

217/782-2113

CONSTRUCTION PERMIT - NSPS

PERMITTEE

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Attention: Michael L. Menne  
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P.O. Box 66149, MC 602  
St. Louis, MO 63166-6149

Application No: 01080020 I.D. No.: 119105AAA  
Applicants Designation: CTG - 2 Date Received: August 9, 2001  
Subject: Gas Turbine (Power Production) - Venice Plant  
Date Issued: October 30, 2001  
Location: 701 Main Street, Venice, Madison County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of a simple cycle combustion turbine unit with two combustion turbines (CTG-2) (nominal capacity 60 MWe) equipped with water injection NO<sub>x</sub> control system, a fuel oil storage tank, and other associated ancillary equipment as described in the above referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

- 1a. The turbine unit is 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<sub>x</sub>) in excess of the applicable standards pursuant to 40 CFR 60.332 (a)(1), except as allowed by 40 CFR 60.332(f).
  - c. The Permittee shall not emit into the atmosphere from any turbine any gases which contain sulfur dioxide (SO<sub>2</sub>) 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. i. The only fuels fired in the turbine unit shall be natural gas and distillate fuel oil.
- ii. The turbine unit shall be equipped, operated, and maintained with water injection system to control NO<sub>x</sub> emissions.
- b. The turbine unit, in total, shall not fire more than 726 million standard cubic feet of natural gas per year. Compliance with this limit shall be determined from a running total of 12 months of data.
- c. The turbines, in total, shall not operate more than 1250 hours per year. Compliance with this limit shall be determined from a running total of 12 months of data from the sum of operating hours counted as set forth below:
  - i. Each hour of operation for a turbine fired with fuel oil shall be counted as 1.6 hours.
  - ii. Each hour of operation for a turbine operating in other modes than identified in Condition 3(c)(i) shall be counted as 1 hour.
- d. Distillate fuel oil with sulfur content greater than 0.05 weight percent shall not be fired in the turbines.
- e. Hourly emissions from each turbine stack shall not exceed the following limits, except during startup, malfunction or breakdown, and shutdown as addressed by Condition 5(b) and 5(c):

Fuel Type	NO <sub>x</sub> <sup>2</sup> (lb/hr)	CO (lb/hr)	VOM (lb/hr)	SO <sub>2</sub> (lb/hr)	PM/PM <sub>10</sub> (lb/hr)
Gas	31.2 (0.0512) <sup>1</sup>	55.4 (0.09) <sup>1</sup>	2.6 (0.004) <sup>1</sup>	0.37	3.0
Oil	49.9 (0.0922) <sup>1</sup>	21.9 (0.04) <sup>1</sup>	2.0 (0.004) <sup>1</sup>	26.9	7.0

1 - Based on Higher Heating Value (HHV) of the fuel.

2 - This limit shall not apply when ice fog is deemed a hazard in accordance with 40 CFR 60.332(f).

These limits are based on manufacturer's data as provided in the permit application. (These limits may be revised by the Illinois EPA if the Permittee demonstrates that such limits would comply with applicable requirements.) Compliance with these limits shall be based on proper operation and emission testing in accordance with Condition 8 (3-run average) or emissions monitoring in accordance with Condition 12 (24-hour average).

- f. i. The total annual emissions from the turbine unit (total 2 turbines of the twin pack unit) shall not exceed the following limitations. Compliance with these limitations shall be determined from a running total of 12 months of data.

<u>Pollutant</u>	<u>(ton/year)</u>
NO <sub>x</sub>	39
CO	80
PM/PM <sub>10</sub>	12
SO <sub>2</sub>	32
VOM	20

ii. For purpose of determining compliance with the above limitations:

- A. Unless emission monitoring is performed for a pollutant, emissions during periods other than startup shall be determined from emission factors developed from testing in accordance with Condition 8 (NO<sub>x</sub>, CO, VOM and PM/PM<sub>10</sub>) and analysis of fuel sulfur content or standard factors (SO<sub>2</sub>).
- B. Unless an alternative factor is established for the pollutant or emissions monitoring is performed for the pollutant, emissions of CO and VOM during an hour that includes a startup shall be presumed to be 110 and 125 percent respectively of the limits in Condition 3(e), i.e. CO and VOM emissions during an hour with a startup shall be presumed to be 61 lb/hr and 3.25 lb/hr, respectively, while firing on natural gas, and 24.1 lb/hr and 2.5 lb/hr, respectively, while firing on fuel oil. These presumptions are based on data in the application describing maximum emissions during startup of a turbine. Any alternative factor for emissions during startup of a turbine shall be based on representative emission testing conducted with USEPA Reference Test Methods. (Refer to Condition 8.)
- C. The establishment of the above procedures for determining compliance with the annual emission limits shall not shield the Permittee from responsibility to account for all emissions from the source, including emissions during startup and malfunction, as other credible information may demonstrate that the above procedures do not adequately account for the actual emissions of the source.

g. Annual emissions of hazardous air pollutants from the unit shall be less than 10 tons of any hazardous pollutant and less than 25 tons in aggregate for any combination of hazardous air pollutants, as indirectly addressed by limits on emissions of criteria pollutants.

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

4a. This permit is issued based on negligible emissions of organic material from the fuel oil storage tank. For this purpose emissions from this tank shall not exceed a nominal emission rate of 0.44 ton/yr.

- b. The fuel oil storage tank is subject to the New Source Performance Standard (NSPS) for storage vessels, 40 CFR 60, Subpart A and Kb. The Illinois EPA is administering NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
  
- 5a. The emission of smoke or other particulate matter from each turbine shall not have opacity greater than 30 percent, pursuant to 35 IAC 212.123(a).
  - b. i. Each turbine shall be operated in a manner consistent with good air pollution control practice to minimize emissions and opacity during startup and shutdown including the following.
    - A. The Permittee shall manage the operation of the turbines to minimize multiple startups of a turbine in a single day, unless the turbine is tripped off during startup, and to provide adequate time for normal startup of the turbines, except for "quick starts" that are due to requests for immediate delivery of power, as would result from unexpected loss of a transmission line or other generating capacity.
    - B. Except during startup or shutdown of a turbine or for the purpose of emission testing, the Permittee shall not operate turbines below the load at which emission testing conducted in accordance with Condition 8(b) has demonstrated compliance with the applicable hourly emission limits in Conditions 3(e) (see Condition 8(b)(iii)).
    - C. The Permittee shall operate the turbines in accordance with written operating procedures that shall include at a minimum the following measures:
      - I. Review of operating parameters of the unit during startup, or shutdown as necessary to make adjustments to reduce emissions; and
      - II. Implementation of inspection and repair procedures for a turbine prior to attempting startup following repeated trips.
    - D. The Permittee shall maintain the turbines in accordance with written procedures that shall include at a minimum the following measures:
      - I. Periodic inspection of components of the turbines that affect emissions; and
      - II. Timely replacement of components of the turbine that affect emissions that must be routinely replaced.
  - ii. The above procedures may incorporate the manufacturer's written instructions for operation and maintenance of the turbines. The Permittee shall review these procedures at least annually and shall enhance them as necessary to be consistent with good air pollution control practice based on actual operating experience and performance of the turbines.

- c. Upon malfunction or breakdown of the water injection system that will result in NO<sub>x</sub> emissions that are above the applicable limit of Condition 3(e), the Permittee shall as soon as practicable repair the system so as to meet this limit or remove the turbine unit from service:

Consistent with the above, if the Permittee has properly maintained the water injection system for the turbine unit, the Permittee shall begin shutdown of the turbine within 1 hour (60 minutes), unless such shutdown could endanger personnel or equipment or threaten the stability of the regional electrical power system, in which case shutdown of the turbine shall be undertaken when it is apparent that shutdown can be safely undertaken.

For this purpose, the Permittee shall be considered to be properly maintaining the water injection system if malfunctions and breakdowns are sudden, infrequent, not caused by poor maintenance or careless operation, and in general are not reasonably preventable. The Illinois EPA may revise requirements related to malfunction and breakdown in future operating permits for the unit.

- 6a. Under this permit, each emission unit may be operated for a period of up to 180 days from initial startup to allow for equipment shakedown and emissions testing. 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 of the turbines demonstrating compliance with applicable limitations, the Permittee may continue to operate the facility as allowed by Section 39.5 (5) of the Environmental Protection Act.
  - c. This condition supersedes Standard Condition 6.
7. The Permittee shall furnish the Illinois EPA with written notification as follows:
- a. The date construction of each turbine commenced, postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1).
  - b. The anticipated date of initial startup of the turbine, postmarked not more than 60 days nor less than 30 days prior to such date, pursuant to 40 CFR 60.7(a)(2).
  - c. The actual date of initial startup of the turbine, postmarked within 15 days after such date, pursuant to 40 CFR 60.7(a)(3).
- 8a. The nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic material (VOM), and particulate matter (PM) emissions, oxygen (O<sub>2</sub>) concentrations and opacity in the exhaust of each combustion turbine while burning natural gas and oil shall be measured by an independent testing service approved by the Illinois EPA as follows to determine compliance with the emissions limits in Condition 1 and 3:

- i. Within 60 days after operating a turbine at the greatest load at which it will normally be operated but not later than 180 days after its initial startup;
  - ii. Within 90 days after a written request from the Illinois EPA, for such pollutants listed above as specified by the request; and
  - iii. Any extension to these time periods that may be provided at its discretion by the Illinois EPA shall not alter the Permittee's obligation to perform emission testing for purpose of the NSPS in a timely manner as specified by 40 CFR 60.8.
- b. The following methods and procedures shall be used for testing of emissions:
- i. USEPA Reference Test Methods shall be used for emission testing, including the following methods:

Opacity	USEPA Method 9
Carbon Monoxide	USEPA Method 10
Volatile Organic Material	USEPA Method 18 or 25A
Nitrogen Oxides	USEPA Method 20
Particulate Matter	USEPA Method 5
Particulate Matter <sub>10</sub>	USEPA Method 201 or 201A (40 CFR 51, Appendix M)
  - ii. Measurements for NO<sub>x</sub> shall be conducted in accordance with 40 CFR 60.335, as specified below, unless alternative testing procedures are approved by USEPA pursuant to 40 CFR 60.8(b):
    - A. The NO<sub>x</sub> emissions shall be computed for each run using the equation in 40 CFR 60.335(c)(1).
    - B. The span values for Method 20 shall be 300 ppm of NO<sub>x</sub> and 21 percent O<sub>2</sub>, pursuant to 40 CFR 60.335(c)(3).
    - C. The NO<sub>x</sub> emissions shall be determined at four points in the normal operating range of the gas turbines, including the minimum point in the range and peak load, pursuant to 40 CFR 60.335(c)(2).
    - D. All loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer, pursuant to 40 CFR 60.335(c)(2).
  - iii. Measurements for other pollutants shall be conducted as follows:
    - A. CO, PM and VOM emissions shall be measured at peak, intermediate and minimum gas turbine load.
    - B. PM emissions measured by USEPA Method 5, including back half condensable particulate, may be provided as an alternative to measurement of PM<sub>10</sub> emissions using USEPA Method 201 or 201A.
    - C. Measurements for organic hazardous air pollutants in the VOM (e.g., formaldehyde, toluene, acetaldehyde, and acrolein)

shall be provided if VOM emissions are measured by Method 18. (See also Condition 8(c)(iii).)

- D. Unless continuous emissions monitoring is conducted for the particular pollutant, measurements shall also be performed for emissions of NO<sub>x</sub>, CO and VOM during startup of a turbine, in accordance with a plan approved by the Illinois EPA. For purposes of these measurements, as approved by the Illinois EPA, the Permittee may adapt USEPA Reference Test Methods as necessary to address the short duration and transient conditions of startups.
- c. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Illinois EPA for review. This plan shall describe the specific procedures for testing and shall include as a minimum:
- i. The person(s) who will be performing sampling and analysis and their experience with similar tests;
  - ii. The specific conditions under which testing shall be performed including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for a turbine will be tracked and recorded;
  - iii. The specific determinations of emissions that are intended to be made, including sampling and monitoring locations; the test method(s) that will be used, with the specific analysis method, if the method can be used with different analysis methods; and identification of any organic hazardous air pollutants that will be measured. As part of this plan, The Permittee shall propose a plan for testing across the normal operating range of the turbines; and
  - iv. The proposed plans for testing emissions during startup of a turbine as required by Condition 8(b)(iii)(D), including the number of startups for which measurements will be performed; the procedures that will be followed for startup of the turbine; the approach that will be generally followed to assure that measurements can be conducted for and will be representative of the startup period; any proposed adaptations to reference test methods; and any other significant considerations for testing of emissions during startup.
- d. 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.

- e. Three copies of the final reports for emission tests shall be forwarded to the Compliance Section in Springfield within 30 days after the test results are compiled and finalized. The final report from testing shall contain 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 ft<sup>3</sup> and/or gallons);
    - B. Firing rate (million Btu/hr);
    - C. Turbine/Generator output rate (MW); and
  - v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.
- 9. The Permittee shall install, operate, and maintain each turbine with a continuous monitoring systems to measure and record the consumption of natural gas and oil, and the ratio of water to fuel being fired, when using water injection to control NO<sub>x</sub> emissions, pursuant to 40 CFR 60.334 (a).
- 10a. The Permittee shall sample and analyze for the sulfur content of the fuel for the turbines in accordance with the Federal Acid Rain Program 40 CFR 75.11(d) [refer to Part 75, Appendix D, Section 2.3 for pipeline natural gas combustion] unless it elects to install and operate CEMS for emission of SO<sub>2</sub> from the turbines.
  - b. Monitoring of fuel nitrogen content is not required while pipeline quality natural gas, as defined in 40 CFR 72.2, is being fired in the turbines.
  - c. The above provisions establish a custom schedule for determination of sulfur content and nitrogen content of fuel, subject to case-specific approval by USEPA pursuant to 40 CFR 60.13(i), in which approval USEPA may establish additional requirements upon the Permittee for sampling and analysis of fuel. If USEPA does not approve a custom schedule for the turbines, the Permittee shall also sample and analyze for sulfur and nitrogen content of the natural gas being fired in the turbines in accordance with 40 CFR 60.334(b).
- 11. The Permittee shall comply with applicable provisions of 40 CFR 60.334(b) with respect to determination of sulfur and nitrogen content of fuels fired in the CT unless USEPA approves alternate provisions for sampling of fuel, in which case the Permittee shall comply with such alternate provisions.

12. The Permittee shall install, operate, and maintain a Continuous Emissions Monitoring (CEM) system on turbines to measure emissions of NO<sub>x</sub>. The applicable procedures under 40 CFR 75.12 and 40 CFR 75, subpart H shall be followed for the installation, evaluation, and operation of this NO<sub>x</sub> CEM system.
- 13a. The Permittee shall maintain a file of the following items:
  - i. Manufacturers specification of rated turbine load;
  - ii. The composition of fuel as determined in accordance with Condition 10;
  - iii. Heat content of the natural gas (Btu/ft<sup>3</sup>) being fired, with supporting documentation, on a quarterly basis;
  - iv. A copy of the Final Report(s) for emission testing conducted pursuant to Condition 8;
  - v. Copies of opacity determinations taken for the source by qualified observer(s) using USEPA method 9; and
  - vi. For the life of fuel oil storage tank, the dimensions of the tank and an analysis showing the capacity of the tank.
- b. The Permittee shall maintain the following daily operating records:
  - i. Consumption of natural gas, consumption of oil, and ratio of water to fuel being fired for each turbine, as determined in accordance with Condition 9;
  - ii. Period of time when fuel oil is fired in the turbine unit;
  - iii. Actual operating hours for the turbine unit (total hours, hours for startup, and hours with fuel oil firing); and
  - vi. Effective operating hours for each turbine with operating hours counted in accordance with Condition 3(c)(i) and (ii).
- c. The Permittee shall maintain the following records related to each startup of the turbines:
  - i. Date and time of startup;
  - ii. Whether operating personnel for the turbines or air environmental staff are on site during startup; and
  - iii. A description of the startup, if written operating procedures are not followed during the startup or significant problems occur during the startup, including detailed explanation.
- d. The Permittee shall keep inspection, maintenance, and repair logs with dates and the nature of such activities for each turbine, including the water injection system.

- e. The Permittee shall maintain detailed records related to continued operation of a turbine with elevated or above normal emissions due to malfunction or breakdown, including the following:
  - i. The following information for each period of elevated NO<sub>x</sub> emissions accompanying malfunction or breakdown of the water injection system:
    - A. Date, time and duration of elevated NO<sub>x</sub> emissions, i.e., emissions in excess of limits in Condition 3(e);
    - B. Identification of the affected turbine, the NO<sub>x</sub> emission rate, the operating condition of the turbine, and possible causes for elevated NO<sub>x</sub> emissions, e.g., interruption or reduction in water injection rate;
    - C. A description of corrective actions taken by the Permittee to return NO<sub>x</sub> emission to no more than limits in Condition 3(e);
    - D. If corrective actions did not promptly return NO<sub>x</sub> emissions to acceptable levels, the time that the Permittee initiated shutdown of the turbine and, if not immediate, a description of the circumstances that made immediate shutdown unsound and a demonstration that shutdown was deferred only until it became safe to do so, with supporting documentation; and
    - E. A description of further investigation and corrective actions taken by the Permittee following shutdown of the turbine prior to returning the affected turbine to service.
  - ii. The following information for each period of above normal opacity:
    - A. Date, time and duration of observed opacity above normal;
    - B. Name and position of observer;
    - C. Identification of the affected turbine, a description of the observed opacity, the operating condition of the turbine, and possible causes for above normal opacity, e.g., excess natural gas pressure or low natural gas temperature;
    - D. Whether exceedances of Condition 5(a) [30 percent opacity] may have occurred, including any Method 9 readings taken by a qualified observer;
    - E. A description of corrective actions taken by the Permittee to restore normal opacity levels;
    - F. If corrective actions did not promptly restore acceptable opacity levels, the time that the Permittee initiated shutdown of the turbine and, if not immediate, a description of the circumstances that made immediate shutdown unsound and a demonstration that shutdown was deferred only until it became safe to do so, with supporting documentation; and

- G. A description of further investigation and corrective actions taken by the Permittee following shutdown of the turbine prior to returning the affected turbine to service.
- f. The Permittee shall maintain the following records related to emissions:
  - i. Other data, not addressed above, used or relied upon by the Permittee to determine emissions;
  - ii. Fuel consumption and number of startups for each turbine, compiled on at least a monthly basis;
  - iii. The annual emissions of NO<sub>x</sub>, SO<sub>2</sub>, PM, VOM and CO for each month since the previous record with supporting calculations. NO<sub>x</sub> emissions shall be based on data from the CEMS. All other emissions shall be calculated based on fuel consumption data and site-specific emission factors developed from emission test data or other methods approved by the Illinois EPA; and
  - iv. NO<sub>x</sub> emissions, from each turbine recorded hourly (in lb/mmBtu and lb or ton) by combining the pollutant concentration (in ppm) and diluent's concentration (in percent O<sub>2</sub> or CO<sub>2</sub>) measurements according to the procedures in 40 CFR 75 Appendix F.
- g. The Permittee shall maintain records that identify:
  - i. Any periods during which a continuous monitoring system was not operational, with explanation;
  - ii. Any 1-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 by test to be necessary to comply with requirements for NO<sub>x</sub> emissions, with the average water-to-fuel ratio, average fuel consumption, ambient conditions and turbine load;
  - iii. 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; and
  - iv. Any day in which emission exceeded an applicable standard or limit.
- h. All records required by this permit shall be retained on site for a period of at least 3 years and shall be readily available for inspection and copying by the Illinois EPA upon request.
- j. The Permittee shall maintain records documenting annual review of its operating procedures (see Condition 5).
- 14a. Pursuant to 40 CFR 60.7(c) and 60.334(c), a report shall be submitted by the Permittee to the Illinois EPA on a quarterly basis no later than 30 days after the end of the calendar quarter. This report shall contain

information on any one-hour period when the average water to fuel ratio falls below the ratio needed to show compliance. For such periods, the report shall include the actual water to fuel ratio, average fuel consumption, ambient conditions and turbine load.

- b. If there is any other exceedance of the requirements of Conditions 1 through 4 of this permit, as determined by the records required by this permit, 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.
15. 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      Fax: 217/524-4710

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  
2009 Mall Street  
Collinsville, IL 62234  
Telephone: 618/346-5120      Fax: 618/346-5155

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

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

DES:MNP

CC: Region 3