



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	Milford Power Company, LLC
Address	55 Shelland Street, Milford, CT 06461
Equipment Location	55 Shelland Street, Milford, CT 06461
Equipment Description	ABB GT-24 combustion turbine train #1 with two natural gas fired chillers
Town-Permit Numbers	105-0068
Premises Number	251
Stack Number	1
Revision Issue Date	August 1, 2019
Prior Permit Issue Dates	April 16, 1999 November 19, 2004 June 26, 2007 September 11, 2014 March 17, 2017 May 18, 2018
Expiration Date	None

/s/Tracy Babbidge for
Betsey C. Wingfield
Deputy Commissioner

8/1/2019
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

ABB GT-24 combustion turbine train with two Caterpillar Model G3516TA natural gas fired chillers

B. Equipment Design Specifications

1. Turbine

a. Maximum Fuel Firing Rates¹:

$T < 0^{\circ}F$: 2.180 MMcf/h (gas), 15,519 gph (oil)

$0^{\circ}F \leq T \leq 100^{\circ}F$: $2.180 - 2.25 \times 10^{-3} \times T$ MMcf/h (gas)
 $15,519 - 16.67 \times T$ gph (oil)

$T > 100^{\circ}F$: 1.955 MMcf/h (gas), 13,852 gph (oil)

b. Maximum Gross Heat Input (MMBTU/hr)^{1,2}:

$T < 0^{\circ}F$: 2,180 (gas), 2,095 (oil)

$0^{\circ}F \leq T \leq 100^{\circ}F$: $2,180 - 2.25 \times T$ (gas)
 $2,095 - 2.25 \times T$ (oil)

$T > 100^{\circ}F$: 1,955 MMcf/h (gas), 1,872 (oil)

¹- T = ambient temperature

²- based on a gross heating value of 1000 Btu/scf

2. Two Natural Gas Fired Chillers

a. Maximum Fuel Firing Rate (scf/h): 9,293 each chiller

C. Control Equipment Design Specifications

1. Low NO_x Burner

a. Make and Model: ABB GT-24 ACS with EV and SEV combustors

b. Guaranteed NO_x Emission Rate (lb/MMBtu): 0.09

c. Design Removal Efficiency (%): Reduce NO_x concentration below 25 ppmvd @ 15% O₂

2. Selective Catalytic Reduction (SCR)

a. Make and Model: MHI or equivalent

b. Catalyst Type: Honeycomb

c. Minimum Gas Flow Rate at Maximum Rated Capacity (acfm): 2,271,500

d. Ammonia Injection Rate at Maximum Rated Capacity (lb/hr): 676

e. Design NO_x Removal Efficiency: Reduce NO_x concentration to 2 ppmvd @ 15% O₂ (gas), 5.9 ppmvd @ 15% O₂ (oil)

3. Oxidation Catalyst

a. Make and Model: Engelhard or equivalent

b. Catalyst Type: Metal substrate catalytic oxidation system

c. Pressure Drop (in. H₂O): 0.7 at design point

- d. Design CO Removal Efficiency: 76%

D. Stack Parameters

- 1. Minimum Stack Height (ft): 135
- 2. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 865,000 (gas), 1,085,000 (oil)
- 3. Minimum Stack Exit Temperature at 100% load (°F): 220
- 4. Minimum Distance from Stack to Property Line (ft): 300

PART II. OPERATIONAL CONDITIONS

A. Equipment

- 1. Turbine
 - a. Fuel Types: Natural gas and No. 2 oil
 - b. Maximum Fuel Consumption over any Consecutive 12 Month Period: 15,663 MMcf (gas) chillers included, 11.08 MMgal (oil)
 - c. Maximum No. 2 Oil Sulfur Content (% by weight, dry basis): 0.05%
 - d. Maximum Allowable Heat Rate on a 12 month rolling basis (MMBtu/kWh net): 7,573
 - e. For start-up, shutdown, fuel switching, equipment tuning and protective load shed, each such event shall not exceed 240 minutes.
- 2. Two Natural Gas Fired Chillers
 - a. Chillers operate independently, as needed, during periods of warmer ambient temperatures.
 - b. Chiller natural gas usage is metered separately from the turbine. The turbine's annual allowance of natural gas includes the chillers' usage.

PART III. DEFINITIONS

- A.** Start-up shall be defined as that period of time from initiation of combustion firing until the unit reaches steady state operation.
- B.** Shutdown shall be defined as that period of time from the initial lowering of the turbine output until the point at which the combustion process has stopped.
- C.** Re-commissioning shall be defined as the manufacturer's required period of equipment tuning conducted after completion of a major inspection. If the unit is commissioned on more than one fuel, re-commissioning on each fuel shall be considered a separate re-commissioning event.
- D.** Malfunction means any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance, careless operation or any other preventable upset condition or careless operation are not malfunctions.
- E.** Protective load shed means an event during which the unit reduces load to less than 50% load without stopping the combustion process, either because of direction from ISO New England or to protect the turbine.

PART IV. 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 V 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).

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

A. Steady State

1. Criteria Pollutants

- a. Turbine operating on natural gas, with or without chillers (50-100% load unless noted). The NO_x and CO emission shall be tracked using CEMS. VOC emissions shall be calculated using the most recent stack test data.

Pollutant	lb/hr	ppmvd @ 15% O ₂	lb/MMBtu ⁷
PM	19.9		0.0095
PM ₁₀	19.9		0.0095
PM _{2.5}	19.9		0.0095
SO ₂	4.4		0.0021
NO _x	14.9	2.0	
VOC ¹	3.0		
VOC ²	2.2		
VOC ³	3.0		
VOC ⁴	3.2		
VOC ⁵	3.7		
VOC ⁶	7.5		
CO (100% load)	13.0		
CO (50-99% load)	52.0		

1 - 50-74% load, all ambient temperatures

2 - 75-99% load, all ambient temperatures

3 - 100% load, ambient temperature up to 60°F

4 - 100% load, ambient temperature 61-70°F

5 - 100% load, ambient temperature 71-80°F

6 - 100% load, ambient temperature 81°F and above

7- This limit shall apply at all times, including periods of start-up and shutdown.

- b. Turbine Operating on No. 2 Oil, with or without chillers (50-100% load unless noted)

Pollutant	lb/hr	ppmvd @ 15% O ₂	lb/MMBtu ³
PM	83.0		0.0392
PM ₁₀	83.0		0.0392
PM _{2.5}	83.0		0.0392

SO ₂	108.0		0.0515
NO _x	47.0	5.9	
VOC ¹	see footnote		
VOC ²	see footnote		
CO	20.6		

¹- 75-100% load ambient temperature 0-59°F. Linear interpolation between 17.2 lb/hr (0°F) and 15.7 lb/hr (59°F)

²- 75-100% load ambient temperature 60-104°F. Linear interpolation between 15.7 lb/hr (60°F) and 14.3 lb/hr (104°F).

³- This limit shall apply at all times, including periods of start-up and shutdown.

2. Non-Criteria Pollutants

For All Operating Scenarios:

Pollutant	ppmvd @ 15% O ₂
Ammonia	10.0

B. Transient Operation

- The Permittee shall not exceed the following emission rates for NO_x, CO and VOC during start-up, shutdown, fuel switching, equipment tuning, protective load shedding and re-commissioning events. The NO_x and CO emission shall be tracked using CEMS. VOC emissions shall be calculated using the most recent stack test data.

Criteria Pollutant	Start-up (lb/event)	Shutdown (lb/event)	Fuel Switching, Equipment Tuning (lb/event)	Protective Load Shed (lb/event)	Re-commissioning ¹ (lb/hr)
NO _x	1,720	530	1,720	2,250	530
CO	770	240	770	1,010	240
VOC	154	48	154	202	48

¹ – During re-commissioning, the maximum duration the unit may operate at these emission limits (not including start-up and shutdown events) is 30 hours. The allowable emissions set forth in Parts IV.A shall apply during the rest of the re-commissioning event.

- Operating requirements for start-up, shutdown and fuel switching, equipment tuning, protective load shed and re-commissioning periods:
 - The frequency and duration of operation during these periods shall be minimized to the maximum extent practicable;
 - All possible steps shall be taken to minimize the impact of emission during these periods;
 - At all times, the turbine shall be operated in a manner consistent with good engineering practice for minimizing emissions and the Permittee shall have the best efforts regarding planning, design and operating procedures to meet the otherwise applicable emission limitation; and
 - The Permittee's actions during these periods shall be documented by properly signed, contemporaneous operating logs or other relevant evidence.

C. Annual Emission Limits

- Criteria Pollutants

Pollutant	tons per 12 consecutive months
PM	103.45
PM ₁₀	103.45
PM _{2.5}	103.45
SO ₂	55.0
NO _x	69.2
VOC	24.0
CO ¹	212.0

- ¹- Based on 50% load, firing natural gas for 8760 hr
2. Hazardous Air Pollutants

Pollutant	tons per 12 consecutive months
Formaldehyde ¹	9.9

¹- Premises-wide limit

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

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 while firing No. 2 oil.

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

- PM (all fractions) and Formaldehyde: Most recent stack test data
- NO_x, CO and NH₃: CEM
- SO₂: Mass balance

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

A. Monitoring

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

Pollutant/Operational Parameter	Averaging Times	Emission Limit
Fuel flow	continuous	n/a

Opacity ¹	six minute block	10%
NO _x	3 hour block	See Part IV
	30 unit operating day rolling average ²	15 ppmvd @ 15% O ₂ (gas) ²
		42 ppmvd @ 15% O ₂ (oil) ²
		96 ppmvd @ 15% O ₂ (< 75% load, gas or oil) ²
CO	1 hour block	See Part IV
O ₂	1 hour block	n/a
NH ₃	24 hour rolling	See Part IV
CO	1 hour block	See Part IV
Ambient temperature	continuous	n/a

¹- Required when firing No. 2 oil only

²- 40 CFR Part 60 Subpart KKKK requirements

2. The Permittee shall use individual non-resettable totalizing fuel metering devices or billing meters to continuously monitor fuel feed to the turbine.
3. The Permittee shall monitor and record the SCR aqueous ammonia 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 monitor and record the oxidation catalyst operating 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.
5. The Permittee shall perform inspections of the SCR and oxidation catalysts as recommended by the manufacturer.
6. The Permittee shall calculate heat input and monitor net electrical output to perform heat rate calculations.
7. In accordance with 40 CFR 60.4345(a), the NO_x diluent CEMS required by this permit, which is installed and certified in accordance with 40 CFR Part 75, is acceptable for use under Subpart KKKK.
8. In accordance with 40 CFR 60.4345(e), the Permittee may satisfy the quality assurance plan requirements of Subpart KKKK by using the QAQC program and plan described in section 1 appendix B to 40 CFR Part 75.

B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption (for each fuel). 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 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 delivery, the name of the fuel supplier, type of fuel delivered, the percentage of sulfur in such fuel, by weight, dry basis, and the method used to determine the sulfur content of such fuel.

3. The Permittee shall calculate and record the monthly and consecutive 12 month PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC and CO emissions in units of tons. Calculations for formaldehyde emissions are to be made on a premises-wide basis. 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 start-up and shutdown shall be counted towards the annual emission limitation in Part IV.C of this permit.

4. The Permittee shall keep records of all exceedances of any emissions limitation or 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.
5. The Permittee shall keep records of the occurrence and duration of any start-up, 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 (start-up, 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.
6. The Permittee shall keep records of each delivery of aqueous ammonia. The records shall include:
 - a. the date of delivery;
 - b. the name of the supplier;
 - c. the quantity of aqueous ammonia delivered; and
 - d. the percentage of ammonia in solution, by weight.
 7. 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 person;
 - b. the date;
 - c. the results or actions; and
 - d. the date the catalyst is replaced.
 8. The Permittee shall keep records of turbine load with ambient temperature. These will be used to determine compliance with VOC emission rates in this permit.
 9. The Permittee shall keep records of event based emissions and event durations in accordance with Part IV.B of this permit.

10. The Permittee shall keep records of all emissions testing performed on the turbine and any emission factors utilized to demonstrate compliance with the requirements of this permit.
11. The Permittee shall keep records of turbine heat rate on a 12 month rolling average basis. The Permittee shall make these calculations within 30 days of the end of the previous month.
12. The Permittee shall keep records of the total actual annual emissions of all criteria pollutants and GHG for Permit Nos. 105-0068 and 105-0069 commencing on the date operation resumed following completion of the first turbine's Alstom MXL upgrade and continuing through the end of the fifth calendar year from the date operation resumed following completion of the last turbine's Alstom MLX upgrade.
The total actual annual emissions (per pollutant) for both turbines, on a calendar year basis, shall be compared to the 24 month average annual baseline emissions (per pollutant) for the turbines for the purposes of determining major modification applicability. In the first calendar year of this comparison, actual emissions prior to the Alstom MLX upgrades shall be included.

This comparison shall be done per calendar year for five years from the date operation resumed for the last turbine upgrade. The representative baseline period has been determined to be January 1, 2013 through December 31, 2014.
13. 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 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 submit an annual report of the records detailed in Part V.B.12 by March 1 of each year for the previous calendar year. The Permittee shall submit this annual report for five years from the date operation resumed following completion of the last turbine's Alstom MLX upgrade.

The report shall be submitted to: Compliance Analysis & Coordination Unit; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, CT 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.

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

PM PM₁₀ PM_{2.5} SO₂ NO_x CO
 VOC Opacity Other (HAPs): Formaldehyde

- B. Stack testing when firing natural gas shall be performed once every five years from the date of the last stack test firing natural gas and stack testing while firing fuel oil shall be performed at least once every five years from the date of the last stack test firing fuel oil or before 700 hours of operation on fuel oil, whichever is longer, for all pollutants listed above with the following exceptions:

- Stack testing shall not be required for SO_x or for pollutants requiring CEMs (NO_x, CO, and NH₃). The commissioner retains the right to require stack testing of any pollutant at any time to demonstrate compliance.
- Metals analysis of the No. 2 fuel oil may substitute for stack testing for metallic HAPs while firing oil.
- Determination of the sulfur content of the natural gas may substitute for stack testing for sulfuric acid and SO_x while firing natural gas.

Stack test results shall be reported as follows: all pollutants in units of lb/hr, NO_x in units of ppmvd @ 15%.

PART VII. 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, 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 start-up, 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.
- D. The Permittee shall immediately institute shutdown of the turbine in the event a malfunction cannot be corrected within three hours.

PART VIII. 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: A and KKKK

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

- B. The Permittee shall comply with all applicable sections of the following National Emission Standards for Hazardous Air Pollutants at all times.

Title 40 CFR Part 63, Subpart: A and ZZZZ

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

- C. The Permittee secured external emission offsets to comply with RCSA §22a-174-3a(l). The offsets were required for NO_x emissions at a rate of 1.2 to 1. The turbines (Permit Nos. 105-0068, 0069) are permitted for 138.4 tpy NO_x total, therefore, 166.1 tons of NO_x offsets were secured, approved and made federally enforceable prior to issuance of the construction permit. These emission offsets were in effect prior to commencement of operation. The Permittee shall maintain sole ownership and possession of these emissions reductions for the duration of this permit and any subsequent changes to the permit.
- D. The Permittee shall comply with all applicable requirements of the Federal Acid Rain Program codified in Title 40 CFR Parts 72-78, inclusive, by the deadlines set forth within the aforementioned regulation.
- E. 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 §§22a-69-1 through 22a-69-7.4. [STATE ONLY REQUIREMENT]

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 §22a-175 of the Connecticut General Statutes, under §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.