(**Adopted:** 02/22/95; **Amended:** 09/28/09)

RULE 1159
Stationary Gas Turbines

(A) General

(1) Purpose:

(a) The purpose of this rule is to limit the emission of oxides of nitrogen from commercial, industrial and institutional Stationary Gas Turbines.

(2) Applicability:

(a) This rule applies to any new or existing non-utility, commercial, industrial or institutional Stationary Gas Turbine of 0.3 megawatt (MW) and larger unless the equipment is exempt from this rule pursuant to Section (D) of this rule.

(B) Definitions

(1) "Air Pollution Control Officer (APCO)" – The person appointed to the position of Air Pollution Control Officer of the District pursuant to the provisions of California Health & Safety Code §40750, and his or her designee.

(2) "Continuous Emissions Monitoring System (CEMS)" – All of the equipment that may be required to meet the data acquisition and availability requirements of this rule, to sample, condition (if applicable), analyze, and provide a record of emissions on a continuous basis.

(3) "Dry Low NO_X Combustion Technology (DLN)" – Any turbine combustor design which uses multiple staging, air/fuel premixing or other modifications to achieve lower levels of NO_X emissions as compared to conventional combustors.

(4) "Emergency Standby Unit" – Any Stationary Gas Turbine that operates as a mechanical or electrical power source for a facility only when the primary power source has been rendered inoperable due to failure beyond the reasonable control of the operator. A power interruption pursuant to a voluntary interruptible power supply agreement is not to be considered as an emergency loss of primary power. Electricity generated by such a unit cannot be sold.

(5) "Emission Control Equipment" – Add-on technologies which control the turbine's emissions, including, but not limited to, Selective Catalytic Control (SCR), water injection, steam injection, but excluding DLN.

(6) "Emission Control System Operating Parameters" – Any operating parameter(s) that the District deems necessary to analyze for the determination of compliance. Such parameters include, but are not limited to, the ammonia and gas flow rates, the exhaust temperature for the Selective Catalytic Reduction (SCR), humidity, water injection rate, exhaust gas flow rate and the temperature for water injection.

(7) "Enhanced Emissions Monitoring Device" – Any automated data recording device or system having both data gathering and retrieval capabilities. Such equipment includes, but is not limited to, Continuous Emissions Monitoring Systems (CEMS) and Predictive Emissions Monitoring Systems (PEMS).

(8) "Higher Heating Value (HHV)" – The Higher Heating Value of the fuel.

(9) "Lower Heating Value (LHV)" – The Lower Heating Value of the fuel.

(10) "Measured NO_X Emissions Concentration" – The concentration of oxides of nitrogen corrected to International Standards Organization (ISO) standard conditions:

$$NO_X = (NO_X \text{ obs})(\text{Pref}/\text{Pobs})^{0.5} (288 \text{ K}/\text{Tamb})^{1.53} \ (e^{19(\text{Hobs}-0.00633)})$$

Where: NO_X = emissions of NO_X at 15 percent oxygen and ISO standard conditions on a dry basis, ppm.
NO_X obs = measured NO_X emissions corrected to 15 percent oxygen on a dry basis, ppm.
Pref = standard reference pressure, (14.696 psia).
Pobs = measured site ambient absolute pressure, psia.
Hobs = measured humidity of ambient air, pounds water per pound dry air.
e = transcendental constant (2.718)
Tamb = measured temperature of ambient air, degrees K.

or an alternate calculation that corrects to ISO standard conditions and is approved by the APCO.

(11) "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.

(12) "Predictive Emissions Monitoring System (PEMS)" – All of the equipment necessary to monitor process and control device operational parameters (for example, control device secondary voltages and electric currents) and other information (for example, gas flow rate, O_2 or CO_2 concentrations), and calculate and record the mass emissions rate (for example, lb/hr) on a continuous basis.

(13) "Public Service Unit" – A Stationary Gas Turbine used to generate electricity for sale or for use in serving the public.

(14) "Rating" – The continuous megawatt (MW) Rating or mechanical equivalent by a manufacturer for gas turbine(s) without Power Augmentation.

(15) "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.

(16) "Selective Catalytic Reduction (SCR)" – A noncombustion control technology that destroys NO_X by injecting a reducing agent (e.g., ammonia) into the flue gas that, in the presence of a catalyst (e.g., vanadium, titanium, or zeolite), converts NO_X into molecular nitrogen and water.

(17) "Shutdown Period" – The period of time during which a unit is taken from an operational to a non-operational status by allowing it to cool down from its operating temperature to ambient temperature as the fuel supply to the unit is completely turned off.

(18) "Startup Period" – The period of time during which a unit is brought from a Shutdown status to its operating temperature and pressure, including the time required by the unit's emission control system to reach full operation.

(19) "Stationary Gas Turbine or Unit" – Any gas turbine system that is gas and/or liquid fueled with or without Power Augmentation. This unit is either attached to a foundation at a facility or is portable equipment operated at a specific facility for more than 90 days in any 12-month period. Two or more gas turbines powering one shaft shall be treated as one unit.

(20) "Thermal Stabilization Period" – The Startup or Shutdown Period necessary to bring the heat recovery steam generator to the proper operating temperature, not to exceed two hours.

(21) "Volatile Organic Compound (VOC)" – Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions and those compounds listed in 40 CFR 51.100(s)(1).

(C) Standards

(1) The owner or operator of any affected Stationary Gas Turbine Unit shall not operate such unit under load conditions, excluding the Thermal Stabilization Period and Startup and Shutdown Periods which results in the Measured NO_X Emissions Concentration exceeding the emissions limits set forth below:

(a) For Stationary Gas Turbines which are not subject to the alternative federal NO_X RACT limits of Subsection (C)(1)(b) and (c), the federal NO_X and Carbon Monoxide (CO) RACT limits in Table 1 apply:

Table 1
NO_X and CO Compliance Limits

Control	Operating hours per year	Rating	NO_X Compliance Limit, ppmv at 15% Oxygen		CO Compliance Limit, ppmv at 15% Oxygen
			Gas Fuel	Liquid Fuel	
SCR + DLN	> 877	> 10 MW	5	25	200
DLN	> 877	2 – 10 MW	25	65	200
SCR	> 877	2 – 10 MW (no DLN available)	35	65	200
DLN	> 877	< 2 MW	42	50	250
SCR or DLN	< 877	> 10 MW	25	42	200

(b) For the Southern California Gas Company Turbine Model LM 1500, the following alternative federal NO_X RACT limit shall apply:

(i) 90 ppmv NO_X when fired with gaseous fuel.

(c) For the Southern California Gas Company Turbine General Electric Model Frame 3, the following alternative federal NO_X RACT limit shall apply:

(i) 225 ppmv NO_X when fired with gaseous fuel, achieved through good combustion practices.

(d) For the Westend Model PQ 5191, the following alternative federal NO_X RACT limit shall apply:

(i) 42 ppmv NO_X achieved with an SCR when fired with gaseous fuel.

(e) For the purposes of these emissions limits the following conventions are applicable:

(i) Gas includes natural, digester and landfill gases.
(ii) Oil includes kerosene, jet fuel, and distillate. The sulfur content of the oil shall be less than 0.05%.
(iii) NO_X = emissions of NO_X, in ppmv, corrected to 15 percent oxygen and ISO standard conditions on a dry basis, averaged over any consecutive 15 minute period.

(2) The owner or operator of any Stationary Gas Turbine subject to (C)(1)(a) shall submit to the APCO for approval, an Emission Control Plan (ECP) for the purpose of establishing compliance with provisions of this rule.

(3) The owner or operator of any Stationary Gas Turbine subject to (C)(1) shall minimize emissions insofar as technologically feasible during Thermal Stabilization Periods.

(D) Exemptions

(1) The provisions of Section (C) of this rule shall not apply to the operation of:

(a) Laboratory units used in research and testing for the advancement of gas turbine technology.

(b) Units operated exclusively for fire fighting and/or flood control.

(c) Stationary Gas Turbines operating as an electric utility which are subject to Rule 1158.

(2) The provisions of this rule, with the exception of Section (F)(2), shall not apply to the operation of Stationary Gas Turbines used under the following conditions:

(a) Emergency Standby Units demonstrated to operate less than 200 hours per calendar year.

(b) Portable, turntable, or track mounted turbines whose operation generates intermittent, high velocity air flow for live fire sustainability, lethality, aerodynamic, cookoff, or remote control operation testing only.

(3) The provisions of section (F)(1) and (H) shall not apply to the Southern California Gas Company Turbine General Electric Model Frame 3.

(E) Administrative Requirements

(1) The Emission Control Plan (ECP) required pursuant to section (C)(2) shall, at a minimum, include the following information if such information is applicable:

(a) A list of all Stationary Gas Turbines required to be controlled pursuant to this rule.

(b) For each Stationary Gas Turbine listed:

(i) District identification number, and District Permit to Operate number;
(ii) Name of the gas turbine manufacturer;
(iii) Equipment model number;
(iv) Manufacturer's rated shaft power output (MW);
(v) Type of liquid fuel and/or type of gaseous fuel;
(vi) HHV for each fuel;
(vii) Heat rate ((Btu/kW-hr), corrected to the HHV) for each type of fuel (gas or liquid) for each turbine;
(viii) Monthly fuel consumption for the previous twelve-month period (cubic feet for gas; gallons for liquid);
(ix) Monthly hours of operation in the previous twelve-month period;

(x) The type of NO_X x Emission Control Equipment, including any auxiliary equipment related to the control of emissions, to be applied;
(xi) Documentation showing the current (existing) concentration and mass rate of emissions of oxides of nitrogen from the unit;
(xii) A schedule with specified increments of progress dates for construction of Emission Control Equipment, operational milestones for implementation of emissions control and/or installation of monitoring equipment; and
(xiii) A final compliance date.

(F) Monitoring and Recordkeeping Requirements

(1) The owner or operator of any Stationary Gas Turbine required to install Emissions Control Equipment for compliance with this rule shall:

(a) Install, operate, and maintain in calibration, the following monitoring equipment, as approved by the APCO:

(i) Continuous measurement and recording of Emissions Control System Operating Parameters;
(ii) Continuous measurement and recording of elapsed time of operation; and
(iii) An Enhanced Emissions Monitoring Device.

(b) Notify the APCO, in writing, before issuance of the Permit To Operate, such information which correlates the Emission Control System Operating Parameters, and PEMS if present, to the associated measured NO_X emissions output. This information will be used to determine compliance with applicable provisions of this rule for non-CEMS-equipped turbines and CEMS-equipped units when the CEMS is not operating properly.

(c) Provide, on an annual basis, compliance testing data and information regarding NO_X emissions. The data shall be corrected to ISO conditions and at 15 percent oxygen on a dry basis; and the percent efficiency (EFF) of each turbine unit.

(2) The owner/operator of any Stationary Gas Turbine shall:

(a) On a daily basis, maintain a turbine operating log that includes, as a minimum, the following information:

(i) The total hours of operation per day;
(ii) The accumulated hours of operation per calendar month;
(iii) The type and quantity of fuel used; and
(iv) The nature of operation of the unit (exempt or non-exempt).

(b) The operating log required to be kept pursuant to this rule shall be kept current and on site for a minimum of two years; and provided to District or state personnel on request.

(G) Notification Requirements for Exempt and Emergency Standby Units

(1) Any Stationary Gas Turbine unit which is exempt or claimed to be exempt pursuant to subsection (D)(2) shall:

(a) Notify the APCO within seven (7) days if the hour-per-year threshold is exceeded.

(i) If the hour-per-year threshold is exceeded, the exemption pursuant to subsection (D)(2) shall be permanently withdrawn.

(ii) If the hour-per-year threshold is exceeded the owner/operator shall, within 30 days of the notification, submit an application for a Permit to Operate to the District. Such application shall including a plan detailing actions and a schedule of progress to meet the applicable RACT limits and provisions of this rule within 18 months after the date of the notification; an Emission Control Plan conforming to the requirements of Section (E) for the emissions control equipment.

(2) Notwithstanding the provisions of Sections (F)(2) and (G)(1) above, A Public Service Unit shall not be subject to the hour-per-year threshold when:

(a) Such unit is operating during a state of emergency declared by a proclamation of the Governor of the State of California; and

(b) Such unit is located within the specific geographic location identified in the state of emergency proclamation.

(H) Test Methods

(1) Compliance testing shall be subject to the protocols prescribed in the District's Compliance Procedural Manual.

(2) The following test methods shall be used to determine compliance with the provisions of this rule.

(a) NO_X emissions shall be determined by EPA Test Method 20.

(b) The Higher Heating Value (HHV) and the Lower Heating Value (LHV) shall be determined by the appropriate method for the fuel type listed below:

(i) For liquid fuels:
   a. ASTM Test Method D 240-87 (Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter).

(ii) For distillate fuel:
   a. ASTM Test Method D 2382-88 (Standard Test Method for Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter - High Precision Method); or**,**

(iii) For gaseous fuels:
   a. ASTM Test Method D 3588-91 (Standard Practice for Calculation Heat Value, Compressibility Factor, and Relative Density (Specific Gravity) of Gaseous Fuels); or
   b. ASTM Test Method D 1826-88 (Standard test Method for Caloric (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter); or
   c. ASTM Test Method D 1945-81 (Standard Method for Analysis of Natural Gas by Gas Chromatography).

(I) Compliance Schedule

(1) The owner/operator of any existing Stationary Gas Turbine subject to the provisions of Section (C)(1)(a) above shall comply with the following increments of progress:

   (a) An Emissions Control Plan shall be submitted to the District within 90 days of rule adoption. The District shall approve the Plan within 30 days of submission.

   (b) Any affected turbine shall be in full compliance with all applicable provisions of the rule within 12 months of rule adoption.

   (c) Demonstrate final compliance with all applicable standards and requirements of the rule within six months of the installation of the NOX reduction technology.

(2) The owner/operator of any new Stationary Gas Turbine subject to the provisions of Section (C) shall comply as of the date of adoption of this rule.

[SIP: Submitted as amended mm/dd/yy on mm/dd/yy; Approved 4/9/96, 61 FR 15719, 40 CFR 52.220(c)(216)(I)(A)(3)]