RULE 413 - STATIONARY GAS TURBINES
Adopted 04-06-95
(Amended 05-01-97, 03-24-05)

INDEX

100 **GENERAL**

101 **PURPOSE:** To limit emissions of nitrogen oxides (NOx) to the atmosphere from the operation of stationary gas turbines.

102 **APPLICABILITY:** This rule applies to all stationary gas turbines with ratings equal to or greater than 0.3 megawatt (MW) output, or 3 MMBTU/hr input and operated on gaseous and/or liquid fuel.

110 **EXEMPTION - EMERGENCY STANDBY UNITS:** Except for Section 303.3, the provisions of Section 300 shall not apply to the operation of gas turbines used to provide emergency electrical power, emergency water pumping for flood control or fire fighting, emergency potable water pumping, or emergency sewage pumping provided the following requirements are met:

110.1 Operation for maintenance purposes shall be limited to 100 hours per year, and such maintenance shall be scheduled in cooperation with the District so as to limit the air quality impact, and

110.2 Operation of the equipment shall be limited to a total of 200 hours per year, and

110.3 Operation of the equipment shall not be for supplying power to a serving utility for distribution on the grid, and

110.4 Operation for other than maintenance purposes shall be limited to actual interruptions of electrical power by the serving utility, emergency water pumping for flood control or fire fighting, emergency potable water pumping, or emergency sewage pumping.

111 **EXEMPTION - REMOVAL FROM SERVICE:** The provisions of Section 300 shall not apply to any unit that will be removed from service prior to May 31, 1997 provided that the owner or operator complies with the requirements specified in Section 401.4.

112 **EXEMPTION - LABORATORY UNITS:** The provisions of Sections 301 and 302 shall not apply to laboratory gas turbine units used in research and testing for the advancement of gas turbine technology.

113 **EXEMPTION - STARTUP/SHUTDOWN PERIOD:** The provisions of Sections 301 and 302 shall not apply to the period of time for the purpose of startup and shutdown of a gas turbine. ~~This period is not to exceed one hour for startup and one hour for shutdown.~~ For a gas turbine with a rated output greater than or equal to 160 MW, which is part of a combined cycle process, the startup period shall not exceed 4 hours following a shutdown of the associated steam turbine of 72 hours or more, and the startup period shall not exceed 3 hours following a shutdown of the associated steam turbine of between 8 hours and 72 hours. In all other cases, the startup period for a gas turbine shall not exceed 1 hour. The shutdown period for a gas turbine shall not exceed 1 hour.

114 **EXEMPTION - SHORT-TERM EXCURSIONS:** The averaging time for compliance with the emission limits of Sections 301 and 302 shall be 6 hours for a gas turbine with a rated output greater than 100 MW, which is part of a combined cycle process, during short-term excursions. Each short-term excursion shall not include more than four consecutive 15-minute periods when the 15-minute average NOx concentration exceeds the limits of Sections 301 and 302. The maximum 6-hour average NOx concentration for periods that include short-term excursions shall not exceed the limits of Sections 301 and 302. The cumulative total of all 15-minute periods when the average NOx concentration exceeds the limits of Sections 301 and 302 shall not exceed 10 hours per calendar year per gas turbine. The exemption for short-term excursions shall apply to equipment operation under any of the following qualified conditions:

114.1 Combustion turbine load changes at a rate which exceeds the turbine manufacturer's recommended ramp rate, and which are initiated by the control area system operator when the plant is operating under automatic generation

control, or are the result of activation of a plant automatic safety or equipment protection system.

114.2 Fuel pressure variations, or the activation of a plant automatic safety or equipment protection system, that force the turbine control system to modify the air/fuel mixture for reasons of safety.

114.3 Initiation or shutdown of an evaporative cooler, inlet air chiller, or inlet air misting system.

114.4 Initiation or shutdown of duct burners.

114.5 Initiation or shutdown of power augmentation water or steam injection.

114.6 Conditions resulting from technological limitations as 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.

200 DEFINITIONS

201 **AUTOMATIC GENERATION CONTROL:** The computer link between the control area system operator and an electrical power generating plant, by which the control area system operator can control adjustments, upward or downward, in the electrical power output of the generating plant.

201~~2~~ **BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY (BARCT):** Best Available Retrofit Control Technology, as defined in Section 40406 of the California Health and Safety Code, is "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of sources." These limits are specified in Section 302.

203 **CONTROL AREA SYSTEM OPERATOR:** The organization that regulates electrical power generation within a specified region (the control area) in order to balance electrical loads and maintain planned interchange schedules with other control areas.

202~~4~~ **CONTROL SYSTEM OPERATING PARAMETERS:** The operating parameters that the Air Pollution Control Officer deems necessary to analyze when determining compliance, including, but not limited to, ammonia and exhaust gas flow rates, the exhaust gas temperature, and the water or steam injection rate.

203~~5~~ **EMERGENCY STANDBY UNIT:** Any gas turbine unit which is used exclusively for either emergency purposes or maintenance operations. Maintenance operations shall be limited to one hundred (100) or fewer hours per ~~calender~~ calendar year with the total hours not to exceed 200 hours. A unit is used for emergency purposes if the unit operates to provide:

203~~5~~.1 Electrical power during interruptions of electrical power by an unforeseeable event,

203~~5~~.2 Water pumping for flood control,

203~~5~~.3 Water pumping for fire control,

203~~5~~.3 Emergency potable water pumping,

203~~5~~.4 Emergency sewage water pumping,

Electricity generated by the unit cannot be sold.

204~~6~~ **MAINTENANCE OPERATION:** The use of an emergency standby unit and fuel system during testing, repair and routine maintenance to verify its readiness for emergency standby use.

205~~7~~ **PEAK LOAD:** Means 100 percent of the manufacturer's design capacity of the gas turbine.

206~~8~~ **POWER AUGMENTATION**: Any increase in the gas turbine shaft output and/or decrease in gas turbine fuel consumption by the addition of energy recovered from exhaust heat.

209 **RAMP RATE:** The rate of change in the electrical power output of a generating unit over time, typically expressed as megawatts per minute.

2~~07~~10 **RATING:** The continuous megawatt (MW) rating or mechanical equivalent specified by a manufacturer for a gas turbine without power augmentation.

2~~08~~11 **REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT):** Reasonably Available Control Technology means "the lowest emission limitation that a unit is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility," as specified in Section 301.

2~~09~~12 **RETROFITTING:** Any physical change to an emissions unit necessary for reducing NOx emissions to comply with the NOx emissions limits specified in Sections 301 through 302 of this rule, including, but not limited to, burner replacement, and the addition of emissions control equipment. Changes in the method of operation ~~is~~ are not considered to be retrofitting.

21~~0~~3 **SELECTIVE CATALYTIC REDUCTION (SCR):** Selective Catalytic Reduction is a post combustion NOx control technique. A reducing agent (for example: ammonia) is used in a gas-phase reaction with oxides of nitrogen in the presence of a catalyst to form nitrogen and water.

214 **SHORT-TERM EXCURSION:** A period of time in which the 15-minute average concentration of NOx emitted from a stationary gas turbine exceeds the limits of Sections 301 and 302 in response to transient operating conditions as specified in Sections 114.1 through 114.6.

21~~1~~5 **STATIONARY GAS TURBINE OR UNIT:** Any gas turbine that remains or will remain at a stationary source for:

21~~1~~5.1 more than 12 consecutive months. Any gas turbine that replaces a gas turbine at a stationary source and is intended to perform the same function as the gas turbine being replaced will be included in calculation the consecutive time period. In that case, the cumulative time of both gas turbines, including the time between the removal of the original gas turbine and installation of the replacement gas turbine, would be counted toward the consecutive residence time period; or

21~~1~~5.2 less than 12 consecutive months where such a period represents the full length of normal annual source operations, such as a seasonal source.

21~~2~~6 **STATIONARY SOURCE:** Any building, structure, facility, or installation which emits or may emit any affected pollutant directly or as a fugitive emission.

21~~2~~6.1 Building, structure, facility, or emissions unit includes all pollutant emitting activities which:

a. belong to the same industrial grouping, and
b. are located on one property or on two or more contiguous properties, and
c. are under the same or common ownership, operation, or control or which are owned or operated by entities which are under common control.

21~~2~~6.2 Pollutant emitting activities shall be considered as part of the same industrial grouping if:

a. they belong to the same two-digit standard industrial classification code, or
b. they are part of a common production process. (Common production process includes industrial processes, manufacturing processes and any connected processes involving a common material.)

300 STANDARDS

301 **RACT EMISSION LIMITS:**

301.1 **RACT EMISSIONS LIMITS - GASEOUS FUEL FIRING:** The NOx emissions shall not exceed 42 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on gaseous fuels.

301.2 **RACT EMISSIONS LIMITS - LIQUID FUEL FIRING:** The NOx emissions from any unit shall not exceed 65 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on liquid fuels.

302 **BARCT EMISSION LIMITS:**

302.1 **BARCT EMISSIONS LIMITS - GASEOUS FUEL FIRING:**

a. The NOx emissions from any unit with a rated unit size output less than 2.9 MW, or any unit greater than or equal to 2.9 MW operating less than 877 hours per year, shall not exceed 42 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on gaseous fuels.

b. The NOx emissions from any unit operated 877 hours or more per ~~calender~~ calendar year with a rated unit size output greater than or equal to 2.9 MW and less than 10 MW shall not exceed 25 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on gaseous fuels.

c. The NOx emissions from any unit operated 877 hours or more per ~~calender~~ calendar year with a rated unit size output greater or equal to 10 MW, without SCR installed, shall not exceed 15 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on gaseous fuels.

d. The NOx emissions from any unit operated 877 hours or more per ~~calender~~ calendar year with a rated unit size output greater or equal to 10 MW, with SCR installed, shall not exceed 9 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on gaseous fuels.

302.2 **BARCT EMISSIONS LIMITS - LIQUID FUEL FIRING:**

a. The NOx emissions from any unit with a rated unit size output of less than 10 MW or any unit greater than or equal to 2.9 MW operating less than 877 hours per year, shall not exceed 65 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on liquid fuels.

b. The NOx emissions from any unit operated 877 hours or more per ~~calender~~ calendar year with a rated unit size output greater or equal to 10 MW, without SCR installed, shall not exceed 42 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on liquid fuels.

c. The NOx emissions from any unit operated 877 hours or more per ~~calender~~ calendar year with a rated unit size output greater or equal to 10 MW, with SCR installed, shall not exceed 25 parts per million by volume on a dry basis, corrected to 15 percent oxygen (O_2) when firing on liquid fuels.

Summary of RACT and BARCT Requirements of Sections 301 and 302

Requirements	Time of Operation (hr/yr)	Unit Size Rating (MW)	NOx Emission Limit (ppmv)	
			Gaseous Fuel	Liquid Fuel
RACT	any	≥0.3	42.0	65.0
BARCT	any	≥0.3 to <2.9	42.0	65.0
	<877	≥2.9	42.0	65.0
	≥877	≥2.9 to <10	25.0	65.0
	≥877	≥10.0 (no SCR)	15.0	42.0
	≥877	≥10.0 (w SCR)	9.0	25.0

303 **EQUIPMENT REQUIREMENTS:**

303.1 The owner or operator of any unit with a rated unit size output of less than 10 MW shall install, operate, and maintain in calibration, equipment approved by the Air Pollution Control Officer that continuously measures and records the following: Control System Operating Parameters, and Elapsed time of operation.

303.2 The owner or operator of any unit with a rated unit size output greater or equal to 10 MW and operated for more than 4000 hours in any one calendar year during the three years before April 6, 1995 shall install, operate, and maintain in calibration, equipment approved by the Air Pollution Control Officer that continuously measures and records the following: Control System Operating Parameters, Elapsed time of operation, and continuous exhaust gas NOx concentrations corrected to 15 percent oxygen (O_2) on a dry basis. The NOx continuous emission monitoring (CEM) system shall meet requirements as specified in 40 CFR Part 60 Appendix B, Specification 2 by May 31, 1997.

303.3 The owner or operator of any unit subject to any provision of this rule shall install by April 6, 1996, a non-resettable totalizing hour meter on each turbine.

400 ADMINISTRATIVE REQUIREMENTS

401 **COMPLIANCE SCHEDULE**

401.1 **RACT EMISSION LIMITS:** The owner or operator of any unit in existence on April 6, 1995, subject to the emission limits of Sections 301.1 and 301.2, shall comply with these limits effective May 31, 1995 unless retrofitting is required. If retrofitting is required to achieve these limits, the owner or operator shall comply with the increments of progress of Section 401.3 and be in compliance with the BARCT limits by the date specified in Section 401.3. Interim compliance with the limits of Sections 301.1 and 301.2 does not exclude that owner or operator from final compliance with the limits of Sections 302.1 and 302.2 and the increments of progress of Section 401.3.

401.2 **BARCT EMISSION LIMITS:** The owner or operator of any unit in existence on April 6, 1995, subject to the emission limits of Sections 302.1 and 302.2, shall comply with the limits effective May 31, 1997 and shall do so in accordance with the increments of progress of Section 401.3.

401.3 **INCREMENTS OF PROGRESS:** The owner or operator of any unit subject to the emissions limits of Sections 301 and 302 shall comply with the following increments of progress:

a. By May 31, 1995, submit to the Air Pollution Control Officer a compliance plan as specified in Section 402.

b. By January 31, 1996, submit to the Air Pollution Control Officer a complete application for an authority to construct for the modifications necessary to meet the limits of Sections 302.1 and 302.2.
c. By November 30, 1996, begin construction.
d. By March 31, 1997, complete construction.
e. By May 31, 1997, comply with the emission limits of Sections 302.1 and 302.2. This shall include the submittal to the Air Pollution Control Officer of a complete source test report indicating compliance.

401.4 **REMOVAL FROM SERVICE:** The owner or operator of any unit in existence on April 6, 1995 that is expected to be removed from service by May 31, 1997 shall comply with the following:
a. By May 31, 1995, submit to the Air Pollution Control Officer a notification requesting an exemption from the requirements of Sections 301 and 302.
b. By January 31, 1996, submit to the Air Pollution Control Officer a complete application for an Authority to Construct for modification of the Permit to Operate.
c. By May 31, 1997, discontinue operation of the unit, disconnect the fuel supply line(s), and notify the Air Pollution Control Officer in writing of the removal from service.

Operation of any unit beyond May 31, 1997, shall be done in compliance with the applicable NOx limits in Section 302.

401.5 **EMERGENCY STANDBY UNITS:** The owner or operator of any unit in existence prior to April 6, 1995 shall, by May 31, 1995, submit to the Air Pollution Control Officer a notification requesting an exemption from the requirements of Section 300.

402 **COMPLIANCE PLAN:** The owner or operator of any unit shall submit, for approval to the Air Pollution Control Officer, a Plan for compliance with the provisions of Section 300. The plan shall include:
402.1 The following information relative to each unit subject to this rule: the name of the manufacturer, model number, rated shaft power output (MW), hours of operation, fuel type, and fuel consumption rate (MCF/hr or gal/hr).
402.2 A description of the NOx control system proposed for each unit, including type and manufacturer, as well as the measurement and recording equipment required in Section 303. Data on the expected performance of the NOx control system shall also be included.
402.3 A compliance schedule for each unit, including, but not limited to, specific dates for the following events: final engineering, contract award, starting date of construction, completion date of construction, and the date of final compliance.

500 MONITORING AND RECORDS

501 **MONITORING:** The owner or operator of any unit subject to the requirements of Sections 301 and 302 shall test the unit annually using the test methods specified in Section 503.

502 **RECORDKEEPING:**
502.1 The owner or operator of any unit subject to the provisions of this rule shall maintain an operation record containing, at a minimum, the following data:
a. Permit number of each gas turbine.
b. Manufacturer, model number and rating in megawatts of each gas turbine.
c. Actual startup and shutdown time, daily hours of operation, and cumulative hours of operation to date for the calendar year. In addition, for emergency standby units, hours of operation shall be listed separately for emergencies and for maintenance operations.
d. Actual daily fuel usage of each unit.
e. Date and results of most recent emission test reported as ppmv @ 15% O_2 and pound per unit time.

f. A summary of any emissions corrective maintenance taken.

502.2 The owner or operator of any unit subject to any provisions of this rule shall maintain the operation records for two years. The records shall be available for inspection by the Air Pollution Control Officer upon request.

502.3 The owner or operator of any unit which is exempt per Section 110 shall notify the Air Pollution Control Officer within seven days if the hour-per-year limit, as specified in Section 110 is exceeded. If the hour-per-year limit is exceeded, the exemption will be permanently withdrawn. Within 30 days of the exceedence, the owner or operator shall submit a plan to show compliance with the rule within 2 years of the exceedence. A public service unit operating during a state of emergency shall be excluded from the hour-per-year limit, when such emergency is declared by proclamation of the Governor and when the unit is located in the specific geographic location identified in the proclamation.

502.4 The owner or operator of any unit for which the startup period exemption is extended beyond 1 hour, pursuant to Section 113, shall record, for each gas turbine startup, the length of time that the associated steam turbine has been shut down prior to startup.

502.5 The owner or operator of any unit to which the exemption for short-term excursions applies, pursuant to Section 114, shall record the following information:

a. The number of consecutive 15-minute periods when the 15-minute average NOx concentration exceeded the limits of Sections 301 and 302 during each short-term excursion.

b. The qualified condition(s) under which each short-term excursion occurred, pursuant to Section 114.

c. The maximum 6-hour average NOx concentration during the period that includes each short-term excursion.

d. The cumulative total, per calendar year per gas turbine, of all 15-minute periods when the 15-minute average NOx concentration exceeded the limits of Sections 301 and 302.

503 **TEST METHODS:** Compliance with the requirements of this rule shall be determined using the following test methods:

503.1 **Oxides of Nitrogen**: Emissions of oxides of nitrogen shall be determined by using EPA Method 20. The average of three runs for 15 minutes shall be used to determine compliance.

503.2 **Oxygen (O_2) Content:** Oxygen content shall be determined by using ARB Method 100 or EPA Method 3A.