

CONSTRUCTION PERMIT - NSPS

PERMITTEE

Carlton Inc. - North Shore Power Plant
Attention: John Notch
627 Maple Avenue Road
Wilmette, Illinois 60091

Application No: 99120057

I.D. No.: 097810AAC

Applicants Designation: NRTSHORE

Date Received: December 21, 1999

Subject: Gas Turbines (Power Production)

Date Issued:

Location: North Of Ninth Street, East of Union Pacific railroad tracks, Near
Zion, Newport township, Lake County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission unit(s) and/or air pollution control equipment consisting of a natural gas fired peaker power plant using simple cycle gas turbines with dry low-NO_x burners and 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 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 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 (SO₂) 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. This permit authorizes construction of three GE Frame 7FA turbines (option A: nominal capacity 187 MWe each) or six GE Frame 7EA (option B: 98.2 MWe nominal capacity each) as proposed in the permit application.
- b. The fuel fired in the turbines shall be only natural gas.
- c. Each turbine shall be equipped, operated, and maintained with dry low NO_x combustors to control NO_x emissions.
- d. Hourly emissions from each turbine shall not exceed the limits in **Table 1** of the attachment A. These limits are based on the information provided in the permit application.
- e. The turbines, in total, shall not fire more than **8,313** million ft³ (option A) or **6,888** million ft³ (option B) of natural gas per year. Compliance with this limit shall be determined from a running total of 12 months of data.
- f. i. The annual emissions from the turbines (total 3 turbines (option A) or total 6 turbines (option B)) shall not exceed the limits in Table 2 of the attachment A. Compliance with these limitations shall be determined from a running total of 12 months of data. For this purpose, a turbine shall be assumed to emit at the applicable limits as specified above, or the value measured with a continuous emission monitoring system.
- ii. For purpose of determining compliance with the above limits, emissions of NO_x, CO and VOM during an hour that includes a startup shall be assumed to be 25, 400 and 250 percent higher respectively than the limits in Condition 3(d), for example, NO_x emissions during an hour with a startup shall be assumed to be 126.1 lb/hr rather than 100.9 lb/hr as allowed for normal operation, unless an alternative determination of startup emissions is approved by the Illinois EPA in a subsequent permit.

The above limits are established pursuant to 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. The emission of smoke or other particulate matter from a turbine shall not have opacity greater than 30 percent, pursuant to 35 IAC 212.123(a).
- b. 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. 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 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.
 - C. The Permittee shall maintain the turbines in accordance with written procedures developed and maintained by them.
- 5a. This permit is issued based on the source not being a participating source or new participating source under the Emission Reduction Market System (ERMS), 35 IAC Part 205, because its VOM emissions during each seasonal allotment period are less than 10 tons. This reflects an expectation that actual VOM emissions will be much less than allowed by **Condition 3(e)**.
- b. The Permittee shall become subject to the ERMS as a new participating source if the VOM emissions from the source are 10 tons or greater in any seasonal allotment period. In such case, the Permittee shall hold Allotment Trading Units (ATU) for its seasonal emissions in accordance with 35 IAC 205.150(c)(1) and 205.720, beginning with the following seasonal allotment period or the first seasonal allotment period for which the Illinois EPA has issued ATUs, whichever occurs later. For this purpose, the source's VOM emissions shall be determined by the methods and procedures specified in this permit or the Clean Air Act Permit Program (CAAPP) permit for the source.
 - c. The Permittee shall promptly notify the Illinois EPA if the source's VOM emissions are 10 tons or greater in a season [see also **Condition 12(e)**]. By December 31 of the year in which seasonal VOM emissions are first 10 tons or greater, the Permittee shall submit a request for a revision to this construction permit or the source's CAAPP permit to address applicable requirements of the ERMS. This request shall include a certification acknowledging that it will be required to hold ATUs by the end of each reconciliation period and an explanation of the means which it plans to obtain ATUs. [35 IAC 205.310(a) and (g)].
- 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 turbines 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 the turbines commenced postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1). With this notification, the Permittee shall identify the turbines that have been selected for installation.
 - 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 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 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).
- 10a. 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 turbine system to measure emissions of NO_x.
 - b. i. This permit is issued based on the turbines being gas-fired peaking units, as specified in 40 CFR Part 75, so that continuous emission monitoring is not required for NO_x under the federal Acid Rain Program. To maintain this status, the three year rolling average annual capacity factor of a turbine shall not be greater than 10 percent, and the highest annual capacity factor shall not be greater than 20 percent in any one of the three averaging years. (Annual capacity factors of 10 and 20 percent are equivalent to operating for 876 and 1752 hours per year, respectively, at full load.)
 - ii. Should the operation of a turbine exceed the above requirements relating to the definition of a gas-fired peaking unit in 40 CFR 75, the Permittee shall operate the appropriate Continuous Monitoring System(s) on the turbine in compliance with the provisions of the Acid Rain Program by December 31 of the following calendar year, as defined in 40 CFR 75.
- 11a. i. 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 to determine compliance with the NO_x, CO and VOM limits in Condition 1 and 3 in the following manner:

- A. The NO_x emission rate shall be computed for each run using the equation in 40 CFR 60.335(c)(1).
 - B. 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).
 - C. The NO_x, CO and VOM 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).
 - D. NO_x concentrations at all loads shall be corrected to ISO conditions using the appropriate equations supplied by the manufacturer, pursuant to 40 CFR 60.335(c)(2).
 - E. Method 10 of 40 CFR 60, Appendix A, shall be used to determine CO concentrations at peak turbine load.
 - F. Method 18/25A of 40 CFR 60, Appendix A, shall be used to determine VOM concentrations at peak turbine load.
 - G. 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).
- ii. The Permittee shall perform emission tests within 45 days of a written request by the Illinois EPA. The Illinois EPA will require these tests if, based on observations by Field personnel, units are poorly maintained or operated so as to make compliance with permit limitations uncertain.
- b. Performance and certification tests shall be conducted by an approved independent testing service. Tests shall be performed in accordance with applicable USEPA test methods and procedures specified in 40 CFR 60.11, 60.335 and 40 CFR 75 for acid rain affected units or otherwise using applicable USEPA Reference Test Methods of 40 CFR 60, Appendix A.
 - c. The Permittee shall submit a test plan to the Illinois EPA at least 60 day 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 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.
 - 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 ft³);
 - B. Firing rate (million Btu/hr); and
 - 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.
- 12a. The Permittee shall maintain records of the following items:
 - i. The sulfur content of the fuel used to fire the turbines as determined in accordance with **Condition 9**;
 - ii. Fuel consumption (for each turbine) as monitored in accordance with **Condition 8**;
 - iii. 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;
 - iv. Total hours operated on a daily basis; and
 - v. Ambient temperature, by hour, for each hour in which a turbine operates when the ambient temperature is less than or equal to 49°F.
- b. The Permittee shall maintain the following records related to each startup of the turbines:
 - i. Date and time of startup;

- ii. Type of startup, i.e. scheduled or emergency;
 - iii. Whether operating personnel for the turbines or air environmental staff are on site during startup; and
 - iv. 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.
- c. The Permittee shall keep a maintenance/repair log for each turbine.
- d. The Permittee shall maintain the following records at least on a quarterly basis:
 - i. Heat content of the natural gas (Btu/ft³) being fired during the quarter, with supporting documentation;
 - ii. Fuel consumption, operating hours and number of startups for each turbine for each month since the previous record; and
 - iii. The annual emissions of NO_x, SO₂, PM, VOM and CO for each month since the previous record with supporting calculations.
- e. The Permittee shall keep records of the seasonal emissions of VOM (May through September) from the facility.
- f. The Permittee shall maintain records that identify:
 - i. Any periods during which a continuous monitoring system was not operational, with explanation; and
 - ii. Any day in which emission and/or opacity exceeded an applicable standard or limit.
- g. These records shall be retained for at least 3 years and shall be readily available for inspection and copying by the Illinois EPA upon request.
- 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.
- c. In conjunction with the Annual Emission Report required by 35 IAC Part 254, the Permittee shall provide the amount of fuel burned and hours of operation for each CT.

- d. The Permittee shall comply with applicable reporting requirements under the Acid Rain Program. In addition to reporting to USEPA, copies of such reports shall also be provided to the Illinois EPA, upon request.
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 Fax: 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 - Regional Office
1701 South 1st Avenue, 12th Floor
Maywood, Illinois 60153

Telephone: 708/338-7969 Fax: 708/338-7930

15. This Permit for the above referenced project does not relieve the Permittee from 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 Manish Patel at 217/782-2113.

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

DES:MNP

CC: Region 1

Attachment AOption A: (GE Frame 7FA turbines)Table 1Hourly Emission Limits¹ for Each Turbines

<u>Pollutant</u>	<u>Emission Rate (lb/mmBtu)</u>	<u>Hourly Emissions (lb/hr)</u>	
		<u>Amb. temp. greater than 49 °F</u>	<u>Amb. temp. less than or equal to 49 °F</u>
NO _x	0.058/0.064 ²	100.9	112.4
CO	0.054	83.0	93.9
PM/PM ₁₀	0.0055	9.6	9.6
VOM	0.0034	5.2	6.0
SO ₂	0.0024	3.8	4.2

1. Limits based on vendor/manufacture data and information provided in the permit application.
2. These limits reflect achievement of 15 ppm NO_x, or emission rate of 0.058 and 0.064 lb NO_x/mmBtu, above and equal to or below 49 °F ambient temperature, respectively.

Table 2

Total Annual Emission Limits (three turbines)

<u>Pollutant</u>	<u>Emissions (tons/year)²</u>
NO _x	245.0
CO	201.5
PM/PM ₁₀	23.3
VOM	12.6
SO ₂	9.2

1. The total annual emissions for NO_x, CO, PM/PM₁₀, VOM, and SO₂ are based on total natural gas usage of 8,313 mmSCF per year and using the hourly emission rates of base load and ambient temperature above 49°F as indicated in Table 1, as peaking turbines operate primarily in summer months.
2. Annual emission limits include emissions during startup.

Option B: (GE Frame 7EA turbines)

Table 1

Hourly Emission Limits for Each Turbines

<u>Pollutant</u>	<u>Emission Rate (lb/mmBtu)</u>	<u>Hourly Emissions (lb/hr)</u>	
		<u>Amb. temp. greater than 49 °F</u>	<u>Amb. temp. less than or equal to 49 °F</u>
NO _x	0.067/0.076 ²	54.1	61.4
CO	0.076	55.0	61.2
PM/PM ₁₀	0.014	10.8	10.9
VOM	0.0037	2.7	3.0
SO ₂	0.0075	5.3	6.0

1. Limits based on vendor/manufacture data and information provided in the permit application.
2. These limits reflect achievement of 15 ppm NO_x, or emission rate of 0.067 and 0.076 lb NO_x/mmBtu, above and equal to or below 49 °F ambient temperature, respectively.

Table 2

Total Annual Emission Limits¹ (six turbines)

<u>Pollutant</u>	<u>Emissions (tons/year)²</u>
NO _x	236.1
CO	240.0
PM/PM ₁₀	47.1
VOM	11.8
SO ₂	23.1

1. The total annual emissions for NO_x, CO, PM/PM₁₀, VOM, and SO₂ are based on total natural gas usage of 6,888 mmSCF per year and using the hourly emission rates of base load and ambient temperature above 49°F as indicated in Table 1, as peaking turbines operate primarily in summer months.
2. Annual emission limits include emissions during startup.