RULE 2.34 STATIONARY GAS TURBINES

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100 GENERAL

101 **PURPOSE:** The purpose of this rule is to limit NOx emissions from stationary gas turbines.

102 **APPLICABILITY:** Except as provided in Sections 110 and 111, this rule shall apply to all stationary gas turbines, 0.3 megawatt (MW) and larger.

103 **SEVERABILITY:** If any provision, clause, sentence, paragraph, section or part of this rule for any reason is judged to be unconstitutional or invalid, such judgment shall not affect or invalidate the remainder of the rule.

110 **EXEMPTION – LABORATORY, FIREFIGHTING/FLOOD CONTROL, AND CHEMICAL PROCESSING UNITS:** The provisions of this rule with the exception of Section 401 shall not apply to the operation of stationary gas turbines used under the following conditions:

110.1 Laboratory units used in research and testing for the advancement of gas turbine technology.

110.2 Units operated exclusively for firefighting and/or flood control.

110.3 Chemical processing gas turbine units.

111 **EXEMPTION – EMERGENCY STANDBY AND SMALL UNITS:** The provisions of this rule with the exception of Sections 401, 402, and 502.2 shall not apply to the operation of stationary gas turbines used under the following conditions:

111.1 Emergency standby units demonstrated to operate less than 200 hours per calendar year.

111.2 Units of less than 4 MW operating less than 877 hours per calendar year.

200 DEFINITIONS

201 **AUTOMATIC GENERATION CONTROL:** Computer linked remote command of the electrical power output of the generating plant by the control area system operation.

202 **CHEMICAL PROCESSING GAS TURBINE UNIT:** A stationary gas turbine that vents its exhaust gases into the operating stream of a chemical process.

203 **COMBINED CYCLE:** Type of power plant in which electric generators are driven by both the expanding exhaust gases of fuel combustion in the gas turbine and by a steam turbine used to recover useful energy from the heat of a gas turbine exhaust.

204 **COMMISSIONING:** The period of initial equipment installation and tuning prior to the initial power deliveries to the electrical distribution grid.

205 **COMPLIANCE LIMIT:** Maximum allowable NOx emissions expressed in parts per million by volume (ppmv).

206 **CONTROL AREA SYSTEM OPERATOR:** The authority which is responsible for electrical power distribution in the local area containing the stationary gas turbine.

207 **CONTROL SYSTEM OPERATING PARAMETERS:** Operating parameters that the Air Pollution Control Officer deems necessary to analyze when determining compliance, such as ammonia and exhaust flow rates and exhaust gas temperature for SCR; or humidity, water injection rate, exhaust gas flow rate, and temperature for water injection.

208 **EMERGENCY STANDBY UNIT:** A stationary gas turbine that operates only as a mechanical or electrical power source for a facility when the primary power source has been rendered inoperable due to a failure beyond the reasonable control of the operator, except due to power interruption pursuant to a voluntary interruptible power supply agreement. Electricity generated by such a unit cannot be sold.

209 **MEASURED NOx EMISSIONS CONCENTRATION:** The concentration of NOx emissions corrected to the International Standards Organization (ISO) standard conditions:

$$\mathbf{NOx = (NOx_{obs})(P_{ref}/P_{obs})^{0.5}(288^{o}/T_{amb})^{1.53}[e^{19(Hobs-0.00633)}]}$$

Where:

NOx	=	Emissions of NOx at 15 percent oxygen and ISO standard conditions on a dry basis, ppm.
NOx_{obs}	=	Measured NOx emissions corrected to 15 percent oxygen on a dry basis, ppm.
P_{ref}	=	Standard reference pressure, 14.696 psia.
P_{obs}	=	Measured site ambient absolute pressure, psia.
H_{obs}	=	Measured humidity of ambient air, pounds water per pound dry air.
e	=	Transcendental constant (2.718)
T_{amb}	=	Measured temperature of ambient air, degrees K.

or an alternate correlation that corrects to ISO standard conditions and is approved by the Air Pollution Control Officer.

210 **NOx EMISSIONS (NOx):** The sum of nitric oxides and nitrogen dioxide in the exhaust gas stream.

211 **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.

212 **PUBLIC SERVICE UNIT:** A gas turbine used to generate electricity for sale or for use in serving the public.

213 **RAMP RATE:** The rate of change in the quantity of electric power generated from the stationary gas turbine.

214 **RATING:** The continuous megawatt (MW) rating or mechanical equivalent by a manufacturer for gas turbine(s) without power augmentation.

215 **SELECTIVE CATALYTIC REDUCTION (SCR):** A post combustion control technology that utilizes ammonia injected into the exhaust gas stream where it reduces NOx to molecular nitrogen in the presence of a catalyst.

216 **SIMPLE CYCLE:** Type of power plant in which all electric generators are driven by the expanding exhaust gases of fuel combustion.

217 **SHORT-TERM EXCURSIONS:** Temporary departures from NOx emission limit compliant operation of a stationary gas turbine with a rated output greater than 100 MW, which is part of a combined cycle process, due to:

217.1 Turbine load changes in excess of the manufacturer's recommended ramp rate required by the control area system operator while the power plant is operating under automatic generation control, or due to safety or equipment protection considerations.

217.2 Fuel pressure variations or automated modifications of the air/fuel mixture caused by safety or equipment protections systems.

217.3 Activation or deactivation of evaporative coolers, inlet air chillers, inlet air misting systems, duct burners, or power augmentation water or steam injection.

217.4 Other conditions identified by the operator and approved in writing by the Air Pollution Control Officer, the California Air Resources Board, and the U.S. Environmental Protection Agency.

218 **SHUT-DOWN PERIOD:** The time necessary to cease operation of a gas turbine from operating under load conditions. This time shall not exceed one (1) hour.

219 **START-UP PERIOD:** The time necessary to bring operation of the gas turbine up to the designed rating. This 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.

220 **STATIONARY GAS TURBINE:** 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.

300 STANDARDS

301 **EMISSIONS LIMITS:** The owner or operator of any stationary gas turbine unit shall not operate such unit under conditions, excluding the start-up period, shut-down period, commissioning, or up to four (4) consecutive fifteen (15) minute periods during short-term excursions which result in the measured NOx emissions concentration exceeding the compliance limit listed below, averaged over 15 minutes:

Unit Size Megawatt Rating (MW)	**Compliance Limit NOx, ppm @ 15% O_2**	
	Gas[A]	**Liquid[B]**
0.3 to Less Than 2.9 MW and Units Greater Than or Equal to 4 MW That Operate Less Than 877 Hour/Year	42	65
2.9 to Less Than 10 MW	25	65
10.0 MW and Over	9	25

A. GAS INCLUDES ONLY COMMERCIAL NATURAL AND LIQUIFIED PETROLEUM GASES.
B. LIQUID INCLUDES KEROSENE, JET, AND DISTILLATE. THE SULFUR CONTENT OF THE LIQUID SHALL BE LESS THAN 0.05%

301.1 The six (6) hour rolling average NOx concentration for a period including a short-term excursion shall not exceed the applicable compliance limit.

301.2 The total of all fifteen (15) minute periods during short-term excursions when NOx concentrations exceed the applicable compliance limit shall not exceed ten (10) hours in a year.

302 **START-UP/SHUT-DOWN:** The owner or operator of any stationary gas turbine shall operate such unit in accordance with good air pollution control practices at all times, including such periods containing start-up/shut-down events. Emissions shall not exceed an average value of 70 ppm @ 15% O_2 during the start-up period for turbines fired on gas fuels, or an average value of 226 ppm @ 15% O_2 for

turbines fired on liquid fuels. SCR control shall be initiated once the temperature of the catalyst media achieves the minimum control operation temperature established by manufacturer recommendation or source test data, which shall be no higher than 550°F. Other emissions control devices shall operate continuously during start-up and shut-down events.

303 **CONTINUOUS MONITORING:** The owner or operator of any stationary gas turbine subject to Section 301 shall install, operate, and maintain in calibration equipment, as approved by the Air Pollution Control Officer, that continuously measures and records the following:

303.1 Control system operating parameters.

303.2 Elapsed time of operation.

303.3 For units with a rating of 10 MW or greater, the exhaust gas NOx concentrations corrected to ISO conditions at 15 percent oxygen on a dry basis. The NOx monitoring system shall meet EPA requirements as specified in 40 CFR Part 60, Appendix B or other systems that are acceptable to the EPA.

304 **SOURCE TESTING:**

304.1 The owner/operator of an affected unit subject to Section 301 shall have the stationary gas turbine source tested using the methods specified in sections 601, 602, and 603 at least once every 12 calendar months.

304.2 The owner/operator of an affected unit with a rating of 10 MW or greater subject to the provisions of this rule shall perform a Relative Accuracy Test Audit (RATA) of the NOx continuous emission monitoring system at least once every four (4) successive Quality Assurance (QA) operating quarters (as defined by 40 CFR Part 72.2) or at least once every twenty four (24) calendar months, whichever is more stringent. The RATA shall be performed in accordance with 40 CFR Part 75, Appendix B (Quality Assurance and Quality Control Procedures).

400 ADMINISTATIVE REQUIREMENTS

401 **EXEMPTION APPLICABILITY:** The owner or operator of any existing stationary gas turbine shall submit to the Air Pollution Control Officer support documentation for any units exempt under the provisions of Sections 110 and 111.

402 **EMERGENCY STANDBY AND SMALL UNITS:** Exempt units shall comply with the following:

402.1 The owner or operator of any unit exempt under section 111 shall notify the Air Pollution Control Officer in writing 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 301 of this rule within two years. Included in this application, the owner or operator shall submit a schedule of increments of progress for the installation of the required control equipment. This schedule shall be subject to the review and approval of the Air Pollution Control Officer.

402.2 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.

500 REPORTING AND RECORDKEEPING

501 REPORTING:

501.1 Submit to the Air Pollution Control Officer information demonstrating that the continuous monitoring system has data gathering and retrieval capability.

501.2 Submit to the Air Pollution Control Officer, prior to issuance of a Permit to Operate, information correlating the control system operating parameters to the associated NOx output. This information may be used by the Air Pollution Control Officer to determine compliance when there is no continuous emission monitoring system for NOx available or when the continuous emission monitoring system is not operating properly.

501.3 Provide source test information annually regarding the exhaust gas NOx concentration at ISO conditions corrected to 15 percent oxygen on a dry basis.

502 RECORDKEEPING:

502.1 Maintain a gas turbine operating log that includes, on a daily basis, the actual Pacific Standard Time start-up and stop time, total hours of operation, type and quantity of fuel used (liquid/gas). This information shall be available for inspection at any time from the date of entry.

502.2 For units exempt under Section 111 maintain a gas turbine operating log that includes, on a daily basis, the actual Pacific Standard Time start-up and stop time, total hours of operation, and cumulative hours of operation to date for the calendar year. This information shall be submitted to the Air Pollution Control Officer at the end of each calendar year in a manner and form approved by the Air Pollution Control Officer.

502.3 All records shall be available for inspection at any time for a period of five years.

600 TEST METHODS:

601 **Oxides of Nitrogen (NO_x):** Oxides of Nitrogen (NO_x) emissions shall be determined in accordance with EPA Method 7E or EPA Method 20.

602 **Oxygen (O_2):** Oxygen (O_2) concentrations shall be determined in accordance with ARB Method 100 or EPA Method 3A.