



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	United States Naval Submarine Base New London
Address	439 Tautog Avenue, Room 104, Groton, CT 06349-5400
Equipment Location	Building 29, Lower Base, Route 12, Groton, CT 06349
Equipment Description	Cogeneration Facility Consisting of a 5 Megawatt Solar Taurus Turbine and Duct Burner Heat Recovery Steam Generator
Town-Permit Numbers	070-0096
Premises Number	28
Stack Number	10
Prior Permit Issue Dates	July 21, 2016 November 18, 2013 May 3, 2002 April 3, 1997
Modification Issue Date	October 9, 2017
Expiration Date	None

/s/ Anne Gobin for
Robert J. Klee
Commissioner

October 9, 2017
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

The United States Submarine Base New London operates a Solar Taurus 60 turbine and duct burner with a heat recovery steam generator 5 MW combined cycle co-generator system which supplies electrical power and steam for the facility.

B. Equipment Design Specifications

1. Turbine

- a. Maximum Natural Gas Firing Rate (scfh/hr): 73,978
- b. Maximum Gross Heat Input (MMBtu/hr): 73.98

¹ at ISO conditions: 288 Kelvin, 60 percent relative humidity and 101.3 kilopascals pressure

2. Duct Burner

- a. Maximum Natural Gas Firing Rate (scf/hr): 27,600
- b. Maximum Gross Heat Input (MMBtu/hr): 27.60

C. Control Equipment Design Specifications

The cogeneration system shall be equipped with a Low NO_x burner, CO catalyst, and water injection for the turbine.

D. Stack Parameters

1. Minimum Stack Height (ft): 147 (bypass stack 52 feet in height shall be used during HRSG repair and maintenance only)
2. Minimum Exhaust Gas Flow Rate at 100% load (acfm): 4,620
3. Minimum Stack Exit Temperature at 100% load (°F): 315
4. Minimum Distance from Stack to Property Line (ft): 1,580

PART II. OPERATIONAL CONDITIONS

A. Turbine and Duct Burner

1. Fuel Types: Natural Gas
2. Maximum Combined Fuel Consumption over any Consecutive 12-month Period (MMBtu/yr): 691,432

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

a. Turbine

Pollutant	ppmvd @ 15% O ₂	lb/MMBtu
PM		0.014
PM ₁₀		0.014
PM _{2.5}		0.014
SO ₂		0.001
NO _x	25	0.090
VOC		0.030
CO		0.037

b. Turbine and Duct Burner (Duct burner cannot run independently)

Pollutant	lb/MMBtu	lb/hr
PM	0.010	5.90
PM ₁₀	0.010	5.90
PM _{2.5}	0.010	5.90
SO ₂	0.001	30.70
NO _x	0.100	14.76
VOC	0.035	3.74
CO	0.168	28.54

B. Annual Emission Limits

Pollutant	Tons Per 12 Consecutive Months
PM	17.54
PM ₁₀	17.54
PM _{2.5}	17.54
SO ₂	31.33
NO _x	38.47
VOC	12.09
CO	57.20

C. 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]

D. 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.

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

- *Manufacturer's Data*
- *Stack Test Results: NOx and CO*

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 applicable parameter requirements as set forth in RCSA Section(s) 22a-174-4, 22a-174-22, 22a-174-22e, and 40 CFR Part 60 Subpart GG. Monitoring shall be required for the following operational parameters and enforced on the following basis:

Operational Parameter	Averaging Times	Limit	Units
Water to Fuel Ratio	Continuous	0.80 -1.60	lb/lb
Steam Flow	Continuous	Maximum of 40,000	lb/hr

2. The Permittee shall use individual totalizing fuel metering devices to continuously monitor fuel feed to each of the turbine and duct burner.
3. 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.
4. The Permittee shall continuously monitor and continuously record the water to fuel ratio (lb/lb). 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 oxidation catalyst as recommended by the manufacturer.
6. The Permittee shall comply with the applicable monitoring requirements pursuant to RCSA Sections 22a-174-22 and 22a-174-22e.

B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption for the turbine and duct burner combined. 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 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 limitation in Part III.B of this permit.

3. 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.
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/duct burner; 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. total NO_x and CO emissions emitted (lb) during the event.
5. The Permittee shall keep records of the inspection and maintenance of the oxidation catalyst. 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.
 6. The Permittee shall comply with the applicable record keeping requirements of RCSA Sections 22a-174-22 and 22a-174-22e.
 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 submit all required reports to the commissioner as required pursuant to the applicable sections in RCSA Sections 22a-174-22, 22a-174-22e and 40 CFR §60.334(c).

PART V. STACK EMISSION TEST REQUIREMENTS

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):

NO_x CO

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

Turbine Performance Curve:

The maximum heat input, as it pertains to stack testing, for the turbine may be the following:

Equation 1:

$$\text{Heat Input (MMBtu/hr)} = -0.1716 * T1 + 74.142$$

Where:

T1 = Ambient Temperature

The system (turbine and duct burner) is physically limited to producing 40,000 lbs of steam/hr @ 100 psig. During stack testing, the duct burner may be allowed to operate, in conjunction with the turbine, at the heat input required to achieve a minimum of 36,000 pounds of steam/hour at 100 psig, which is 90% of the maximum steam rating of the HSRG.

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, 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 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 at all times.

Title 40 CFR Part 60, Subparts Dc and Gg.

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 RCSEA 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 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.