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Colorado Department
of Public Health
and Environment

General Operating and Maintenance Plan for Reciprocating Internal Combustion Engines
February 26, 2007

The Colorado Department of Public Health and Environment, Air Pollution Control Division (the Division) has developed the following General Operating and Maintenance Plan (O&M Plan) for natural gas-fired Reciprocating Internal Combustion Engines (RICE) that reduce emissions below major source thresholds, thus becoming a synthetic minor source in the State of Colorado. The General O&M Plan shall become the default O&M Plan for natural gas-fired RICE unless the source chooses to submit a specific O&M Plan to the Division for review and approval through the Final Approval permitting process. The source shall maintain records to demonstrate compliance with either the General O&M Plan or another O&M Plan approved by the Division. The source shall provide documentation and recordkeeping to demonstrate compliance with the O&M Plan upon request by the Division.

All engines shall comply with the following operating parameters and maintenance schedules:

1. The source shall follow the manufacturer's scheduled maintenance guide for the engine and document the date that activities were completed. If a company has established its own maintenance schedule then this schedule may be followed presuming it is consistent with good air pollution control practices for minimizing emissions as defined in the New Source Performance Standard (NSPS) general conditions. Determination of whether or not acceptable operating and maintenance procedures are being used will be based on information available to the Division, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. (Reference: Regulation No. 6, Part A. General Provisions from 40 CFR 60.11)

Parameters 2 and 3 apply only to rich burn engines equipped with an air-fuel ratio controller:

2. The source shall maintain records to verify that the air-fuel ratio controller (AFRC) is operated per the manufacturer's recommendations. The oxygen sensor millivolt (mV) reading of the AFRC shall be recorded per the schedule in Table 1. Additionally, the mV reading shall be tracked and recorded during each portable analyzer test.

3. The source shall follow the manufacturer's oxygen sensor replacement schedule if an oxygen sensor is utilized. If the equipment maintenance and replacement is dependent on the hours of operation then the hours shall be tracked and recorded and made available to the Division upon request. If the source is using a method other than hours of operation to track oxygen sensor replacement then tracking must be recorded and available to the Division upon request. Records of oxygen sensor replacement shall be made available to the Division upon request.

4. The source shall clean, recondition and replace the catalyst per the manufacturer's or packager's recommended schedule. A copy of this maintenance schedule shall be made available to the Division upon request. If maintenance activities or actions are dependent upon hours of operation then engine operating hours shall be recorded and made available to the Division upon request. Records of the catalyst cleaning, reconditioning or replacement shall be documented and made available to the Division upon request.

5. The source shall record the inlet temperature into the catalyst per the schedule specified in Table 1.
    - For a rich burn engine with non-selective catalytic reduction (NSCR) emission control equipment the temperature into the catalyst shall be operated between 750°F and 1250°F.

- For a lean burn engine with an oxidation catalyst emission control equipment, the temperature shall be operated between 450°F and 1350°F.

If the temperature is outside this range then the appropriate maintenance activities shall be performed.

6. The source shall monitor and record the pressure drop across the catalyst monthly. The pressure differential shall not deviate by more than 2 inches of water column from the baseline value established by the source when the engine is operating at 90% - 110% load. Baseline pressure differential shall be established by the source and recorded during each portable analyzer test. If the pressure differential exceeds baseline values by more 2 inches water column then the appropriate maintenance shall be performed.

   Note: If the pressure differential is not within the parameters established during a baseline performance test, then the source may forgo maintenance activities and perform a portable analyzer test of the engine to establish new pressure differential baseline. The most recent baseline pressure differential established during portable analyzer testing shall be used to determine compliance.

7. Compliance demonstration:
   a. Existing Permitted Engines:
      i. Pressure differential across the control equipment shall be established within the first 100 hours of engine operations from the date that the catalyst is cleaned, reconditioned, or replaced.
   b. Newly Permitted Engines or Engines Associated with a Permit Modification:
      i. Pressure differential across the control equipment shall be established within 180 days from the date of equipment startup for newly permitted engines or within 180 days from the date of permit issuance for engines associated with a modified permit.

8. The source shall perform portable analyzer testing for NOx, CO and O2 per the schedule in Table 1. Portable analyzer testing shall follow the Division's approved protocol and shall include emissions testing at the outlet of the catalyst. The protocol can be found at the Division's web page at the following link: http://www.cdphe.state.co.us/ap/down/portanalyzeproto.pdf

Table 1

Facility Permitted Emission Limits	Records of Inlet Temperature	Record of AFRC milli-volt reading	Portable Analyzer Testing
Engines at facilities with NOx or CO emissions **greater than or equal to 80 tons per year**. Including portable engines moved to these facilities	Daily	Weekly	Quarterly Testing If monitoring demonstrates compliance during four consecutive quarters then the source shall be allowed to test semi-annually. If any of the semi-annual tests fail then the source shall return to quarterly tests.
Engines at facilities with NOx or CO emissions **less than 80 tons per year**. Including portable engines moved to these facilities	Weekly	Weekly	Semi-annually Testing If monitoring demonstrates compliance during two consecutive semi-annual tests then the source shall be allowed test annually. If any of the annual tests fail then the source shall return to semi-annual testing.
All synthetic minor engines that do not have emission control equipment shall conduct portable exhaust gas analysis testing at least once per calendar year.			