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	P.O. Box 289, Windsor Locks, CT 06096-2335
Equipment Location	26 Canal Bank Road, Windsor Locks, CT 06096-2335
Equipment Description	Cogeneration facility consisting of a 15 Megawatt Solar Titan 130 gas turbine with a lean premix combustor, a non-fired heat recovery steam generator, a selective catalytic reduction system and an oxidation catalyst.
Town-Permit Numbers	213-0116
Premises Number	01
Stack Number	34
Permit Issue Date	December 8, 2011 July 31, 2014
Modification Issue Date	October 5, 2018
Expiration Date	None

/s/Robert Kaliszewscki
Robert Kaliszewscki
Deputy Commissioner

October 5, 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.

PART I. DESIGN SPECIFICATIONS

A. General Description

Algonquin Power Windsor Locks LLC (APWL) owns and operates APWL Cogeneration facility located at 26 Canal Bank Road in Windsor Locks. The cogeneration facility includes a 15 MW Solar Titan 130 combustion turbine generator with a lean premix combustor, a non-fired heat recovery steam generator with a selective catalytic reduction (SCR) system and an oxidation catalyst.

B. Equipment Design Specifications

Turbine

1. Maximum Natural Gas Firing Rate[1]: 0.173 MMSCF/hr

2. Maximum Gross Heat Input[1]: 178 MMBtu/hr (natural gas HHV of 1,030 Btu/scf)

[1] at 100% full load, 60% relative humidity, 0 °F and 29.88 inches Hg ambient pressure

C. Control Equipment Design Specifications

1. Selective Catalytic Reduction (SCR)
   a. Make and Model: Haldor Topsoe custom design system
   b. Catalyst Type: DNX-629 or equivalent

2. Oxidation Catalyst
   a. Make and Model: Emerachem custom design system
   b. Catalyst Type: ADCAT or equivalent

D. Stack Parameters

1. Minimum Stack Height: 130 ft (above minimum building grade or 120 ft above turbine foundation)

2. Minimum Exhaust Gas Flow Rate at 100% load: 101,397 acfm

3. Minimum Stack Exit Temperature at 100% load: 301 °F

4. Minimum Distance from Stack to Property Line: 0 ft

PART II. OPERATIONAL CONDITIONS

A. Equipment

1. Turbine
   a. Fuel Type(s): Natural Gas
   b. Maximum Natural Gas Consumption over any Consecutive 12 Month Period: 1,516 MMCF/yr

PART III. ALLOWABLE EMISSION LIMITS

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

A. Short Term Emission Limits

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

1. Criteria Pollutants

   Turbine Operating on Natural Gas

Pollutant	lb/hr	ppmvd @ 15% O_2
PM_{10}/ $PM_{2.5}$	2.66	
SO_2	1.59	
NOx	3.22	5.0
VOC	2.39	
CO	2.37	6.0

2. Non-Criteria Pollutants

Pollutant	ppmvd @ 15% O_2
Ammonia	5.0

B. Startup and Shutdown Emission Limits

1. NOx startup limit: 13.8 lb/event
   NOx shutdown limit: 6.0 lb/event

2. CO startup limit: 740 lb/event
   CO shutdown limit: 405 lb/event

3. The Permittee shall minimize emissions during periods of startup and shutdown by the following work practices and time constraints:
   a. Start the ammonia injection as soon as minimum catalyst temperature is reached;
   b. The oxidation catalyst shall not be bypassed during startup or shutdown;

c. The duration of startup shall not exceed 60 minutes for a hot start;
d. The duration of startup shall not exceed 120 minutes for a warm start;
e. The duration of startup shall not exceed 180 minutes for a cold start;
f. A hot start shall be defined as startup when the turbine has been down for less than 8 hours;
g. A warm start shall be defined as startup when the turbine has been down for more than 8 hours;
h. A cold start shall be defined as startup when the turbine has been down for more than 48 hours;
i. The duration of shutdown shall not exceed 30 minutes; and
j Emissions during these periods shall be counted towards the annual emission limits stated herein.

C. Annual Emission Limits

Pollutant	tons per 12 consecutive months
PM_{10}/ $PM_{2.5}$	11.9
SO_2	7.0
NOx	14.2
VOC	10.9
CO	17.3
GHG	91,323

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 60, Appendix A, Reference Method 9.

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

1. NOx, CO: Stack test data.

2. VOC and Ammonia: Stack test data.

3. SO_2, HAPs: Compilation of Air Pollutant Emission Factors, AP-42, fifth edition, Section 3.1, April 2000 (turbine).

4. PM10/PM2.5: Manufacturer's data

5. NOx (startup/shutdown): Manufacturer's data

6. CO (startup/shutdown): Manufacturer's data

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. CEM shall be required for the following pollutant/operational parameters and enforced on the following basis:

Pollutant/Operational Parameter	Averaging Times	Emission Limit	Units
Fuel Consumption	Continuous	Manufacturer's recommendation	SCF
SCR Temperature	4 hour rolling	Manufacturer's recommendation	°F
SCR Pressure Drop	4 hour rolling	Manufacturer's recommendation	Inches H_2O

2. The Permittee shall use an individual non-resettable totalizing fuel metering devices or billing meters to continuously monitor fuel feed to the turbine.

3. The Permittee shall continuously monitor and continuously record the SCR ammonia injection rate (lb/hr), operating temperature (°F) and pressure drop (inches of water) across the catalyst bed. 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 continuously monitor and continuously record the oxidation catalyst inlet temperature (°F). The Permittee shall maintain this parameter within the range recommended by the manufacturer to achieve compliance with the emission limits in this permit.

5. The Permittee shall perform inspections of the SCR and oxidation catalysts as recommended by the manufacturer.

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 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_{10}, $PM_{2.5}$, SO_2, NOx, 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.**

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

3. 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.

4. The Permittee shall 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_x and CO emissions emitted (lb) during the event.

5. The Permittee shall keep records of each delivery of anhydrous ammonia. The records shall include:
   a. the date of delivery;
   b. the name of the supplier; and
   c. the quantity of ammonia delivered.

6. The Permittee shall keep records of the inspection and maintenance of the SCR and oxidation catalysts. The records shall include:
   a. the name of the inspector;
   b. the date;
   c. the results or actions; and
   d. the date the catalyst is replaced.

7. 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 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.

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):

☒ NOx ☒ CO ☒ VOC ☒ Other (HAPs): Ammonia

Recurrent stack testing for NOx, VOC, CO and ammonia shall be conducted within five years from the date of the previous stack test to demonstrate compliance with their respective limits.

Stack test results shall be reported as follows: all pollutants in units of lb/hr, NOx and CO in units of ppmvd at 15% O_2, ammonia in units of µg/m^3 and ppmvd at 15% O_2.

B. The maximum rated capacity of the turbine may be corrected for the ambient temperature at the time of stack testing using the following equations:

Inlet Temperature °F		Fuel Flow Y = MMSCF/hr X = Actual Inlet Temperature, °F
From	To	Equation
0	59	Y = 0.173 – (X * 0.0003)
60	79	Y = 0.157 – [(X-60) * 0.0004]
80	100	Y = 0.149 – [(X-80) * 0.0005]

Inlet Temperature (°F)	Fuel Flow (MMSCF/hr)
0	0.173
20	0.167
40	0.161
60	0.157
80	0.149
100	0.139

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. 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.

B. The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.

C. The Permittee shall keep records, when turbines are changed for routine maintenance, to include the following:

1. The date the turbine was changed,
2. The reason for the change,
3. Documentation that the replacement turbine is the same make and model number, and
4. Documentation that the replacement turbine does not result in an increase in emissions, the emission of any new pollutants, or increases in electrical output of the turbine.

PART VII. SPECIAL REQUIREMENTS

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

Title 40 CFR Part 60, Subparts KKKK and A.

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

B. In the event that a malfunction causing either an emission exceedance or a parameter monitored out of recommended range is not corrected within three hours, the Permittee shall immediately institute shutdown of the turbine.

C. 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.

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.