

**BUREAU OF AIR MANAGEMENT  
NEW SOURCE REVIEW PERMIT  
TO CONSTRUCT AND OPERATE A STATIONARY SOURCE**

Issued pursuant to Title 22a of the Connecticut General Statutes (CGS) and Section 22a-174-3a of the Regulations of Connecticut State Agencies (RCSA).

<b>Owner/Operator</b>	Iroquois Gas Transmission System, L.P./ Iroquois Pipeline Operating Co.
<b>Address</b>	One Corporate Drive, Suite 600, Shelton, CT 06484
<b>Equipment Location</b>	Brookfield Compressor Station, 78 High Meadow Road, Brookfield, CT 06804
<b>Equipment Description</b>	Solar Turbines, Inc. Model Taurus 60 Turbine with SoLoNO <sub>x</sub> and CO Oxidation Catalyst (Phase 2 Only), Unit No. A1
<b>Town-Permit Numbers</b>	028-0027
<b>Premises Number</b>	49
<b>Stack Number</b>	1
<b>Collateral Conditions</b>	Part IV.B.2 - Combined Startup and Shutdown Limit for Permit Nos. 028-0027, 028-0028, 028-0029 and 028-0030  Part IV.C.2 - Combined Annual Emission NO <sub>x</sub> Limits for Permit Nos. 028-0027, 028-0028, 028-0029, 028-0030 and emergency engines EU-3 and EU-6
<b>Permit Issue Date</b>	
<b>Prior Permit Issue Dates</b>	March 3, 2007 (Original) April 14, 2014 (Minor Modification)
<b>Expiration Date</b>	None

\_\_\_\_\_  
Katherine S. Dykes  
Commissioner

\_\_\_\_\_  
Date

This permit specifies necessary terms and conditions for the operation of this equipment to comply with state and federal air quality standards. The Permittee shall at all times comply with the terms and conditions stated herein.

**DRAFT**

## **PART I. DESIGN SPECIFICATIONS**

### **A. General Description**

The Brookfield Compressor Station is an interstate natural gas transmission compressor station. The primary components include simple-cycle low nitrogen oxides (NO<sub>x</sub>) natural gas combustion turbines driving centrifugal natural compressors. The compressors boost natural gas pipeline pressure to transfer natural gas from one pipeline to another.

### **B. Equipment Design Specifications**

1. Turbine
  - a. Maximum Gross Heat Input (MMBtu/hr): 65
  - b. Maximum Fuel Firing Rate:
    - i. 63,352 scf/hr@100% load, 0°F and Higher Heating Value (HHV) = 1026 Btu/scf

### **C. Control Equipment Design Specifications**

1. Low NO<sub>x</sub> Burner (SoLoNO<sub>x</sub> dry lean pre-mixed internal combustor)
  - a. Make and Model: Solar SoLoNO<sub>x</sub> Technology
2. Oxidation Catalyst (Phase 2)
  - a. Pollutants Controlled: Carbon Monoxide (CO)
  - b. Make and Model: Braden (or Equivalent)

### **D. Stack Parameters**

1. Phase 1
  - a. Minimum Stack Height (ft): 50
  - b. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 95,600
  - c. Minimum Stack Exit Temperature at 100% load (°F): 889
  - d. Minimum Distance from Stack to Nearest Property Line (ft): 435
2. Phase 2
  - a. Minimum Stack Height (ft): 69.2
  - b. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 95,600
  - c. Minimum Stack Exit Temperature at 100% load (°F): 889
  - d. Minimum Distance from Stack to Nearest Property Line (ft): 416.4

## **PART II. DEFINITIONS**

- A.** A cold start shall be defined as startup when the turbine has been down for more than 48 hours.
- B.** Phase 1: Time period prior to the addition of oxidation catalyst and changes to stack parameters.
- C.** Phase 2: After physical modification - Time period after the addition of oxidation catalyst and changes to stack parameters.

- DRAFT**
- D. "Low Load/Speed Operation" shall be defined as periods of operation of the turbine with SoLoNO<sub>x</sub> disabled and less than 50% of the maximum rated heat input, excluding startup/shutdown, low temperature events, and malfunctions.
  - E. "Low temperature event" shall be defined as operation of the turbine when the inlet air temperature is below 0 °F.
  - F. "Malfunction" shall be defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment or a process to operate in accordance with the allowable limits in Part IV.A of this permit. Failures that were caused in part by poor maintenance or careless operation are not malfunctions.
  - G. "Shutdown event" shall be defined as the initial lowering of turbine fuel combustion rate beginning once SoLoNO<sub>x</sub> is inactive and ending at the point which the fuel combustion process has stopped.
  - H. "Startup event" shall be defined as the period of time from initiation of fuel combustion until SoLoNO<sub>x</sub> is enabled and active.
  - I. "Steady-state" operation shall be defined as operation of the turbine when SoLoNO<sub>x</sub> is enabled, active and ambient temperatures are above 0°F.
  - J. "Transient event" shall be defined as any infrequent or unplanned operation of the turbine outside of manufacturer warranty conditions, not including startup/shutdown, low load/speed operation, or low temperature events.
  - K. A warm start shall be defined as startup when the turbine has been down for less than 8 hours.

### **PART III. OPERATIONAL CONDITIONS**

#### **A. Equipment**

- 1. Turbine
  - a. Fuel Type: Pipeline Quality Natural Gas
  - b. Maximum Fuel Consumption over any Consecutive 12 Month Period (cf): 554,963,520

#### **B. Control Equipment**

- 1. Low NO<sub>x</sub> Burner (SoLoNO<sub>x</sub> dry lean pre-mixed internal combustor) and Oxidation Catalyst (Phase 2)
  - a. The Permittee shall not operate the turbine without the SoLoNO<sub>x</sub> control device, except as allowed during startup/shutdown, low load/speed operation, transient events, and low temperature events.
  - b. The oxidation catalyst shall not be bypassed at anytime.

## PART IV. ALLOWABLE EMISSION LIMITS

The Permittee shall not cause or allow this equipment to exceed the emission limits stated herein at any time.

# DRAFT

An exceedance of either (i) the emission limits in the tables below, or (ii) the emissions limits developed for this permit due to an emergency, malfunction, or cleaning shall not be deemed a "Federally Permitted Release," as that term is used in 42 U.S.C. 9601(10).

### A. Allowable Short Term Emission Limits

These short term emission limits do not apply during periods of startup and shutdown, unless otherwise noted.

1. Steady State: Turbine Inlet Temperatures above 0 °F and greater than 50% load

Pollutant	lb/hr	lb/MMBtu	ppmvd @ 15% O <sub>2</sub>
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	1.17	1.8E-02	
SO <sub>2</sub>	0.065	1.0E-03	
NO <sub>x</sub>	3.9	6.0E-02	15
VOC	0.2	3.0E-03	
CO (Phase 1)	4.0	6.1E-02	25
CO (Phase 2)	0.16	2.0E-03	1.0

### B. Startup and Shutdown Emissions Limits

The Permittee shall not exceed the emissions limits below and shall abide by the following work practices during periods of startup and shutdown.

	Cold, Warm, & Hot Startup	Shutdown
Maximum Duration of Startup or Shutdown Event (min)	10	10
NO <sub>x</sub> (lb/hr)	4.2	2.4
CO (lb/hr)	25.7	13.2

1. The oxidation catalyst shall not be bypassed during startup or shutdown;
2. The Permittee shall not exceed 500 hours of startup or shutdown for all stationary gas turbines operating at this premises in any calendar year combined. (i.e. Permit Nos. 028-0027, 028-0028, 028-0029, 028-0030.

**C. Annual Emission Limits****1. Criteria Pollutants**

<b>Pollutant</b>	<b>tons per 12 consecutive months (including startup and shutdown events)</b>
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	5.1
SO <sub>2</sub>	0.2
NO <sub>x</sub>	17.1
VOC	1.0
CO (Phase 1)	17.4
CO (Phase 2)	0.7

2. The Permittee shall not cause or allow premises-wide emissions of NO<sub>x</sub> to exceed 38.6 tons during any period of 12 consecutive calendar months. Premises-wide emissions shall include the emissions of all turbines, reciprocating engines and any other ancillary fuel burning equipment installed at the site.

**D. Hazardous Air Pollutants**

This equipment shall not cause an exceedance of the Maximum Allowable Stack Concentration (MASC) for any hazardous air pollutant (HAP) emitted and listed in RCSA §22a-174-29. [STATE ONLY REQUIREMENT]

**E. Opacity**

1. This equipment shall not exceed: [RCSA §22a-174-18(b)(1)(A) and (B)]
- 10% opacity during any six-minute block average as measured by 40 CFR 60, Appendix A, Reference Method 9; or
  - 40% opacity as measured by 40 CFR 60, Appendix A, Reference Method 9, reduced to a one-minute block average.

**F. Demonstration of compliance with the above emission limits may be met by calculating the emission rates using emission factors from the following sources:**

- NO<sub>x</sub> & CO: Most recent Department of Energy and Environmental Protection (DEEP) approved stack test
- PM<sub>10</sub> & PM<sub>2.5</sub>: Manufacturer's Recommended Emission Factor
- VOC: 3.0E-03 lb VOC/MMBtu multiplied by actual Btu value of the fuel consumed by the turbine unit each month (VOC = manufacturer's UHC data multiplied by a 10% VOC fraction)
- NO<sub>x</sub> & CO (startup/shutdown): Solar Turbines Inc., Product Information Letter No. 170, "Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNO<sub>x</sub> Combustion Products", Revision 5, Table 3, 6/13/12 and oxidation catalyst manufacturer's guarantee.
- SO<sub>x</sub>: Mass balance calculation based on Iroquois' fuel gas sulfur content and assuming that all elemental sulfur is converted to SO<sub>2</sub>.

The commissioner may require other means (e.g. stack testing) to demonstrate compliance with the above emission limits, as allowed by state or federal statute, law or regulation.

## **PART V. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS**

# **DRAFT**

### **A. Monitoring**

1. The Permittee shall use individual non-resettable totalizing fuel metering devices or billing meters to continuously monitor fuel feed to the turbine.
2. The Permittee shall maintain an automated alarm system which is triggered when the unit operates at less than 50% of maximum load for more than 10 minutes.
3. The Permittee shall continuously monitor the oxidation catalyst inlet temperature (°F) and differential pressure across the catalyst. The Permittee shall maintain these parameters within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.
4. The Permittee shall comply with the applicable monitoring requirements in accordance with RCSA §22a-174-22e(l).
5. The Permittee shall monitor the status of the SoLoNO<sub>x</sub> operation at all times.
6. The Permittee shall perform inspections of the oxidation catalysts as recommended by the manufacturer.

### **B. Record Keeping**

1. The Permittee shall make and keep records of monthly and consecutive 12 month fuel consumption. The consecutive 12 month fuel consumption shall be determined by adding the current month's fuel consumption to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
2. The Permittee shall calculate and record the monthly and consecutive 12 month PM, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC, and CO emissions in units of tons, the consecutive 12 month emissions shall be determined by adding (for each pollutant) the current month's emissions to that of the previous 11 months. Such records shall include a sample calculation for each pollutant. The Permittee shall make these calculations within 30 days of the end of the previous month.
3. The Permittee shall calculate and record the monthly and 12-month aggregate NO<sub>x</sub> for the premises. The Permittee shall make these calculations within 30 days of the end of the previous month.
4. The Permittee shall make and keep records of hours of startup and shutdown for Permit Nos. 028-0027, 028-0028, 028-0029 and 028-0030, individually and combined.
5. The Permittee shall calculate and record the monthly and consecutive 12 month NO<sub>x</sub> and CO emissions during startup and shutdown emissions. The consecutive 12 month emissions shall be determined by adding (for each pollutant) the current month's emissions to that of the previous 11 months. These emissions shall be counted toward the applicable annual emission limits in Part IV.C of this permit. Such records shall include a sample calculation for each pollutant. The Permittee shall make these calculations within 30 days of the end of the previous month.
6. The Permittee shall comply with the applicable record keeping requirements pursuant to RCSA §22a-174-22e(j).

7. The Permittee shall make and keep records of all alarm events from the system monitoring turbine load. Such records shall include:
  - a. The date, time and turbine's % load when the alarm went off; and
  - b. The duration of the alarm ringing
8. The Permittee shall make and keep records of all exceedances of any operating parameters. Such records shall include:
  - a. the date and time of the exceedance;
  - b. a detailed description of the exceedance; and
  - c. the duration of the exceedance.
9. The Permittee shall make and keep records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the stationary gas turbine and any malfunction of the air pollution control equipment. [40 CFR §60.7(b)]

Such records shall contain the following information:

- a. type of event (startup, shutdown, or malfunction);
  - b. equipment affected;
  - c. date of event;
  - d. duration of event (minutes);
  - e. fuel being used during event; and
  - f. total NO<sub>x</sub> and CO emissions emitted (lb) during the event.
10. The Permittee shall make and keep records of the inspection and maintenance of the oxidation catalysts. The records shall include:
    - a. the name of the person;
    - b. the date;
    - c. the results or actions; and
    - d. the date the catalyst is replaced.
  11. The Permittee shall keep records of all stack testing results.
  12. The Permittee shall make and keep records of the Allowable Stack Concentration (ASC) and MASC calculations for the turbine to show compliance with RCSA §22a-174-29.
  13. The Permittee shall make and keep records indicating the instances when the SoLoNO<sub>x</sub> is disabled while the turbine is in operation, not including startup/shutdown, low load/speed operation, or low temperature events. Such records shall include:
    - a. the date and time the SoLoNO<sub>x</sub> is disabled;
    - b. the duration the SoLoNO<sub>x</sub> is disabled; and
    - c. the reason and corrective action taken.
  14. The Permittee shall make and keep records of any emissions limitation or operating limitation exceedances. Such records shall include:
    - a. the date and time of the exceedance;
    - b. a detailed description of the exceedance;
    - c. the duration of the exceedance; and
    - d. reason and corrective action taken.
  15. The Permittee shall maintain records of the maintenance/repairs/parts replacement of the turbine. The maintenance records shall include, at a minimum, a description of the maintenance activity, the date the maintenance was performed, and cost of service.

16. The Permittee shall record the oxidation catalyst inlet temperature (°F) and differential pressure across the oxidation catalyst, via the plant control system, and record any alarms for deviations outside manufacturers specifications.
17. The Permittee shall keep copies of all reports and notifications submitted in accordance with Part V.C of this permit.
18. The Permittee shall keep a certified copy of this permit on the premises at all times, and shall make this copy available upon request of the Commissioner for the duration of this permit.
19. The Permittee shall make and keep records of any applicable requirement as required by 40 CFR Part 60 Subpart KKKK.
20. The Permittee shall keep all records required by this permit for a period of no less than five years and shall submit such records to the commissioner upon request.

### **C. Reporting**

1. The Permittee shall notify the commissioner, in writing, of the following:
- the date of commencement of Phase 2 construction;
  - the date of initial Phase 2 startup of this equipment; and
  - the date the equipment achieved maximum rated capacity if it is within 180 days of the date reported in Part IV.C.1.b of this permit.

Any required written notifications above shall be submitted to [DEEP.CACU@ct.gov](mailto:DEEP.CACU@ct.gov), [DEEP.SEM@ct.gov](mailto:DEEP.SEM@ct.gov) and [DEEP.BAM.AirPermits@ct.gov](mailto:DEEP.BAM.AirPermits@ct.gov) no later than 30 days after the subject event.

2. The Permittee shall notify the commissioner in writing of any malfunction of the stationary gas turbine, the air pollution control and monitoring equipment, or the continuous monitoring system. The Permittee shall submit such notification within ten days of the malfunction. The notification shall include the following:
- a description of the malfunction and a description of the circumstances surrounding the cause or likely cause of such malfunction; and
  - a description of all corrective actions and preventive measures taken and/or planned with respect to such malfunction and the dates of such actions and measures.
3. The Permittee shall submit all applicable reports in accordance with RCSA §22a-174-22e(k).
4. The Permittee shall submit all applicable reports pursuant to 40 CFR Part 60 Subpart KKKK.
5. The Permittee shall submit the above notifications to the Supervisor of the Compliance Analysis & Coordination Unit, Enforcement Section, Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.

## **PART VI. STACK EMISSION TEST REQUIREMENTS**

- A.** Stack emission testing shall be performed in accordance with the Emission Test Guidelines available on the DEEP website at [www.ct.gov/deep/stacktesting](http://www.ct.gov/deep/stacktesting).

Stack testing shall be required for the following pollutants:

☒ NO<sub>x</sub> (Phase 1 and Phase 2)      ☒ CO (Phase 2)



1. The Permittee shall conduct recurring Phase 1 testing for NO<sub>x</sub> in accordance with Part VI.E of this permit.
  2. The Permittee shall conduct initial Phase 2 testing for NO<sub>x</sub> and CO within 60 days of achieving the maximum production rate, but not later than 180 days after initial startup. The Permittee shall submit test results within 60 days after completion of testing.
- B.** During emissions testing, the maximum rated capacity of the turbine may be corrected for the ambient temperature at the time of stack testing by the following equation (Calculated Maximum Fuel Firing Rate shall be adjusted to one decimal place):
- $$\text{Maximum Fuel Firing Rate} = -0.0007T^2 - 0.0447T + 61.834$$
- Where T = Ambient Air Temperature (°F)
- C.** Recurrent stack testing for CO shall be conducted within five years from the date of the previous stack test.
- D.** The Permittee shall conduct NO<sub>x</sub> testing in accordance with RCSA 22a-174-22e(l) and 40 CFR Part 60 Subpart KKKK.

Stack test results shall be reported as follows: all pollutants in units of lb/hr, lb/MMBtu and ppmvd at 15% O<sub>2</sub>.

The commissioner retains the right to require stack testing of any pollutant at any time to demonstrate compliance.

## **PART VII. OPERATION AND MAINTENANCE REQUIREMENTS**

- A.** The Permittee shall not operate this turbine in steady-state at less than 50% of the maximum load specified by the manufacturer.
- B.** The Permittee shall not operate the unit more than 10 minutes at less than 50% load.
- C.** The Permittee shall operate and maintain this equipment and air pollution control equipment in accordance with the manufacturer's specifications and written recommendations.
- D.** The Permittee shall operate and maintain this equipment, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction.
- E.** The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.
- F.** During any air pollution emergency episode that occurs, the turbine shall be operated in accordance with RCSA §22a-174-6.

## PART VIII. SPECIAL REQUIREMENTS

DRAFT

- A. The Permittee shall comply with all applicable sections of the following New Source Performance Standard(s) at all times.

Title 40 CFR Part 60, Subpart: KKKK and A.

Copies of the Code of Federal Regulations (CFR) are available online at the U.S. Government Printing Office website.

### B. Premises Emissions Summary

1. On January 1<sup>st</sup> of each calendar year, if the potential emissions of NO<sub>x</sub> or VOC from the premises are equal to or greater than 25 tons per year per pollutant, then for such pollutant(s), the Permittee shall:
    - a. Monitor NO<sub>x</sub> and/or VOC emissions, as applicable, from the premises for such calendar year.
    - b. Calculate and record annual NO<sub>x</sub> and/or VOC emissions, as applicable, from the premises for such calendar year, in units of tons. The Permittee shall make these calculations on or before February 1<sup>st</sup> of the following year with respect to the previous calendar year. Such records shall include a sample calculation(s).
    - c. If actual NO<sub>x</sub> and/or VOC emissions, as applicable, from the premises are equal to or greater than 25 tons for such calendar year, the Permittee shall submit to the commissioner, on or before March 1<sup>st</sup> of the following year, an annual emissions summary with respect to the premises for the previous calendar year. Such summary shall be submitted on forms prescribed or provided by the commissioner.
  2. A Permittee is exempt from Part VIII.B.1 requirements of this permit if, on January 1<sup>st</sup> of the subject year, the premises was operating in accordance with any of the following:
    - a. A valid Title V permit issued pursuant to RCSA section 22a-174-33;
    - b. RCSA section 22a-174-33a; or
    - c. RCSA section 22a-174-33b
- C. The Permittee shall commence construction no later than 24 months after receiving the Federal Energy Regulatory Commission's (FERC) Notice to Proceed. This requirement does not supersede the requirement to resubmit Best Available Control Technology (BACT) pursuant to RCSA §22a-174-3a(j)(4). [RCSA §22a-174-3a(f)(2)]
- D. The Permittee shall resubmit for review and approval a BACT analysis if such construction or phased construction has not commenced within the 18 months following the commissioner's approval of the current BACT determination (i.e., the date of this permit) for such construction or phase of construction. [RCSA §22a-174-3a(j)(4)]

## PART IX. ADDITIONAL TERMS AND CONDITIONS

- A. This permit does not relieve the Permittee of the responsibility to conduct, maintain and operate the regulated activity in compliance with all applicable requirements of any federal, municipal or other state agency. Nothing in this permit shall relieve the Permittee of other obligations under applicable federal, state and local law.
- B. Any representative of the DEEP may enter the Permittee's site in accordance with constitutional limitations at all reasonable times without prior notice, for the purposes of inspecting, monitoring and enforcing the terms and conditions of this permit and applicable state law.

- C. This permit may be revoked, suspended, modified or transferred in accordance with applicable law.
- D. This permit is subject to and in no way derogates from any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material, nor any exclusive privileges, and is further subject to any and all public and private rights and to any federal, state or local laws or regulations pertinent to the facility or regulated activity affected thereby. This permit shall neither create nor affect any rights of persons or municipalities who are not parties to this permit.
- E. Any document, including any notice, which is required to be submitted to the commissioner under this permit shall be signed by a duly authorized representative of the Permittee and by the person who is responsible for actually preparing such document, each of whom shall certify in writing as follows: "I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute."
- F. Nothing in this permit shall affect the commissioner's authority to institute any proceeding or take any other action to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resource damages, and to impose penalties for violations of law, including but not limited to violations of this or any other permit issued to the Permittee by the commissioner.
- G. Within 15 days of the date the Permittee becomes aware of a change in any information submitted to the commissioner under this permit, or that any such information was inaccurate or misleading or that any relevant information was omitted, the Permittee shall submit the correct or omitted information to the commissioner.
- H. The date of submission to the commissioner of any document required by this permit shall be the date such document is received by the commissioner. The date of any notice by the commissioner under this permit, including but not limited to notice of approval or disapproval of any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.
- I. Any document required to be submitted to the commissioner under this permit shall, unless otherwise specified in writing by the commissioner, be directed to: Office of Director; Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.