



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>	Naval Sub Base New London (SUBASENLON)
<b>Address</b>	Public Works Department, Box 400 Groton, CT 06349
<b>Equipment Location</b>	Route 12, Groton, CT 06349
<b>Equipment Description</b>	5,564 kW Rolls Royce Natural Gas Fired Combined Heat and Power (CHP) 4-Stroke Lean-Burn Internal Combustion Engine with SCR and Oxidation Catalyst
<b>Town-Permit Numbers</b>	070-0292
<b>Premises Number</b>	0028
<b>Stack Number</b>	40
<b>Permit Issue Date</b>	September 14, 2020
<b>Expiration Date</b>	None

Betsey Wingfield  
Betsey Wingfield  
Deputy Commissioner

September 14, 2020  
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 Naval Sub Base New London (SUBASENLON) operates a Combined Heat and Power (CHP) plant consisting of two 5,564 kW Rolls Royce natural gas fired CHP 4-Stroke Lean Burn internal combustion engines, Permit Numbers 070-0292 and 0070-0293. Each engine has a separate operating permit and can operate either in combination or separately from the other. The engines are subject to 40 CFR Part 60 Subpart JJJJ and 40 CFR Part 63 Subpart ZZZZ.

The engines use selective catalytic reduction (SCR) and oxidation catalyst for emission controls along with individual heat recovery steam generators (HRSG). All power and steam generated is supplied to SUBASENLON. Each HRSG can be bypassed so that only electrical power is produced.

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

1. Make and Model: Rolls Royce/Bergen Model B35:40V12AG2
2. Maximum Fuel Firing Rate (Mcf/hr): 45.487 (HHV of 1,000 Btu/ft<sup>3</sup>)
3. Maximum Gross Heat Input (MMBtu/hr): 45.487

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

1. Selective Catalytic Reduction (SCR)
  - a. Make and Model: Steuler DeNOx – B3540V12AG2
  - b. SCR Catalyst Volume (ft<sup>3</sup>): 160
  - c. Maximum Pressure Drop Across Catalyst/Mixer (in): 7 in. WC
  - d. Aqueous Urea Solution Concentration (%): 38, by weight
  - e. Maximum Aqueous Urea/Water Consumption Rate (gal/hr): 3.9
  - f. Catalyst Bed Temperature Range (°F): 680 - 860
2. Oxidation Catalyst
  - a. Make and Model: Steuler DeNOx – B3540V12AG2
  - b. Catalyst Type: Honey Comb
  - c. Oxidation Catalyst Volume (ft<sup>3</sup>): 35.58
  - d. Catalyst Bed Temperature Range (°F): 680 - 860

### **D. Stack Parameters**

1. Minimum Stack Height (ft): 100
2. Minimum Exhaust Gas Flow Rate at 100% load (acf m): 22,000
3. Minimum Stack Exit Temperature at 100% load (°F): 315

4. Minimum Distance from Stack to Nearest Property Line (ft): 560

## PART II. OPERATIONAL CONDITIONS

### A. Equipment

1. Engine (U507)
  - a. Fuel Type: Natural Gas
  - b. Maximum Natural Gas Consumption over any Consecutive 12 Month Period (ft<sup>3</sup>/yr): 455,345,000
2. Selective Catalytic Reduction (SCR)
  - a. Maximum Pressure Drop Across Catalyst/Mixer (inches WC): 7
  - b. Maximum Aqueous Urea/Water Consumption Rate (gal/hr): 3.9

### B. Definitions

1. "Steady-state" operation shall be defined as all periods of operation other than transient operation. Minimum steady state operating load shall be 25%.
2. "Load" shall be defined as the net electrical output of the engine.
3. "Transient" operation shall be all modes of operation of the engine during periods of startup, shutdown, fuel switching, run back, and equipment cleaning where engine load is below 25%.

## 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 transient operation, unless otherwise noted.

#### 1. Criteria Pollutants

Pollutant	lb/MMBtu	g/bhp-hr
PM <sub>10</sub>	0.01	
PM <sub>2.5</sub>	0.01	
SO <sub>2</sub>	6.6E-4	
NOx	0.02	0.05
CO	0.008	0.02
VOC	0.02	0.05

#### 2. Non-Criteria Pollutants

For All Operating Scenarios:

Pollutant	ppmvd @ 15% O <sub>2</sub>
Ammonia	5
Formaldehyde	14

## **B. Transient Emission Limits**

1. The Permittee shall not cause or allow this equipment to exceed these limits during transient operation.

<b>Pollutant</b>	<b>lb/hr</b>
NO <sub>x</sub>	17.76
VOC	5.57
CO	35.53

2. The Permittee shall minimize emissions during periods of transient operation by the following work practices and time constraints:
  - a. Start the aqueous urea injection as soon as minimum catalyst temperature is reached;
  - b. The oxidation catalyst shall not be bypassed during transient operation;
  - c. The duration of transient operation shall not exceed 15 minutes;
  - d. Emissions during these periods shall be counted towards the annual emission limits stated herein.

## **C. Annual Emission Limits**

<b>Pollutant</b>	<b>Tons per 12 Consecutive Months</b>
PM <sub>10</sub>	2.0
PM <sub>2.5</sub>	2.0
SO <sub>2</sub>	0.12
NO <sub>x</sub>	3.7
VOC	3.5
CO	2.0

## **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 may be met by calculating the emission rates using emission factors from the following sources:**

- PM<sub>10</sub>/PM<sub>2.5</sub>, SO<sub>2</sub>, HAP (except Formaldehyde, Acrolein, and Ammonia): AP-42, Fifth Edition, Volume 1, Table 3.2-2
- NO<sub>x</sub>, CO, VOC, Formaldehyde, Acrolein, and Ammonia: Most Recent Stack Test Data
- NO<sub>x</sub>, CO, VOC (Transient Emissions): Manufacturer's Data

The Permittee is not required to demonstrate compliance with the short-term emission limits stated herein during the initial shakedown period. Emissions during the initial shakedown period shall be counted towards the annual emission limits stated herein. The shakedown period shall not extend beyond the required date for the initial performance tests.

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 use an individual non-resettable totalizing fuel metering device or billing meter to continuously monitor fuel feed to the engine.
2. The Permittee shall continuously monitor the SCR aqueous urea injection rate (lb/hr), operating temperature (°F) and pressure drop (inches of water) across the catalyst bed for the SCR. The Permittee shall maintain these parameters within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.
3. The Permittee shall continuously monitor 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 perform inspections of the SCR and oxidation catalysts as recommended by the manufacturer.
5. The Permittee shall conduct an inspection and tune-up of the engine a minimum of once per calendar year. Each subsequent annual tune-up shall be performed no earlier than 180 days after the previous tune-up conducted under RCSA Section 22a-174-22e(i)(1). The inspection and tune-up of the emission unit shall be conducted according to the manufacturer's recommended procedures, or, if the manufacturer's recommendations are no longer available, according to best available practices.

### **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<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, 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 limitation in Part III.C of this permit.

3. The Permittee shall continuously record the SCR aqueous urea injection rate (lb/hr), operating temperature (°F) and pressure drop (inches of water) across the catalyst bed for the SCR. 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 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 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.
6. The Permittee shall make and keep records of the occurrence and duration of any transient operation of this equipment; any malfunction of the air pollution control equipment; or any periods during which a 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) to determined compliance with Parts III.B.2 of this permit.
  - f. total NOx, VOC, and CO emissions emitted (lb) during the event.
7. The Permittee shall keep records of each delivery of aqueous urea. The records shall include:
  - a. the date of delivery;
  - b. the name of the supplier;
  - c. the quantity of aqueous urea delivered; and Concentration.
8. 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.
9. The Permittee shall keep records of each tune-up. The records shall include:
  - a. the date on which the engine is tuned-up;
  - b. the name and affiliation of the person performing the tune-up;
  - c. a description of work performed;
  - d. the procedures used to inspect and perform adjustments; and
  - e. copies of all documents submitted to the commissioner pursuant to RCSA §22a-174-22e.
10. The Permittee shall keep records in accordance with 40 CFR §63.6655, as applicable.

11. 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 engine or the air pollution control equipment. 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 of commencement of construction and the date of initial startup of this equipment. Such written notifications shall be submitted no later than 30 days after the subject event.

**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 at [www.ct.gov/dep/stacktesting](http://www.ct.gov/dep/stacktesting).
- B. Initial stack testing shall be required for the following pollutants:

NOx       CO       VOC  
 Other (HAPs): Ammonia, Acrolein, Formaldehyde, and PAH
- C. The Permittee shall conduct initial stack testing within 60 days after achieving the maximum production rate, but not later than 180 days after initial startup. The Permittee shall submit test results within 60 days after completion of testing.
- D. Recurrent stack testing for NOx, CO, and VOC shall be conducted every three years from the date of the previous stack test to demonstrate compliance with their respective limits.
- E. Stack test results shall be reported as follows: All criteria pollutants in units of lb/MMBtu; NOx, CO, and VOC in units of g/bhp-hr; HAP in units of ug/m<sup>3</sup>; Formaldehyde in units of 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 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 JJJJ and A.

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, Subparts ZZZZ and A.

Copies of the CFR are available online at the U.S. Government Printing Office website.

- C. Premises Emissions Summary**

1. On January 1<sup>st</sup> of each calendar year, if the potential emissions of NOx and/or VOC from the premises are equal to or greater than 25 tons per year per pollutant, then for such pollutant(s), the Permittee shall:
  - a. Monitor NOx and/or VOC emissions, as applicable, from the premises for such calendar year.
  - b. Calculate and record annual NOx and/or VOC emissions, as applicable, from the premises for such calendar year, in units of tons. The Permittee shall make these calculations on or before February 1<sup>st</sup> of the following year with respect to the previous calendar year. Such records shall include a sample calculation(s).
  - c. If actual NOx and/or VOC emissions, as applicable, from the premises are equal to or greater than 25 tons for such calendar year, the Permittee shall submit to the commissioner, on or before March 1<sup>st</sup> of the following year, an annual emissions summary with respect to the premises for the previous calendar year. Such summary shall be submitted on forms prescribed or provided by the commissioner.
2. A Permittee with either of the following premises is exempt from Part VII.C.1 requirements of this permit if, on January 1<sup>st</sup> of the subject year, the:
  - a. Premises is operating in accordance with a valid Title V permit issued pursuant to RCSA section 22a-174-33; or
  - b. Premises is operating in accordance with a valid Approval of Registration issued pursuant to the General Permit to Limit Potential to Emit from Major Stationary

- D.** 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 engine.
- F.** The Permittee shall notify the commissioner, in writing, of the commencement of construction, completion of construction and commencement of commercial operation of this equipment. Such written notifications shall be submitted no later than 30 days after the subject event.
- G.** 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]
- H.** The Permittee shall resubmit for review and approval a Best Available Control Technology (BACT) analysis if such construction or phased construction has not commenced within the 18 months following the commissioner's approval of the current BACT determination (i.e., the date of this permit) for such construction or phase of construction. [RCSA §22a-174-3a(j)(4)]

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