



**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>	Pratt & Whitney, Division of Raytheon Technologies Corporation
<b>Address</b>	400 Main Street, East Hartford, CT 06118
<b>Equipment Location</b>	400 Main Street, East Hartford, CT 06118
<b>Equipment Description</b>	FT-8 Stationary Gas Turbine Cogeneration System
<b>Town-Permit Numbers</b>	053-0049
<b>Premises Number</b>	0009
<b>Stack Number</b>	107
<b>Collateral Conditions</b>	This permit contains collateral conditions affecting three registered boilers as specified in Parts VII.A.- C. of this permit.
<b>Modification Issue Date</b>	March 30, 2023
<b>Prior Permit Issue Dates</b>	July 19, 2013 July 19, 2006 September 8, 2004 August 2, 2002 February 15, 2001 July 28, 1995 October 10, 1991 – Permit to Construct
<b>Expiration Date</b>	None

for

Katherine S. Dykes  
 Commissioner

March 30, 2023

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 FT-8 Stationary Gas Turbine Cogeneration System is a cogeneration cycle gas turbine plant used to produce both power and steam for use in heating and manufacturing process applications at Pratt & Whitney's East Hartford plant. It is also used for research and design purposes for engines manufactured at the plant.

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

1. Fuel Types: Natural Gas (NG), Ultra-Low Sulfur Diesel (ULSD)
2. Maximum Fuel Firing Rates: 359,000 ft<sup>3</sup>/hr (NG), 2,473 gal/hr (ULSD)
3. Maximum Gross Heat Input (MMBTU/hr): 365.7 (NG), 332.6 (ULSD)

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

1. Selective Catalytic Reduction (SCR)
  - a. Make and Model: Cormetech
  - b. Catalyst Type: Fixed bed ceramic honeycomb
  - c. Inlet Temperature to Catalyst (°F): 500-760 (at ISO Standard Conditions)
  - d. Reagent: Anhydrous Ammonia, Aqueous Ammonia or Urea
  - e. Reagent Injection Rate at Maximum Rated Capacity: 21 lb/hr of ammonia (or equivalent)
  - f. Design Removal Efficiency (%): 83.3% (at ISO Standard Conditions)
2. Water Injection
  - a. Make and Model: TP&M Water Injection Skid
  - b. Water to Fuel Ratio (lb/lb): 0.40 to 1.30
  - c. Water Injection Rate on Natural Gas (lb/hr): 2,550-19,129
  - d. Water Injection Rate on ULSD (lb/hr): 3,825 – 21,965

### **D. Stack Parameters**

1. Minimum Stack Height (ft): 132
2. Minimum Exhaust Gas Flow Rate (acfm): 245,157
3. Minimum Stack Exit Temperature (°F): 325 (at ISO Standard Conditions)
4. Minimum Distance from Stack to Property Line (ft): 50

## PART II. OPERATIONAL CONDITIONS

### A. Equipment

1. Maximum Fuel Consumption over any Consecutive 12 Month Period: No restrictions on Natural Gas, 6,145,400 gallons (ULSD)
2. Maximum ULSD Sulfur Content (% by weight, dry basis): 0.0015
3. The Permittee shall not supply more than one-third of the cogeneration equipment's potential electric output capacity on an annual basis to any utility power distribution system for sale.

### B. Start-up, Shutdown, and Malfunction Operation:

1. Start-up shall be defined as that period of time from which initiation of combustion turbine firing until the unit reaches steady-state operation. This period shall not exceed 60 minutes for a hot start, nor 180 minutes for a cold start. A cold start shall be defined as start-up when the turbine has been down for more than 24 hours.
2. Shutdown shall be defined as that period of time from the initial lowering of the turbine output to the cessation of turbine operation. This period shall not exceed 30 minutes.
3. Malfunction is defined in 40 CFR §60.2.
4. The hours of start-up and shutdown, in which NO<sub>x</sub> emissions exceed 9 ppmvd, shall not exceed 250 hours in any consecutive 12-month period.
5. During periods of start-up, and shutdown, NO<sub>x</sub> emissions shall not exceed 66.6 pounds per cold start, 22.2 pounds per hot start, or 11.1 pounds per shutdown, as measured from CEMS data, excluding data collected during monitor calibrations, maintenance, and data reported to and accepted by the Department in quarterly CEM and Quality Assurance Reports as invalid.
6. During periods of start-up, shutdown, and malfunction, opacity shall not exceed 20% during any six-minute block average.

## 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. Pollutant Emission Limits

Pollutant	ppmvd @ 15% O <sub>2</sub>	tpy
PM		12.53
PM <sub>10</sub>		12.53
PM <sub>2.5</sub>		12.53
SO <sub>2</sub>		0.96
NO <sub>x</sub>	9.0*	42.62
VOC		3.36
CO		77.77
Pb		0.006
H <sub>2</sub> SO <sub>4</sub>		0.753
Ammonia	10.0	19.14

\* This limit shall apply at all times except during start-up, shutdown, and malfunction as specified in Part II.B.5, above.

- B. 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 RCSCA Section 22a-174-29. [STATE ONLY REQUIREMENT]
- C. Opacity:** Except as specified in Part II.B.6., this equipment shall not exceed 10% opacity during any six minute block average as measured by 40 CFR 60, Appendix A, Reference Method 9.

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>: CEMS
- CO: Pratt & Whitney Power Systems emission test data for FT-8 turbines operating at base load or higher, as listed below:
 

<u>Natural Gas Fired</u>	<u>lb/MMBTU</u>
CO	0.049
<u>ULSD Fired</u>	
CO	0.024
- PM, SO<sub>2</sub>, VOC, & PM (for all fuels): Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Table 3.1-2a, April 2000.
- H<sub>2</sub>SO<sub>4</sub> (ULSD): CTDEEP emission factor of 2.45\*S lb/1000 gal for liquid fuel, where S is the maximum percent sulfur content by weight.
- Ammonia: Calculation from 10 ppmvd.
- Hazardous Air Pollutants: Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Tables 3.1-3 to 5, pages 3.1-13 to 15, April 2000.

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 install, certify, maintain, operate, and quality-assure a CEM system consisting of NO<sub>x</sub>, O<sub>2</sub>, and opacity monitors. The CEMS shall be installed, certified, maintained, and operated in accordance with 40 CFR §60.334(b) and RCSCA 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
Opacity	6 minute block	10	%
Opacity during start-up, shutdown, or malfunction	6 minute block	20	%
NO <sub>x</sub>	4 hour rolling*	9.0	ppmvd @ 15% O <sub>2</sub>
O <sub>2</sub>	1 hour block		

\* Calculated as the arithmetic average of the average NO<sub>x</sub> concentration measured by the

CEMS for a given hour (corrected to 15 percent O<sub>2</sub>) and the three unit operating hour average NO<sub>x</sub> concentrations immediately preceding that unit operating hour.

- a. All CEM equipment shall be operated in compliance with RCSA §22a-174-4a. The NO<sub>x</sub> CEMS shall include a dual range analyzer capable of measuring during all modes of turbine operation or shall be otherwise capable of measuring the full range of NO<sub>x</sub> emissions from the unit including emissions during startup, shutdown, and malfunctions. NO<sub>x</sub> data will be corrected to a dry basis and 15% O<sub>2</sub>.
  - b. Continuous emissions monitoring shall be required during all periods of operation, including periods of start-up, shutdown, malfunctions, or emergency conditions.
  - c. The Permittee shall operate an opacity monitor to continuously monitor visible emissions during any period when ULSD is fired in the turbine.
2. The Permittee shall monitor the total sulfur content of all liquid fuel being fired in the turbine. The sulfur content of the fuel must be determined using the total sulfur methods described in 40 CFR §60.335(b)(10) as required by 40 CFR §60.334(h)(1), and RCSA section 22a-174-19b(f)(3) and (4). The sampling frequency shall be conducted as described in sections 2.2.3, 2.2.4.1, 2.2.4.2, and 2.2.4.3 of 40 CFR Part 75 Appendix D. [40 CFR §60.334(i)(1)] The fuel analyses required under 40 CFR §60.335(b)(10) may be performed by the Permittee, a service contractor retained by the Permittee, the fuel vendor, or any other qualified agency. [40 CFR §60.335(b)(11)]
  3. The Permittee shall install and operate a continuous monitoring system to monitor and record the ammonia injection rate on an hourly basis.
  4. The Permittee shall inspect the SCR catalyst once per year, at a minimum, and replace it as required through the monitoring of catalyst test pieces.

## **B. Record Keeping**

1. The Permittee shall keep records of monthly and consecutive 12 month natural gas and ULSD consumption. 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 sulfur content of liquid fuel being fired in this turbine per Part VII.D. of this permit.
3. The Permittee shall keep records of the inspection of the SCR catalyst. The records shall include the name of the person inspecting the SCR catalyst, the date of inspection, the results of the inspection, and the date the catalyst is replaced.
4. The Permittee shall maintain records of the occurrence and duration of any start-up and shutdown, of the stationary gas turbine.
5. The permitted shall keep records of the occurrence of each malfunction of the turbine and of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative.
  - a. The records shall include:
    - i. Date of event;
    - ii. Duration of the event;
    - iii. Equipment affected
    - iv. A description of the event and a description of the circumstances surrounding the cause or likely cause of the event; and

- v. description of corrective actions and preventative measures taken or planned with respect to malfunction.
6. The Permittee shall keep records of when the turbine is changed for routine maintenance, to include the following:
    - a. The date the turbine was changed;
    - b. The reason for the change;
    - c. Documentation that the replacement turbine is the same make and model; and
    - d. Documentation showing that the replacement turbine does not result in an increase in emissions, the emission of any new air pollutants, or increases in electrical output of the turbine.
  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 review all data required by this permit daily. The Permittee shall notify the commissioner, in writing, of any deviation from an emissions limitation, and shall identify the cause or likely cause of such deviation, all corrective actions and preventative measures taken with respect thereto, and the dates of such actions and measures no later than ten (10) days after such deviation commenced.
2. The Permittee shall submit reports of excess emissions and monitor downtime to the Administrator/commissioner, in accordance with 40 CFR §60.7(c). For the purpose of reports required under §60.7(c), periods of excess emissions that shall be reported are defined in 40 CFR §60.334(j). The Permittee shall meet this requirement by submitting the Quarterly Report to the commissioner.
3. The Permittee shall furnish the Administrator/commissioner written notification as required by 40 CFR §60.7(a).

## **PART V. 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 the turbine, 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 malfunctions events
- C. The Permittee shall comply with the conditions of this permit when operating either production or R&D engines.

## **PART VI. SPECIAL REQUIREMENTS**

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

Title 40 CFR Part 60, Subparts GG 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 not cause or permit the emission of any substance or combination of substances which creates or contributes to an odor beyond the property boundary of the premises that constitutes a nuisance as set forth in RCSA Section 22a-174-23. [STATE ONLY REQUIREMENT]
- 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 VII. PREMISES-WIDE REQUIREMENTS**

- A.** The Permittee shall burn an aggregate of no greater than 23,500,000 gallons per year of ULSD over any consecutive 12-month period in boilers 6, 8 & 9 (registration numbers 053-0039, -0041, and -0042) at the Pratt & Whitney, 400 Main Street, East Hartford, Connecticut plant. The Permittee shall operate the three boilers on fuels with a sulfur content of no greater than 0.0015%, dry weight basis.
- B.** The Permittee shall install, maintain, and operate fuel metering devices for the sources listed in Part VII.A. of this permit, unless natural gas utility meters are already used for that purpose.
- C.** The Permittee shall make and keep records of the monthly and consecutive 12-month fuel usage for the sources listed in Part VII.A of this permit. The consecutive 12-month fuel usage shall be determined by adding the current month's fuel usage to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.
- C.** The Permittee shall make and keep records of the sulfur content of each shipment of liquid fuel received at the 400 Main Street, East Hartford plant, either by (1) a shipping receipt and certification from the fuel supplier, or (2) performing an analysis using the method in item IV.A.2. of this permit, or (3) a copy of a current fuel supplier contract. Records for a fuel certification and analysis shall include the following information: 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. Records for a current contract shall include the following information: the name of the fuel supplier and type or grade of fuel delivered.

### **D. Premises Emissions Summary**

- 1. On January 1<sup>st</sup> of each calendar year, if the potential emissions of NO<sub>x</sub> 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 NO<sub>x</sub> and/or VOC emissions, as applicable, from the premises for such calendar year.
  - b. Calculate and record annual NO<sub>x</sub> 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 NO<sub>x</sub> 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 is exempt from Part VII.C.1 requirements of this permit if, on January 1st of the subject year, the premises was operating in accordance with any of the following:
  - a. A valid Title V permit issued pursuant to RCSA section 22a-174-33;
  - b. RCSA section 22a-174-33a; or
  - c. RCSA section 22a-174-33b

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