

RULE 4701 INTERNAL COMBUSTION ENGINES – PHASE 1 (Adopted May 21, 1992; Amended December 17, 1992; Amended October 20, 1994; Amended March 16, 1995; Amended December 19, 1996; Amended November 12, 1998; Amended December 19, 2002; Amended August 21, 2003)

1.0 Purpose

The purpose of this rule is to limit the emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC) from internal combustion engines.

2.0 Applicability

Except as provided in Section 4.0, the provisions of this rule apply to any internal combustion engine, rated greater than 50 bhp, that requires a Permit to Operate (PTO).

3.0 Definitions

3.1 Beam-balanced pumping engine: A cyclic loaded engine powering an oil well pump, with the pump counterweight on the back end of the walking beam. The counterweight is moved mechanically without a cylinder supplying air pressure.

3.2 California Reformulated Gasoline: Gasoline meeting California Air Resources Board requirements for motor vehicle fuel in accordance with California Code of Regulations, Chapter 5, Article 1, Subarticle 2 - Standards for gasoline sold beginning March 1, 1996.

3.3 CO: Carbon monoxide.

3.4 Crank-balanced pumping engine: A cyclic loaded engine powering an oil well pump, with the pump counterweight attached to a gearbox which is attached to the walking beam with a pitman arm. The counterweight is moved mechanically, in a circular motion, without a cylinder supplying air pressure.

3.5 Cyclic Loaded Engine: An internal combustion engine that, under normal operating conditions, varies in shaft load by 40% or more of rated brake horsepower during recurrent periods of 30 seconds or less or is used to power an oil well reciprocating pump unit.

3.6 De-rated Engine: An internal combustion engine which has been physically limited and restricted by permit condition to an operational level of 50 horsepower or less.

3.7 Diesel Engine: Any compression-ignited internal combustion engine.

- 3.8 Dual-Fuel Engine: Any internal combustion engine which is designed to burn a liquid and gaseous fuel mixture during a single operating cycle.
- 3.9 Flood: A sudden and reasonably unforeseen rising and overflowing of a body of water especially onto normally dry land.
- 3.10 Gaseous Fuel: Any fuel which is a gas at standard conditions including but not limited to natural gas, methane, ethane, propane, butane and liquefied petroleum gas (LPG).
- 3.11 Internal Combustion Engine: Any spark- or compression-ignited reciprocating engine.
- 3.12 Lean-Burn Engine: Any spark ignited internal combustion engine that is operated with an exhaust stream oxygen concentration of four (4) percent by volume, or greater prior to any exhaust stream control device.
- 3.13 Location: Any single site at a building, structure, facility, or installation.
- 3.14 Low-use Engine: Any internal combustion engine that is limited by District permit to operate no more than 1,000 hours in any one calendar year, and is equipped with a non-resettable, totalizing hour-meter. Total time shall include all operational use and operation for maintenance and testing purposes.
- 3.15 Major NO_x Source: Any major source as defined in Rule 2201 (New and Modified Stationary Source Review Rule) and with a potential to emit 50 tons or more per year of NO_x.
- 3.16 Military Tactical Equipment: Any transportable engine operated by the United States armed forces or National Guard which is designed specifically for military use in an off-road, dense terrain; hostile environment; or aboard military combat vessels.
- 3.17 NO_x: Oxides of nitrogen, calculated as equivalent nitrogen dioxide (NO₂).
- 3.18 Public Water District: Any government agency whose primary function is the supply and/or distribution of water; the collection and disposal of storm water runoff; or the collection, treatment, and disposal of wastewater.
- 3.19 Rated Brake Horsepower: The continuous brake horsepower rating specified for the engine by the manufacturer or listed on the nameplate of the unit, unless otherwise physically limited and specified by a condition on the engine's Permit to Operate (PTO).

- 3.20 Rich-Burn Engine: Any spark ignited internal combustion engine that is operated with an exhaust stream oxygen concentration of less than four (4) percent by volume prior to any exhaust stream control device.
- 3.21 Spark-ignited Internal Combustion Engine: A liquid or gaseous fueled engine designed to ignite its air/fuel mixture by a spark across a spark plug.
- 3.22 Standby Engine: Any internal combustion engine used exclusively for non-utility electric power generation or any other emergency engine, approved by the APCO, and limited by permit condition to operate no more than 200 hours per calendar year for non-emergency purposes and not used in conjunction with any voluntary utility demand reduction program.
- 3.23 Stationary Source: As defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.24 Transportable engine: Any engine designed to be and capable of being carried or moved from one location to another, and that is operated at one location for no more than 12 consecutive months. Indications of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.
- 3.24.1 Any transportable engine that replaces a transportable engine at a location will be included in calculating the consecutive time if it performs the same function as the engine being replaced. In that case, the cumulative time of both engines, including the time between the removal of the original unit and installation of the replacement unit, would be counted towards the consecutive time period.
- 3.24.2 A replacement engine is not transportable if it performs the same function as the replaced engine and remains at the location for more than 12 consecutive months.
- 3.24.3 An engine is not transportable if it remains or will remain at a location for less than 12 consecutive months where such a period represents the length of normal annual source operations of the stationary source.
- 3.24.4 An engine is not transportable if it is removed from one location for a period and then returned to the same location in an attempt to circumvent the residence time requirement.
- 3.24.5 The period during which an engine is maintained at a storage facility shall be excluded from the time used to determine the resident time requirement.
- 3.25 VOC: Volatile organic compounds, as defined in Rule 1020 (Definitions).

- 3.26 Waste Derived Gaseous Fuel: Any gaseous fuel that was generated from the biodegradation of solid or liquid waste including, but not limited to, sewage sludge digester gas, and landfill gas.
- 3.27 Westside: For the purposes of this rule, this phrase refers to any facility which is physically located west of Interstate Highway 5 in Fresno, Kern, or Kings County and any facility designated as west of Interstate Highway 5 in the photochemical modeling submitted for the State Implementation Plan.

4.0 Exemptions

- 4.1 The provisions of this rule do not apply to engines in agricultural operations in the growing of crops or raising of fowl or animals.
- 4.2 Except for the administrative requirements of Sections 6.1, 6.2.2, and 6.2.3, the provisions of this rule shall not apply to:
 - 4.2.1 Standby engines.
 - 4.2.2 Engines used exclusively for fire fighting services and flood control.
 - 4.2.3 Laboratory engines used in research and testing or for the advancement of engine performance.
 - 4.2.4 Any engine registered as a portable emissions unit under Rule 2280 (Portable Equipment Registration) or the Statewide Portable Equipment Registration Program pursuant to Sections 2450-2465, Article 5, Title 13, California Code of Regulations.
 - 4.2.5 Engines using other fuels during natural gas curtailment that are normally fired with natural gas fuel. This exemption is limited to periods of natural gas curtailment or maintenance testing on the ancillary fuel and is limited to 336 cumulative hours of operation on the ancillary fuel per calendar year. These engines are not exempt from compliance when fired on natural gas.
 - 4.2.6 Military Tactical Equipment.
 - 4.2.7 Transportable engines.
- 4.3 Except for the administrative requirements of Sections 6.1, 6.2.2, and 6.2.3, the provisions of this rule shall not apply to a low-use engine not subject to the Reasonably Available Control Technology (RACT) requirements of Section 5.2.

4.4 The requirements of this rule shall not apply to any de-rated engine, provided the de-rating occurred before December 31, 1995.

4.5 The requirements of Section 5.1.3 shall not apply to any engine which is or will be de-rated before the applicable compliance date.

5.0 Requirements

5.1 The owner of an internal combustion engine shall not operate it under load in such a manner that results in emissions exceeding the applicable emission limit table, according to the compliance schedules listed in Section 7.0:

5.1.1 Table 1 Engine Emission Levels (corrected to 15% oxygen on a dry basis)

Engine Type	NOx	CO
1. Rich-Burn	9.5 g/bhp-hr or 640 ppmv	2000 ppmv
2. Lean-Burn	10.1 g/bhp-hr or 740 ppmv	2000 ppmv
3. Diesel	9.6 g/bhp-hr or 700 ppmv	2000 ppmv

5.1.2 Table 2 Engine Emission Levels (corrected to 15% oxygen on a dry basis)

Engine Type	NOx	CO
1. Rich Burn		
a. Beam-balanced or crank-balanced pumping engine	300 ppmv	2000 ppmv
b. Other rich burn	90 ppmv or 80% reduction	2000 ppmv
2. Lean-Burn	150 ppmv or 70% reduction	2000 ppmv
3. Diesel	600 ppmv or 20% reduction	2000 ppmv

5.1.3 Table 3 Engine Emission Levels (corrected to 15% oxygen on a dry basis)

Engine Type	NOx	CO	VOC
1. Waste Derived Gaseous Fuel.	125 ppmv or 80% reduction	2000 ppmv	750 ppmv
2. Engines owned by public water districts			
a. Rich-Burn	90 ppmv or 80% reduction	2000 ppmv	
b. Lean-Burn	150 ppmv or 70% reduction	2000 ppmv	
c. Diesel or dual-fuel	600 ppmv or 20% reduction	2000 ppmv	
3. Engines not listed in categories 1 and 2, above			
a. Rich Burn			
i. Beam-balanced or crank-balanced pumping engine	300 ppmv	2000 ppmv	
ii. Other rich burn	50 ppmv or 90% reduction	2000 ppmv	250 ppmv
b. Lean Burn	75 ppmv or 85% reduction	2000 ppmv	750 ppmv
c. Diesel or dual-fuel	80 ppmv or 90% reduction	2000 ppmv	750 ppmv

5.1.4 All continuous emission monitoring systems (CEMS) emissions measurements shall be averaged over a period of 15 consecutive minutes. Any 15-consecutive-minute block average CEMS measurement exceeding the applicable emission limits of this rule shall constitute a violation of this rule.

5.1.5 Percent emission reductions, if used to comply with the emission limits of Section 5.1, shall be calculated as follows:

5.1.5.1 For engines with external control devices that are not operated in combination with a second emission control device or technique, percent reduction shall be calculated using emission samples taken at the inlet and outlet of the control device.

5.1.5.2 For engines without external control devices and for engines with an external control device in combination with a second emission control device or technique, percent reduction shall be based on source test results for the uncontrolled engine and the engine after the control device or technique has been employed. In this

situation, the engine's typical operating parameters, loading, and duty cycle shall be documented and repeated at each successive post-control source test to ensure that the engine is meeting the percent reduction limit. When representative source sampling prior to the application of an emissions control technology or technique is not available, the APCO may approve the use of manufacturer's uncontrolled emissions information or source sampling from a similar, uncontrolled engine.

- 5.1.6 The owner of an internal combustion engine with an external emission control device that uses percent emission reduction to comply with the emission limits of Section 5.1 shall provide an accessible inlet and outlet on the external control device for taking emission samples and as approved by the APCO.
- 5.1.7 Owners choosing to comply with a grams/bhp-hr emission limit shall also demonstrate the rated horsepower at the source tested power level using the test method specified in Section 6.4.
- 5.1.8 California Reformulated Gasoline shall be used as the fuel for all gasoline-fired, spark-ignited engines.

5.2 Low-use engines:

- 5.2.1 The owner of the following low-use engines shall not operate such engines under load in a manner that results in emissions exceeding the applicable limits of Section 5.1.1 and 5.1.2, according to the compliance schedules listed in Section 7.3.1 and 7.3.2:
 - 5.2.1.1 Natural gas fired, low-use engines in the Central and Western Kern County Fields.
 - 5.2.1.2 Low-use engines operated at a major NO_x source outside the Westside area.

5.2.2 Compliance with Section 5.1.3 is not required for low-use engines.

- 5.3 In lieu of compliance with the emission limits of Sections 5.1 and 5.2, an owner of any internal combustion engine may elect to permanently remove it from service. NO_x emission reductions achieved by removal of an engine in lieu of compliance with the emission requirements of Sections 5.1.1 or 5.1.2 shall not be available for emission reduction credit (ERC).

5.4 Monitoring Equipment

The owner of any engine subject to the provisions of this rule shall:

- 5.4.1 For engines with external control devices, either install and maintain continuous emissions monitoring equipment for NO_x, CO, and oxygen, as identified in Rule 1080 (Stack Monitoring), or install and maintain APCO-approved alternate monitoring consisting of one or more of the following:
 - 5.4.1.1 periodic NO_x and CO emission concentrations,
 - 5.4.1.2 engine exhaust oxygen concentration,
 - 5.4.1.3 air-to-fuel ratio,
 - 5.4.1.4 flow rate of reducing agents added to engine exhaust,
 - 5.4.1.5 catalyst inlet and exhaust temperature,
 - 5.4.1.6 catalyst inlet and exhaust oxygen concentration,
 - 5.4.1.7 other operational characteristics.
- 5.4.2 For engines without external control devices, monitor operational characteristics recommended by the engine manufacturer or emission control system supplier, and approved by the APCO.
- 5.4.3 Effective on and after November 21, 2003, use a portable NO_x analyzer to take NO_x emission readings to verify compliance with the emission limits or percent control specified in Section 5.1 during each calendar quarter in which a source test is not performed. All emission readings shall be taken with the engine operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. NO_x emission readings taken pursuant to this section shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period.
- 5.4.4 An APCO approved CEMS shall comply with the requirements of 40 Code of Federal Regulations (CFR) Part 51, 40 CFR Parts 60.7 and 60.13 (except subsection h), 40 CFR Appendix B (Performance Specifications), 40 CFR Appendix F (Quality Assurance Procedures), and applicable provisions of Rule 1080 (Stack Monitoring).

6.0 Administrative Requirements

6.1 Emission Control Plan

The owner of any engine subject to the provisions of this rule shall submit to the APCO an emissions control plan of all actions to be taken to satisfy the emission requirements of Section 5.1 and the compliance schedule of Section 7.0.

6.1.1 Such plan shall contain a list with the following for each permitted engine:

- 6.1.1.1 Permit to Operate number
- 6.1.1.2 engine manufacturer
- 6.1.1.3 model designation
- 6.1.1.4 rated brake horsepower
- 6.1.1.5 type of fuel and type of ignition
- 6.1.1.6 combustion type: rich-burn or lean-burn

6.1.2 Such plan shall identify the type of emission control device or technique to be applied to each engine and a construction/removal schedule, or shall provide support documentation sufficient to demonstrate that the engine is in compliance with the emission requirements of this rule.

6.1.3 The plan shall include support documentation for any exempt engine, pursuant to Section 6.2.2, and a letter of intent for any engine being permanently removed from service, pursuant to Section 7.5.

6.2 Recordkeeping

6.2.1 The owner of any engine subject to the provisions of this rule shall maintain an engine operating log with information necessary to demonstrate compliance with this rule. The engine operating log shall include, on a monthly basis, the following information:

- 6.2.1.1 Total hours of operation,
- 6.2.1.2 The type and quantity (cubic feet of gas or gallons of liquid) of fuel used,
- 6.2.1.3 Maintenance or modifications performed,
- 6.2.1.4 Monitoring data,
- 6.2.1.5 Compliance source test results, and
- 6.2.1.6 Any other information necessary to demonstrate compliance with this rule.

6.2.2 An owner claiming an exemption under Sections 4.2 or 4.3 shall maintain annual operating records. This information shall be submitted to the APCO upon request and at the end of each calendar year in a manner and

form approved by the APCO. The records shall include, but are not limited to, the following:

- 6.2.2.1 Total hours of operation,
- 6.2.2.2 The type and quantity (cubic feet of gas or gallons of liquid) of fuel used,
- 6.2.2.3 The purpose for operating the engine,
- 6.2.2.4 For standby engines, all hours of non-emergency and emergency operation shall be reported, and
- 6.2.2.5 Other support documentation necessary to demonstrate a claim to the exemption.

6.2.3 Information kept pursuant to Section 6.2.1 or Section 6.2.2 shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request.

6.3 Compliance Testing

The owner of any engine subject to the emission limits in Section 5.0, shall:

- 6.3.1 Demonstrate compliance with applicable limits by the date specified in Section 7.3 and at least once every 24 months thereafter, in accordance with the test methods in Section 6.4.
- 6.3.2 Conduct emissions source testing with the engine operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. For emissions source testing performed pursuant to Section 6.3.1 for the purpose of determining compliance with an applicable standard or numerical limitation, the arithmetic average of three (3) 30-consecutive-minute test runs shall apply. If two (2) of three (3) runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC shall be reported as methane. VOC, NO_x, and CO concentrations shall be reported in ppmv, corrected to 15 percent oxygen. For engines that comply with a percent reduction in Table 2 or Table 3, the percent reduction of NO_x emissions shall also be reported.
- 6.3.3 In addition to other information, the source test protocol shall describe which critical parameters will be measured and how the appropriate range for these parameters shall be established.
- 6.3.4 The owner of an engine which has been part of a representative test group for the 24 months prior to August 21, 2003, and has not demonstrated compliance with applicable limits in accordance with the test methods in Section 6.4 within 24 months prior to August 21, 2003, shall, effective on

and after August 21, 2003, demonstrate compliance with applicable limits in accordance with the test methods in Section 6.4. Such compliance shall be demonstrated within 6 months after August 21, 2003. Thereafter, such engine shall demonstrate compliance pursuant to the requirements of Section 6.3.1.

6.4 Test Methods

Compliance with the requirements of Section 5.0 shall be determined in accordance with the following test procedures or any other method approved by EPA and the APCO:

- 6.4.1 Oxides of nitrogen- EPA Method 7E, or ARB Method 100.
- 6.4.2 Carbon monoxide - EPA Method 10, or ARB Method 100.
- 6.4.3 Stack gas oxygen - EPA Method 3 or 3A, or ARB Method 100.
- 6.4.4 Volatile organic compounds – EPA Method 25A or 25B, or ARB Method 100.
- 6.4.5 Operating horsepower determination - any method approved by the APCO and EPA.

7.0 Compliance Schedules

- 7.1 By December 19, 1997 owners of engines subject to Section 5.1.3 shall submit to the APCO an emission control plan pursuant to Section 6.1.
- 7.2 Owners of engines subject to Section 5.1.3 shall submit a complete application for an ATC for each engine to be modified by December 19, 1997 or at least 24 months before compliance with Section 5.1.3 is required as indicated in Section 7.3, whichever is later.
- 7.3 Owners shall not operate any engine unless the owner demonstrates and maintains the engine in compliance with the applicable emissions limit by the indicated dates:

7.3.1 Emission Limit Compliance Schedule for non-cyclic loaded natural gas fired engines in the Central and Western Kern County Fields:

Engine Location	Section 5.1.1 (Table 1) Compliance	Section 5.1.2 (Table 2) Compliance	Section 5.1.3 (Table 3) Compliance
1. Central Kern County Fields	Not Required	12/31/95	5/31/99
2. Western Kern County Fields	Not Required	12/31/95	5/31/01

7.3.2 Emission Limit Compliance Schedule for the following engines, but excluding engines identified in Section 7.3.1:

7.3.2.1 liquid-fueled and LPG engines operating on those fuels on October 20, 1994 in Central and Western Kern County Fields at a major NOx source;

7.3.2.2 cyclic loaded, natural gas fired engines in the Central and Western Kern County Fields;

7.3.2.3 other engines operated at a major NOx source not located in the Westside area.

Engine Location or Type	Section 5.1.1 (Table 1) Compliance	Section 5.1.2 (Table 2) Compliance	Section 5.1.3 (Table 3) Compliance
1. Public Water District Engines	Not Required	Not Required	5/31/99
2. Rich-burn, beam-balanced or crank-balanced, pumping engines shall comply with either:			
a. Early RACT Compliance	5/31/95	Not Required	12/31/97
b. Delayed RACT Compliance	Not Required	5/31/97	Not Required
3. Engines in Western Kern County Fields, not identified in category 2, shall comply with either:			
a. Early RACT Compliance	5/31/95	Not Required	5/31/01
b. Delayed RACT Compliance	Not Required	5/31/97	5/31/01
4. Engines not identified in categories 1, 2, or 3 shall comply with either:			
a. Early RACT Compliance	5/31/95	Not Required	5/31/99
b. Delayed RACT Compliance	Not Required	5/31/97	5/31/99

7.3.3 Emission Limit Compliance Schedule for all other engines not specified in Sections 7.3.1 or 7.3.2:

Engine Location or Type	Section 5.1.1 (Table 1) Compliance	Section 5.1.2 (Table 2) Compliance	Section 5.1.3 (Table 3) Compliance
1. Rich-burn, beam-balanced or crank-balanced pumping engines shall comply with either:			
a. Early Compliance	Not Required	Not Required	12/31/97
b. Delayed Non-Westside Compliance	Not Required	5/31/99	Not Required
c. Delayed Westside Compliance	Not Required	5/31/01	Not Required
2. Engines not identified in category 1 shall comply with either:			
a. Non-Westside Compliance	Not Required	Not Required	5/31/99
b. Westside Compliance	Not Required	Not Required	5/31/01

7.4 Any owner of an engine which becomes subject to the emission limits of this rule after August 21, 2003, through loss of exemption, shall not operate the subject engine, except as required for obtaining a new or modified District permit-to-operate for the engine, until the owner demonstrates full compliance with the requirements of this rule.

7.5 Any owner who elects to permanently remove an engine from service as allowed in Section 5.3, shall comply with the following:

7.5.1 Operators removing an engine from service in lieu of compliance with the emission requirements of Sections 5.1.1 or 5.1.2 shall

7.5.1.1 Submit a letter stating the intent to permanently remove the engine from service no later than May 31, 1997; and

7.5.1.2 Permanently remove the engine from service and officially surrender the permit to operate by May 31, 1999.

7.5.2 Operators removing an engine from service in lieu of compliance with the emission requirements of Section 5.1.3 shall

- 7.5.2.1 Submit a letter with the emission control plan stating the intent to permanently remove the engine from service; and
- 7.5.2.2 Permanently remove the engine from service and officially surrender the permit to operate by the applicable compliance date in Section 7.3.

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