

2.34 Stationary Gas Turbines

2.34.1 Applicability and Designation of Affected Facility

- (a) The provisions of this source category are applicable to the following affected facilities: All stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour, based on the lower heating value of the fuel fired.
- (b) Any facility under paragraph (a) of this section which commences construction, modification, or reconstruction after October 3, 1977 is subject to the requirements of this source category, except as provided in paragraphs (e) and (j) of §60.332 of the Code of Federal Regulations, Title 40, Part 60.

2.34.2 Test Methods and Procedures

- (a) To compute the nitrogen oxides emissions, the owner or operator shall use analytical methods and procedures that are accurate to within 5 percent and are approved by the Director to determine the nitrogen content of the fuel being fired.
- (b) In conducting the performance tests required in Section 1.2, the owner or operator shall use as reference methods and procedures the test methods in Appendix A of this text or other methods and procedures as specified in this section, except as provided for in Section 1.2(b). Acceptable alternative methods and procedures are given in paragraph (f) of this section.
- (c) The owner or operator shall determine compliance with the nitrogen oxides and sulfur dioxide standards in §§60.332 and 60.333(a) as follows:

- (1) The nitrogen oxides emission rate (NO_x) shall be computed for each run using the following equation:

$$NO_x = (NO_{xo}) (P_r / P_o)^{0.5} e^{19(H_o - 0.00633)} (288^\circ K / T_a)^{1.53}$$

Where:

- NO_x = emission rate of NO_x at 15 percent O_2 and ISO standard ambient conditions, volume percent.
- NO_{xo} = observed NO_x concentration, ppm by volume.
- P_r = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg.
- P_o = observed combustor inlet absolute pressure at test, mm Hg.
- H_o = observed humidity of ambient air, g H_2O /g air.
- e = transcendental constant, 2.718.
- T_a = ambient temperature, °K.

- (2) The monitoring device of 2.34.3 shall be used to determine the fuel consumption and the water-to-fuel ratio necessary to comply with §60.332 at 30, 50, 75, and 100 percent of peak load or at four points in the normal operating range of the gas turbine, including the minimum point in the range and peak load. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer.
- (3) Method 20 shall be used to determine the nitrogen oxides, sulfur dioxide, and oxygen concentrations. The span values shall be 300 ppm of nitrogen oxide and 21 percent oxygen. The NO_x emissions shall be determined at each of the load conditions specified in paragraph (c)(2) of this section.

- (d) The owner or operator shall determine compliance with the sulfur content standard in

§60.333(b) as follows: ASTM D 2880-71 shall be used to determine the sulfur content of liquid fuels and ASTM D 1072-80, D 3031-81, D 4084-82, or D 3246-81 shall be used for the sulfur content of gaseous fuels (incorporated by reference--see Section 1.6). The applicable ranges of some ASTM methods mentioned above are not adequate to measure the levels of sulfur in some fuel gases. Dilution of samples before analysis (with verification of the dilution ratio) may be used, subject to the approval of the Director.

- (e) To meet the requirements of 2.34.3(b), the owner or operator shall use the methods specified in paragraphs (a) and (d) of this section to determine the nitrogen and sulfur contents of the fuel being burned. The analysis may be performed by the owner or operator, a service contractor retained by the owner or operator, the fuel vendor, or any other qualified agency.
- (f) The owner or operator may use the following as alternatives to the reference methods and procedures specified in this section:
 - (1) Instead of using the equation in paragraph (b)(1) of this section, manufacturers may develop ambient condition correction factors to adjust the nitrogen oxides emission level measured by the performance test as provided in §60.8 to ISO standard day conditions. These factors are developed for each gas turbine model they manufacture in terms of combustion inlet pressure, ambient air pressure, ambient air humidity, and ambient air temperature. They shall be substantiated with data and must be approved for use by the Director before the initial performance test required by Section 1.2.

2.34.3 Operation and Emission Monitoring

- (a) The owner or operator of any stationary gas turbine subject to the provisions of this section and using water injection to control NO_x emissions shall install and operate a continuous monitoring system to monitor and record the fuel consumption and the ratio of water to fuel being fired in the turbine. This system shall be accurate to within ±5.0 percent and shall be approved by the Director.
- (b) The owner or operator of any stationary gas turbine subject to the provisions of this subpart shall monitor sulfur content and nitrogen content of the fuel being fired in the turbine. The frequency of determination of these values shall be as follows:
 - (1) If the turbine is supplied its fuel from a bulk storage tank, the values shall be determined on each occasion that fuel is transferred to the storage tank from any source.
 - (2) If the turbine is supplied its fuel without intermediate bulk storage, the values shall be determined and recorded daily. Owners, operators or fuel vendors may develop custom schedules for determination of the values based on the design and operation of the affected facility and the characteristics of the fuel supply. These custom schedules shall be substantiated with data and must be approved by the Director before they can be used to comply with paragraph (b) of this section.
- (c) For the purpose of reports required under Section 1.5, periods of excess emissions that shall be reported are defined as follows:
 - (1) **Nitrogen oxides.** Any one-hour period during which the average water-to-fuel ratio, as measured by the continuous monitoring system, falls below the water-to-fuel ratio determined to demonstrate compliance with NO_x standards by the performance test required in Section 1.2, or any period during which the fuel-bound nitrogen of the fuel is greater than the maximum nitrogen content allowed by the fuel-bound nitrogen allowance used during the performance test. Each report shall include the average water-to-fuel ratio, average fuel consumption, ambient conditions, gas turbine load, and nitrogen content of the fuel during the period of excess emissions, and the graphs or figures developed.
 - (2) **Sulfur dioxide.** Any daily period during which the sulfur content of the fuel being fired in the gas turbine exceeds 0.8 percent.
 - (3) **Ice fog.** Each period during which an exemption is in effect shall be reported in writing

to the Director quarterly. For each period the ambient conditions existing during the period, the date and time the air pollution control system was deactivated, and the date and time the air pollution control system was reactivated shall be reported. All quarterly reports shall be postmarked by the 30th day following the end of each calendar quarter.