

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

COM 2300

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

TITLE: RULE 4702 - INTERNAL COMBUSTION ENGINE – Phase 2

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

OBJECTIVE:

To provide guidance in the application of Rule 4702, *Internal Combustion Engines – Phase 2*, 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 4702.

POLICY STATEMENT:

Internal combustion engines are a significant source of air pollution in the valley, especially oxides of nitrogen (NOx). Hence, 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 NOx emission limits. Rule 4701 did not address engines serving agricultural operations (AO) or compression-ignited (diesel) engines. Rule 4702 incorporates requirements for both AO and diesel engines.

The new requirements are phased in over a period of years and compliance deadlines depend on engine type and usage (see Appendix 1). Subject deadlines

extend from June 2004 through January 2015, and requirements range from increased record keeping, modifications to meet 25 parts per million (ppm) NO_x, or replacement of the engine with an “Environmental Protection Agency (EPA) Certified” unit. In addition, many of the engines will require source testing to verify compliance with new limits. In the case where a unit does not require equipment modification to meet the new limit, previous source tests may be used to demonstrate compliance with the new limits.

Rule 4702-Phase 2 divides the emission-limited engines into five general categories: spark-ignited engines not used in AO (with enforceable limits), spark-ignited engines used in AO (with enforceable limits), certified spark-ignited engines used in AO (with calculated limits), non-certified compression-ignited engines (with certified engine replacement or with enforceable limits), and certified compression-ignited engines. Rule requirements for the last two categories include the use of EPA-certified engines.

Diesel-fired engines may meet compliance by retrofitting with an EPA-certified engine. These “family” units have specific and relatively low emissions rates guaranteed by the manufacturer as long as they are properly maintained. Rule 4702 allows the use of these engines without verifying emissions. The EPA certification varies in Tiers, with Tier 4 having the lowest emissions rates. Rule 4702 requires that the diesel engines be replaced by Tier 3 or 4 engines or that they meet emissions limits. The primary control exercised by Rule 4702 on diesel engines is the family standard and the deadline to replace the engine.

Rule 4702 eliminates the transportable engine emissions exemptions found in Rule 4701. Other 4702 requirements include enhanced record keeping for a variety of engines including specific records for emergency standby (Section 4.2.1), limited use (down to 200 hours from the previous 1000 hours, Section 4.2.2), and a newly defined category used only during disasters such as fires, floods, and earthquakes (Section 4.3).

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, 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 oilfield and agricultural equipment may harbor snakes or other unfriendly 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. Spark-ignited engine requirements are straightforward. Unless these engines have an exemption, they are subject to an emission limit based on engine, fuel type, year of permitting, and use (the AO engines have much later compliance dates and higher limits). 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 specified in Table 1 of Rule 4702, 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. For certified AO engines verify family number. 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 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.

The rule requires that each engine install and maintain a non-resettable time meter or other method of determining run hours (with approval on the PTO/ATC).

A. Use of a Portable Emissions Monitor

Specific sources may be permitted with special conditions that restrict emissions to a greater extent than Rule 4702.

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 results 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. Rule

4702 does not require an engine be started to check the emissions with a portable emissions monitor, unless the engine has operated within the testing period.

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 4702:

- A. Failure to submit Emissions Control Plan (ECP) or Inspection and Maintenance (I & MP) as required,
- 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 at or greater than 115% 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 and 2, includes some diesels and some AO engines) are also required to submit an ECP. The required ECP must specify how and when each unit will comply with the rule. Rule 4702-Phase 2 includes AO and diesel engines in this requirement but excludes non-retrofitted certified engines (spark and diesel) and AO engines that have not been retrofitted and are certified. Section 7 specifies the deadlines for these plans. The inspector shall check the current deadline status with each inspection.

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.

Rule 4702 defines Types A and B Monitoring Requirements. Type A are the most stringent and are required for those non-AO units subject to emission requirements (except for the largest diesel engines).

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 A

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.

Alternative Monitoring Requirements A also require that each engine subject to emission limits must be sampled with an emissions monitor during each calendar quarter in which the engine is operated and is not source tested. Rule 4701 did not specify the sampling period for this data but Rule 4702 requires that a contiguous 15 minutes worth of data (with a minimum of 5 evenly spaced readings) be recorded at each juncture, and the average of those readings must indicate compliance.

2. Alternative Monitoring Requirements B

These engines must be maintained, operated, and monitored per the manufacturer's recommendations and the engine must be equipped with an elapsed time meter or permit-approved alternative. Those engines with specific emission limits must be sampled with a portable emission monitor during each six-month period in which the engine is operated and is not source tested.

B. Inspection and Maintenance Plan

Rule 4702 requires that an I&MP be submitted for non-AO spark-ignited engines and non-certified diesel engines subject to emission limits. This plan requires operators identify engine or control parameters that are consistent with compliant operation (as verified by a source test), and specifies monthly monitoring of those parameters. The plan must specify a procedure for correcting the parameters found out of range and must include District notification when out of range. The plan must also specify a preventative maintenance schedule, periodic use of an emissions analyzer, and the process for the collection of data. The operator must notify the District within 7 days of a change in the plan and must submit a revised plan within 14 days. The plan shall be reviewed as part of an annual inspection.

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.*