



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 Power Windsor Locks LLC
Address	26 Canal Bank Road, Windsor Locks, CT 06096
Equipment Location	26 Canal Bank Road, Windsor Locks, CT 06096
Equipment Description	General Electric Gas Turbine Model PB6541(B)
Town-Permit Numbers	213-0029
Premises Number	1
Stack Number	29
Prior Permit Issue Date	November 16, 1988 (Permit to Construct) September 29, 1989 (Temporary Permit to Operate) November 6, 1991 (Permit to Operate) October 29, 1993 (Revision) November 5, 1996 (Revision) June 28, 2018 (Minor Modification)
Revision Issue Date	August 15, 2018
Expiration Date	None

/s/Robert E. Kaliszewski
Robert E. Kaliszewski
Deputy Commissioner

August 15, 2018
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.

Prevention of Significant Deterioration: The following language is for historical purposes only:
This permit was issued pursuant to Section 22a-174-3 of the Regulations of Connecticut State Agencies and pursuant to the Clean Air Act and U.S. Environmental Protection Agency's (U.S. EPA) Prevention of Significant Deterioration (PSD) Regulations (40 CFR Part 52.21) under the authority granted to the Connecticut Department of Environmental Protection by the U.S. EPA on September 29, 1982.

PART I. DESIGN SPECIFICATIONS

A. Equipment Design Specifications

Turbine

1. Maximum Fuel Firing Rates:
 - a. Natural Gas: 539,029.1 ft³/hour
 - b. No. 2 Fuel Oil: 3,755.3 gal/hour
2. Maximum Gross Heat Input:
 - a. Natural Gas: 555.2 MMBtu/hour @ 0°F
 - b. No. 2 Fuel Oil: 529.5 MMBtu/hour @ 0°F

B. Control Equipment Design Specifications

Steam Injection with NO_x limits enforceable by CEM

1. Target Steam/Fuel Ratios:
 - a. Natural Gas: 1.13/1
 - b. No. 2 Fuel Oil: 1.25/1

C. Stack Parameters

1. Minimum Stack Height: 177 feet above grade
2. Minimum Exhaust Gas Flow Rate at Maximum Operation:
 - a. Gas Turbine: 430,965 acfm
 - b. Gas Turbine with the equivalent of one Nebraska boiler: 480,801 acfm
3. Minimum Exhaust Temperature: 325°F Boiler
4. Minimum Distance from Stack to Nearest Property Line: 250 feet

D. Definitions

1. "Event" shall be defined as the time that it takes the combustion turbine to startup or shutdown.
2. "Startup" shall be defined as that period of time from the initiation of combustion turbine firing until the unit reaches steady state operation.
3. "Shutdown" shall be defined as that period of time from the initiation of the shutdown process of the combustion turbine until the point at which the combustion process stopped.

4. "Malfunction" means any sudden and unavoidable failure of air pollution control equipment or of a process to operate in a normal or usual manner.
5. "Nebraska Boiler" means one or both boilers operating in accordance with Permit Nos. 213-0031 and 213-0032.

PART II. OPERATIONAL CONDITIONS

- A. Combustion Turbine:
 1. Fuel Types: Natural Gas, No. 2 Fuel Oil
 2. Maximum No. 2 Fuel Oil Sulfur Content (% by weight, dry basis): 0.05
- B. The Permittee shall operate the equivalent of only one of the two Nebraska boilers at full load simultaneously with the combustion turbine.
- C. The Permittee shall be allowed to burn a combination of No. 2 fuel oil and natural gas for the purpose of maintenance for a period not to exceed one hour per week. During these periods, the gas turbine will be subject to the No. 2 fuel oil allowable emissions in Part III of this permit.
- D. The Permittee shall maintain and operate a Continuous Monitoring System (CMS) for all operating parameters and air pollution control parameters necessary to determine compliance with the limits in this permit.
- E. The Permittee shall shut down the turbine in accordance with the following:

Pollutant/Parameter	Shutdown Limits
NO _x	24 consecutive 1 hour block average > permit limit
Opacity	Five consecutive 6 minute block average > 40%

- F. The Permittee shall operate and maintain this equipment in accordance with the manufacturer's specifications and written recommendations.
- G. 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.
- H. A period of startup or shutdown shall not exceed 180 minutes per event.
- I. The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.

PART III. ALLOWABLE EMISSION LIMITS

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

A. Natural Gas

1. Criteria Pollutants

a. Filterable PM and PM₁₀

Pollutant	lb/hr	ppmvd @ 15% O ₂	lb/MMBtu	Tons per 12 Consecutive Months
PM	7.73		0.014	29.11
PM ₁₀	2.37		4.26E-3	8.87

b. PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO and GHG

Pollutant	lb/hr	ppmvd @ 15% O ₂ ⁽¹⁾	lb/MMBtu	Tons per 12 Consecutive Months
PM	TBD		TBD	TBD
PM ₁₀	TBD		TBD	TBD
PM _{2.5}	TBD		TBD	TBD
SO ₂	0.32			1.21
NO _x	82.28	42		309.8
VOC	14.36		0.026 ⁽¹⁾	54.06
CO	61.85			232.87
GHG				261,241

⁽¹⁾ This limit shall not apply during periods of startup or shutdown

2. Non-Criteria Pollutant

Pollutant	lb/hr	Tons per 12 Consecutive Months
H ₂ SO ₄	0.10	0.29

B. No. 2 Fuel Oil

1. Criteria Pollutants

a. Filterable PM and PM₁₀

Pollutant	lb/hr	ppmvd @ 15% O ₂	lb/MMBtu	Tons per 12 Consecutive Months
PM	18.53		0.035	69.23
PM ₁₀	16.23		3.06E-2	60.63

b. PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO and GHG

Pollutant	lb/hr	ppmvd @ 15% O ₂ ⁽¹⁾	lb/MMBtu	Tons per 12 Consecutive Months
PM	TBD		TBD	TBD
PM ₁₀	TBD		TBD	TBD
PM _{2.5}	TBD		TBD	TBD
SO ₂	26.48			98.90
NO _x	130.25	62		486.6
VOC	13.77		0.026 ⁽¹⁾	51.43
CO	57.71			215.60
Pb	0.007			0.03
GHG				347,295

⁽¹⁾ This limit shall not apply during periods of startup or shutdown

2. Non-Criteria Pollutants

Pollutant	lb/hr	Tons per 12 Consecutive Months
H ₂ SO ₄	3.15	11.78

C. Annual Emission Limits – Combustion Turbine and the Equivalent of One Nebraska Boiler at Maximum Rated Capacity

1. Criteria Pollutants

Pollutant	Tons per 12 Consecutive Months
PM ⁽¹⁾	79.79
PM ₁₀ ⁽¹⁾	66.32
PM _{2.5}	TBD
SO ₂	136.15
NO _x	635.6
VOC	58.44
CO	296.6
Pb	0.032
GHG	458,862

⁽¹⁾ PM/PM₁₀: Filterable Only

2. Non-Criteria Pollutants

Pollutant	Tons per 12 Consecutive Months
H ₂ SO ₄	12.6

3. Emissions during startup and shutdown shall be counted towards the annual emission limits.

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 for any 6 minute block average or 40% instantaneous opacity.

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:

Natural Gas and No. 2 Fuel Oil

- NO_x: CEM
- CO: Emission factor was calculated using CEM data from a Frame 6 turbine and best engineering judgement

- VOC: Emission factor was calculated using CEM CO data from a Frame 6 turbine and best engineering judgement
- PM/PM₁₀/PM_{2.5}, Pb, HAPs: Compilation of Air Pollutant Factors, AP42, Fifth Edition, Section 3.1, April 2000
- SO₂: Mass Balance
- H₂SO₄: Mass balance
- Lead: No. 2 Fuel Oil: AP42, Fifth Edition, Table 3.1-2a (4/00)

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 comply with the CEM requirements as set forth in RCSA Section 22a-174-4, RCSA Section 22a-174-22e, 40 CFR Part 60 Subpart GG and 40 CFR Parts 72-78, if applicable.
2. CEM shall be required for the following pollutant/operational parameters and enforced on the following basis:

Pollutant/Operational Parameter	Averaging Times	Emission Limit
Opacity	six minute block	10%
NO _x (Burning No. 2 Fuel Oil)	1 hour block	62 ppmvd @ 15% O ₂ ⁽¹⁾
NO _x (Burning Natural Gas)	1 hour block	42 ppmvd @ 15% O ₂ ⁽¹⁾
O ₂	1 hour block	

⁽¹⁾ These limits shall not apply during periods of startup or shutdown.

3. The Permittee shall use individual fuel metering devices or billing meters to continuously monitor fuel feed to the turbine.

B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption. The consecutive 12 month fuel consumption shall be determined by adding (for each fuel) 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 keep records of the natural gas quality characteristics in a current, valid purchase contract, tariff sheet or transportation contract for the fuel specifying the maximum total sulfur content for the natural gas.
3. The Permittee shall keep records of the fuel certification for each delivery of fuel oil from a bulk petroleum provider or a copy of the current contract with the fuel supplier supplying the fuel used by the equipment that includes the applicable sulfur content of the fuel as a condition of each shipment. The shipping receipt or contract shall include the date of the delivery, the name of the fuel supplier, type of fuel delivered, and the percentage of sulfur in such fuel, by weight, dry basis, and the method used to determine the sulfur content of such fuel.

4. The Permittee shall calculate and record the monthly and consecutive 12 month PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO and H₂SO₄ emissions in units of tons for natural gas and No. 2 fuel oil separately. 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.

Emissions during startup and shutdown shall be counted towards the annual emission limitation in Part III.C of this permit.

5. The Permittee shall calculate and record the monthly and consecutive 12 month PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO and H₂SO₄ emissions in units of tons for Permit Nos. 213-0029, 213-0031 and 213-0032 combined. The monthly and consecutive 12 month emissions shall be calculated to demonstrate compliance with the annual emission limitation in Part III.C of this permit. The combined consecutive 12 month emissions shall be determined by adding (for each pollutant) the current month's combined 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.
6. 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; and
 - c. the duration of the exceedance.
7. The Permittee shall keep records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the stationary gas turbine; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative. [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, VOC and CO emissions emitted (lb) during the event. VOC and CO emissions during an event, shall be accounted by calculating emissions using the lb/hr allowable emissions in Part III.A.1.b and III.B.1.b of this permit.
8. 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 any exceedance of an emissions limitation or 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, the air pollution control 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. 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 date that No. 2 fuel oil is burned in either the combustion turbine or any of the two Nebraska boilers, after the issuance of the minor modification to Permit Nos. 213-0029, 213-0031 and 213-0032 (Application Nos. 201608189, 201608191 and 201608192). Such written notifications shall be submitted no later than 30 days after the subject event.
4. The Permittee shall submit the above notification 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. Natural Gas

1. Within one year of the date of issuance of the minor permit modification to Permit Nos. 213-0029, 213-0031 and 213-0032 (Application Nos. 201608189, 201608191 and 201608192), the Permittee shall conduct a one time emission test for the following pollutants:
 - PM (Filterable + Condensable) PM₁₀ (Filterable + Condensable)
 - PM_{2.5} (Filterable + Condensable)
2. The Filterable portion of the emission test shall be used to demonstrate compliance with the PM and PM₁₀ emission limits in Part III.A.1.a of this permit.
3. The Permittee shall submit a permit modification application within 90 days of submitting the results of the emission test to incorporate emission limits for PM, PM₁₀ and PM_{2.5}, filterable plus condensable, in Part III.A.1.b and III.B.1.b of this permit.
4. Part V.A.3 shall not be construed as a compliance plan. The commissioner reserves the right to pursue enforcement action based on the outcome of the stack emission testing.

B. No. 2 Fuel Oil

1. Within six months of burning No. 2 fuel oil in the combustion turbine or any of the two Nebraska boilers, after the issuance of the minor modification to Permit Nos. 213-0029, 213-0031 and 213-0032 (Application Nos. 201608189, 201608191 and 2016 08192), the Permittee shall conduct a one time emission test for the following pollutants:
 - PM (Filterable + Condensable) PM₁₀ (Filterable + Condensable)
 - PM_{2.5} (Filterable + Condensable)

2. The Filterable portion of the emissions test shall be used to demonstrate compliance with the PM and PM₁₀ emission limits in Part III.B.1.a of this permit.
 3. The Permittee shall submit a permit modification application within 90 days of submitting the results of the emission test to incorporate emission limits for PM, PM₁₀ and PM_{2.5}, filterable plus condensable, in Part III.A.1.b and III.B.1.b of this permit.
 4. Part V.B.3 shall not be construed as a compliance plan. The commissioner reserves the right to pursue enforcement action based on the outcome of the stack emission testing.
- C. Stack emission testing shall be performed in accordance with the Emission Test Guidelines available on the DEEP website.
- D. The maximum rated capacity of the turbine may be corrected for the ambient temperature at the time of stack testing using Equations 1 and 2 below:

Equation 1: Natural Gas
 $Y: -2,156.12X + 539,029.1$

Ambient Temperature (°F) X	Rated Capacity (ft ³ /hour) Y
100	323,417.1
80	366,539.5
60	409,661.9
40	452,784.3
20	582,151.5
0	539,029.1

Equation 2: No. 2 Fuel Oil
 $Y: -15.02X + 3,755.3$

Ambient Temperature (°F) X	Rated Capacity (gal/hour) Y
100	2,253.3
80	2,553.7
60	2,854.1
40	3,154.5
20	3,454.9
0	3,755.3

- E. Stack test results shall be reported in units of lb/hr and lb/MMBtu.
- F. The Permittee shall submit test results within 60 days after completion of testing.

PART VI. SPECIAL REQUIREMENTS

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

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