Santa Barbara County
Air Pollution Control District

Our Vision Clean Air

Rule 333 Engine Inspection and Maintenance Plan Guidelines

These guidelines describe 1) who is required to submit an Engine Inspection and Maintenance (I&M) Plan, 2) when the Plan is required to be submitted, 3) what information must be included in the Plan, and 4) routine recordkeeping requirements associated with implementation of an Engine I&M Plan. These guidelines also include, as an attachment, APCD-approved Engine Inspection and Maintenance Plan templates with examples for use by owners and operators in complying with Rule 333 I&M Plan requirements.

Who is Required to Submit an Engine Inspection and Maintenance Plan?

Revisions to Santa Barbara County Air Pollution Control District Rule 333 were adopted on June 19, 2008. The Engine Inspection and Maintenance Plan requirements of this rule apply to the owner or operator of any engine subject to the requirements of Rule 333.E – Emission Limits with a rated brake horsepower of 50 or greater unless the engine is exempt from the rule requirements pursuant section B.1 and B.2. The following engines are exempt from the requirement to submit an Engine Inspection and Maintenance Plan;

- Spark ignition engines operating on gaseous fuel consisting of 75 percent or more of landfill gas on a volume basis determined by annual fuel use. (ref. Rule 333.B.1.a.)
- Engines that are exempt from permit under the provisions of Rule 202, Exemptions to Rule 201. (ref. Rule 333.B.1.b.)
- Any derated engine having a maximum allowable and enforceable output rating of less than 50 brake horsepower provided such rating is specified by the District in an Authority to Construct or Permit to Operate and accepted by the engine owner or operator. (ref. Rule 333.B.1.c.)
- Any compression ignition emergency standby engines, as defined under California Code of Regulations, Title 17, Section 93115, Airborne Toxic Control Measure for Stationary Compression Ignition (CI) Engines. (Ref. Rule 333.B.1.d.)
- Any engine that has a total aggregated operational period less than 200 hours per year is exempt from the requirements of this rule, with the exception of the engine identification requirement in Section D.1, the elapsed operating time meter requirement in Section D.2, the recordkeeping provisions in Section J.3, and the compliance schedules for these provisions specified in Section K. (ref. Rule 333.B.2)

When is an Engine Inspection and Maintenance Plan Required to be Submitted?

The owner or operator of any engine subject to Rule 333 is required to submit a new/revised Engine Inspection and Maintenance Plan (Plan) for each stationary source to the APCD and obtain the Control Officer's approval of the Plan. (ref. Rule 333.K.2.d.ii) The Plan is required to be submitted to the APCD in a format approved by the Control Officer. Approved Plan format templates are attached to this guidance for use by engine owners or operators in complying with Rule 333 Plan submittal requirements.

For engines located on the Outer Continental Shelf (OCS), an Engine Inspection and Maintenance Plan must be submitted within 6 months of the date the United States Environmental Protection Agency (EPA) promulgates final notice of the June 19, 2008 revision to District rules 102, 202 and 333 into the OCS Air Regulations (40 CFR Part 55). To date, the EPA has not issued its final notice. Upon promulgation, the APCD will promptly notify affected OCS sources of the promulgation date and advise that a new/revised Engine Inspection and Maintenance Plan would be required to be submitted to the APCD for approval within 6 months following the date of final notice as published within the Federal Register.

The owner of operator of any engine subject to Rule 333 which is located onshore or within State Territorial Waters is required to submit a new/revised Engine Inspection and Maintenance Plan for each stationary source by December 19, 2008. Any previously approved Engine Inspection and Plan will continue to be in force until the APCD approvs a revised Plan.

Engine owners or operator are advised to do one of the following:

1. If you have a current Engine Inspection and Maintenance (I&M) Plan that is in effect, please resubmit your I&M plan for APCD review to see if it needs modification, or
2. Submit an amended I&M Plan incorporating for example the addition of new engines now subject to Rule 333 or new carbon monoxide (CO) monitoring requirements, or
3. Submit an entirely new I&M Plan. This option would be applicable to 1) engine owners or operators who could not locate their I&M Plans, 2) operators becoming subject to engine I&M requirements for the first time, or 3) operators who wanted to overhaul their I&M Plans.

What are the Requirements of an Engine Inspection and Maintenance Plan?

The owner or operator of any engine subject to emission limits of Rule 333.E is required to maintain an Engine Inspection and Maintenance (I&M) Plan for each stationary source that complies with the following requirements (ref. Rule 333.F):

1. The I&M Plan shall be prepared in a format approved by the APCD. Note, the I&M plan templates attached to this guidance document are prepared in format approved by the APCD.
2. The engine owner or operator is required to obtain APCD approval of their I&M Plan.
3. The I&M Plan is required to list all engines by their engine classification (rich-burn noncyclically-load spark ignition, rich-burn cyclically-loaded spark ignition, lean-burn spark ignition, compression ignition, or dual-fuel). In addition, each engine is required to be identified by its make, model, serial number or the owner's or operator's unique identification number. For each engine, the owner or operator is required to identify the method, engine and control equipment operating parameter ranges, and compliance values, including engine exhaust oxygen concentration ranges, to be used to verify compliance with the emission limits specified Section E. (Please refer to attached Inspection Parameters and Compliance Values Table, Attachments 1 and 2).
4. A portable emissions analyzer is required to be used to take oxides of nitrogen (NOx) and carbon monoxide (CO) emission readings and engine exhaust oxygen (O2) concentration readings to determine compliance with the emission limits or percent control specified in Section E during any quarter (or month if performing monthly monitoring) in which a source test is not performed and the engine is operated in excess of 20 hours per quarter. All emissions readings are required to be taken at the engine's typical duty cycle. (Please refer to attached Rule 333 Inspection and Maintenance Log, Attachments 3 and 4).
5. If the portable emissions analyzer shows a reading in excess of the emission compliance values or a source test result in excess of an emission limit or less than the percent control requirements, the inspection and maintenance monitoring schedule is required to a monthly basis until Rule 333 compliance is demonstrated in three consecutive months (by portable analyzer or source tests).
6. The emissions analyzer is required to be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations.
7. The applicable control equipment parameters and engine operating parameters are required to be inspected and monitored in conformance with a regular inspection schedule listed in the I&M Plan.
8. The results and readings for each engine and control equipment operating parameter indentified in the I&M Plan, the analyzer instrument readings, a description of the corrective actions taken, a determination of whether or not the engine is in compliance is required to be maintained in an Inspection and Maintenance Log. (See Attachments 3 and 4).

9. The name of the person recording the information is required to be recorded in an inspection log consistent with the recordkeeping requirements specified in Rule 333.J.I.

What are the Recordkeeping Requirements?

The owner or operator of any engine subject to the emission limits of Rule 333E. is required to maintain a written Engine Operation, Inspection and Maintenance log for each engine. The written log is required to contain the following information:

1. Engine classification, including make, model, serial number or the owner's unique identification number.
2. Hours of operation, as determined by a non-resettable elapsed operating time meter since the date of the last inspection.
3. Location of operation of the engine.
4. Summary of any maintenance performed on an emission control device. (See Attachment 5).
5. Summary of any maintenance performed on the engine that affects the emission control device. (See Attachment 5).
6. Observations made during each monthly or quarterly inspection
7. The date of each log entry and the printed or typed name of the person entering the log information
8. For every engine that has been relocated, a notation identifying both the present and prior location, the reason(s) for the engine relocation, and the elapsed operating time meter readings for both the relocated engine and the engine being displaced.

Attachments

1. Example #1 – Inspection Parameters & Compliance Value Table (page A-1)
2. Blank Inspection Parameters & Compliance Value Table (page A-2)
3. Example #2 – Rule 333 Inspection and Maintenance Log (page A-3)
4. Blank Rule 333 Inspection and Maintenance Log (page A-4)
5. Blank Rule 333 Quarterly Engine Preventative Maintenance Actions Log (page A-5)

Example #1 - Rule 333, Section F -Inspection and Maintenance Plan

Inspection Parameters & Compliance Value Table

Applicable To:

Plan Date or Plan Revision Date: July 2008

Engine Owner/Operator: Ajax Petroleum, Inc.

Stationary Source : Santa Maria Valley West

FID No: 1776 Permit No: 9123

Engine		Emission Control System	
Type:	Spark-ignited, Rich-burn	Type: NSCR	Type: AFRC
Make:	Waukesha	Make: ACME	Make: Blackhawk
Model No.:	F-1197	Model No: CA123	Model No: BHK123
Serial or Tag No:	G1234567	Serial or Tag No: D96235	Serial or Tag No: B1234
Rated Brake Horsepower: 195			
Engine Category[1]: 1			

Parameter	Compliant Value or Range	Measurement or Inspection Method	Inspection Frequency
Engine Operating Hours	Not applicable	Engine hour meter	Monthly
Exhaust NOx	< 50 ppmv corrected to 15% oxygen	ACME Portable NOx Analyzer Model XXX	Quarterly
Exhaust CO	< 4500 ppmv corrected to 15% oxygen	ACME Portable CO Analyzer Model YYY	Quarterly
Ignition Timing	25-27 ^{o} BTDC @ 650 RPM	Timing Light	Monthly
NSCR Catalyst Inlet Temperature	>650 ^{o}F but < 1200 ^{o}F	Calibrated thermocouple	As needed, if NOx or CO out of specification
NSCR Catalyst Outlet Temperature	< 1200 ^{o}F	Calibrated thermocouple	As needed, engine equipped with high temp alarm and shutdown
NSCR Catalyst Bed Temp Increase	>50 ^{o}F	Calculated difference between Inlet and Outlet temperature readings	As needed, if NOx or CO out of specification.
NSCR In-service Life	Specify the maximum allowed in-service life	Review engine hour meter data	Quarterly
NSCR Catalyst Inlet Oxygen	0.3 - 0.7% oxygen	Oxygen analyzer	Quarterly
Oxygen Sensor Life *Make: Carsound* *Model #: ADC123*	In service life: max.3000 hrs	Review engine hour meter data	Quarterly
Oxygen Sensor Signal	millivolt output: 0.8 to 1.1 equals 0.3 to 0.7% exhaust oxygen	Fuel Air Ratio controller data screen	Monthly

[1] **Engine Categories: 1** = Rich burn noncyclically loaded spark ignition engines 50 ppm NOx and 4500 ppm CO; **2** = lean burn spark ignition engines if ≥ 50 bhp but < 100 bhp 200 ppm NOx and 4500 ppm CO, if ≥100 bhp 125 ppm NOx and 4500 ppm CO; **3** = rich burn cyclically loaded spark ignition engines 300 ppm NOx and 4500 ppm CO; **4** = compression ignition engines and dual fuel engines 700 ppm NOX and 4500 ppm CO

Rule 333, Section F -Inspection and Maintenance Plan

Inspection Parameters & Compliance Value Table

Applicable To:

Plan Date or Plan Revision Date: _____

Engine Owner/Operator: _____

Stationary Source :_____

FID No: _____ Permit No: _____

Engine	Emission Control System	
Type: _____ Make: _____ Model No.: _____ Serial or Tag No: _____ Rated Brake Horsepower: _____ Engine Category[1]: ____	Type: _____ Make: _____ Model No: _____ Serial or Tag No: _____	Type: _____ Make: _____ Model No: _____ Serial or Tag No: _____

Parameter	Compliant Value or Range	Measurement or Inspection Method	Inspection Frequency

[1] **Engine Categories: 1** = Rich burn noncyclically loaded spark ignition engines 50 ppm NOx and 4500 ppm CO; **2a** = lean burn spark ignition engines if ≥ 50 bhp but < 100 bhp 200 ppm NOx and 4500 ppm CO, **2b** if ≥100 bhp 125 ppm NOx and 4500 ppm CO; **3** = rich burn cyclically loaded spark ignition engines 300 ppm NOx and 4500 ppm CO; **4** = compression ignition engines and dual fuel engines 700 ppm NOX and 4500 ppm CO

Example #2 - Rule 333 Inspection and Maintenance Log

Engine Owner/Operator: Ajax Petroleum, Inc. Stationary Source : Santa Maria Valley West FID No: 1776 Permit No: 9123

Engine Location at Start of Quarter: SMVW Well 12 Engine Location at End of Quarter: SMVW Well 12 Quarterly Engine Hours: 572

Engine & Permit Data	Portable NOx Analyzer Data	Inspection Data
Make & Model #: Waukesha F-1197	Make: Enerac	Date of inspection: June 30, 2008
Serial or Tag #: G-1234567	Model No: 3000E	Inspected by: John Q. Public
Rated Brake Horsepower: 195	Serial No: E500103254	Inspector Name (print): John Q. Public
Engine Category[1]: 1		

Compliance Parameter Verifications

Parameter[1]	Parameter Compliance Values		In Compliance?	Corrective Action	Follow-up Inspection	
	Measured	Allowed	✓ = Yes	(for out of compliance values)	Date	Re-measured Parameter Value
Exhaust NOx @ 15% O2	37 ppmv	50 ppmv	✓			
Exhaust CO @ 15% O2	103ppmv	4500 ppmv	✓			
NSCR Inlet O2	0.5% O2	0.3-0.7%	✓			
Engine Timing	30° BTDC @ 650 RPM	25-27 ° BTDC	*No*	*Adjusted ignition timing with timing light to correct specification.*	*06/30/08*	*25° BTDC @ 650 RPM*
NSCR Inlet Temp		>650 but <1200 °F				
NSCR Outlet Temp		<1200 °F				
NSCR In-service Life (hours)		Up to 5000 hours				
O2 Sensor Life	2,900 hrs	up to 3,000 hrs	✓	*Replace oxygen sensor with new such that 3,000 hr limit not exceeded during next quarter.*	*06/28/08*	*Engine hour meter at 5,236 with new O2 sensor.*

[1] **Engine Categories: 1** = Rich burn noncyclically loaded spark ignition engines 50 ppm NOx and 4500 ppm CO; **2a** = lean burn spark ignition engines if ≥ 50 bhp but < 100 bhp 200 ppm NOx and 4500 ppm CO, **2b** if ≥100 bhp 125 ppm NOx and 4500 ppm CO; **3** = rich burn cyclically loaded spark ignition engines 300 ppm NOx and 4500 ppm CO; **4** = compression ignition engines and dual fuel engines 700 ppm NOX and 4500 ppm CO

Rule 333 Inspection and Maintenance Log

Engine Owner/Operator: _____ Stationary Source: _____ FID No: _____ Permit No: ____

Engine Location at Start of Quarter: _____ Engine Location at End of Quarter: _____ Quarterly Engine Hours: ___

Engine & Permit Data	Portable NOx Analyzer Data	Inspection Data
Make & Model #: _____	Make: _____	Date of inspection: _____
Serial or Tag #: _____	Model No: _____	Inspected by: _____
Rated Brake Horsepower: _____	Serial No: _____	Inspector Name (print): _____
Engine Category[1]: _____		

Compliance Parameter Verifications

Parameter[2]	Parameter Compliance Values		In Compliance?	Corrective Action	Follow-up Inspection	
	Measured	Allowed	✓ = Yes	(for out of compliance values)	Date	Re-measured Parameter Value

[1] **Engine Categories: 1** = Rich burn noncyclically loaded spark ignition engines 50 ppm NOx and 4500 ppm CO; **2a** = lean burn spark ignition engines if ≥ 50 bhp but < 100 bhp 200 ppm NOx and 4500 ppm CO, **2b** if ≥100 bhp 125 ppm NOx and 4500 ppm CO; **3** = rich burn cyclically loaded spark ignition engines 300 ppm NOx and 4500 ppm CO; **4** = compression ignition engines and dual fuel engines 700 ppm NOX and 4500 ppm CO

Rule 333 Quarterly Engine Preventative Maintenance Actions Log

Engine Owner/Operator:_____

Stationary Source:_____

FID No:_____ Permit No:_____

Calendar Quarter:_____ Year: _____

Engine No.	Date	Description of Preventative Actions Taken this Quarter