

**SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT
COMPLIANCE DEPARTMENT**

COM 2295

APPROVED: _____ **SIGNED** _____ **DATE:** April 26, 2007
Jon Adams
Director of Compliance

TITLE: **INTERNAL COMBUSTION ENGINE – PHASE 1**

SUBJECT: **GUIDELINES FOR THE INSPECTION OF INTERNAL
COMBUSTION ENGINES**

OBJECTIVE:

To provide guidance in the application of Rule 4701, *Internal Combustion Engines – Phase 1*, to ensure consistent and effective application throughout the San Joaquin Valley Air Pollution Control District (District).

PURPOSE:

To provide an inspection procedure that will ensure consistent and efficient enforcement of Rule 4701.

POLICY STATEMENT:

Internal combustion engines are a significant source of air pollution in the valley, especially oxides of nitrogen (NO_x). It is important to minimize these emissions with uniform and effective enforcement of this rule. District Staff will ensure the uniform application of this rule through the use of this policy. The compliance program will include permitting or registration, inspections, and educational outreach.

1. BACKGROUND

Rule 4702 was adopted to replace Rule 4701 with more stringent NO_x emission limits. Unlike Rule 4702, Rule 4701 does not address engines serving agricultural operations (AO). Further, as of June 1, 2006, there are very few engines still subject to Rule 4701, and, except for those in the last 4702 implementation group, probably none subject to the emission limits specified in the rule. This policy will address inspection practices for those engines subject to Rule 4701.

Rule 4701 divides engines into spark-ignited and compression-ignited engines. Emission limits from this rule have been in effect since the last “Table 3” limits were imposed on 5/31/2001. Rule 4702 will supersede the requirements of Rule 4701 no later than 6/1/2007 for spark-ignited engines, and no later than 1/1/2015 for compression-ignited engines.

Rule 4701 provides emission limit exemption for standby engines (known as emergency standby engines under 4702), low-use engines operated less than 1000 hours per year (Section 4.2.2 engines under 4702, limited to 200 hours per year), and transportable engines (with no similar category in 4702).

Rule 4701 requires spark-ignited engines to meet limits as low as 50 parts per million NO_x (ppm NO_x), 2000-ppm carbon-monoxide (CO), and 250-ppm volatile organic compounds (VOC). Compression-ignited engines subject to emission limits are required to meet 80 ppm NO_x, 2000 ppm CO, and 750 ppm VOC, or show a 90% emission reduction. The compression-ignited limits have effectively prevented the use of these engines if they could not be permitted as low-use or transportable.

An emission control plan was required by December 19, 1997 for those engines subject to emission limits. All engines subject to this rule are required to keep monthly records including hours of operation, fuel use, maintenance and modification records, and records of any compliance tests.

An overview of engine types is included in Appendix 2.

2. INSPECTION SAFETY

All engine inspections may require the safety and inspection equipment listed below:

- A. Hardhat, steel-toed boots, Nomex, as required by the source,
- B. Hearing protection if the engine is operating,
- C. Gloves, and H₂S monitor as appropriate,
- D. Portable emissions monitor for all but portable, transportable, limited firing, or certified units,
- E. Tools to hook emissions monitor to existing sample lines,
- F. Flashlight or mirror to read engine data plate,
- G. Putty knife and rags to clean engine data plate,
- H. VEE Forms,
- I. Thermometer, psychrometer, and,
- J. Copies of permits or registrations and inspection forms.

All inspections should be approached with safety in mind. Inspectors shall exercise caution around all equipment. The inspector shall take care to identify any hazards before approaching a unit. Operating engines are very hot and replete with moving parts. Because the engines and environs are frequently oily or greasy, footing may be insecure. If operating, engines require hearing protection. The engines are often located in tight spaces that require care to enter, and may harbor snakes or other wildlife.

Access to the stack may involve climbing permanent ladders to attach a line or insert the probe. The inspector shall not climb an un-secured ladder to sample an engine, and the portable monitors are never to be carried up a ladder. If the stack is only accessible from an elevated platform, the analyzer shall be hauled up with a rope. *If any part of the engine cannot be accessed safely, that part of the inspection will not be completed.*

3. PRE-INSPECTION ACTIVITIES

Whenever possible, inspections are to be conducted un-announced. Where source coordination is required, make contact (preferably while en-route), verify safety requirements, and secure permission to inspect.

Check for any Authorities to Construct (ATCs) or new registrations that may be implemented, check if the source is under variance or breakdown, and review previous inspection reports.

If needed, insure that a portable emissions monitor is available and sign up for the unit.

On the day of the inspection, perform the start-up procedures for the portable emissions monitor including the leak check (refer to Portable Emissions Monitor Policy).

Determine the type and use of the engine and the enforceable limits, if any. The limits will be specified in the rule or on the Permit to Operate (PTO) or ATC.

4. INSPECTION SCHEDULE

All engines subject to emissions limits, or those that have lower emissions limits specified by PTO/ATC conditions shall be inspected annually with a portable emissions monitor. Standby engines shall be inspected on a 36-month basis and are not to be checked with a monitor.

5. INSPECTION ACTIVITIES

Verify manufacturer, model number, horsepower, and company identification number for the unit. To the extent that it can be determined, verify that the unit

has not been modified. Insure that the unit is equipped as required, i.e. with catalyst, air/fuel ratio controller, and that it has an hour meter. Ensure that the engine is operating on the permitted fuel type, performing the specified task, and that it is in the proper location.

Record operating parameters specified on the inspection form including fuel type and rate, temperatures across the catalyst, air/fuel ratio, and elapsed time, and other data as appropriate.

A. Use of a Portable Emissions Monitor

Appendix 3 consists of a table that establishes which engines need to be sampled with a portable monitor.

Specific sources may be permitted with special conditions that restrict emissions to a greater extent than Rule 4701.

Compliance will be determined with the average of oxygen-corrected readings from a 15-minute sample run. For emissions samples obtained during a District inspection with District equipment, the engine will be considered in compliance if the average readings are below 115 % of the limit. Averaged readings at or above 115% are considered out of compliance. For readings above 115% and up to 125% of the limit, the source shall be directed to have the engine checked and/or adjusted to meet the limits, and must report to the District within 10 days. If the results of the follow-up sampling are still at or above 115%, an NOV shall be issued. An NOV shall be issued for averaged readings in excess of 125% of the emissions limit. Please refer to the Portable Emissions Monitor Policy for details on the use of this equipment.

B. Dormant or Non-Operating Units

If the unit is not in operation, the inspector shall determine if it is down temporarily or out of service. Units that are out of service but not permitted as dormant must be source tested in the normal rotation. Unless the engine has operated during the testing period, it need not be started to check the emissions with a portable emissions monitor.

If the unit is permitted as dormant, insure that it is disabled as specified in the PTO/ATC (typically by disconnecting the fuel supply). If the facility has brought an engine out of dormancy, the PTO/ATC will usually require a source test within a short time period.

C. Inspection Procedures for Emergency Standby Engines

Prior to starting the engine, the inspector shall verify serial and model numbers and check the elapsed time meter. Insure that the engine is equipped as required by the PTO/ATC, i.e. turbocharger, aftercooler,

Positive Crankcase Vent (PCV) control, catalyst, timing retard certification, or a vertical stack with no rain cap (a flapper that moves out of the exhaust flow is allowed), et al. If possible, the operator should run the engine under load while the inspector conducts a visible emissions evaluation (VEE).

Many sources, especially those with emergency generator engines, cannot run the engines under load without significant difficulty. At some sources, the engine can only assume a load by interrupting power to the facility and this may result in lost computer data or a dark operating room. For these sources, it is not required to put the engine under load for the VEE. Because hospitals are required to load-test the engines on an annual basis, it may be possible to conduct the inspection and the VEE during this annual test.

Additionally, the California State Airborne Toxic Control Measure for Stationary Compression Ignition Engines has an “at-school and near-school provision” that prohibits an owner or operator from operating a new stationary, emergency-standby, diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

1. Whenever there is a school sponsored activity, if the engine is located on school grounds, and,
2. Between 7:30 a.m. and 3:30 p.m. on days when school is in session, if the engine is located within 500 feet of school grounds.

However, this section does not apply if the engine emits no more than 0.01 g/bhp-hr of diesel particulate matter.

In lieu of the above, consideration should be given to requiring a source to startup a subject engine for compliance testing and VEE determination.

If visible emissions are observed, the inspector shall complete the VEE form (refer to VEE policy).

The inspector shall check the elapsed time meter after completing the rest of the inspection. If the engine has operated longer than six minutes, the counter should have advanced by 0.1 hours. If not, the meter may not be functioning and the facility records shall be checked to insure that engine run time is documented.

6. VIOLATIONS

The following will be considered violations of Rule 4701:

- A. Failure to submit Emissions Control Plan (ECP),
- B. Failure to submit ATCs as required,
- C. Failure to implement modifications as required,
- D. Failure to conduct or failure to record monitoring as required by ECP,
- E. Modification of equipment without, or differing from ATC,
- F. District emissions monitor test results between 115% and 125% of Rule and/or PTO/ATC limits. An NOV shall be issued for those readings in excess of 125% of the emissions limit, and,
- G. Source tests greater than the PTO/ATC limits.

7. POST INSPECTION ACTIVITIES

- A. **Emission Control and Inspection and Monitoring Plans**
Engines that are required to comply with emissions limits or emissions standards (see Tables 1, 2, and 3, includes some diesels) are also required to submit an ECP. The required ECP must specify how and when each unit will comply with the rule. Rule 4701. The inspector shall check the current deadline status with the initial inspection of an engine.

Because the rule requires that the monitoring scheme be approved prior to use, the monitoring parameters must be specified on the PTO/ATC. Unless the source is using a continuous emission monitor (CEM) system, is being polled, and is submitting quarterly emission reports, the inspector shall verify that the required data is being captured and kept.

Each engine inspection should include a review of records including the operational characteristics as are specified in the source ECP or the PTO/ATC.

The Inspector shall ensure that the source is keeping the required records and that the records indicate compliance with the appropriate limits.

- 1. **Alternative Monitoring Requirements**
For those facilities that use periodic emission measurements, the inspector shall examine their records to determine that they are operating in compliance and that they are recording the data as often as is required by the PTO/ATC (typically monthly or quarterly).

Other alternative monitoring schemes include temperature change across a catalyst, air/fuel ratios, and excess oxygen concentrations. These will have monitoring periods (daily, weekly, quarterly) specified on the PTO/ATC. In many cases the range of parameters are determined during source testing and the

facility must know the parameters to be able to ascertain if they are operating within limits.

The PTO/ATC will specify a time during which the source can return the unit to conformity with the alternative monitoring parameters (typically 1 or 8 hours). If the unit cannot be corrected within that time, the source must notify the District and either accept a Notice of Violation for excess emissions or source test the unit (within sixty days) to verify compliance at the new parameters.

C. Source Test Verification

The rule requires that each engine subject to emission limits be source tested every two years. As part of each inspection, the inspector shall utilize the Source Test History portion of the District Permit Administrative System (PAS) to verify that the engine has been tested as required.

APPENDICES:

1. Overview of Engine Types
2. Portable Emission Monitor Sampling Guidelines

APPENDIX 1

Overview of Engine Types

There are three broad categories of internal combustion (IC) engines: (1) spark-ignited, (2) lean burn (a special class of the first), and (3) compression-ignited or diesel-fired engines.

The first two groups typically burn natural gas, propane, waste- or sewer-derived gas, or gasoline. The mixture of fuel and air is ignited by a spark plug. Normal spark-ignited engines mix the fuel and air so that the exhaust is low in excess oxygen. These engines require a catalyst to react with the unburned exhaust components in order to meet the more stringent emission limits. More sophisticated set-ups will have an air/fuel ratio controller that sets the mixture based on the excess exhaust oxygen. These controllers work continuously and can make very precise adjustments to allow the engine to operate with minimal emissions even under a variety of loads. Lean burn engines will also have mixture controllers but these engines are designed to operate with a very lean (low fuel) air/fuel ratio, and produce relatively low emissions without a catalyst. Lean burn engines are allowed higher emission limits by the rule because additional controls are not effective. These specially designed engines are generally used only in very controlled applications such as in industry or at sewer plants.

Diesel-fired engines ignite the fuel/air mixture by compression. These engines have the advantages of being very powerful, relatively light weight, with dependable and economic operation. However, they have the highest emission rates by far and are rarely if ever used where adherence to low emissions limits is required.

The EPA has established emission parameters for various types and sizes of engines. These “Tiers” contain engines tested during the development process and “Certified” to meet specific emissions limits. Certified engines that are installed for this rule will not be subject to any sort of emissions testing.

APPENDIX 2
Portable Emission Monitor Sampling Guidelines

Usage	Engine	Reference/Reason	Portable Analyzer Testing during Inspection
Non-emergency requiring permit	Spark or compression ignited engines subject to limits in Table 3 of Rule 4701.	Permit Equipment Description and Conditions and Rule	Do test
Low-use	Any engine limited by permit condition to less than 1000 hours per year of operation	Permit Equipment Description and Conditions and Rule	Do not test*
Transportable	Any engine permitted as a transportable engine	Permit Equipment Description and Conditions and Rule	Do not test*
Emergency Backup	Any engine limited to emergency use and 200 hours or less for maintenance and testing by permit conditions	Permit Equipment Description and Conditions/Limits for emergency engine are generally based on certification using a multilevel test that cannot be performed in field.	Do not test*
Portable	Any registered portable engine	Portable Registration/Limits for portable engine are generally based on certification using a multilevel test that cannot be performed in field.	Do not test*

** Two exceptions - if engine has been somehow modified from manufacturer's configuration in a way that would affect emissions, or if a unit has a lower limit on their permit than the certification standard. - Then testing would be appropriate.*