

**Draft Model Rule for Control of Nitrogen Oxide (NOx) Emissions
from Natural gas-fired Industrial, Commercial, and Institutional (ICI) Boilers,
Steam Generators, Process Heaters, and Water Heaters.**

Statement of purpose: The provisions of this model rule limit nitrogen oxide (NOx) emissions from natural gas-fired industrial, commercial, and institutional (ICI) boilers, steam generators, process heaters, and water heaters. This model rule may be implemented as a manufacturing restriction, a sales restriction, a use restriction, or a combination of these restrictions. Each implementing state agency will choose the entities to regulate after consideration of the agency's compliance assurance and enforcement practices and policies.

The emission limits of this model rule are developed from requirements now in effect in certain jurisdictions, including: (1) San Joaquin Valley Air Pollution Control District Rule 4308 for boilers, steam generators, process heaters and water heaters with maximum rated heat input capacity equal to or greater than 75,000 Btu/hr and up to but less than 2.0 million Btu/hr; (2) San Joaquin Valley Air Pollution Control District Rule 4307 for gas-fired and liquid fuel-fired boilers, steam generators, and process heaters with maximum rated capacity of 2.0 million Btu/hr up to and including 5.0 million Btu/hr; and (3) similar rules adopted by other California Air Pollution Control Districts and the State of Texas.

A number of provisions of this model rule are labeled as optional because implementation depends on the adopting agency's enforcement practices, resources, and choice of regulated entity (*i.e.*, manufacturer, seller, user, or combination thereof). For example, compliance verification may take the form of (1) acceptance of certifications for a particular make and model of heater, boiler or generator issued by the San Joaquin Valley Air Quality Management District or South Coast Air Quality Management District; (2) the adopting state agency's own certification program; (3) mandatory unit-specific performance testing; or (4) a combination of approaches. Each optional requirement is set out as a regulatory concept that the adopting agency will need to revise according to the state rule adoption procedures.

**Model Rule for
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PART Env-A xxxx Control of Nitrogen Oxide (NOx) Emissions From Natural gas-fired Industrial, Commercial, and Institutional (ICI) Boilers, Steam Generators, Process Heaters, and Water Heaters

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Env-A xxxx.01 Definitions. The following words, terms, and abbreviations used in this part (subchapter) shall have the following meaning:

The definitions in this section are optional and only provided as examples for state adoption as needed. These sample definitions were taken from San Joaquin Valley Air Pollution Control District Rules 4307 and 4308, the OTC Model Rule for Additional NOx Control Measures dated March 6, 2001, and 40 CFR 63.

- (a) "Annual Heat Input" means the actual, total heat inputs of fuels burned by a unit in a calendar year, as determined from the higher heating value (hhv) and cumulative annual usage of each fuel;
- (b) "Atmospheric unit" means any unit with a non-sealed combustion chamber in which the combustion air and flue gases are drawn through the unit without the use of a fan;
- (c) "Boiler, Steam Generator, or Water Heater" means any external combustion equipment fired with any fuel to produce hot water or steam;
- (d) "British Thermal Unit (Btu)" means the amount of heat required to raise the temperature of one pound of water from 59° F to 60° F at one atmosphere pressure;
- (e) "Control apparatus" means any device which prevents or controls the emission of any air contaminant directly or indirectly into the outdoor atmosphere;
- (f) "Emission unit" means an individual piece of equipment or control apparatus from which any air contaminant is emitted to the ambient air, e.g., an individual boiler;
- (g) "Gaseous fuel" means any fuel which is a gas at Standard Conditions;

Alternate definition: "Gas" or Gaseous fuel" means any of the following, if they can be used to create useful heat and/or mechanical energy:

- (1) Natural gas;
 - (2) Gaseous substances produced synthetically from coal or oil;
 - (3) Gaseous substances derived from the decomposition of organic matter; or
 - (4) Gaseous substances derived as a by-product of a manufacturing process
- (h) "Heat Input" means the heat (hhv basis) released due to fuel combustion in a unit, not including the sensible heat of incoming combustion air and fuel;
 - (i) "Heat Output" means the enthalpy of the working fluid output of the unit;

- (j) "Higher Heating Value (hhv)" means the total heat liberated per mass of fuel burned (expressed as 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;
- (k) "Humidifier" means a device or system that uses an air stream heated by a direct contact combustion process in combination with a water spray to produce warm air of high humidity in order to maintain or increase the moisture content of material being processed or conveyed by the air stream;
- (l) "Industrial/Commercial/Institutional (ICI) boiler" means a steam generating unit that generates steam to supply power and/or heat to an industrial, institutional, or commercial operation. This term doesn't include boilers that serve electric generating units and cogeneration facilities;
- (m) "Liquid fuel" means any fuel which is a liquid at Standard Conditions;
- (n) "Manufactured Home" means a manufactured home as defined in 42 United States Code Section 5402 and California Health and Safety Code Section 18007;
- (o) "Maximum allowable emission rate" means the maximum amount of an air contaminant that may be emitted into the ambient air during one of the following:
 - (1) A prescribed interval of time, such as one hour or one day;
 - (2) The period of time required for a unit activity, such as the burning of one therm of natural gas or one gallon of fuel;
 - (3) The period of time required to produce a given unit of output; such as one pound of steam
- (p) "Maximum heat input rate" means, for a given unit of fuel-burning equipment, its maximum steady state fuel firing rate, in Btus per hour of gross heat input as determined by the design rating of the equipment manufacturer;
- (q) "MM Btu" means million British thermal units;
- (r) "Natural gas" means:
 - (1) A naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the earth's surface, of which the principal constituent is methane; or
 - (2) Liquid petroleum gas, as defined by the ASTM Standard Specification for Liquid Petroleum Gases, D1835-82;
- (s) "NO_x Emissions" means the sum of the oxides of nitrogen as expressed as NO₂ in the flue gas;
- (t) "Oxides of nitrogen (NO_x)" means all oxides of nitrogen, except nitrous oxide, as measure in accordance with test methods approved by the State of xxxx and EPA, such as the test methods set forth at 40 CFR 60 Appendix A Method 7E;
- (u) "ppmvd" means parts per million dry volume;
- (v) "Process Heater" means any combustion equipment fired with liquid and/or gaseous fuel and which transfers heat from combustion gases to water or process streams excluding kilns or ovens used for drying, baking, cooking, calcining, or vitrifying; and unfired waste recovery heaters used to recover sensible heat from the exhaust of combustion equipment.
- (w) "Qualified Technician" means 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 Air Pollution Control Officer (APCO). The documentation of tune-up training and experience shall be made available to the APCO upon request.
- (x) "Rated Heat Input" (expressed as million Btu per hour) means the heat input capacity specified on the name plate of the unit. If the unit has been physically modified such that its 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 the Permit to Operate;

- (y) "Residential dwelling" means a structure severing as a dwelling for one or more persons, especially for a family or household.
- (z) "School" means any public or private school used for the purpose of education and instruction of school pupils in the Kindergarten through Grade 12, but does not include any private school in which education and instruction are primarily conducted in private homes;
- (aa) "Solid Fuel" means any fuel which is solid at Standard Conditions;
- (bb) "Standard Conditions" means a gas temperature of 70 degrees Fahrenheit and a gas pressure of 14.7 pounds per square inch absolute. Results of all analyses and tests shall be calculated or reported at this gas temperature and pressure;
- (cc) "Stationary Source" means any building, structure, facility, or installation which emits or may emit any affected pollutant directly or as a fugitive emission. Building, structure, facility, or installation includes all pollutant emitting activities which are under the same or common ownership or operation, or which are owned or operated by entities which are under common control and belong to the same industrial grouping either by virtue of falling within the same two-digit standard industrial classification code or by virtue of being part of a common industrial process, manufacturing process, or connected process involving a common raw material, and are located on one or more contiguous or adjacent properties;
- (dd) "Steam generating unit" means fuel burning equipment or combustion equipment that combusts any fuel, process byproduct, or waste in order to produce steam or to heat water or any heat transfer medium;
- (ee) "Unit" means any boiler, steam generator, process heater or water heater as defined in this rule.

Env-A xxxx.02 Applicability.

- (a) Except as provided in section (b) below this rule applies to any person who on or after <xx months from date of adoption> manufactures, distributes, supplies, sells, offers for sale, for lease, for rent, imports, delivers, installs, or solicits the installation of, any new or replacement natural gas-fired industrial, commercial, and institutional (ICI) boilers, steam generators, process heaters, and water heaters by size as follows:
 - (1) Type 1 unit - maximum rated heat input capacity greater than or equal to 75,000 BTU/hr but no more than 400,000 Btu/hr;
 - (2) Type 2 unit - maximum rated heat input capacity greater than 400,000 Btu/hr but less than 2.0 million Btu/hr; and
 - (3) Type 3 unit - maximum rated heat input capacity of 2.0 million Btu/hr up to and including 5.0 million Btu/hr
 - (b) This rule does not apply to:
 - (1) Units using a fuel other than natural gas;
 - (2) Units used in recreational vehicles;
 - (3) Units installed in manufactured homes;
 - (4) Humidifiers, where the products of combustion come into direct contact with the material to be heated; or
 - (5) Units intended for shipment and use outside of **State xxxx**.
- States also have the option to adopt one or both of the following exemptions:**
- (6) Type 3 units located in residential dwellings designed for 4 or fewer families;
 - (7) Type 3 units burning less than 9,000 therms of gas per calendar year based on gas bills;

[States may choose to implement this model rule as a manufacturing restriction or sales restriction, which may be enforced through the acceptance of San Joaquin Valley Air Quality Management District's

certification program or South Coast Air Quality Management District's certification program, through a state certification program, through performance testing, or through a combination of any of these options. The choices offered in this model rule are voluntary options for states to consider based on available resources and current enforcement practices. Sample text for the compliance options are set out in this model rule as regulatory concepts that will need to be revised by any state prior to rule adoption.]

Env-A xxxx.03 NOx Emission Limits

(a) The NOx limits for natural gas-fired boilers, steam generators, process heaters, or water heaters supplied, sold, offered for sale, installed, or solicited for installation within **State xxxx** are as follows:

- (1) Type 1 units
 - a. manufactured on or after <xx months from date of adoption> 0.093 lbs NOx/mmBtu heat input
- (2) Type 2 units
 - b. manufactured on or after <xx months from date of adoption> 0.036 lbs NOx/mmBtu heat input
- (3) Type 3 units

Upon installation of a new or replacement unit on or after <xx months from date of adoption>

- a. For Atmospheric Units: 0.014 lb/MMBtu heat input or 12 ppmv
- b. For Non-Atmospheric Units: 0.011 lb/MMBtu heat input or 9 ppmv

(b) All NOx emission limits specified in Env-A xxxx.03 (a) above shall be corrected to 3% oxygen by volume on a dry basis.

(c) To demonstrate compliance with the NOx emission limits specified in Env-A xxxx.03 (a) above, a person shall: [Note: The compliance requirements may apply to a seller, manufacturer, and/or the owner or operator of a unit, at an individual state's option. The enforcement responsibilities to the state will differ depending on which persons are required to demonstrate compliance.]

- (1) Obtain certification pursuant to Env-A xxxx.05; or
- (2) Conduct compliance testing specified in Env-A xxxx.07 [Note: Env-A xxxx.07 allows states to require initial and/or periodic stack testing (once every 3 years after the initial compliance test).]

Env-A xxxx.04 Combustion Tune-Ups [Optional]

This section is optional and inserted as *an example* of existing rules that deal with this issue.

(a) Except as provided in section Env-A xxxx.02 (b) above, the owners or operators of all **Type 3 units** shall:

(1) Before April 1st of each year:

- a. Perform an efficiency test using the test procedures specified in chapter 3, Combustion Efficiency Tables, Taplin, Harry, R. Fairmont Press, 1991; and
- b. Adjust the combustion process of the boiler in accordance with the procedures specified in chapter 5, Combustion Efficiency Tables, Taplin, Harry, R. Fairmont Press, 1991; and

1st Alternate language for (a)(1):

(1) Before April 1st of each year:

- a. Perform an efficiency test using the test procedures specified in New York Department of Environmental Conservation's (NYDEC's) Air Guide-33 (Small Boiler Tune-up Requirements for NOx RACT Compliance); and
- b. Adjust the combustion process of the boiler in accordance with the procedures specified in New York Department of Environmental Conservation's (NYDEC's) Air Guide-33 (Small Boiler Tune-up Requirements for NOx RACT Compliance); and

2nd Alternate language for (a)(1):

(1) Before April 1st of each year:

- a. Perform an efficiency test using the test procedures specified in ASME/ANSI Boiler Test Code 4.1; and
- b. Adjust the combustion process of the boiler in accordance with the procedures specified in ASME/ANSI Boiler Test Code 4.1; and

(2) Maintain in a permanently bound log book the following information:

a. The date(s) on which:

- 1. The efficiency test was conducted; and
- 2. The combustion process was last adjusted;

b. The name(s), title, and affiliation of the person(s) who:

- 1. Conducted the efficiency test; and
- 2. Made the adjustments;

c. The NOx emission concentration, in parts-per-million by volume, dry basis (ppmvd), corrected to 15% oxygen, after the adjustments are made;

- d. The CO emission concentration, in ppmvd, corrected to 15% oxygen, after the adjustments are made;
- e. The opacity readings; and
- f. Any other information required by Env-A xxx (state specific general recordkeeping requirements), Env-A xxx (state specific NOx emission statements requirements), and Env-A xxx (state specific NOx emission statement reporting requirements)

1st Alternate language for (a)(2)

(2) Maintain written copies of all records specified in New York Department of Environmental Conservation's (NYDEC's) Air Guide-33 (Small Boiler Tune-up Requirements for NOx RACT Compliance)

2nd Alternate language for (a)(2):

(2) Maintain written copies of all information generated pursuant to the test procedures specified in ASME/ANSI Boiler Test Code 4.1;

Env-A xxxx.05 NOx Compliance Certification

This section is inserted as *an example* of an existing rule that deals with this issue.

- (a) A person may demonstrate compliance with the applicable NOx emission limits specified in Env-A xxxx.03 (a) by obtaining one of the following certifications:
 - (1) Certification by the San Joaquin Valley Air Pollution Control District that the equipment complies with San Joaquin Valley Air Pollution Control District Rule 4306 or 4307 for the applicable Type of unit; or
 - (2) Certification by [another state or regional air quality program like California's South Coast Air Quality Control District] that the equipment complies with the NOx emission limits specified in Env-A xxxx.03 for the applicable Type of unit; or
 - (3) Certification by the manufacturer that the equipment complies with the NOx emission limits in Env-A xxxx.03 for the applicable Type of unit; or
 - (4) Certification by [State X air quality program] pursuant to Env-A xxxx.06.
- (b) Documentation sufficient to demonstrate certification shall include:
 - (1) A valid certificate from the manufacturer stating that the subject make and model of boiler, steam generator, process heater, or water heater is capable of compliance with the NOx emission limits specified in Env-A xxxx.03 for the applicable type of unit;
 - (2) A valid and effective order issued by the San Joaquin Valley Air Pollution Control District certifying compliance as provided for in Env-A xxxx.05 (a)(1) above; or
 - (3) A valid and effective certificate of compliance issued by **State X** certifying compliance as provided for in Env-A xxxx.05 (a)(4) above.
- (c) A certification under Env-A xxxx.05 (a)(3) above shall apply to a specific make and model of boiler, steam generator, process heater or water heater and shall include the certifying entity's statement that such make and model of boiler, steam generator, process heater, or water heater has the ability to operate in compliance with the NOx emission limits in Env-A xxxx.03 for the applicable Type of unit for the lesser of

the first 15,000 hours of operation or three years, when such boiler, steam generator, process heater, or water heater is installed, operated and maintained according to the manufacturer's instructions.

(d) A boiler, steam generator, process heater, or water heater's compliance with the NO_x emission limits in Env-A xxxx.03 for the applicable Type of unit shall be verifiable for the first three years of the boiler, steam generator, process heater or water heater's operation by an emission test performed in accordance with Env-A xxxx.07

(e) An owner or operator of a boiler, steam generator, process heater, or water heater that is operating in compliance pursuant to a certification provide for under Env-A xxxx.04(a) above shall maintain such boiler, steam generator, process heater, or water heater prescribed by the manufacturer and this section.

Env-A xxxx.06 [State X] Compliance Certification Program

This section is *inserted as a place holder* for a State that may already be implementing a boiler certification program or a State that may choose to establish and implement a boiler certification program. States will need to specify criteria and procedures for boiler certification.

Env-A xxxx.07 NO_x Compliance Testing [Optional]

This section is optional and inserted as *an example* of an existing rule that deals with this issue.

(a) Except for those units that have demonstrated compliance pursuant to Env-A xxxx.05 or those units specified in Env-A xxxx.xx [refers to State specific requirement], all **Type 3 units** subject to this part shall conduct an initial compliance stack test to demonstrate compliance with the NO_x emission limits specified in Env-A xxxx.03.

(b) Except for those units specified in Env-A xxxx.xx [refers to State specific requirement], all **Type 3 units** subject to this part shall conduct periodic stack testing, no less frequently than once every 3 years, in order to demonstrate compliance with the NO_x emission limits specified in Env-A xxxx.03. The first test shall occur no later than 3 years from the date of the initial compliance stack test required by Env-A xxxx.07 (a).

(c) The owner or operator of a stationary source or unit required to conduct an initial compliance stack test or periodic stack testing shall submit a stack test report to the State of xxxx within in 30 days of the date of such stack test.

(d) For stationary sources, including industrial, commercial, and institutional boilers, the following test methods shall be used:

(1) Method 7, 7A, 7C, 7D or 7E, 40 CFR Part 60, Appendix A or ISO 8178-2 to determine NO_x concentrations in stack gases from applicable stationary sources.

(2) Method 1 or 2, 40 CFR Part 60, Appendix A to determine the exit velocity of stack gases from applicable stationary sources.

(e) Method 3 or 3A, 40 CFR Part 60, Appendix A to determine carbon dioxide, oxygen, excess air and molecular weight (dry basis) of stack gases from applicable stationary sources.

(f) Method 4, 40 CFR Part 60, Appendix A to determine moisture content (volume fraction of water vapor) of stack gases from applicable stationary sources.

(g) Gaseous concentration measurements required by Env-A xxxx.03 for nitrogen oxides (NO_x), carbon monoxide (CO), and oxygen (O₂) shall be conducted with the following procedures and the following equipment:

(1) Any of the following monitors shall be acceptable for making the gaseous concentration measurements:

a. All analyzers meeting the specifications set forth in the applicable sections of 40 CFR Part 60, Appendix B, Performance Specifications 2 through 4;

- b. Portable extractive monitors using an electrochemical sensor performing the gas concentration measurement; and
 - c. Alternative monitors, if written technical information is provided to the State of xxxx demonstrating that the analyzer in the alternative monitor is at least as accurate as the analyzer using the electrochemical sensor;
- (2) All concentration monitors shall be operated following the operating procedures specified by the manufacturer;
 - (3) Measurements shall be taken at one minute intervals at each representative operation condition over a minimum of a 15-minute period following the achievement of stable operation;
 - (4) All measurements shall be documented and averaged over the period of testing;
 - (5) Prior to and following measurement, a zero and calibration span shall be performed following the manufacturer's recommended procedures. The span calibration values shall be chosen by the operator of the instrument at a value between 80 and 150% of the expected concentration based on manufacturer's data or EPA-published emission factors for the emission unit:
 - (6) All calibration data shall be recorded and kept on-site; and
 - (7) Concentration measurements shall be reported on a dry basis. If the direct measurement is on a wet basis, the basis for the percentage moisture used and the correction calculation to dry basis shall be documented.
- (h) Stationary sources and units subject to this part shall also comply with the testing requirements specified in Env-A xxxx [Refers to other State specific testing requirements].

Env-A xxxx.08 NOx Compliance Monitoring Requirements [Optional]

This section is optional and inserted as *an example* of an existing rule that deals with this issue.

The State of xxxx shall require installation, operation, maintenance, and quality assurance testing of a CEM system for NOx which meets all of the requirements specified in Env-A xxxx [Refers to other State specific CEM requirements], if any of the following conditions exist:

- (a) A source or unit utilizes air pollution control equipment in order to maintain compliance with a NOx emission limit and continuous emission monitoring is determined by the State of xxxx to be necessary in order to ensure that this emission limit is not exceeded and that the control equipment is performing correctly; and
- (b) Any stationary source or unit subject to the provisions of Env-A xxxx.xx [Refers to other State specific CEM requirements].

Env_A xxxx.09 NOx Compliance Record Keeping and Reporting Obligations [Optional]

This section is optional and inserted as *an example* of an existing rule that deals with this issue.

(a) The owner or operator of a unit subject to this regulation shall maintain, for a period of at least 5 years, copies of all measurements, tests, reports, logs, required to demonstrate compliance with this regulation. This information shall be provided to the [state regulatory agency] upon request.

