

RULE 4351 BOILERS, STEAM GENERATORS, AND PROCESS HEATERS – PHASE 1
(Adopted October 20, 1994; Amended March 16, 1995; Amended October 19,
1995, Amended August 21, 2003)

1.0 Purpose

The purpose of this rule is to limit emissions of oxides of nitrogen (NOx) from boilers, steam generators, and process heaters to levels consistent with reasonably available control technology (RACT).

2.0 Applicability

This rule applies to any boiler, steam generator or process heater, with a rated heat input greater than 5 million Btu per hour that is fired with gaseous and/or liquid fuels, and is included in a major NOx source. This rule does not apply to any unit located west of Interstate Highway 5 located in Fresno, Kern, or Kings county.

3.0 Definitions

- 3.1 Annual Heat Input: the total heat input (hhv basis) of fuel burned by a unit in a calendar year as determined from the higher heating value and cumulative annual usage of each fuel.
- 3.2 Boiler or Steam Generator: any external combustion equipment fired with any fuel used to produce hot water or steam.
- 3.3 British Thermal Unit (Btu): the amount of heat required to raise the temperature of one pound of water from 59°F to 60°F at one atmosphere.
- 3.4 Crude Oil: petroleum extracted from the earth which has not been processed in a refining operation.
- 3.5 Distillate Oil: a petroleum fraction produced by distillation and conforming to ASTM specification D396 for No. 1, 2, or ASTM specification D975 for No. 1-D and 2-D fuels.
- 3.6 Gaseous Fuel: any fuel that is a gas at standard conditions.
- 3.7 Heat Input: the heat (hhv basis) released due to fuel combustion in a unit, not including the sensible heat of incoming combustion air and fuel.
- 3.8 Higher Heating Value (hhv): the total heat liberated per mass of fuel burned (Btu per pound), when fuel and dry air at standard conditions undergo complete combustion and all resulting products are brought to their standard states at standard conditions.

- 3.9 Induced Draft Unit: a unit similar to natural draft unit having a stack, which by itself is not of sufficient size to create the necessary draft for proper combustion, and therefore utilizes a mechanically driven blower in the stack to supplement the draft requirements of the unit.
- 3.10 Liquid Fuel: any fuel, including distillate and crude oil, which is liquid at standard conditions.
- 3.11 Major NO_x Source: any major source as defined in Rule 2201 (New and Modified Stationary Source Review Rule), with a potential to emit 50 tons or more per year of NO_x.
- 3.12 Natural Draft Unit: a unit that uses no mechanical means to cause air to flow through a combustion chamber, flue, chimney, or space.
- 3.13 NO_x Emissions: the sum of oxides of nitrogen expressed as NO₂ in the flue gas.
- 3.14 Process Heater: any combustion equipment fired with liquid and/or gaseous fuel which transfers heat from combustion gases to water or process streams. This definition excludes: kilns or ovens used for drying, baking, cooking, calcining, or vitrifying; and unfired waste heat recovery heaters used to recover sensible heat from the exhaust of combustion equipment.
- 3.15 Public Utilities Commission (PUC) Quality Natural Gas: any gaseous fuel, gas-containing fuel where the sulfur content is no more than one-fourth (0.25) grain of hydrogen sulfide per one hundred (100) standard cubic feet and no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet. PUC quality natural gas also means high methane gas (at least 80% methane by volume) as specified in PUC General order 58-A.
- 3.16 PUC Quality Natural Gas Curtailment: means a shortage in the supply of Public Utility Commission (PUC) quality natural gas, due solely to limitations or restrictions in distribution pipelines by the utility supplying the gas, and not due to the cost of natural gas.
- 3.17 Qualified Technician: a stationary source employee or any personnel contracted by a stationary source operator who has a documented training and a demonstrated experience performing tune-ups on a unit to the satisfaction of the APCO. The documentation of tune-up training and experience shall be made available to the APCO upon request.
- 3.18 Reasonably Available Control Technology (RACT): the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility (44 FR 53762; September 17, 1979).

- 3.19 Rated Heat Input (million Btu per hour): the heat input capacity specified on the nameplate of the unit. If the unit has been physically modified such that the maximum heat input differs from what is specified on the nameplate, the modified maximum heat input shall be considered as the rated heat input and made enforceable by Permit to Operate.
- 3.20 Residual Oil: The heavier oils that remain after the distillate oils and lighter hydrocarbons are distilled off in refinery operations, including No. 4-D, No. 5 and No. 6 fuel oils, Navy Special fuel oil, and Bunker C fuel oil.
- 3.21 Small Producer: a person who is engaged exclusively in the production of oil, and who produces an average of less than 6000 barrels of crude oil per day from all operations in any one county within the District, and who does not engage in refining, transporting or marketing of refined petroleum products.
- 3.22 Solid Fuel: any fuel which is a solid at standard conditions.
- 3.23 Standard Conditions: defined in Rule 1020 (Definitions).
- 3.24 Unit: a single burner, or group of burners with a common stack, associated with any boiler, steam generator, or process heater as defined in this rule.

4.0 Exemptions

- 4.1 This rule shall not apply to:
 - 4.1.1 Unfired waste heat recovery boilers that are used to recover heat from the exhaust of combustion turbines or internal combustion engines.
 - 4.1.2 Units fired with solid fuel.
- 4.2 The requirements of Section 5.0 shall not apply during PUC quality natural gas curtailment to units burning liquid fuel that are normally fired with PUC quality natural gas fuel. This exemption is limited to 336 cumulative hours of operation per calendar year excluding equipment testing not to exceed 48 hours per calendar year.
- 4.3 The provisions of Section 5.0 shall not apply to the use of a permitted emergency standby unit during equipment breakdowns and during routine maintenance of the primary unit. Operation of the permitted emergency standby unit during the primary equipment breakdowns and routine maintenance, shall not exceed either the total heat input of 9 billion Btus per year or a maximum of 720 hours of operation per year.

5.0 Requirements

NOx and carbon monoxide (CO) emission limits in ppmv are referenced at dry gas conditions, adjusted to 3.00 percent by volume stack gas oxygen in accordance with Section 8.0, and averaged over 60 minutes. A violation of the emission limits as measured by the test methods listed in Section 6.2 will constitute a violation of this rule.

5.1 NOx emissions for any unit with heat input equal to or greater than 9 billion Btu per year, shall not exceed the following levels:

	Gaseous Fuel	Distillate Oil	Residual Oil	Crude Oil
Units Except Natural & Induced Draft Units	95 ppmv or 0.10 lb/MMBtu	115 ppmv or 0.15 lb/MMBtu	165 ppmv or 0.22 lb/MMBtu	165 ppmv or 0.22 lb/MMBtu
Natural & Induced Draft Units	147 ppmv or 0.18 lb/MMBtu	155 ppmv or 0.20 lb/MMBtu	194 ppmv or 0.25 lb/MMBtu	194 ppmv or 0.25 lb/MMBtu

5.2 In lieu of complying with the NOx limits in sections 5.1, the owner/operator of any unit shall comply with the following:

5.2.1 Between May 31, 1995 and May 31, 1997:

5.2.1.1 tune each unit at least once per year in accordance with Rule 4304, (Equipment Tuning Procedure for Boilers, Steam Generators, and Process Heaters); or

5.2.1.2 operate each unit in a manner that maintains stack gas oxygen at less than or equal to 3.00 percent by volume on a dry basis, and averaged over 60 minutes; or

5.2.1.3 operate each unit with a stack gas oxygen trim system set at 3.00 percent or less by volume oxygen, and averaged over 60 minutes.

5.2.2 On or after May 31, 1997, except for units included in section 5.2.3 or 5.2.4 NOx emissions shall not exceed the following:

5.2.2.1 30 ppmv or 0.036 lb/MMBtu when fired on gaseous fuels,

5.2.2.2 40 ppmv or 0.052 lb/MMBtu when fired on liquid fuels.

5.2.3 By May 31, 1999, NO_x emissions from natural and induced draft units with rated heat input equal to or less than 40 million Btu per hour, shall not exceed the following limits:

5.2.3.1 74 ppmv or 0.085 lb/MMBtu when fired on gaseous fuels,

5.2.3.2 78 ppmv or 0.102 lb/MMBtu when fired on distillate oil,

5.2.3.3 97 ppmv or 0.127 lb/MMBtu when fired on residual or crude oil.

5.2.4 The compliance date in Section 5.2.2, shall be extended to May 31, 1999, for any unit meeting one or more of the following conditions:

5.2.4.1 by May 31, 1997, the unit is controlled to limit NO_x emissions equal to 0.061 pound per million Btu of heat input or 52 ppmv when fired with gaseous fuels and 0.077 pound per million Btu of heat input or 59 ppmv when fired with liquid fuels, or

5.2.4.2 by October 20, 1994, the unit has a rated heat input of less than or equal to 40 million Btu per hour, or

5.2.4.3 the unit will be shutdown or replaced to comply with this rule and identified in the emission control plan, or

5.2.4.4 the method of achieving compliance with this rule includes change of fuel type or quality and identified in the emission control plan, or

5.2.4.5 the unit is fired exclusively on liquid fuel and is owned and operated by a small producer; or

5.2.4.6 the unit is a part of petroleum refining operation engaged in the production of state required reformulated fuels.

Failure to comply with the provisions of this section by May 31, 1999, shall constitute a violation of this rule.

5.2.5 Between May 31, 1995 and May 31, 1999, any unit subject to the requirements of Sections 5.2.3 or 5.2.4, shall comply with the provisions of Sections 5.2.1.1, 5.2.1.2, or 5.2.1.3.

5.3 Any unit with a heat input of less than 9 billion Btu per calendar year, shall comply with the following:

- 5.3.1 tune each unit at least once per year by a qualified technician in accordance with Rule 4304; or
 - 5.3.2 operate each unit in a manner that maintains stack gas oxygen at less than or equal to 3.00 percent by volume on a dry basis; or
 - 5.3.3 operate each unit with a stack gas oxygen trim system set at 3.00 percent or less by volume oxygen.
- 5.4 NO_x emissions from each unit fired simultaneously on gaseous and liquid fuels shall not exceed the applicable liquid fuel limit specified in sections 5.1, or 5.2. provided the gaseous fuel consumption does not exceed 55 percent of the total fuel consumption.
- 5.5 Except for units operated in compliance with section 5.2.1, 5.2.5, or 5.3, carbon monoxide (CO) emissions shall not exceed 400 ppmv.
- 5.6 Monitoring Provisions
- 5.6.1 The owner of any unit that simultaneously fires combinations of different fuels shall install and maintain totalizing mass or volumetric flow rate meters in each fuel line.
 - 5.6.2 The owner of any unit equipped with NO_x reduction control technology subject to the requirements of this rule, shall install and maintain appropriate provisions to monitor the operational characteristics of the NO_x control system.
- 5.7 Compliance Determination
- 5.7.1 The owner of any unit shall have the option of complying with either the heat input basis (lb/MMBtu) emission limits or the concentration (ppmv) emission limits specified in Section 5.0. Compliance determination shall be done using the applicable test methods in Section 6.2. The basis selected to demonstrate compliance shall be specified in the emission control plan required by section 6.4.
 - 5.7.2 All emission measurements shall be made with the unit operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. Compliance determination shall be conducted with the unit operating at conditions representative of normal operations.

6.0 Administrative Requirements

6.1 Recordkeeping

The records required by Sections 6.1.1 through 6.1.3 shall be maintained for a period of five calendar years and shall be made available to the APCO upon request. Failure to maintain records or information contained in the records that demonstrates noncompliance with the applicable requirements of this rule shall constitute a violation of this rule.

6.1.1 The owner of each unit shall monitor and record for each unit the hhv and cumulative annual use of each fuel.

6.1.2 The owner of any unit operated under the exemption of Section 4.2 shall monitor and record for each unit the cumulative annual hours of operation on each nongaseous fuel during curtailment and during testing. Failure to maintain records required by Section 6.1.2 or information contained in the records that demonstrates noncompliance with the conditions for exemption under Section 4.2 will result in loss of exemption status. On and after August 21, 2003, any unit losing an exemption status shall be brought into full compliance with this rule as specified in Section 7.3.

6.1.3 The owner of any unit operated under the exemption of Section 4.3 shall monitor and record for each unit the cumulative annual hours of operation and the cumulative annual fuel heat input in Btus. Failure to maintain records required by Section 6.1.3 or information contained in the records that demonstrates noncompliance with the conditions for exemption under Section 4.3 will result in loss of exemption status. Any unit losing an exemption status shall be brought into full compliance with this rule as specified in Section 7.3.

6.2 Test Methods

6.2.1 Fuel hhv shall be certified by third party fuel supplier or determined by:

6.2.1.1 ASTM D 240-87 or D 2382-88 for liquid hydrocarbon fuels;

6.2.1.2 ASTM D 1826-88 or D 1945-81 in conjunction with ASTM D 3588-89 for gaseous fuels.

6.2.2 Oxides of nitrogen (ppmv) - EPA Method 7E, or ARB Method 100.

6.2.3 Carbon monoxide (ppmv) - EPA Method 10, or ARB Method 100.

6.2.4 Stack gas oxygen - EPA Method 3 or 3A, or ARB Method 100.

6.2.5 NOx Emission Rate (Heat Input Basis) - EPA Method 19.

6.2.6 Stack gas velocities - EPA Method 2.

6.2.7 Stack gas moisture content - EPA Method 4.

6.3 Compliance Testing

6.3.1 Units subject to the requirements of this rule except units subject to section 5.3, and 5.2.1, shall be tested to determine compliance with the applicable requirements of Sections 5.0 at least once every 12 months in which fuel consumption exceeds 9 billion Btus. Gaseous fuel fired units demonstrating compliance on two consecutive 12-month source tests shall be tested not less than once every 36 months. On and after August 21, 2003, during the 36-month source testing interval, the operator shall tune the unit in accordance with the provisions of Section 5.2.1, and shall monitor, on a monthly basis, the unit's operational characteristics recommended by the manufacturer to ensure compliance with the applicable emission limits of this rule. Tune-ups required by Section 5.3.1 and Section 6.3.1 do not need to be performed for units that operate and maintain an APCO approved Continuous Emissions Monitoring System (CEMS) or an APCO approved Alternate Monitoring System where the applicable emission limits are periodically monitored. If the result of the 36-month source testing demonstrates that the unit does not meet the applicable emission limits of this rule, the source testing frequency shall revert to at least once every 12 months. Failure to comply with the requirements Section 6.3.1, or any source test results that exceed the applicable emission limits of this rule shall constitute a violation of this rule.

6.3.2 On and after August 21, 2003, in lieu of compliance with Section 6.3.1, compliance with the applicable limits shall be demonstrated by submittal of annual emissions test results to the District from a unit or units that represents a group of units, provided:

6.3.2.1 All units in the group are initially source tested. The emissions from all test runs from units within the group are less than 90% of the permitted value, and the emissions do not vary greater than 25% from the average of all test runs; and

6.3.2.2 All units in a group are similar in terms of rated heat input, make and series, operational conditions, fuel used, and control method. No unit with a rated heat input greater than 100 MMBtu shall be considered as part of the group; and

- 6.3.2.3 The group is owned by a single owner and is located at a single stationary source; and
- 6.3.2.4 Selection of the representative unit(s) is approved by the APCO prior to testing; and
- 6.3.2.5 The number of representative units source tested shall be at least 30% of the total number of units in the group. The representative tests shall rotate each year so that within three years all units in the group have been tested at least once.
- 6.3.2.6 All units in the group shall have received similar maintenance and tune-up procedures as the representative unit(s) as listed in the Permit to Operate. By December 30, 2003, the operator shall submit to the APCO the specific maintenance procedures to be performed on each unit that will be included in the group for representative testing. Such maintenance procedures shall be specified in the Permit to Operate for units that are included in the group for representative testing. Any maintenance work on a unit which has no effect on emissions standards and which is not specified in the maintenance procedures shall be submitted to the APCO for approval before such unit can be included as part of the group for representative testing. Any unit that necessitates any maintenance work which has an effect on emission standards and is beyond the maintenance procedures identified in the Permit to Operate, shall not be included as part of the group for representative testing. The unit shall be source tested in accordance with the provisions of Section 6.3.1; and
- 6.3.2.7 Should any of the representative units exceed the required emission limits, each of the units in the group shall demonstrate compliance by emissions testing. Failure to complete emissions testing within 90 days of the failed test shall result in the untested units being in violation of this rule. After compliance with the requirements of Section 6.3.2.7 has been demonstrated, subsequent source testing shall be performed pursuant to Sections 6.3.1 or 6.3.2.

6.4 Emission Control Plan

The owner/operator of any unit subject to this rule shall submit to the APCO an emissions control plan of actions to be taken to satisfy the requirements of section 5.0. Such plan shall identify the type of control to be applied to each unit and a construction schedule, or shall include source test results to demonstrate that the

unit is already in compliance with applicable requirements. Any modification to the emission control plan shall be subject to APCO's review and approval prior to implementation. Failure to implement the provisions of the approved emission control plan, shall constitute a violation of this rule.

7.0 Compliance Schedule

7.1 The owner/operator of any unit required to comply with section 5.1 or section 5.3, shall comply with the following schedule:

7.1.1 By April 20, 1995, submit to the APCO an emission control plan pursuant to section 6.4, and a complete application for Authority to Construct if necessary.

7.1.2 By May 31, 1995, demonstrate full compliance with all applicable provisions of this rule.

7.2 The owner/operator of any unit complying with section 5.2, shall comply with the following schedule:

7.2.1 By April 20, 1995, submit to the APCO an emission control plan pursuant to section 6.4.

7.2.2 By May 31, 1995, comply with the provisions of section 5.2.1 or 5.2.5.

7.2.3 By May 31, 1995, submit a complete application for Authority to Construct for all modifications necessary to comply with the requirements of section 5.2.2.

7.2.4 By May 31, 1997, demonstrate full compliance with all applicable provisions of this rule, including the requirements of section 5.2.2.

7.2.5 By May 31, 1997, any unit subject to the provisions of section 5.2.3 or 5.2.4, shall submit a complete application for Authority to Construct for all modifications necessary to comply with the requirements of these sections.

7.2.6 By May 31, 1999, demonstrate full compliance with all applicable provisions of this rule, including the requirements of section 5.2.2 and 5.2.3.

7.3 A unit that exceeds the fuel heat input or hours of operation exemption limit as specified in Sections 4.2, 4.3, or 5.3 shall comply with the applicable requirements of section 5.1 on and after the date the limit is exceeded.

8.0 Calculations

- 8.1 All ppmv emission limits specified in Section 5.0 are referenced at dry stack gas conditions and 3.00 percent by volume stack gas oxygen. Emission concentrations shall be corrected to 3.00 percent oxygen as follows:

$$[\text{ppm NOx}]_{\text{corrected}} = \frac{17.95\%}{20.95\% - [\% \text{O}_2]_{\text{measured}}} \times [\text{ppm NOx}]_{\text{measured}}$$

$$[\text{ppm CO}]_{\text{corrected}} = \frac{17.95\%}{20.95\% - [\text{O}_2]_{\text{measured}}} \times [\text{ppm CO}]_{\text{measured}}$$

- 8.2 All lb/MMBtu NOx emission rates shall be calculated as pounds of nitrogen dioxide per million Btu of heat input (hhv).

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