

RULE 425 Stationary Gas Turbines (Oxides of Nitrogen) - Adopted 8/16/93, Amended 1/11/18, 11/13/24

I. Purpose

The purpose of this Rule is to limit oxides of nitrogen (NOx) emissions from stationary gas turbines.

II. Applicability

The provisions of this Rule shall apply to any stationary gas turbine with a rating equal to or greater than 0.88 megawatts (MW) operating in the Eastern Kern Air Pollution Control District (District).

III. Definitions

- A. APCO: Air Pollution Control Officer of the Eastern Kern Air Pollution Control District.
- B. Combined Cycle: Any stationary gas turbine operated for both the production of electrical energy from shaft work and the useful energy produced from heat recovered from its exhaust gases.
- C. Dry Low-NOx Combustor: Any gas turbine engine combustor using staging, air/fuel premixing or other design features to reduce NOx emissions.
- D. Gaseous Fuel: Any fuel existing as gas at standard conditions.
- E. Liquid Fuel: Any fuel, including distillate and residual oil, existing as liquid at standard conditions.
- F. Oxides of Nitrogen (NOx): Total nitrogen oxides (expressed as NO₂).
- G. Power Augmentation: An increase in the gas turbine shaft output and/or the decrease in gas turbine fuel consumption by the addition of energy recovered from exhaust heat.
- H. Parts Per Million Volume (ppmv): Measure of the concentration of gaseous or liquid substances in the atmosphere or other media.
- I. Rating: Manufacturer's continuous electrical output megawatt (MW) specification for a gas turbine system.
- J. Simple Cycle: Any stationary gas turbine in which all electric generators are driven by shaft work from fuel combustion.
- K. Selective Catalytic Reduction (SCR): A post-combustion control technology that utilizes a reducing agent, such as ammonia, injected into the exhaust gas stream where it converts NOx to molecular nitrogen in the presence of a catalyst.

- L. Stationary Gas Turbine: Any gas turbine system, with or without power augmentation, which is permanently attached to a foundation, or is not a portable gas turbine. The gas turbine is not self-propelled nor intended to be propelled while performing its function, although it may be mounted onto a foundation. Two or more gas turbines powering a common shaft shall be treated as one gas turbine.
- M. Standard Conditions: A gas temperature of 68° Fahrenheit (20° Celsius) and an absolute pressure of 14.7 pounds per square inch (760-millimeters of mercury). Results of all analyses and tests shall be calculated or reported at this gas temperature and pressure.
- N. Shutdown Period: The time necessary to cease operation of a gas turbine from operating under load conditions. The time shall not exceed one (1) hour.
- O. Startup Period: The time necessary to bring operation of a gas turbine up to the designed rating. The time shall not exceed six (6) hours for combined cycle gas turbine power plants or two (2) hours for simple cycle gas turbine power plants.

IV. Exemptions

The provision of this Rule shall not apply to the operation of stationary gas turbines under the following conditions:

- A. Emergency standby units demonstrated to operate less than 200 hours per year.
- B. Units rated less than 4 MW that operate less than 877 hours per year.
- C. Laboratory units used in research and testing for the advancement of gas turbine technology.
- D. Units operated exclusively for firefighting and/or flood control.
- E. Turbines used in test cells and test stands.
- F. Portable equipment registered in accordance with California Air Resources Board (CARB) regulations under 13 CCR 2450-2465, Portable Equipment Registration Program (PERP) or 13 CCR 2420 Off-road Compression-ignition Engines and Equipment. Portable turbines used by the Department of Defense or National Guard exclusively used for military tactical support or other federal emergency purposes.

V. Requirements

A. Emission Limits

The owner or operator of any stationary gas turbine unit shall not operate such unit under load conditions, excluding the startup or shutdown period, which results in the measured NOx emissions concentration exceeding the compliance limits listed in Table 1, averaged over one (1) hour, based on four consecutive 15-minute averages.

TABLE 1

| Stationary Gas Turbine Unit | Compliance Limit NO _x , ppmv at 15% O ₂ | |
|---|--|-------------|
| | Gaseous Fuel | Liquid Fuel |
| Rated 0.88 MW to Less Than 2.9 MW OR Greater Than or Equal to 4 MW That Operate Less Than 877 Hour/Year | 42 | 65 |
| 2.9 MW to Less Than 10 MW | 25 | 65 |
| 10.0 MW and Greater | 9 | 25 |
| Owner or operator of a Westinghouse W251B10 with Authority to Construct issued before January 1, 1983, using dry low-NO _x combustors | 20 | N/A |

B. Startup/Shutdown Combined Cycle Units

NO_x emissions shall comply with at least one of the following limits averaged over the duration of the startup or shutdown period:

1. 70 ppmv at 15% O₂ for turbines fired with gaseous fuel or,
2. 226 ppmv at 15% O₂ for turbines fired with liquid fuel.

C. Startup/Shutdown Simple Cycle Units

NO_x emission shall be kept to a minimum by use of the following:

1. Manufacturer's recommendation for operation during startup and shutdown.
2. Injection of water as soon as reasonably possible.
3. Maintaining proper air to fuel ratios.

VI. Administrative Requirements

A. Emission Control Plan

The owner or operator of any existing stationary gas turbine subject to this Rule shall submit to the APCO for approval an emissions control plan, including a schedule of increments of progress to be taken to meet or exceed requirements of Section V to comply with the compliance schedule prescribed by Section VIII.

An emissions control plan shall be submitted for each stationary gas turbine subject to this Rule, including:

1. District permit number,
2. Gas turbine manufacturer's name and model number,
3. Rated electrical energy output (MW) and rated heat recovery (Btu/hr),
4. Type of fuel (gas and/or liquid),
5. Last year's fuel consumption (cubic feet of gas or gallons of liquid),
6. Last year's hours of operation,
7. Type of emissions control to be applied to engine, and
8. Documentation showing current NO_x emissions concentration.

B. Monitoring and Recordkeeping

The owner or operator of any stationary gas turbine subject to the provisions of this rule shall perform the following actions:

1. Install, operate, and maintain in calibration equipment capable of continuously measuring and recording the following:
 - a. Control system operating parameters:
 - i. Periodic NO_x emission concentrations,
 - ii. Turbine exhaust oxygen concentration,
 - iii. Air-to-fuel ratio,
 - iv. Flow rate of reducing agents added to turbine exhaust,
 - v. Catalyst inlet and exhaust temperature,
 - vi. Catalyst inlet and exhaust oxygen concentration,
 - vii. Other operational characteristics.
 - b. Elapsed time of operation measured by an hourly meter.
2. For units 10 MW or greater, the owner or operator shall monitor the exhaust gas NO_x concentrations. The NO_x monitoring system shall meet EPA requirements as specified in 40 CFR Part 60, Appendix B, Specification 2, or other systems approved by EPA. The owner or operator shall submit information to the APCO demonstrating that the emission monitoring system has data gathering and retrieval capability.
3. Prior to issuance of a Permit to Operate, information must be submitted to the APCO correlating the control system operating parameters to the associated NO_x output. This information may be used by the APCO to determine compliance when there is no continuous emission monitoring system for NO_x available, or when the continuous emission monitoring system is not operating properly.
4. Provide source test information regarding the exhaust gas NO_x concentration at ISO conditions corrected to 15 percent oxygen on a dry basis.
5. Maintain a daily stationary gas turbine engine operating log that includes actual startup and shutdown times, total hours of operation, type and quantity of fuel used (liquid/gas), and actions taken to comply with Section V.C. for simple cycle turbines.

6. All records required by this Rule shall be maintained on-site for a period of five (5) years and made available to the APCO upon request.

C. Compliance Testing

The owner or operator of any stationary gas turbine subject to provisions of this rule shall conduct annual testing using the methods specified in Section VI.D.

D. Test Methods

1. NO_x emissions shall be determined using EPA Method 7E or EPA Method 20 or ARB Method 100.
2. Exhaust gas Oxygen (O₂) concentration content shall be determined using EPA Method 3A or ARB Method 100.

E. Federal Reporting

1. At least every six (6) calendar months, the owner or operator shall submit an excess emissions and continuous monitoring system performance report to the APCO according to 40 CFR 60.7(c). The report shall cover each continuous monitoring system required by Section VI.B.1 and B.2. An excess emission occurs for any unit operating period in which the requirements in Section V are not met. This semi-annual monitoring report may be aligned with the due dates of other reporting requirements to avoid duplication (e.g., semiannual compliance reporting required by title V of the federal Clean Air Act).
2. For each performance test conducted, the owner or operator shall submit a test protocol to the APCD 30 days prior to any testing and submit a performance test report to the APCO within 60 days of completion of the testing.

F. Exempt Units

Exempt units shall comply with the following:

1. The owner or operator of any unit exempt under Section IV shall submit support documentation to the APCO within seven days if the hour-per-year limit is exceeded. If the hour-per-year limit is exceeded, the exemption shall be permanently withdrawn. Within 30 days after the exceedance, the owner or operator shall submit an application for Authority to Construct that details a plan to meet the applicable limits specified in Section V of this Rule. The application shall include a schedule of increments of progress for the installation of the required control equipment. This schedule shall not exceed four years from the date of the receipt of Authority to Construct application.
2. A public service unit operating during a state of emergency, when such emergency is declared by proclamation of the Governor of the State of California and when the unit is located in the specific geographical location identified in the proclamation, shall be excluded from the hour-per-year limit.

VII. Calculations

NOx emissions concentrations shall be calculated using the following equation:

$$\text{NOx} = (\text{NOx}_{\text{obs}}) (\text{P}_{\text{ref}}/\text{P}_{\text{obs}})^{0.5} (288 \text{ K}/\text{T}_{\text{amb}})^{1.53} (e^{19(\text{H}_{\text{obs}}-0.00633)})$$

Where:

| | | |
|--------------------|---|---|
| NOx | = | NOx emissions concentration (ppmv) corrected to 15 percent oxygen and ISO standard conditions on a dry basis. |
| NOx _{obs} | = | Measured stack gas NOx emissions concentration (ppmv) corrected to 15 percent oxygen on a dry basis. |
| P _{ref} | = | Standard atmospheric pressure (14.7 psia). |
| P _{obs} | = | Atmospheric pressure measured at site during testing, psia. |
| H _{obs} | = | Absolute ambient humidity measured at site during testing, pounds water per pound dry air. |
| e | = | transcendental constant (2.718). |
| T _{amb} | = | Ambient air temperature in K and measured at site during testing. |

VIII. Compliance Schedule

An owner or operator of a stationary gas turbine subject to this Rule shall comply with all applicable requirements within 30-days of Board adoption. This includes submittal of a complete Authority to Construct application for all necessary equipment modifications, if applicable.

Remainder of Page Intentionally Left Blank