



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

**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).

Owner/Operator	Algonquin Gas Transmission, LLC
Address	P.O. Box 1642, Houston, TX 77251
Equipment Location	Cromwell Compressor Station 252 Shunpike Road, Cromwell, CT 06416
Equipment Description	148.88 MMBtu/hr (13.5 MW) natural gas fired Solar Mars 100-16002S4 turbine (simple cycle) with Oxidation Catalyst and SoLoNOx
Town-Permit Numbers	043-0031
Premises Number	5
Stack Number	9
Permit Issue Date	January 29, 2015
Expiration Date	None

/s/Macky McCleary
Macky McCleary
Deputy Commissioner

1/29/15
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.

PART I. DESIGN SPECIFICATIONS

A. General Description

Algonquin Gas Transmission, LLC (Algonquin) transports natural gas via underground pipelines from New Jersey through southern New England to eastern Massachusetts or in reverse. At several points along the pipeline, the gas must be recompressed to ensure that it continues to move along the pipeline and can be delivered to customers at serviceable pressures. The gas is compressed by gas-fired turbine driven centrifugal compressors and gas-fired reciprocating internal combustion engine compressors. The natural gas used to fuel the gas-fired units comes from Algonquin's pipeline.

B. Equipment Design Specifications

1. Turbine
 - a. Maximum Fuel Firing Rate (scfh): 145,963
 - b. Maximum Gross Heat Input (MMBtu/hr): 148.88

Where the Maximum Gross Heat Input is governed by equation 1 developed based on the Maximum Gross Heat Input Rate vs. Ambient Temperature.

Equation 1:

$$Y: -0.0008X^2 - 0.2049X + 143.2898$$

Where Y= Heat Input (MMBtu/hr)
X= Ambient Air Temperature (°F)

C. Control Equipment Design Specifications

1. Oxidation Catalyst
 - a. Pollutants Controlled: CO and VOC
 - b. Make and Model: EmeraChem or equivalent
 - c. Catalyst Type: Platinum/Palladium
 - d. Destruction Efficiency:
CO: 95%
VOC: 50%
2. SoLoNOx
 - a. Pollutant Controlled: NOx

PART I. DESIGN SPECIFICATIONS, continued

D. Stack Parameters

1. Minimum Stack Height (ft): 78.23
2. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 180,668
3. Minimum Distance from Stack to Property Line (ft): 400

PART II. OPERATIONAL CONDITIONS

A. Equipment

1. Turbine
 - a. Fuel Type: Natural Gas
 - b. Maximum Fuel Consumption over any Consecutive 12 Month Period (MMscf): 1,143
 - c. Maximum Natural Gas Sulfur Content: 20.0 grains/100 scf [40 CFR §60.4365(a)]
 - d. The Permittee shall immediately institute shutdown of the turbine in the event a malfunction cannot be corrected within three hours.

PART III. ALLOWABLE EMISSION LIMITS

The Permittee shall not cause or allow this equipment to exceed the emission limits stated herein at any time, as determined in accordance with the applicable averaging periods defined in Part III of this permit or as specified in an approved stack test protocol.

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. Short Term Emission Limits

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

1. Turbine Inlet Air Temperatures Above 0 °F

Pollutant	lb/hr	lb/MMBtu	ppmvd @ 15% O ₂
PM/ PM ₁₀ / PM _{2.5}	0.95	0.0066	
SO ₂	0.49		
NO _x	4.69	0.032	9.0
VOC	0.50		
CO	0.40		25

2. Turbine Inlet Air Temperatures Between 0 °F and -20 °F

Pollutant	lb/hr
PM/ PM ₁₀ / PM _{2.5}	0.98
SO ₂	0.51
NO _x	22.58
VOC	1.02
CO	1.64

PART III. ALLOWABLE EMISSION LIMITS, continued

3. Turbine Inlet Air Temperatures Below -20 °F

Pollutant	lb/hr
PM/ PM ₁₀ / PM _{2.5}	0.98
SO ₂	0.51
NO _x	64.52
VOC	1.54
CO	2.45

4. The Permittee is not required to demonstrate compliance with the **short term emission limits** stated herein during the initial shakedown period. Emissions during the initial shakedown period shall be counted towards the annual emission limits stated herein. The shakedown period shall not extend beyond the required date for the initial performance tests.

B. Startup and Shutdown Emission Limits (at all temperatures)

Pollutant	Startup Emissions ^{(1)&(2)} (lb/event)	Shutdown Emissions ^{(1)&(2)} (lb/event)
NO _x	1.52	1.76
CO	146.98	8.04 ⁽³⁾

(1) The startup/shutdown values were calculated using Solar information and adjusted to account for site specific temperature, flowrate and startup/shutdown information.

(2) The Permittee shall minimize emissions during periods of startup and shutdown by the following work practices and time constraints:

- The oxidation catalyst shall not be bypassed during startup or shutdown;
- lb/event means “one startup” or “one shutdown;”
- The duration of startup shall not exceed 10 minutes for a hot, warm or cold startup;
- The duration of shutdown shall not exceed 10 minutes; and
- Emissions during these periods shall be counted towards the annual emission limits stated herein.

(3) The shutdown emission limit takes into account the destruction efficiency of 95%.

C. Annual Emission Limits

Criteria Pollutants

Pollutant	Tons per 12 Consecutive Month Period
PM/PM ₁₀ / PM _{2.5}	3.85
SO ₂	1.98
NO _x	19.38
CO	33.05
VOC	2.55
GHG	69,113

PART III. ALLOWABLE EMISSION LIMITS, continued

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 Section 22a-174-29. [STATE ONLY REQUIREMENT]

E. Opacity

This equipment shall not exceed 10% opacity during any six minute block average as measured by 40 CFR Part 60, Appendix A, Reference Method 9.

F. Demonstration of compliance with the above emission limits shall be met by calculating the emission rates using the most recent approved stack test results for that pollutant, or if unavailable, emission factors from the following sources:

1. Turbine Inlet Temperatures Above 0 °F

Criteria Pollutant	Emission Factor	Source
PM/PM ₁₀ /PM _{2.5} Filterable (F) + Condensable (C)	F: 1.9E-03 lb/MMBtu C: 4.7E-03 lb/MMBtu	AP-42, Section 3.1, Table 3.1-2a (April 2000)
NO _x Before initial stack testing	33.00 lb/MMscf	Manufacturer's information
CO Before initial stack testing	2.79 lb/MMscf	Manufacturer's information
VOC Before initial stack testing	3.50 lb/MMscf	Manufacturer's information
SO ₂	0.94 x S lb/MMBtu Where S: percent sulfur in fuel	AP-42, Section 3.1, Table 3.1-2a (April 2000)

2. Turbine Inlet Temperatures Between 0 °F and -20 °F

Criteria Pollutant	Emission Factor	Source
PM/PM ₁₀ /PM _{2.5}	0.98 lb/hr	Emission factors were calculated using Solar information and best engineering judgment.
NO _x	22.58 lb/hr	
CO	1.64 lb/hr	
VOC	1.02 lb/hr	
SO ₂	0.51 lb/hr	

3. Turbine Inlet Temperatures Below -20 °F

Criteria Pollutant	Emission Factor	Source
PM/PM ₁₀ /PM _{2.5}	0.98 lb/hr	Emission factors were calculated using Solar information and best engineering judgment.
NO _x	64.52 lb/hr	
CO	2.45 lb/hr	
VOC	1.54 lb/hr	
SO ₂	0.51 lb/hr	

PART III. ALLOWABLE EMISSION LIMITS, continued

4. Startup/Shutdown

Criteria Pollutant	Startup Emission Factor	Shutdown Emission Factor	Source
NO _x	1.48 lb/event	1.71 lb/event	The startup/shutdown emission factors were calculated using Solar information and best engineering judgment.
CO	143.48 lb/event	7.80 lb/event	

5. 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 IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS

A. Monitoring

1. The Permittee shall use gas metering devices to continuously monitor fuel feed to the turbine to show compliance with the limit in Part II.A.b of this permit.
2. The Permittee shall continuously monitor and continuously record the oxidation catalyst inlet temperature (°F). The Permittee shall maintain this parameter within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.
3. The Permittee shall perform inspections of the oxidation catalysts as recommended by the manufacturer.

B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption in units of standard cubic feet. 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, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC and CO emissions, including startup and shutdown, and malfunction 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 make and keep records of the ASC and MASC calculations for the turbine to show compliance with RCSA section 22a-174-29.
4. The Permittee shall keep records of turbine inlet air temperature on a basis no less frequent than hourly while the turbine is operating during the months in which low ambient temperature are within the realm of reasonability (October, November, December, January, February and March). The Permittee may utilize ambient temperature monitoring data recorded at the nearest observing station which collects National Weather Service (NWS) data for data substitution purposes should the monitoring and recording system which is integral to the turbine malfunction.

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, continued

5. The Permittee shall keep records of the hours of operation when the turbine inlet air is equal to or below 0 °F and greater than -20 °F, including the date and the pertinent number of hours.
6. The Permittee shall keep records of the hours of operation when the turbine inlet air is below -20 °F.
7. The Permittee shall keep records of a current valid purchase contract, tariff sheet, or transportation contract which demonstrates the maximum total sulfur content of the natural gas burned in the combustion turbine.
8. The Permittee shall keep records of all exceedances of any operating parameter. 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.
9. The Permittee shall keep records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the stationary gas turbine; or 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_x and CO emissions emitted (lb) during the event.
10. The Permittee shall keep records of the emissions of this turbine during the initial shakedown period. Emissions during shakedown shall be calculated using good engineering judgment and the best data and methodology available for estimating such emissions. Emissions during shakedown shall be counted towards the annual emission limitation in Part III.C of this permit.
11. The Permittee shall keep records of the inspection and maintenance of the oxidation catalysts. The records shall include:
 - a. the name of the person conducting the inspection or maintenance;
 - b. the date;
 - c. the results or actions; and
 - d. the date the catalyst is replaced.
12. The Permittee shall keep records of stack testing results.
13. The Permittee shall keep records of manufacturer's information for the catalytic oxidizer and SoLoNO_x.
14. 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.

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, continued

C. Reporting

1. The Permittee shall notify the commissioner in writing of any exceedance of an operating parameter, and shall identify the cause or likely cause of such exceedance, all corrective actions and preventive measures taken with respect thereto, and the dates of such actions and measures as follows:
 - a. For any hazardous air pollutant, no later than 24 hours after such exceedance commenced; and
 - b. For any other regulated air pollutant or operating parameter, no later than ten days after such exceedance commenced.
2. The Permittee shall notify the commissioner in writing of any malfunction of the stationary gas turbine or the air pollution control equipment. The Permittee shall submit such notification within ten days of the malfunction. The notification shall include the following:
 - a. a description of the malfunction and a description of the circumstances surrounding the cause or likely cause of such malfunction; and
 - b. 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 notify the commissioner, in writing, of the dates of commencement of construction, initial startup and commencement of commercial operation of this equipment. Such written notifications shall be submitted no later than 30 days after the subject event.
4. 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 V. STACK EMISSION TEST REQUIREMENTS

- A. Stack emission testing shall be performed in accordance with the [Emission Test Guidelines](#) available on the DEEP website.

Initial stack testing shall be required for the following pollutant(s):

PM PM₁₀/PM_{2.5} (filterable + condensable) NO_x CO VOC

- B. The Permittee shall conduct initial stack testing 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.
- C. Annual/biennial stack testing for NO_x shall be performed to demonstrate compliance with the NO_x emission limits in accordance with 40 CFR §60.4400.
- D. Recurrent stack testing for NO_x, CO and VOC shall be performed within five years from the previous stack test to demonstrate compliance with their respective limits.
- E. Stack test results shall be reported as follows:
1. all pollutants in units of lb/hr;
 2. NO_x and CO in units of ppmvd at 15% O₂; and

PART V. STACK EMISSION TEST REQUIREMENTS, continued

3. NO_x and PM in units of lb/MMBtu.
- F. The commissioner retains the right to require stack testing of any pollutant at any time to demonstrate compliance.

PART VI. OPERATION AND MAINTENANCE REQUIREMENTS

- A. The Permittee shall operate and maintain this equipment in accordance with the manufacturer's specifications and written recommendations.
- B. The Permittee shall operate and maintain this equipment and air pollution control equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction.
- C. The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.

PART VII. SPECIAL REQUIREMENTS

- 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

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

- B. The Permittee shall operate this facility at all times in a manner so as not to violate or contribute significantly to the violation of any applicable state noise control regulations, as set forth in RCSA Sections 22a-69-1 through 22a-69-7.4. [STATE ONLY REQUIREMENT]

PART VIII. 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.

PART VIII. ADDITIONAL TERMS AND CONDITIONS, continued

- 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; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.