

Draft

217/782-2113

CONSTRUCTION PERMIT -- NSPS

PERMITTEE

CILCO  
Attention: Lawrence H. Haynes  
300 Liberty Street  
Peoria, Illinois 61602

Application No: 99100102 I.D. No.: 143810AAG  
Applicants Designation: MEDINA Date Received: October 29, 1999  
Subject: Gas Turbines (Cogeneration Facility)  
Date Issued:  
Location: Medina Cogeneration Plant, 1823 East Neal Lane, Mossville,  
Peoria County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of three gas turbines (12.2 MWe each) equipped with supplementary-fired heat recovery steam generators (HRSG) (up to 10 MWe from steam turbine generator) utilized with catalytic converters, one natural gas fired backup boiler, one natural gas engine-driven chiller, four cooling tower modules, and two diesel generator sets (1.8 MWe each) as described in the above referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

- 1a. The combustion turbines (CT) 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.
  - i. The NO<sub>x</sub> emissions from each CT shall not exceed the limit established by the NSPS, pursuant to 40 CFR 60.332 (a)(1).
  - ii. The emission from each CT shall not contain SO<sub>2</sub> in excess of 0.015 percent by volume at 15 % O<sub>2</sub> and on a dry basis or the CT 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).
- b. The duct burners in the HRSG are subject to the New Source Performance Standard (NSPS) for Small Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 60, Subpart A and Dc. The Illinois EPA is administrating NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
- c. The backup boiler is subject to the New Source Performance Standard (NSPS) for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 60, Subpart A and Db. The Illinois EPA is administrating NSPS in

Illinois on behalf of the United States EPA under a delegation agreement.

The emission of nitrogen oxides (NO<sub>x</sub>) into the atmosphere from the backup boiler shall not exceed 0.10 lb/mmBtu (low heat release) or 0.20 lb/mmBtu (high heat release). [40 CFR 60.44b(a)(1)]

- d. At all times, the Permittee shall maintain and operate the CT's, HRSG duct burners and boiler in a manner consistent with good air pollution control practice for minimizing emissions, pursuant to the NSPS, 40 CFR 60.11(d).
- 2a. The only fuel fired in the turbines, boiler and chiller shall be natural gas.
- b. Operation of equipment shall not exceed the following annual fuel use limits:

<u>Unit</u>	<u>(mmscf)</u>	<u>(gallons)</u>
Turbines *	3,468.96	--
duct burners *	2,049.84	--
Backup boiler	1,077.48	--
Chiller	19.3	--
Diesel generators *	--	2,624,496

\* Total fuel usage for all units

Compliance with these limits shall be determined from a running total of 12 months of data.

- c. The emissions from the CT/HRSG's shall not exceed the limits in Table 2 (Attachment A). Compliance with these limitations shall be determined from a running total of 12 months of data.
- d. The emissions and operation from the backup boiler, chiller, diesel generators and cooling towers shall not exceed the limits in Table 3 (Attachment A). Compliance with these limitations shall be determined from a running total of 12 months of data.
- e. The above limits and the limits in Condition 4 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 Medina Cogeneration Plant and operation of the existing plant does not constitute a new major source pursuant to PSD.
- 3a. The emission of smoke or other particulate matter from a turbine, backup boiler or chiller 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.
- b. The emission of carbon monoxide (CO) into the atmosphere from the boiler and duct burners shall not exceed 200 ppm, corrected to 50 percent excess air. [35 IAC 216.121]

- 4a. This permit is issued based upon the Medina Cogeneration Plant (Medina) not constituting a major modification for purpose of PSD, because the new construction will be accompanied by a contemporaneous decrease in emissions from existing boilers at the site. For this purpose, the existing boilers operated by Caterpillar, Inc. (CAT) and the proposed new facility being developed by CILCO are considered a single source because Caterpillar will have sufficient authority over both facilities, so that they are considered under common control.
- b. The annual emissions from all units at Medina and boilers BV1 -BV6 at CAT shall not exceed limits in Table 4, Attachment A. Compliance with this limitation shall be determined from a running total of 12 months of data.
5. The gas turbines are affected units under the Acid Rain Deposition Control Program pursuant to Title IV of the Clean Air Act. The Permittee may petition the Administrator for an exemption from certain requirements of the Acid Rain Program.
- 6a. 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.
- c. This permit allows construction of the two diesel generator sets and their initial operation for purposes of initial startup, routine shakedown, and trial operation, provided that construction of the diesel generator sets are started, i.e., a binding construction contract is issued for the system or on-site construction activity for the system is begun by the Permittee, by March 1, 2003. This period may be extended by the Illinois EPA upon request of the Permittee if additional time is needed to begin construction.
- d. The Permittee shall submit a semiannual report describing the diesel generator sets project status until such time as the Permittee notifies the Illinois EPA that the diesel generator sets have successfully demonstrated reliable operation. This report shall be sent to the following addresses:

Illinois Environmental Protection Agency  
Division of Air Pollution Control-Regional Office  
5415 N. University  
Peoria, IL 61614

Telephone 309/693-5461

Facsimile 309/693-5467

Illinois Environmental Protection Agency (#11)  
Division of Air Pollution Control  
Air Permit Section  
P. O. Box 19506  
Springfield, IL 62794-9506

Telephone 217/782-2113 Facsimile 217/524-5023

- e. The Permittee shall notify the Illinois EPA when the diesel generator sets begins initial operation.
- 7. The Permittee shall furnish the Illinois EPA with written notification as follows:
  - a. The date construction of a CT/HRSG or boiler commenced, postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1). This notification shall identify whether the boiler is of low or high release design and include a copy of the emission guarantees or specification of the boiler.
  - b. The anticipated date of initial startup of a CT/HRSG or boiler, 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 a CT/HRSG or boiler postmarked within 15 days after such date, pursuant to 40 CFR 60.7(a)(3).
  - d. Commercial operation date of the cogeneration facility.
- 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).
- 9a. The Permittee shall maintain and operate the boiler with a continuous monitoring system for measuring the nitrogen oxide emissions discharged to the atmosphere and record the output of the system. This system shall be operated during all periods of operation of the affected boiler except for continuous monitoring system breakdowns and repairs. Data is to be recorded during calibration checks, and zero and span adjustments. [40 CFR 60.48b (b) and (c)]
  - b. At least 30 days prior to initial startup of the boiler, 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<sub>x</sub> CEM system.
  - c. 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.
- 10a. 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 or the boiler 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 and boiler 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<sub>x</sub>, CO, PM, VOM and opacity. During the initial performance tests, turbine emissions shall also be measured at the minimum load, and two intermediate load levels for NO<sub>x</sub>.
  - 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<sub>x</sub> and SO<sub>2</sub> emissions shall be conducted and data collected in accordance with the test methods and procedures specified in 40 CFR 60.335. For the boiler, measurement of NO<sub>x</sub> emissions shall be conducted and data collected in accordance with the test methods and procedures specified in 40 CFR 60.46b(e).

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 7, or 7E, or 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 PM<sub>10</sub>, including back half condensable particulate. If the Permittee reports USEPA Method 5 PM emissions as PM<sub>10</sub>, 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. 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 ft<sup>3</sup>);
    - 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 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  
5415 N. University  
Peoria, Illinois 61614

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 10;
  - ii. Fuel consumption for each turbine in accordance with Condition 8;
  - iii. Operating hours and fuel consumption for each CT/HRSG and the backup boiler, on a daily basis;
  - iv. Calculations of the annual boiler capacity factor, determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar quarter, per quarter [40 CFR 60.49b(d)];
- b. The Permittee shall keep a maintenance/repair log for each CT/HRSG, each diesel generator, each cooling tower, chiller, and backup boiler.
- c. For each boiler operating day the Permittee shall maintain records of the following items:
  - i. Calendar date [40 CFR 60.49b(g)(1)];
  - ii. Total natural gas usage for each affected boiler (ft<sup>3</sup>/day) [40 CFR 60.49b(d)];
  - iii. The average hourly nitrogen oxides emission rates (expressed in lb/million Btu heat input) measured or predicted [40 CFR 60.49b(g)(2)];

- iv. The 30-day average nitrogen oxides emission rates (lb/million Btu heat input) calculated at the end of each affected boiler operating day from the measured or predicted hourly nitrogen oxide emission rates for the preceding 30 affected boiler operating days [40 CFR 60.49b(g)(3)];
  - v. Identification of the boiler operating days when the calculated 30-day average nitrogen oxides emission rates are in excess of the nitrogen oxides emissions standards under 40 CFR 60.44b, with the reasons for such excess emissions as well as a description of corrective actions taken [40 CFR 60.49b(g)(4)];
  - vi. Identification of the affected boiler operating days for which pollutant data have not been obtained, including reasons for not obtaining sufficient and a description of corrective actions taken [40 CFR 60.49b(g)(5)];
  - vii. Identification of the times when emission data have been excluded from the calculation of average emission rates and the reasons for excluding data [40 CFR 60.49b(g)(6)];
  - viii. Identification of "F" factor used for calculations, method of determination, and type of fuel combusted [40 CFR 60.49b(g)(7)];
  - ix. Identification of the times when the pollutant concentration exceeded full span of the continuous monitoring system [40 CFR 60.49b(g)(8)];
  - x. Description of any modifications to the continuous monitoring system that could affect the ability of the continuous monitoring system to comply with Performance Specification 2 or 3 [40 CFR 60.49b(g)(9)];
  - xi. Results of daily CEMS drift tests and quarterly accuracy assessments as required under Appendix F, Procedure 1 of 40 CFR 60 [40 CFR 60.49b(g)(10)];
- d. The Permittee shall keep the following records with regards to emissions:
- i. Heat content of the natural gas (Btu/ft<sup>3</sup>) and fuel oil (Btu/gal) being fired during the quarter, with supporting documentation;
  - ii. Fuel consumption for each turbine, each diesel generator, and backup boiler for each month since the previous record.
  - iii. Monthly emissions of NO<sub>x</sub>, CO, SO<sub>2</sub>, VOM, and PM from each CT/HRSG, each diesel generator, each cooling tower, chiller, and backup boiler (ton/month). Boiler NO<sub>x</sub> emissions shall be based on data from the CEM. All other emissions shall be calculated based on fuel data and site-specific emission factors developed from emission test data or standard emission factors, with supporting calculations;

- iv. Annual plant emissions of NO<sub>x</sub>, CO, SO<sub>2</sub>, VOM, and PM based on monthly emission totals.
  - e. The Permittee shall maintain records that identify:
    - i. Any periods during which a continuous monitoring system was not operational, with explanation.
    - ii. Any day in which emissions exceeded an applicable standard or limit.
  - f. 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 5 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  
5415 N. University  
Peoria, Illinois 61614

Telephone 309/693-5461

Facsimile 309/693-5467

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 2  
Caterpillar

Attachment A

Table 1

Historical Plant Emissions  
Ton per Year  
Caterpillar, Inc. (143810AAB) Steam Plant, Building N, Units BV1 - BV6

<u>Pollutant</u>	<u>1996</u>	<u>1997</u>	<u>Two Year Average</u>
NO <sub>x</sub>	562	533	548
SO <sub>2</sub>	510	450	480
CO	202	192	197
PM	61	86	74
PM <sub>10</sub>	12	17	15
VOM	2	2	2

Emissions from annual emissions reports

Table 2

Emissions from CT/HRSG

<u>Pollutant</u>	<u>(lb/hr)<sup>1</sup></u>	<u>(tons/year)<sup>1</sup></u>	<u>Total (tons/year)<sup>2</sup></u>
NO <sub>x</sub>	22.4	98.1	278.0
SO <sub>2</sub>	0.2	0.9	3.0
CO	14.4	63.1	177.0
PM	0.7	3.1	12.0
PM <sub>10</sub>	0.7	3.1	12.0
VOM	0.9	3.9	12.0

1. Limits are based on manufacturers' emission guarantees @ 20 °F and are per unit.
2. Limits are based on manufacturers' guarantees and an annual average temperature.

Table 3

CILCO Cogeneration Facility Emissions

<u>Unit</u>	<u>Firing Rate</u> <sup>1</sup> (mmBtu/hr)	<u>NO<sub>x</sub></u> (ton/yr)	<u>CO</u> (ton/yr)	<u>PM</u> (ton/yr)	<u>PM<sub>10</sub></u> (ton/yr)	<u>SO<sub>2</sub></u> (ton/yr)	<u>VOM</u> (ton/yr)
CT/HRSGs <sup>2</sup> (3 units)	210	278.0	177.0	12.0	12.0	3.0	12.0
Backup boiler	121	52.0	42.0	12.0	12.0	6.6	20.0
Chiller	5.3	5.5	5.0	0.1	0.1	0.0	0.6
Diesel generators <sup>2</sup> (2 units)	17.6	201.2	9.2	3.2	3.2	3.8	8.8
Cooling Towers	--	--	--	2.0	1.0	--	--
Totals:		536.7	253.2	29.3	28.3	13.4	41.4

1. Firing rate per unit
2. Total emissions

Table 4

Net Change in Emissions  
Ton per Year

<u>Pollutant</u>	<u>Historical Actual Emissions</u> <sup>1</sup>	<u>Insignificant Emission Increase</u>	<u>Future Permitted Emissions</u> <sup>2</sup>	<u>Net Change</u>
NO <sub>x</sub>	500	39.9	536.7	-3.2
SO <sub>2</sub>	--	39.9	13.4	-26.5
CO	155	99.9	253.2	-1.7
PM	6	24.9	29.3	-1.6
PM <sub>10</sub>	13.5	14.9	28.3	-0.1
VOM	2	39.9	41.4	-0.5

1. Caterpillar Inc. (143810AAB) Steam Plant, Building N emissions used in netting exercise.
2. Includes insignificant emission increases.