

217/782-2113

CONSTRUCTION PERMIT -- NSPS

PERMITTEE

Reliant Energy Aurora, L.P.
Attention: J. D. Furstenwerth, Leader, Air Resources Division
1111 Louisiana
Houston, TX 77002

Application No: 99110018 I.D. No.: 043407AAF
Applicants Designation: Reliant Energy Aurora Date Received: October 29, 1999
Subject: Gas Turbines (Power Production)
Date Issued: May 9, 2000
Location: North-east Corner of Eola Road and Ferry Road, Aurora, DuPage County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of a 950 MW_e natural gas fired power plant with ten gas turbines, (four larger turbines with a nominal capacity of 170 Mwe and rated heat input of 1,885 mmBtu/hr per turbine, CTG1-CTG4 and six smaller turbines with a nominal capacity of 45 MWe and rated heat input of 444 mmBtu/hr per turbine, CTG5-CTG10), and other ancillary operations, as described in the above referenced application and summarized in Attachment A. This Permit is subject to standard conditions attached hereto and the following special condition(s):

- 1a. The turbines are subject to the New Source Performance Standard (NSPS) for Stationary Gas Turbines, 40 CFR 60, Subpart A and GG. The Illinois EPA is administrating NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
- b. The Permittee shall not emit into the atmosphere from any turbine any gases which contain nitrogen oxides (NO_x) in excess of the following equation, pursuant to 40 CFR 60.332 (a)(1), except as allowed by 40 CFR 60.332(f):

$$STD = 0.0075 \left(\frac{14.4}{Y} \right) + F$$

where:

STD = allowable NO_x emission (percent by volume at 15 percent oxygen and on a dry basis).

Y = manufacturer's rated heat rate at manufacture's rated load (kilojoules per watt hour) or, actual measured heat rate based on lower heating value of fuel as measured as actual peak load for the facility. The value of *Y* shall not exceed 14.4 kilojoules per watt-hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in 40 CFR 60.332 (a)(3).

- c. The Permittee shall not emit into the atmosphere from any turbine any gases which contain sulfur dioxide in excess of 0.015 percent by volume at 15 percent oxygen and on a dry basis, or shall not burn any fuel which contains sulfur in excess of 0.8 percent by weight, pursuant to 40 CFR 60.333 (a) and (b).
 - d. At all times, the Permittee shall maintain and operate the turbines in a manner consistent with good air pollution control practice for minimizing emissions, pursuant to the NSPS, 40 CFR 60.11(d).
2. The turbines are affected units under the Acid Rain Deposition Control Program pursuant to Title IV of the Clean Air Act and are subject to certain control requirements and emissions monitoring requirements pursuant to 40 CFR Parts 72, 73 and 75. As affected units under the Acid Rain Program, the Permittee must also obtain an Acid Rain Permit for operation of the turbines in accordance with 40 CFR 70.30(a)(2)(ii) and 72.32(a).
- 3a. The larger turbines (CTG1, CTG2, CTG3, and CTG4) shall be equipped, operated, and maintained with Low NO_x combustors.
 - b. The smaller turbines (CTG5, CTG6, CTG7, CTG8, CTG9, and CTG10) shall be equipped, operated, and maintained with water injection in the combustors.
- 4a. The only fuel fired in the turbines and natural gas heater shall be natural gas.
- b.i. Hourly emissions from each turbine shall not exceed the following limits except, when ice fog for smaller turbines with water injection is deemed a traffic hazard by the Permittee and as allowed during startup (see Condition 5(b)):

Unit	NO _x (lb/hr)	CO (lb/hr)	PM/PM ₁₀ (lb/hr)	VOM (lb/hr)	SO ₂ (lb/hr)
Larger turbines (CTG1-CTG4)	105	31	9	3	1.1
Smaller turbines (CTG5-CTG10)	41	45	3	4	0.27

These limits are based on information provided in the permit application.

- ii Notwithstanding the above, when ambient temperature is less than 59°F, hourly carbon monoxide emissions from the smaller turbines shall not exceed 192.0 lb each and 1,152.0 lb total.
- c. The turbines, in total, shall not fire more than 9,878 million ft³ of natural gas per year. Compliance with this limit shall be determined from a running total of 12 months of data.
- d. The annual emissions of the gas heater shall not exceed 0.5, and 0.8 tons of nitrogen oxides and carbon monoxide, respectively.

- e. The annual emissions of the ten turbines shall not exceed the following limitations, as further detailed in Table 1. Compliance with these annual limitations shall be determined from a running total of 365 days of data, with emissions calculated from operating data in accordance with Condition 10 (NOx) and emissions determined from testing in accordance with Condition 11 (CO) or standard emission factors (VOM, SO₂ and PM/PM₁₀).

<u>Pollutant</u>	<u>Emissions (tons/year)</u>
NO _x	247.0
CO	210.0
PM/PM ₁₀	28.5
VOM	9.1
SO ₂	3.0

The above limitations are established pursuant to 40 CFR 52.21, the federal rules for Prevention of Significant Deterioration of Air Quality (PSD) and 35 IAC Part 203, the state rules for Major Stationary Source Construction and Modification (MSSCAM). These limits ensure that the construction and operation of the power plant does not constitute a new major source pursuant to PSD.

- 5a. The emission of smoke or other particulate matter from each turbine shall not have an opacity greater than 30 percent, pursuant to 35 IAC 212.123(a), except as allowed below (35 IAC 201.149, 212.123(b) or 212.124).
- b.
 - i. The Permittee is authorized to operate the turbines in excess of 30 percent opacity during startup pursuant to 35 IAC 201.262 and the limits in Condition 4 (b), provided that all reasonable efforts are made to minimize startup emissions. This authorization only extends for a period of up to 20 minutes following initial firing of fuel during each startup event.
 - ii. Each turbine shall be operated in a manner consistent with good air pollution control practice to minimize emissions associated with during startup and shutdown including the following. These practices shall be reviewed at least annually and enhanced consistent with good air pollution control practice based on actual operating experience and performance of the turbines.
 - A. The Permittee shall manage the operation of the turbines to provide adequate time for normal startup of the turbines, except for emergencies, and to minimize multiple startups of a turbine in a single day, unless startup is tripped off.
 - B. The Permittee shall operate in accordance with the manufacturer's written instructions or other written instructions developed and maintained by the Permittee, which shall include at a minimum the following measures:
 - Review of operating parameters of the unit during startup, or shutdown as necessary to make adjustments to reduce emissions;

Implementation of inspection and repair procedures for a turbine prior to attempting startup following repeated trips.

C Maintenance of the turbine in accordance with written procedures developed and maintained by the Permittee.

- 6a. Under this permit, the turbines may be operated for a period of up to 180 days from initial startup to allow for equipment shakedown and emissions testing as required. This period may be extended by the Illinois EPA upon request of the Permittee if additional time is needed to complete startup or perform emission testing.
- b. Upon successful completion of emission testing demonstrating compliance with applicable limitations, the Permittee may continue to operate the turbines as allowed by Section 39.5 (5) of the Environmental Protection Act.
7. The Permittee shall furnish the Illinois EPA with written notification as follows:
 - a. The date construction of the turbines commenced, postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1).
 - b. The actual date of initial startup of the turbines, postmarked within 15 days after such date, pursuant to 40 CFR 60.7(a)(3).
8. Each turbine shall each be equipped, operated, and maintained with a continuous monitoring system to monitor and record the fuel consumption, pursuant to 40 CFR 60.334 (a). The Permittee is monitoring NO_x emissions in accordance with the Acid Rain Program in lieu of monitoring the ratio of water to fuel being fired.
- 9a. The Permittee shall monitor sulfur content of the natural gas fired in the turbines pursuant to the applicable provisions in 40 CFR 75, Appendix D, Section 2.3.2 for pipeline natural gas combustion.
- b. Monitoring of fuel nitrogen content is not required, as natural gas is the only fuel fired in the turbines.
- c. The above provisions establish a custom schedule for determination of sulfur and nitrogen content in accordance with 40 CFR 60.334 (b) and USEPA's Custom Fuel Monitoring Document dated August 14, 1987.
- 10a. The Permittee shall install, operate, and maintain a Continuous Emissions Monitoring (CEM) system to measure emissions of NO_x from each gas turbine in accordance with the Federal Acid Rain Program. These CEMS shall also be used to demonstrate compliance with the limitations of this permit.
 - b. i. The procedures under 40 CFR 60.13 and 75.12 and 40 CFR 75, Appendix F shall be followed for the installation, evaluation, and operation these CEM systems.

- ii. At least 30 days prior to initial startup of a gas turbine, the Permittee shall submit to the Agency for review and comments a detailed plan describing the configuration and operation of the NO_x CEM system(s). The plan shall also state whether the Permittee is installing a SO₂ CEM system (40 CFR 75.11) rather than sulfur analysis and fuel flow monitoring equipment in accordance with 40 CFR 75.11(e).
- 11a. Within 60 days after achieving the maximum production rate at which the turbines will be operated, but not later than 180 days after initial startup, the nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic material (VOM) and oxygen (O₂) concentrations in the exhaust of the turbines shall be measured by an approved independent testing service to determine compliance with the NO_x and CO limits in Condition 1 and 4 in the following manner:
- i. The NO_x emission rate shall be computed for each run using the equation in 40 CFR 60.335(c)(1).
 - ii. Method 20 of 40 CFR 60, Appendix A, shall be used to determine the NO_x and O₂ concentrations. The span values shall be 300 ppm of NO_x and 21 percent O₂, pursuant to 40 CFR 60.335(c)(3).
 - iii. The NO_x emissions shall be determined at four points in the normal operating range of the turbines, including the minimum point in the range and peak load, pursuant to 40 CFR 60.335(c)(2).
 - iv. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer, pursuant to 40 CFR 60.335(c)(2).
 - v. Method 10 of 40 CFR 60, Appendix A, shall be used to determine CO concentrations at peak and minimum turbine load.
 - vi. Method 18 of 40 CFR 60, Appendix A, shall be used to determine VOM concentrations at peak and minimum turbine load.
 - vii. The test at each load shall consist of three separate runs each at least 60 minutes in duration. Compliance shall be determined from the average of the runs provided that the Illinois EPA may accept the arithmetic mean of two of the runs in circumstances described in 40 CFR 60.8(f).
- b. The Permittee shall submit a test plan to the Illinois EPA at least 60 days prior to testing. As part of this plan, the Permittee may propose for approval by the Illinois EPA a strategy for performing emission testing of selected turbines of each model type provided that all turbines are fitted for testing. The Permittee may also propose a strategy for testing across the normal load range of the turbines.
 - c. The Illinois EPA shall be notified prior to these tests to enable the Illinois EPA to observe these tests. Notification of the expected date of testing shall be submitted a minimum of thirty (30) days prior to the expected date. Notification of the actual date and expected time of

testing shall be submitted a minimum of five (5) working days prior to the actual date of the test. The Illinois EPA may, at its discretion, accept notifications with shorter advance notice provided that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe the testing.

- d. The Final Report for these tests shall be submitted to the Illinois EPA within 60 days after the date of the tests. The Final Report shall include as a minimum:
 - i. A summary of results.
 - ii. General information.
 - iii. Description of test method(s), including description of sampling points, sampling train, analysis equipment, and test schedule.
 - iv. Detailed description of test conditions, including:
 - A. Fuel consumption (standard ft³);
 - B. Firing rate (million Btu/hr); and
 - C. Turbine/Generator output rate (MW);
 - v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.
- 12a. The Permittee shall maintain records of the following items:
 - i. Heat content of the natural gas (Btu/ft³) being fired during the quarter, with supporting documentation on at least a quarterly basis.
 - ii. The sulfur content of the fuel used to fire the turbines;
 - iii. Fuel consumption for each turbine as monitored in accordance with Condition 8; and
- b. The Permittee shall maintain operating logs for each turbine which at a minimum shall include daily information for operating hours and fuel consumption and periods of time when inlet air cooling is used.
- c. The Permittee shall maintain the following records related to startup and shutdown of the turbines:
 - i. The following information for each startup of the turbines:
 - A. Date and time of startup;
 - B. Type of startup, i.e; scheduled or emergency

- C. Whether operating personnel for the turbines or air environmental staff are on site during startup; and
 - D. A description of the startup, if written operating procedures are not followed during the startup or operating problems occur during the startup, including detailed explanation.
- ii The following information for each shutdown of the turbines:
- A Date and time of shutdown;
 - B Type of shutdown, i.e; scheduled or emergency
 - C. Whether operating personnel for the turbines or air environmental staff are on site during shutdown; and
 - D. A description of the shutdown, if written operating procedures are not followed during the shutdown or operating problems occur during the shutdown, including detailed explanation.
- iii. The following information for the turbines when above normal opacity has been observed by source personnel as identified in (i)(B) above:
- A. Name of observer, position and reason for being at site;
 - B. Date and duration of above normal opacity, including start time and time normal operation was achieved;
 - C. If normal operation was not achieved within 20 minutes, an explanation why startup could not be achieved;
 - D. A detailed description of the startup, including reason for operation and whether reduced loading was performed;
 - E. An explanation why reduced loading and other established startup procedures could not be performed, if not performed;
 - F. The nature of opacity following the end of startup or 30 minutes of operation, whichever occurs first, and duration of operation until achievement of normal opacity or shutdown; and
 - G. Whether exceedance of Condition 5(a) [30 percent opacity] may have occurred during startup, with explanation if qualified observer was on site.
- d. The Permittee shall keep a maintenance/repair log for the turbines and the water injection system on each smaller turbine.
- e. The Permittee shall maintain the following emission records on at least a monthly basis:

The emissions of NO_x, SO₂, PM, VOM and CO from the turbines for each day since the previous record with supporting calculations; and

- f. The Permittee shall maintain records that identify:
 - i. Any periods during which a continuous monitoring system was not operational, with explanation.
 - ii. Any period when the turbine was in operation during which ice fog was deemed to be a traffic hazard, the ambient conditions existing during the periods, the date and time the water injection system was deactivated, and the date and time the system was reactivated.
 - iii. Any day in which emission exceeded an applicable standard or limit.
- g. These records shall be retained for three years and shall be available for inspection and copying by the Illinois EPA.
- 13a. The Permittee shall notify the Illinois EPA within 10 days if NO_x emissions exceed 160 tons/ year.
- b. If there is any exceedance of the requirements of Conditions 1 through 4 of this permit, as determined by the records required by this permit or by other means, the Permittee shall submit a report within 30 days after the exceedance. The report shall include the emissions released in accordance with the recordkeeping requirements, a copy of the relevant records, and a description of the exceedance or violation and efforts to reduce emissions and future occurrences.
- 14. Two copies of required reports and notifications concerning equipment operation or repairs, performance testing, or a continuous monitoring system shall be sent to:

Illinois Environmental Protection Agency
Division of Air Pollution Control
Compliance Section (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276
Telephone: 217/782-5811 Facsimile: 217/782-6348

and one copy shall be sent to the Illinois EPA's regional office at the following address, unless otherwise indicated:

Illinois Environmental Protection Agency
Division of Air Pollution Control
1701 South 1st Avenue, 12th Floor
Maywood, IL 60153
Telephone: 708/338-7969 Facsimile: 708/338-7930

15 This permit is issued based on the power plant not qualifying as a new participating source under the Emission Reduction Market System (ERMS), 35 IAC Part 205. This is because seasonal emissions of volatile organic material (VOM) would be less than 10 tons.

16 This Permit for the above referenced project does not relieve the Permittee of the responsibility to comply with all Local, State and Federal Regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State, and Local requirements.

Please note that additional rules addressing NO_x emissions from these turbines may be adopted in the near future in response to USEPA's so called "NO_x SIP call" and the development of Illinois's plans for attainment of the ozone air quality standard in the Chicago and Metro-East ozone nonattainment areas.

If you have any questions concerning this permit, please contact Shashi Shah at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:SRS: finalprmt/050900

CC: Region 1

Attachment A

Emission Units

<u>Unit ID</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Number</u>	<u>Rated Heat Input¹</u> (mmBtu/hr)	<u>Rated Electrical Output¹</u> (MWe)	<u>Control</u>
CTG1-CTG4	Larger turbines	GE	4	1,885	170	<u>Low NO_x combustors</u>
CTG5-CTG10	Smaller turbines	Stewart & Stevenson	6	444	45	<u>Water injection in the combustors</u>
	Fuel Heater		1	9.8	--	<u>Low NO_x burners</u>

1. Nominal ratings are based on lower heating value and are per unit.

Table 1

Project Emissions (ton/yr.)

<u>Unit</u>	<u>NO_x¹</u>	<u>CO</u>	<u>PM</u>	<u>VOM</u>	<u>SO₂</u>
Larger Turbines	124.0	60.0	19.0	5.9	2.2
Smaller Turbines	123.0	150.0	9.5	3.2	0.8
Gas fired heater	0.5	0.8	0.1	0.1	0.1
Totals:	247.5	210.81	28.6	9.2	3.1

1 Total NOx emissions of the turbines are limited to 247.0 tons per year.