Form APCD-301

Colorado Department of Public Health and Environment
Air Pollution Control Division

Colorado Department of Public Health and Environment

Operating and Maintenance Plan Template for Reciprocating Internal Combustion Engines

Ver. September 19, 2013

The Air Pollution Control Division (Division) developed this Operating and Maintenance Plan (O&M Plan) template for reciprocating internal combustion engines that are permitted at synthetic minor facilities in the State of Colorado. The O&M Plan shall be submitted with the permit application. A single O&M Plan can be used for all engines at the facility. If the O&M Plan template is completed correctly, the Division will approve the O&M Plan and a construction permit will be issued with the requirement to follow the O&M Plan as submitted. If the template is not completed correctly, the Division will work with the facility to make corrections. Once a construction permit is issued, the facility operator must comply with the requirements of the O&M Plan upon commencement of operation. Operators are not required to use this template. Independent case specific O&M Plans may be developed and submitted for approval with the permit application. However, the Division encourages the use of this template to expedite the permit application approval process.

Submittal Date: _____

Section 1 - Source Identification

For new permits some of this information (i.e. Facility AIRS ID, Facility Equipment ID, Permit Number, and AIRS Point ID) may not be known at the time of application. Please only fill out those fields that are known and leave the others blank.

Company Name: _____ Facility Location: _____
Facility Name: _____ Facility AIRS ID (for existing facilities) _____

Units Covered by this O&M form

Facility Equipment ID						
AIRS Point ID						
Permit Number						
Rich Burn (RB) or Lean Burn (LB)						
Air Fuel Ratio Controller (Y/N)						
Catalyst Type [a]						

[a] Non-selective Catalytic Reduction (NSCR) or Selective Oxidation Catalyst (SCO)

Section 2 - Maintenance Schedules

Check one of the following:

☐ Facility shall follow manufacturer recommendations for the operation and maintenance of equipment and control devices. These schedules and practices, as well as any maintenance records showing compliance with these recommendations, shall be made available to the Division upon request.

☐ Facility shall follow individually developed maintenance practices and schedules for the operation and maintenance of equipment and control devices. These schedules and practices, as well as any maintenance records showing compliance with these recommendations, shall be made available to the division upon request and should be consistent with good air pollution control practices for minimizing emissions as defined in the New Source Performance Standard (NSPS) general conditions.

Section 3 - Monthly Emission Modeling or Calculations

The following box must be checked for O&M plan to be considered complete.

☐ The operator will calculate emissions based on the methods and emission factors provided in the permit application and approved by the division, as reflected in the construction permit. *Please see the operation and maintenance plan guidance document for further details and examples of emission calculations.*

Section 4 - General Monitoring Requirements

Table 1 below details the schedule by which fuel consumption and hours of operation must be tracked by the source. The hours of operation must be tracked *only* if emissions, fuel consumption or maintenance activities are based on hours of operation.

Table 1	
Parameter	**Monitoring Frequency**
Fuel Consumption	Monthly
Hours of Operation	Monthly

Table 2 outlines fuel use monitoring methods. The source must choose one primary monitoring method and, optionally, may choose up to two backup methods. Check each box that applies.

Table 2		
Primary	**Back-up**	**Fuel Consumption Monitoring Method**
☐	☐	**Individual engine fuel meter**
☐	☐	**Facility-wide fuel meter attributed to fuel consumption rating and hours of operation**
☐	☐	**Manufacturer-provided fuel consumption**
☐	☐	**Other (to be approved by the division)** - attach explanation and sample calculations

Table 3 details the portable testing frequency for engines at the facility based on the requested permitted emission totals for the entire facility. Check the appropriate box based on facility-wide NOx and CO permitted emissions. Consecutive portable analyzer tests must be separated by at least a calendar month. *All portable analyzer tests must be performed per Division protocol, which can be found* at http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251596520270.

Table 3			
Control Status	**Portable Testing Frequency**		
	☐ **Permitted Facility Emissions ≥ 100 tpy NO_x or CO**	☐ **Permitted Facility Emissions < 100 tpy ≥ 80 tpy NO_x or CO**	☐ **Permitted Facility Emissions < 80 tpy NO_x or CO**
NSCR or SCO	Quarterly; the frequency shall remain quarterly regardless of the number of consecutive passing tests.	Quarterly; then semi-annual after 4 consecutive quarterly passing tests. If any of the semi-annual tests fail then the source shall return to quarterly tests.	Semi-annual; then annual after 2 consecutive passing semi-annual tests. If any of the annual tests fail then the source shall return to semi-annual testing.
No catalyst	Annual	Annual	Annual

Note: The schedule for portable analyzer testing begins upon engine startup, in other words if an engine is to be tested quarterly then the engine should be tested twice within the first 180 days of operation. A reference method test performed on an engine may substitute for a portable analyzer test.

Section 5 - Emission Control Equipment Monitoring Requirements – ***fill out applicable sections only***

Table 4 details control equipment monitoring frequency for rich burn engines. Check the appropriate box based on facility-wide NOx and CO permitted emissions. See the footnotes following Tables 4 and 5 for details on proper control equipment operating parameter monitoring and compliance requirements.

Table 4			
Rich Burn Engine Monitoring Frequency			
Emissions Control Device	**Monitoring Requirement**	**Monitoring Frequency**	
		☐ **Permitted Facility Emissions ≥ 80 tpy NO_x or CO**	☐ **Permitted Facility Emissions < 80 tpy NO_x or CO**
Non-selective catalytic reduction (NSCR)	Pre-catalyst Temperature [b]	Daily	Weekly
	Catalyst Differential Pressure [e]	Monthly	Monthly
Air-Fuel Ratio Controller (AFRC)	AFRC O_2 sensor mV reading [c]	Weekly	Weekly

[b] Pre-catalyst temperature shall stay within the range of 750º F to 1250º F. If the temperature is outside of this range then appropriate maintenance activities shall be performed.

[c] AFRC O_2 Sensor Monitoring and Maintenance Requirements

- If the engine uses an oxygen sensor then it will be replaced per manufacturer's recommended schedule. If the replacement is determined by hours of operation then the source will track the hours of operation.
- In addition to the weekly AFRC O_2 Sensor mV reading, this parameter must be recorded during each portable analyzer test.

Table 5 details control equipment monitoring frequency for lean burn engines. Check appropriate box based on facility-wide NOx and CO permitted emissions. See the footnotes following Table 5 for details on proper control equipment operating parameter monitoring and compliance requirements.

Table 5			
Lean Burn Engine Monitoring Frequency			
Emissions Control Device	**Monitoring Requirement**	**Monitoring Frequency**	
		☐ **Permitted Facility Emissions ≥ 80 tpy NO_x or CO**	☐ **Permitted Facility Emissions < 80 tpy NO_x or CO**
Selective Oxidation Catalyst (SCO)	Pre-catalyst Temperature [d]	Daily	Weekly
	Catalyst Differential Pressure [e]	Monthly	Monthly

[d] Pre-catalyst temperature shall stay within the range of 450º F to 1350º F. If the temperature is outside of this range then appropriate maintenance activities shall be performed.

[e] Catalyst Differential Pressure Baseline Establishment and Monitoring Requirements

- The pressure drop shall not exceed 2 inches of water column from the baseline value established by the source when the engine is operating at maximum achievable load. This baseline pressure drop shall be established by the source during each initial compliance and portable analyzer test, and as noted below.
- If the pressure is outside this range then the appropriate maintenance shall be performed to bring the pressure back into range. In lieu of maintenance the source may choose to perform a portable analyzer test of the engine to establish a new pressure drop value. If the test demonstrates that the engine is in compliance with its emission limits, the pressure drop value at which the engine is tested shall become the new baseline.
- The catalyst will be cleaned, reconditioned and replaced per the manufacturer's recommended schedule and a copy of maintenance reports shall be kept. If the catalyst cleaning, reconditioning and replacement depends on hours of operation then the source shall track the hours of operation for the engine.
- For new, cleaned or reconditioned catalyst on an existing engine: the new pressure drop baseline must be established by the operator within the first 7 days of engine/catalyst operation and re-established during the next regularly scheduled emission test.
- For new cleaned or reconditioned catalyst on a new engine: the new pressure drop baseline must be established within the first 180 days of engine operation.

Section 6 – Recordkeeping Requirements

The following box must be checked for O&M plan to be considered complete.

☐ Synthetic minor sources are required to maintain maintenance and monitoring records for the requirements listed in sections 2, 3, 4 and 5 for a period of 5 years. If an applicable Federal NSPS, NESHAP or MACT requires a longer record retention period the operator must comply with the longest record retention requirement.

Section 7 - Additional Notes and O&M Activities

Please use this section to describe any additional notes or operation and maintenance activities.

Note: These templates are intended to address operation and maintenance requirements of the State of Colorado for equipment operated at synthetic minor facilities. If the facility or equipment is subject to other state or federal regulations with duplicative requirements, the source shall follow the most stringent regulatory requirement.