop that was measured during the initial performance test. Also, maintain the temperature of the engine exhaust so that the catalyst inlet temperature is greater than or equal to 450 degrees Fahrenheit and less than or equal to 1,350 degrees Fahrenheit, or you may petition EPA for a different temperature range. The 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 limitations approved by EPA.

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An initial performance test is required within 180 days of the compliance date. You may not be required to conduct an initial test on units for which a test has been previously conducted, but the test must meet the following:

- The test must have been conducted using the required methods
- The test must have been performed within the last two years and accepted by EPA.
- There have been no process or equipment changes made since the test was performed, or you must be able to demonstrate that the results of the performance test, with or without adjustments, reliably demonstrate compliance.
- The test must have been conducted at 100% load, plus or minus 10%.

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If you are not using a CEMS, conduct subsequent performance tests every 8,760 hours or three years, whichever comes first. If your engine is currently non-operational, you may conduct the test when the engine is started up again.

[Slide 8:]

You must reduce the emissions of carbon monoxide or limit the concentration of carbon monoxide in the engine exhaust using the procedures and approved methods indicated here. If you are using a control device to reduce the emissions of carbon monoxide, then the sampling must be performed at the inlet and outlet of the control device. All measurements to determine oxygen concentration and moisture content must be made at the same time and location as the measurements for carbon monoxide concentration.

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You must conduct three separate test runs for each performance test required. Each run must last at least one hour. Use the equation shown to evaluate compliance with the percent reduction requirement.

[Slide 10:]

You must 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 the measurements are corrected to carbon dioxide, a correction factor may be used according to the formulas indicated here.

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If you comply with an emission limitation on the concentration of carbon monoxide in the engine exhaust and you are **not** using an oxidation catalyst, you must petition EPA to either establish operating limitations determined during the initial test or obtain approval of no operating limitations prior to conducting the test.

Any petition for approval of operating limitations must include the parameters you propose to use as operating limitations and their relationship to the hazardous air pollutant emissions, identifying how you will establish the upper and/or lower values for these parameters, and the methods and instruments you will use to measure and monitor these parameters. Finally, the petition shall include the relative accuracy of the instruments and the precision, frequency and methods for recalibrating the instruments you will use for monitoring these parameters.

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Any petition for approval of no operating limitations must include the parameters associated with operation of the engine, any emission control device which could change intentionally or unintentionally on a routine basis or over time, and the relationship between changes in the parameters and changes in hazardous air pollutant emissions. For parameters which could change in such a way as to increase hazardous air pollutant emissions, the petition shall include a discussion of whether establishing limits on the parameters would serve to limit hazardous air pollutant emissions, and how you could establish upper and/or lower values for the parameters which would establish limits on

the parameters in operating limits. You should also include in the petition a discussion identifying the methods that will be used to measure the parameters and the instruments you could use to monitor them, as well as the relative accuracy, precision, frequency and methods for recalibrating the instruments. Finally, include an explanation of why you feel it is infeasible or unreasonable to adopt the parameters as operating limits.

Engine testing must be performed at a specific load as determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. The following information shall be included in the Notification of Compliance Status: the engine model number, manufacturer, year of purchase, site brake horsepower, and ambient conditions encountered during the test. An explanation of all assumptions that were made to estimate or calculate percent load during the performance test and the model number and estimated accuracy of any measurement devices used to determine percent load shall also be included in the Notification of Compliance Status.

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You may be asking yourself, “How do I 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 CPMS, you have demonstrated initial compliance if:

- The average reduction of carbon monoxide emissions determined from the initial performance test achieves the required carbon monoxide percent reduction; and
- You have installed a CPMS to monitor catalyst inlet temperature according to the monitoring requirements in this module; and
- You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

If you are complying with the requirement to limit the concentration of carbon monoxide and you are using an oxidation catalyst and a CPMS, you have demonstrated initial compliance if:

- The average carbon monoxide concentration determined from the initial performance test is less than or equal to the carbon monoxide emission limit; and
- You have installed a CPMS to monitor catalyst inlet temperature according to the monitoring requirements in this module; and
- You have recorded the catalyst pressure drop and catalyst inlet temperature during the initial performance test.

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

- The average reduction of emissions of carbon monoxide determined from the initial performance test achieves the required carbon monoxide percent reduction; and
- You have installed a CPMS to monitor operating parameters approved by EPA (if any) according to the monitoring requirements in this module; and
- You have recorded the approved operating parameters (if any) during the initial performance test.

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

- The average carbon monoxide concentration determined from the initial performance test is less than or equal to the carbon monoxide emission limit and
- You have installed a CPMS to monitor operating parameters approved by EPA (if any) according to the monitoring requirements in this module; and

- You have recorded the approved operating parameters (if any) during the initial performance test.

If you are complying with the requirement to reduce carbon monoxide emissions and you are using a 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 according to the requirements in this module; and
- You have conducted a performance evaluation of your CEMS using PS 3 and 4A of 40 CFR part 60, Appendix B; and
- The average reduction of carbon monoxide calculated using 40 CFR 63.6620 equals or exceeds the required percent reduction. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is based on the average percent reduction achieved during the 4-hour period.

If you are complying with the requirement to limit the concentration of carbon monoxide and you are using a CEMS, you have demonstrated initial compliance if:

- You have installed a CEMS to monitor carbon monoxide and either oxygen or carbon dioxide at the outlet of the oxidation catalyst according to the requirements in this module; and
- You have conducted a performance evaluation of your CEMS using PS 3 and 4A of 40 CFR part 60, Appendix B; and
- The average concentration of carbon monoxide calculated using 40 CFR 63.6620 is less than or equal to the carbon monoxide emission limit. The initial test comprises the first 4-hour period after successful validation of the CEMS. Compliance is based on the average concentration measured during the 4-hour period.

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During the initial performance test, you must reduce carbon monoxide emissions by 70% or more, or limit the concentration of carbon monoxide in the engine exhaust to less than or equal to 23 ppm at 15% oxygen. Submit a Notification of Compliance Status according to 40 CFR 63.6645.

[Slide 16:]

Let's talk about your monitoring requirements. If you install a CEMS to monitor the requirement to reduce carbon monoxide emissions, you must install, operate, and maintain a CEMS to monitor carbon monoxide and either oxygen or carbon dioxide at both the inlet and the outlet of the control device. A CEMS is required only at the outlet if you are complying with the requirement to limit the concentration of carbon monoxide. Each CEMS must be installed, operated, and maintained according to the applicable performance specifications of 40 CFR part 60, appendix B. You must conduct an initial performance evaluation and an annual relative accuracy test audit, or RATA, of each CEMS according to the requirements in 40 CFR 63.8 and 40 CFR part 60, appendix B as well as daily and periodic data quality checks in accordance with 40 CFR part 60, appendix F, procedure 1.

Each CEMS must complete a minimum of one cycle of operation for each successive 15-minute period and you must have at least two data points, with each representing a different 15-minute period, to have a valid hour of data. CEMS data must be 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 CPMS, you must prepare a monitoring plan that addresses specific monitoring system design, data collection, quality assurance and quality control elements. You may request approval of alternative monitoring system quality assurance and quality control procedures in your site-specific monitoring plan. Each CPMS must be installed, operated, and maintained according to the procedures in your monitoring plan. The CPMS must collect data at least once every 15 minutes.

Conduct the CPMS equipment performance evaluation, system accuracy audits, or other audit procedures specified in your monitoring plan at least annually.

[Slide 18:]

If your engine is not equipped with a closed crankcase ventilation system, then you must either install a closed crankcase ventilation system or 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. Follow the manufacturer's maintenance requirements for operating and maintaining the crankcase ventilation systems or you can request that EPA approve different maintenance requirements that are as protective as the manufacturer's requirements.

You must minimize engine idling time and limit startup time to a period needed for appropriate and safe loading of the engine. Engine startup may not exceed 30 minutes, after which time the non-startup emission limits apply.

[Slide 19:]

You must continuously monitor emissions at all times that the engine is operating, except for monitor malfunctions, associated repairs, required performance evaluations and required quality assurance or control activities. You may not use data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities in data averages and calculations used to report emission or operating levels. Monitoring failures caused in part by poor maintenance or careless operation are not malfunctions.

[Slide 20:]

To comply with the requirement to reduce carbon monoxide emissions or limit the concentration of carbon monoxide in the exhaust using a CEMS, you must collect the monitoring data according to the requirements in this module by reducing the measurements to 1-hour averages and calculating the percent reduction or concentration of carbon monoxide emissions. You must also demonstrate that the catalyst achieves the required percent reduction of carbon monoxide emissions over the 4-hour averaging period, or that emissions remain at or below the carbon monoxide concentration limit, and, conduct an annual RATA of your CEMS using 40 CFR part 60, Appendix B and Appendix F, procedure 1.

If you are complying with the requirement to either reduce carbon monoxide emissions, or limit the concentration of carbon monoxide in the exhaust using an oxidation catalyst, then you must conduct performance tests every 8,760 hours or three years, whichever comes first, to demonstrate that the required percent reduction is achieved or that your emissions remain at or below the limit. You must also collect the catalyst inlet temperature data according to the requirements in this module, reduce the data to 4-hour rolling averages, and maintain the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature. Finally, you are required to measure the pressure drop across the catalyst once per month and demonstrate that the pressure drop across the catalyst is within the operating limitation established during the performance test.

[Slide 21:]

If you are complying with the requirement to reduce carbon monoxide emissions or limit the concentration of carbon monoxide in the exhaust, and you are *not* using an oxidation catalyst, you must conduct performance tests every 8,760 hours or three years of operation, whichever comes first, to show that the required percent reduction is achieved or that your emissions remain at or below the limit, and collect the approved operating parameter data according to the requirements in this module. You must also reduce the data to 4-hour rolling averages and maintain the 4-hour rolling averages within the operating limitations for the operating parameters established during the performance test.

[Slide 22:]

Let's talk about your recordkeeping and reporting requirements. You are required to keep records of each notification and report submitted and all supporting documentation, the occurrence and duration of each malfunction, any performance tests and evaluations, required maintenance performed on air pollution control and monitoring equipment, any actions taken during malfunctions to minimize emissions, and corrective actions.

[Slide 23:]

If you have a CPMS, you must keep records of each period during which a CMS is malfunctioning, inoperative or out-of-control, all required measurements needed to demonstrate compliance with a relevant standard, all CMS performance test results and evaluations, and the conditions during the performance tests and evaluations. All CMS calibration checks, adjustments and maintenance performed on the CMS, previous versions of the performance evaluation plan, and requests for alternatives to the RATA plan shall also be included.

Keep all records for five years from the date of creation.

[Slide 24:]

A Notification of Applicability was due December 13<sup>th</sup>, 2004. You are required to submit a notification 60 days prior to performing any compliance test, and 60 days after your compliance demonstration.

[Slide 25:]

Each year, you are required to submit a Semi-Annual Compliance Report by January 31<sup>st</sup>, covering the period of July 1<sup>st</sup> to December 31<sup>st</sup> of the previous year; and by July 31<sup>st</sup> for the period covering January 1<sup>st</sup> through June 30<sup>th</sup> of the current year. The first compliance report must cover the period beginning on May 3<sup>rd</sup>, 2013 and ending on June 30<sup>th</sup>, 2013.

The report must contain:

- A statement by a responsible official certifying the accuracy of the report
- A statement as to whether any malfunction occurred during the reporting period, including the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any limits to be exceeded. Also include actions taken during malfunction to minimize emissions and correct malfunctions.
- If no deviations occurred, a statement indicating so.
- If there were no periods during which the CMS was out-of-control, a statement indicating so.

For each deviation that occurs where you are not using a CMS, the report must contain:

- A statement by a responsible official certifying the accuracy of the report
- A statement indicating whether any malfunctions occurred during the reporting period, including the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any limits to be exceeded. Also include actions taken during malfunction to minimize emissions and correct malfunctions.
- Total operating time of the engine at which the deviation occurred
- Information on the number duration, and cause of deviations, and the corrective action taken.

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For each deviation that occurs where you *are* using a CMS, the semi-annual report must include the date and time each malfunction or deviation started and stopped, and whether each deviation occurred during a period of malfunction or during another period. You must also include the date, time, and duration that each CMS was inoperative or out-of-control, and a summary of the total duration of the deviation and the total duration as a percent of the total source operating time during that reporting period.

The report must also include a breakdown of the total duration of the deviations during the reporting period into those that are due to control equipment problems, process problems, other known causes, or other unknown causes. Finally, the report shall include an identification of each parameter and pollutant that was monitored at the engine, a brief description of the engine and CMS, the date of the latest CMS certification or audit, and a description of any changes in CMS, processes, or controls since the last reporting period.

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The Semi-Annual Compliance Report must include each instance in which you did not meet an emission limit, operating limit or any requirement of the general provisions. If you change your catalyst then you must reestablish the values of the operating parameters measured during the initial performance test and demonstrate that you are meeting the required emission limit applicable to your engine.

If your source has a Title V Operating Permit, report all deviations in the Title V Semi-Annual Monitoring Report.

[Slide 28:]

Notifications must be sent to EPA Region 1 at the address shown.

[Slide 29:]

You must comply with the rule by May 3<sup>rd</sup>, 2013.

[Slide 30:]

If you would like more information about the RICE rule, please visit the EPA RICE Compliance web page at the address provided. 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.

[Slide 31:]

Let's summarize the requirements for your major source existing non-emergency compression ignition engine greater than 500 horsepower under this rule.

You must limit the concentration of carbon monoxide in the engine exhaust to less than or equal to 23 parts per million at 15% oxygen **or** reduce carbon monoxide emissions by 70% or more and use an oxidation catalyst as well as ultra-low sulfur diesel. If you are not using a CEMS to monitor your emissions, you must perform an initial emission test and conduct subsequent testing.

[Slide 32:]

If your engine is not equipped with a closed crankcase ventilation system, you must either install a closed crankcase ventilation system or an open crankcase filtration emission control system. You must also minimize the engine's time spent at idle during startup, minimize the startup time, and continuously monitor the engine operation. Keep records of notifications, reports, malfunctions, testing and maintenance for a period of five years.

Submit Notifications of Applicability, Intent to Conduct a Performance Test and Compliance Status. Also, submit a Semi-Annual Compliance Report (or an Annual Report if your engine classifies as limited use). Your compliance date is May 3<sup>rd</sup>, 2013.