

217/782-2113

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CONSTRUCTION PERMIT GRANT -- OPERATING PERMIT DENIAL -- NSPS

PERMITTEE

Midwest Electric Power Inc.
Attention: James M. Helm/Assistant Secretary Treasurer
P. O. Box 355
Joppa, Illinois 62953

Application No: 99100060

I.D. No.: 127899AAA

Applicants Designation: GAS TURBINE

Date Received: October 18, 1999

Subject: Gas Turbines (Power Production)

Date Issued: March 29, 2000

Location: 2100 Portland Road, Joppa, Massac County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of five gas turbines, three rated at a nominal capacity of 72 MWe per turbine (frame 7) and two rated at a nominal capacity of 51 MWe per turbine (frame 6) (Total 318 MWe) (rated heat input 761 and 542 mmBtu/hr per turbine for the frame 7 and 6, respectively), and ancillary operations as described in the above referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

- 1a. The gas 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

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

60.332(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 gas 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, Midwest Electric Power Inc. 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).
 3. The turbines shall each be equipped, operated, and maintained with water injection in the combustors.
 - 4a. The only fuel fired at the Midwest facility shall be natural gas.
 - b. The turbines, in total, shall not fire more than 4,040 million ft³ of natural gas per year. Compliance with this limit shall be determined from a running total of 12 months of data.
 - c. Hourly emissions from each turbine shall not exceed the following limits, except during startup or malfunction as addressed by Condition 7 and when the Permittee deems ice fog a traffic hazard. When the Permittee deems ice fog a traffic hazard, the turbines may exceed the NO_x lb/hr limit and are exempt from Condition 1 (b) and 3.

Unit	NO _x (lb/hr)	CO (lb/hr)	PM ₁₀ (lb/hr)	SO ₂ (lb/hr)	VOM (lb/hr)
Frame 7	89.5	10	5.5	1.7	2.1
Frame 6	90	49	3.9	1.2	1.5

These limits are based on the information provided in the permit application and AP-42 emission factors (5/98 Table 3.1-2).

Note: The above limits may be revised by the Illinois EPA after emissions testing is complete, at the written request by the Permittee.

- d. The annual emissions from the gas turbines shall not exceed the limits in Table 2 (Attachment A). Compliance with the CO and PM₁₀ limits shall be determined by natural gas usage and the curve plotted on Graph 1 (Attachment A). Compliance with these limitations shall be determined from a running total of 12 months of data.

Note: To demonstrate compliance by using Graph 1, natural gas usage for the units shall remain on or below the curve.

- e. The above limits and the limits in Condition 6 are established pursuant to 40 CFR 52.21, the federal rules for Prevention of Significant Deterioration of Air Quality (PSD). These limits ensure that the construction and operation of the turbines and operation of the existing plant does not constitute a new major source pursuant to PSD.
- 5. The emission of smoke or other particulate matter from a turbine shall not have an opacity greater than 30 percent, pursuant to 35 IAC 212.123(a), except as allowed by 35 IAC 201.149, 212.123(b) or 212.124.
- 6a. This permit is issued based upon the turbines not constituting a major modification for NO_x for purpose of PSD, because they will be accompanied by a contemporaneous decrease in NO_x emissions for existing boilers at the site. For this purpose, the existing boilers operated by Electric Energy Inc. (EEI), and the proposed new facility, Midwest Electric Power Inc. (Midwest), are considered a single source because EEI exercises authority over both facilities, so that they are considered under common control. Table 1 shows the EEI historical plant NO_x emissions and net change in emissions.
- b. The annual NO_x emissions from the boilers shall not exceed 11,506 ton/year and NO_x emissions from Boiler 5 shall not exceed 2,976 ton/year. Compliance with these limitations shall be determined from a running total of 12 months of data.
- 7a. Each turbine shall be operated in a manner consistent with good air pollution control practice to minimize emissions during startup, malfunction and breakdown, and shutdown including:
 - i. Operation 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:
 - A. Review of operating parameters of the unit during startup, malfunction, and breakdown, or shutdown as necessary to make adjustments to reduce or eliminate excess emissions;
 - B. Operation of the water injection (WI) system as soon as and as long as the unit operating conditions are amenable to its effective use.
 - ii. Maintenance of the WI system in accordance with written procedures developed and maintained by the Permittee, these procedures shall be reviewed at least annually.
- b. i. Upon malfunction or breakdown of the WI system that will result in NO_x emissions in excess of the applicable limit in Condition 4(c). The Permittee shall as soon as practicable repair the affected system or remove the turbine from service so that excess emissions cease;

- ii. Consistent with the above, if the Permittee has maintained and operated a WI system so that malfunctions are sudden, infrequent, not caused by poor maintenance or careless operation, and in general are not reasonably preventable, the Permittee shall begin shutdown of the turbine within 90 minutes, unless the malfunction is expected to be repaired in 120 minutes or such shutdown could threaten the stability of the regional electrical power system. In such case, shutdown of the turbine shall be undertaken when it is apparent that repair will not be accomplished within 120 minutes or shutdown would not endanger the regional power system. In no case shall shutdown of a turbine be delayed solely for the economic benefit of the Permittee.
 - iii. Notwithstanding the above, if the Permittee determines that the NO_x continuous emission monitoring system (CEMS) is inaccurately reporting excess NO_x emissions, the Permittee may continue operation provided the Permittee records the information it is relying upon to conclude that the turbine and WI is functioning properly and the CEMS is reporting inaccurate data and the Permittee takes prompt action to resolve the accuracy of the CEMS.
- 8a. Under this permit, each turbine 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 facility as allowed by Section 39.5 (5) of the Environmental Protection Act.
9. The Permittee shall furnish the Illinois EPA with written notification as follows:
- a. The date construction of the 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).
10. 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).
- 11a. To demonstrate compliance with the NO_x limits of this permit, the Permittee shall install, operate, and maintain a Continuous Emissions Monitoring (CEM) system on each gas turbine to measure emissions of NO_x. The applicable procedures under 40 CFR 60.13, 60.47a(c) and 75.12 shall

be followed for the installation, evaluation, and operation of this NO_x CEM system.

- b. At least 30 days prior to initial startup of a gas turbine, the Permittee shall submit to the Illinois EPA for review and comment a detailed monitoring plan. This plan shall describe the configuration and operation of the NO_x CEM system for each gas turbine.
 - c. These monitoring systems shall be operated and collect data in accordance with the applicable provisions of the Acid Rain Program.
 - d. Notwithstanding the above conditions of the permit specifying monitoring practices, other credible evidence may be used to establish compliance or noncompliance with applicable emission limits.
- 12a. The Permittee shall monitor sulfur content of the gas fired in the turbines pursuant to the applicable provisions in 40 CFR Part 75, Appendix D, Section 2.3 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 content and nitrogen content of fuel in accordance with 40 CFR 60.334 (b)(2) and USEPA's Custom Fuel Monitoring Document dated August 14, 1987, subject to case-specific approval by USEPA pursuant to 40 CFR 60.13(i).
- 13a. Within 60 days after operating a gas turbine at the greatest load at which it will normally be operated but not later than 180 days after its initial startup, the Permittee shall perform emissions tests of the gas turbine as follows. These tests shall be used as the initial compliance tests to demonstrate compliance with the limits and conditions set in this permit.
- b. Emissions shall be measured by an approved testing service at maximum load for NO_x, CO, PM, and opacity. During the initial performance tests, emissions shall also be measured at the minimum load, and two intermediate load levels for NO_x.
 - c. The following USEPA methods and procedures shall be used for testing of emissions, unless another USEPA method is approved or specified by the Illinois EPA. For each turbine, measurement of NO_x and SO₂ emissions shall be conducted and data collected in accordance with the test methods and procedures specified in 40 CFR 60.335.

Location of Sample Points	USEPA Method 1
Gas Flow and Velocity	USEPA Method 2
Flue Gas Weight	USEPA Method 3 or 3A
Moisture	USEPA Method 4
Particulate Matter	USEPA Method 5
Nitrogen Oxides	USEPA Method 20
Opacity	USEPA Method 9
Carbon Monoxide	USEPA Method 10

Volatile Organic Material	USEPA Method 18, or 25A
PM10	USEPA Method 5* or Method 201 or 201A (40 CFR 51, Appendix M)

*The Permittee may report all PM emissions measured by USEPA Method 5 as PM₁₀, including back half condensable particulate. If the Permittee reports USEPA Method 5 PM emissions as PM₁₀, testing using USEPA method 201 or 201A need not be performed.

- d. 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 the gas turbine will be tracked and recorded.
 - iii. The specific determinations of emissions that are intended to be made, including sampling and monitoring locations. As part of this plan, the Permittee may set forth a strategy for performing emission testing of selected turbines provided that all turbines are fitted for testing; the identity of the gas turbine to be tested is determined immediately before testing, by the Illinois EPA or otherwise randomly; and continuous emission monitoring of NO_x is present on all turbines. The Permittee also may set forth a strategy for measuring emissions at levels other than maximum load.
 - iv. The test method(s) which will be used, with the specific analysis method, if the method can be used with different analysis methods.
- e. The Illinois EPA shall be notified prior to these tests to enable it to observe these tests. Notification for the expected date of testing shall be submitted a minimum of 30 days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of 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 testing.
- f. Three copies of the Final Reports for these tests shall be forwarded to the Illinois EPA, Compliance Section in Springfield within 30 days after the test results are compiled and finalized, in advance of the operating permit application if necessary. The Final Report from testing shall contain a minimum:
 - i. A summary of results;

- ii. General information;
 - iii. Description of test method(s), including a 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);
 - C. Turbine/Generator output rate (MW); and
 - v. Data and calculations, including copies of all raw data sheets and records of laboratory analysis, sample calculations, and data on equipment calibration.
- g. Submittals and notification with respect to emissions testing shall be made to the following:

Illinois Environmental Protection Agency
Division of Air Pollution Control - Regional Office
2009 Mall Street
Collinsville, Illinois 62234

Illinois Environmental Protection Agency
Emission Monitoring and Testing Unit
P. O. Box 19276
Springfield, IL 62794-9276

Illinois Environmental Protection Agency
Division of Air Pollution Control, Compliance Section (#40)
P. O. Box 19276
Springfield, IL 62794-9276

Telephone 217/782-5811 Facsimile 217/782-6348

- 14a. The Permittee shall maintain records of the following items:
- i. The sulfur contents of the fuel used to fire the turbines as determined in accordance with Condition 12;
 - ii. Fuel consumption for each turbine in accordance with Condition 10;
 - iii. Operating hours and fuel consumption for each turbine, on a daily basis;
- b. The Permittee shall keep a maintenance/repair log for the turbines and the water injection system on each turbine.
- c. NO_x emissions from each gas turbine recorded hourly, quarterly, and annual (in lb/mmBtu) by combining the NO_x concentration (in ppm) and

diluent concentration (in percent O₂ or CO₂) measurements according to the procedures in 40 CFR 75 Appendix F;

- d. The Permittee shall maintain the following records on at least a quarterly basis:
 - i. Heat content of the natural gas (Btu/ft³) being fired during the quarter, with supporting documentation;
 - ii. Fuel consumption for each turbine for each month since the previous record.
 - iii. The annual emissions of NO_x, SO₂, PM and CO for each month since the previous record with supporting calculations.
 - iv. Total annual NO_x emissions from all units at the EEI and Midwest facilities, with supporting documentation.
- e. 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 emissions exceeded an applicable standard or limit.
- f. The Permittee shall maintain the following records related to startup, malfunction and breakdown, and shutdown of each turbine:
 - i. The time and date of startup, malfunction or breakdown and shutdown of a turbine, and confirmation that standard practices were followed;
 - ii. Each incident when operation of a turbine continued during malfunction or breakdown with excess emissions, including the following information:
 - A. Date and duration of malfunction or breakdown;
 - B. A description of the malfunction or breakdown;
 - C. The reason continued operation was necessary, including supporting documentation;
 - D. The corrective actions used to reduce the quantity of emissions and the duration of the incident;
- g. All records and logs required by this permit shall be retained at a readily accessible location at the source for at least three years from

the date of entry and shall be available for inspection and copying by the Illinois EPA upon request. Any record retained in an electronic format (e.g., computer) shall be capable of being retrieved and printed on paper during normal source office hours so as to be able to respond to an Illinois EPA request for records during the course of a source inspection.

15. If there is any other exceedance of the requirements of Conditions 1 through 6 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.
16. 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

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

Facsimile 618/346-5155

The OPERATING permit application is DENIED because the Illinois Environmental Protection Act, Section 9, and 35 Ill. Adm. Code 201.160 might be violated.

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

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

DES:TDP

CC: Region 3

Attachment A

Table 1A

Boiler 5 Net Change in NO_x Emissions
Ton per Year

<u>Boiler 5 Baseline</u> ¹	<u>New Turbines</u>	<u>Insignificant Emission Increase</u>	<u>Future Boiler 5 Emissions</u>	<u>Net Change</u>
3,287	350.4	39.4	2,976	+39.4

1. The installation of the low-NO_x burner in Boiler 5 was completed in 1995. Its average NO_x emission, based on 1993 and 1994, was 4,090 tons prior to installation of the low-NO_x burners. After adjustment for compliance with the Acid rain program, this reduces to 3,287 ton/year. (4,090 * 0.45/0.56 = 3,287)

Table 1B

Historical Boiler NO_x Emissions and Decreases in NO_x Emissions from
Installation of Low-NO_x Burners
Ton per Year

<u>1991</u>	<u>1992</u>	<u>1990, 1991 Average</u> ¹	<u>Creditable Emissions</u> ²
20,101	21,066	20,584	16,540
<u>1995</u>	<u>1996</u>		<u>1995, 1996 Average</u> ³
10,345	11,398		10,872
			<u>Decrease in Emissions</u>
			-5,668

1. Average emissions prior to installation of Low-NO_x burners
2. Average emissions adjusted for compliance with the NO_x limit of the Acid Rain Program, 0.45 lb NO_x/mmBtu compared to the actual NO_x emission rate of 0.56 lb NO_x/mmBtu. (20,584 * 0.45/0.56 = 16,540)
3. Average emissions after installation of Low-NO_x burners

Table 1C

Overall Net Change in NO_x Emissions
Ton per Year

<u>Plant Baseline</u> ¹	<u>New Turbines</u>	<u>Insignificant Emission Increase</u>	<u>Future Permitted Boiler Emissions</u>	<u>Future Plant Emissions</u>	<u>Net Change</u>
11,817	350.4	39.4	11,506	11,856.4	+39.4

1. The installation of low-NO_x burners on the last boiler of the six boilers (Boiler 5), which was completed in April 1995, is contemporaneous. Accordingly the baseline is the 1995/1996 emissions of the boilers with

low-NO_x burners plus 1/6 of the decrease in emissions from installation of low-NO_x burners (10,872 + 5,668/6 = 11,817)

Table 2

Annual emissions from gas turbines

<u>Pollutant</u>	<u>Emissions (tons/year)</u>
NO _x	350.0
CO	99.8
PM ₁₀	14.9
SO ₂	10
VOM	10

Table 3

Midwest Facility Emissions

<u>Unit</u>	<u>NO_x (ton/yr)¹</u>	<u>CO (ton/yr)</u>	<u>PM (ton/yr)</u>	<u>VOM (ton/yr)</u>	<u>SO₂ (ton/yr)</u>
Gas Turbines	350.0	99.8	14.9	10	10
Diesel Starting motor	<u>0.4</u>	<u>0.1</u>	<u>0.01</u>	--	--
Totals:	350.4	99.9	14.91	10	10

1. The overall NO_x emissions is limited by Condition 6 (b).

**Graph 1
Gas Usage**

