



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).

<b>Owner/Operator</b>	PSEG New Haven LLC
<b>Address</b>	600 Connecticut Avenue, New Haven, CT 06512
<b>Equipment Location</b>	600 Connecticut Avenue, New Haven, CT 06512
<b>Equipment Description</b>	GE LM6000PC Combustion Turbine
<b>Town-Permit Numbers</b>	117-0373
<b>Premises Number</b>	551
<b>Stack Number</b>	5
<b>Modification Issue Date</b>	September 13, 2016
<b>Prior Permit Issue Date</b>	1/13/11, 2/21/13 and 8/14/15
<b>Expiration Date</b>	None

/s/Anne Gobin for  
Robert J. Klee  
Commissioner

September 13, 2016  
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 except those noted as equipment design specifications.

## **PART I. DESIGN SPECIFICATIONS**

### **A. General Description**

PSEG Power Connecticut LLC operates three GE LM6000PC combustion turbines at the New Haven Harbor Station facility. The turbines are used to meet peak power demands and alleviate constraints on the power network system. The turbines fire both natural gas and ultra-low sulfur distillate oil (ULSD), and they utilize water injection, selective catalytic reduction and catalytic oxidation for emissions reduction.

This permit contains collateral conditions for the three turbines operating under Permit Nos. 117-0373, 117-0374 and 117-0375. Also there are conditions for the three turbines combined, any such condition is so specified.

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

1. Turbine
  - a. Maximum Fuel Firing Rate(s): 474,827 scf/hr (Natural Gas) and 3,341 gal/hr (ULSD)
  - b. Maximum Gross Heat Input (MMBTU/hr): 484.3 (Natural Gas) and 459.2 (ULSD)
  - c. Nominal Electrical Output (MW): 50

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

1. Water Injection
2. Selective Catalytic Reduction (SCR)
  - a. Make: Haldor Topsoe
  - b. Model No. DNX-629
  - c. Catalyst Type: Corrugated fiber-reinforced titanium dioxide (TiO<sub>2</sub>)
3. Oxidation Catalyst
  - a. Make: Advanced Catalyst Systems, Inc.
  - b. Catalyst Type: Metal honeycomb

### **D. Stack Parameters**

1. Minimum Stack Height (ft): 130
3. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 436,400 (Natural Gas) and 435,600 (ULSD)
4. Minimum Stack Exit Temperature at 100% load (°F): 747 (Natural Gas) and 758 (ULSD)
5. Minimum Distance from Stack to Property Line (ft): 190

## PART II. OPERATIONAL CONDITIONS

### A. Equipment

1. Turbine
  - a. Fuel Type(s): Natural Gas and ULSD
  - b. Maximum Distillate Fuel Oil Sulfur Content (% by weight, dry basis): 0.0015
  - c. Maximum Fuel Consumption over any Consecutive 12 Month Period\*: 1,564 MMscf/yr (Natural Gas); 5,503 Mgal/yr (ULSD)

\*The primary fuel for the turbine shall be Natural Gas when physically available. The turbine shall fire ULSD only during periods when the physical supply of Natural Gas is unavailable, as determined by the Southern Connecticut Gas Company or its successor. During periods of Natural Gas availability, the turbine may operate on ULSD if required for emission testing, maintenance testing of any equipment that requires ULSD operation, and unit testing requested by the Independent System Operator-New England (ISO-NE). The Maximum Fuel Consumption over any Consecutive 12 Month Period outlined above is for all three turbines combined (covered by Permit Nos. 117-0373, 117-0374 and 117-0375).

The allowable fuel usage will be governed by the following equation:

$$\text{Maximum Natural Gas Use} = 1,564 \text{ MMscf/yr} - (0.28421) \times \text{Fuel}_{\text{ULSD}}$$

Where:

Maximum Annual Consumption of Natural Gas when no ULSD is burned = 1,564 MMscf/yr

Constant = 0.28421

Fuel<sub>ULSD</sub> = Annual Consumption of ULSD in Mgal/yr, not to exceed 5,503 Mgal/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, as determined in accordance with the applicable averaging periods defined in Part IV.A.1 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. Steady State (50-100% Load)

1. Criteria Pollutants
  - a. Turbine Operating on Natural Gas

Pollutant	lb/hr	ppmvd @ 15% O <sub>2</sub>
PM <sub>10</sub> /PM <sub>2.5</sub>	6.00	
SO <sub>2</sub>	0.95	
NO <sub>x</sub>	4.38	2.5
VOC	1.11	2.0
CO	5.12	5.0

b. Turbine Operating on ULSD

Pollutant	lb/hr	ppmvd @ 15% O <sub>2</sub>
PM <sub>10</sub> /PM <sub>2.5</sub>	12.0	
SO <sub>2</sub>	0.72	
NO <sub>x</sub>	7.47	5.0
VOC	0.79	1.3
CO	1.00	0.93
Pb	0.01	

2. Non-Criteria Pollutants

For All Operating Scenarios:

Pollutant	ppmvd @ 15% O <sub>2</sub>
Ammonia	5.0
Formaldehyde	0.091

**B. Transient Operation (< 50% Load)**

1. Startup and Shutdown Emission Limits

a. Natural Gas

	Startup	Shutdown
Maximum Duration of Startup or Shutdown Event (min)	30	10
NO <sub>x</sub> * (lb/event)	8.20	3.30
VOC* (lb/event)	1.60	0.40
CO* (lb/event)	18.4	9.00

b. ULSD

	Startup	Shutdown
Maximum Duration of Startup or Shutdown Event (min)	30	10
NO <sub>x</sub> * (lb/event)	17.7	8.90
VOC* (lb/event)	1.50	0.30
CO* (lb/event)	5.10	6.80

\*The values presented are deemed to be representative, by the manufacturer, of uncontrolled emissions during startup and shutdown events from this turbine. These values were used to calculate the final annual emission limits for this turbine.

**C. Annual Emission Limits (Combined for Permit Nos. 117-0373, 117-0374 and 117-0375)**

1. Criteria Pollutants

<b>Pollutant</b>	<b>tons per 12 consecutive months</b>
PM <sub>10</sub> /PM <sub>2.5</sub>	9.9
SO <sub>2</sub>	1.6
NO <sub>x</sub>	11.5
VOC	2.1
CO	12.7
Pb	0.005

**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:**

- NO<sub>x</sub>, CO (Natural Gas): CEMS data
- CO (ULSD): CEMS data
- Ammonia, Formaldehyde, PM<sub>10</sub>/PM<sub>2.5</sub>: Stack test data
- SO<sub>2</sub>, VOC: Manufacturer's data
- HAPs: AP-42, Fifth edition, Section 3.1, April 2000
- NO<sub>x</sub>, CO, VOC (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 CEMS requirements as set forth in RCSA Section 22a-174-4, RCSA §22a-174-22, 40 CFR 60 Subpart KKKK and 40 CFR Parts 72-78, if applicable. CEMS shall be required for the following pollutant/operational parameters and enforced on the following basis:

a. Natural Gas

Pollutant/Operational Parameter	Averaging Times	Emission Limit	Units
NO <sub>x</sub>	1 hour block	2.5	ppmvd @15% O <sub>2</sub>
CO	1 hour block	5.0	ppmvd @15% O <sub>2</sub>
O <sub>2</sub>	1 hour block		None <sup>1</sup>

b. ULSD<sup>2</sup>

Pollutant/Operational Parameter	Averaging Times	Emission Limit	Units
NO <sub>x</sub>	1 hour block	5.0	ppmvd @15% O <sub>2</sub>
CO	1 hour block	0.93	@15% O <sub>2</sub>
O <sub>2</sub>	1 hour block		None <sup>1</sup>

Note 1: Monitoring is required solely to provide basis for correction of actual exhaust gas conditions to dry conditions @ 15% by volume.

Note 2: The following applies during ULSD operation only:

To account for relative accuracy and calibration drift of the CO CEMS, a maximum error of 1.0 ppm is allowed. Therefore, any CO emissions measurement obtained from the CEMS that is less than or equal to 1.93 ppm (and the equivalent lb/hr conversion) shall be considered in compliance with the applicable CO emission limits of this permit.

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 continuously monitor and continuously record the SCR aqueous 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 a 4-hour rolling average of the catalyst inlet temperature 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 or good engineering practices.

**B. Record Keeping**

1. The Permittee shall make and 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 make and 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 oil used by the equipment that includes the applicable sulfur content of the fuel oil 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 oil.
3. The Permittee shall calculate and record the monthly and consecutive 12 month 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. The Permittee shall total the emission of each pollutant for Permit Nos. 117-0373, 117-0374 and 117-0375. 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.1 of this permit.

4. The Permittee make and 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 make and 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<sub>x</sub> and CO emissions emitted (lb) during the event.
6. The Permittee shall make and 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 make and 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 make and 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 that causes an exceedance of any of the limits in this permit. 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.

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

- |  |  |   |  |  |
|--|--|---|--|--|
| <input type="checkbox"/> PM <sub>10</sub> /PM <sub>2.5</sub> | <input type="checkbox"/> PM <sub>2.5</sub> | <input type="checkbox"/> SO <sub>2</sub>                  | <input type="checkbox"/> NO <sub>x</sub> | <input checked="" type="checkbox"/> CO (ULSD operation only) |
| <input type="checkbox"/> VOC                                 | <input type="checkbox"/> Opacity           | <input checked="" type="checkbox"/> Other (HAPs): Ammonia |  |  |

- B.** Recurrent stack testing shall be performed within five years from the previous stack test for the following all pollutants listed in Part V.A with the following exceptions:

- After the initial stack test, stack testing may not be required for pollutants requiring CEMS (NO<sub>x</sub> and CO). The commissioner retains the right to require stack testing of any pollutant at any time to demonstrate compliance.

Stack test results shall be reported as follows: all pollutants in units of lb/hr, CO in units of ppmvd at 15% O<sub>2</sub>, ammonia in units of µg/m<sup>3</sup> and ppmvd at 15% O<sub>2</sub>.

**PART VI. OPERATION AND MAINTENANCE REQUIREMENTS**

- A.** The Permittee shall operate and maintain this equipment in accordance with the manufacturer’s specifications or good engineering practices.
- 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 startup, shutdown, and malfunction.



- C. The Permittee shall keep records when the 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 any air pollutant emissions.
- D. The Permittee shall properly operate the control equipment at all times that this equipment is in operation and emitting air pollutants.
- E. The Permittee shall immediately institute shutdown of the turbine in the event a malfunction cannot be corrected within 60 minutes.

#### **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 Standards of performance for Stationary Combustion Turbines and 40 CFR Part 60 Subpart A General Provisions

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 YYYY National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines and 40 CFR Part 63 Subpart A General Provisions

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

- 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.