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	Pfizer, Inc.
Address	445 Eastern Point Road, Groton, CT 06340
Equipment Location	445 Eastern Point Road, Groton, CT 06340
Equipment Description	Combine Heat and Power Cogeneration Facility Consisting of a Solar Mars 100s Turbine with Coen Duct Burner and Deltak Heat Recovery Steam Generator
Town-Permit Numbers	070-0268
Premises Number	0004
Stack Number	175
Modification Issue Date	June 30, 2014
Prior Permit Issue Date(s)	July 16, 2008
Expiration Date	None

/s/ Anne Gobin for
Robert J. Klee
Commissioner

June 30, 2014
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

Pfizer Inc. operates a pharmaceutical research and development facility in Groton, CT. This combined-cycle cogeneration plant is designed to generate 10.5 MW of electricity and approximately 110,000 pounds of steam per hour. It consists of three main components: a turbine, duct burner, and a Heat Recovery Steam Generator (HRSG). The turbine can be run by itself or in conjunction with the duct burner to produce high pressure steam for the HRSG; however, the duct burner is not capable of being operated alone. The system will provide a portion of the site's steam and electricity needs.

B. Equipment Design Specifications

1. Turbine
   a. Maximum Natural Gas Firing Rate (MMSCF/hr): 0.129
   b. Maximum No. 2 Oil Firing Rate (gal/hr): 906.6
   c. Maximum Gross Heat Input (MMBTU/hr): 131.8 natural gas; 126.9 No. 2 oil

   Maximum firing rates shown above correspond to 20 °F, 60% relative humidity and 101.3 kpa, per the manufacturer's firing rate vs. ambient temperature design values. The achievable maximum firing rates are dependent on actual ambient temperatures as expressed by the following equations:

   Natural Gas MMSCFH = $7.5843E\text{-}09*T^3 - 2.2441E\text{-}06*T^2 - 1.4098E\text{-}04*T + 0.13305$

   No. 2 Oil GPH = $5.6006E\text{-}05*T^3 - 1.1164E\text{-}02*T^2 - 1.9854*T + 9.4949E+02$

   Where T is in degree Fahrenheit (°F).

2. Duct Burner
   a. Maximum Fuel Firing Rate (MMSCF): 0.094
   b. Maximum Gross Heat Input (MMBTU/hr): 96

C. Control Equipment Design Specifications

1. Selective Catalytic Reduction (SCR)
   a. Make and Model: Haldor Topsoe DNX920 or Cormetech CM-21 or Cormetech CM-27 or equivalent
   b. Catalyst Type: Homogenous Honeycomb/$Tio_2/V_2O_5/WO_3$

2. Oxidation Catalyst
   a. Make and Model: Emerachem ADCAT or BASF CAMET or equivalent
   b. Catalyst Type: Platinum or aluminum oxide

3. Low NOx Burner
   a. Make and Model: Turbine: SoloNOx dry low NOx combustor; Duct Burner: Coen low NOx burner

D. Stack Parameters

1. Minimum Stack Height (ft): 160

2. Stack Exit Diameter (ft): 7

3. Minimum Exhaust Gas Flow Rates at 90% of Maximum Rate (acfm):
   a. 48,420 for turbine & duct burner on gas
   b. 49,292 for turbine on oil & duct burner on gas
   c. 27,037 for turbine alone on gas
   d. 27,908 for turbine alone on oil

4. Typical Stack Exit Temperature (°F): 350

5. Minimum Distance from Stack to Property Line (ft): 583

PART II. OPERATIONAL CONDITIONS

A. Equipment

1. Turbine
   a. Fuel Type(s): Natural Gas, No. 2 Oil
   b. Maximum Fuel Consumption over any Consecutive 12 Month Period: 1,132 MMSCF of natural gas; 7,252,800 gallons of No. 2 oil
   c. Maximum Oil Sulfur Content (% by weight, dry basis): 0.0015

2. Duct Burner
   a. Fuel Type(s): Natural gas
   b. Maximum Fuel Consumption over any Consecutive 12 Month Period: 824.5 MMSCF of natural gas

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 Operating on Natural Gas

Pollutant	lb/hr	lb/MMBtu*
$PM_{10}/PM_{2.5}$	5.52	0.027
SO_2	0.45	
NOx	1.60	
VOC	4.25	
CO	1.48	

b. Turbine Operating on Oil

Pollutant	lb/hr	lb/MMBtu*
$PM_{10}/PM_{2.5}$	7.74	0.038
SO_2	0.21	
NOx	4.69	
VOC	4.28	
CO	1.48	
Pb	1.78E-3	

c. Duct Burner Operating on Natural Gas**

Pollutant	lb/hr
$PM_{10}/PM_{2.5}$	0.71
SO_2	0.06
NOx	1.39
VOC	0.52
CO	0.79

d. For All Operating Scenarios

Pollutant	ppmvd @15% O_2
NOx (natural gas)	3.3
NOx (No. 2 oil)	9.0
CO	6.0
Ammonia	5.0

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

** The duct burner cannot be operated independently from the turbine. When the duct burner is operating the duct burner's allowable hourly limits shall be added to the turbine's allowable hourly limits for (as stated above) oil or natural gas depending on which operational mode applies.

B. Startup and Shutdown Emission Limits

The Permittee shall minimize emissions during periods of startup and shutdown by the following work practices and time constraints:

1. Start the ammonia injection as soon as minimum catalyst temperature is reached;

2. The oxidation catalyst shall not be bypassed during startup or shutdown;

3. The duration of startup shall not exceed 60 minutes for a hot start;

4. The duration of startup shall not exceed 60 minutes for a warm start;

5. The duration of startup shall not exceed 240 minutes for a cold start;

6. A hot start shall be defined as startup when the turbine has been down for less than 8 hours;

7. A warm start shall be defined as startup when the turbine has been down for more than 8 hours;

8. A cold start shall be defined as startup when the turbine has been down for more than 24 hours;

9. The duration of shutdown shall not exceed 30 minutes; and

10. Emissions during these periods shall be counted towards the annual emission limits stated herein.

C. Annual Emission Limits

Pollutant	tons per 12 consecutive months
$PM_{10}/PM_{2.5}$	34.1
SO_2	2.3
NOx	24.9
VOC	20.9
CO	10.0
Pb	7.1E-03

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:

- PM_{10}, $PM_{2.5}$, NOx, CO, VOC, Ammonia: Most recent Stack Test Results
- SO_2, Pb, HAPs: Compilation of Air Pollutant Emission Factors, AP-42, fifth edition, Section 3.1, April 2000 (turbine) and Section 1.4, July 1998 (duct burner).

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 individual non-resettable totalizing fuel metering devices to continuously monitor the natural gas and No. 2 oil feed to the turbine and the natural gas feed to the duct burner.

2. 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.

3. The Permittee shall continuously monitor and continuously record the oxidation catalyst inlet 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.

4. The Permittee shall inspect the SCR and oxidation catalysts once per year, at a minimum, or more frequently if recommended by the manufacturer.

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 (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. Turbine and duct burner fuel consumption records shall be kept independently.

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_{10}, $PM_{2.5}$, SO_2, 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.

4. 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.

5. 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.

6. 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)]

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.

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):

☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ SO_2 ☒ NOx ☒ CO
☐ VOC ☐ Opacity ☒ Other (HAPs): Ammonia

Stack testing for NOx, CO and ammonia shall be conducted every five years from the date of the previous test to demonstrate compliance with their respective limits. Tests shall be conducted for the following operating modes: turbine only on oil; turbine only on natural gas; turbine on oil and duct burner on natural gas; and turbine on natural gas and duct burner on natural gas. The hourly emission limits shall be based on the operating mode in accordance with the Allowable Emission Limits stated in Part III of this permit.

Stack test results shall be reported as follows: all pollutants in units of lb/hr, NOx and CO in units of ppmvd at 15% O_2, ammonia in units of $\mu g/m^3$ and ppmvd at 15% O_2.

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. The Permittee shall operate and maintain this stationary combustion 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 malfunction. [40 CFR §60.4333(a)]

B. The Permittee shall properly operate the control equipment at all times that this turbine is in operation and emitting air pollutants.

C. The Permittee shall keep records, when 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;

4. Documentation of all associated costs; and

5. Documentation 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.

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 KKKK and A.

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

B. Premises-wide HAP emissions shall be less than 10 tons per consecutive 12 months of any single HAP, which has been listed in Section 112(b) of the Federal Clean Air Act, and less than 25 tons per consecutive 12 months of any combination of HAPs.

The Permittee shall keep records of the monthly and consecutive 12 month premises-wide HAP 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 make these records within 30 days of the end of the previous month.

The Permittee shall calculate actual HAP emissions using one or more of the following sources of information:

1. The monthly and consecutive 12 month amount of fuels, solvents, coatings or raw materials used;

2. Purchase orders or invoices;

3. AP-42 emission factors, manufacturer's data, material balance; and/or

4. Any other documentation the commissioner reasonably deems necessary to accurately calculate actual HAP emissions.

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]

D. In the event a malfunction cannot be corrected within three hours, the Permittee shall immediately institute shutdown of the turbine.

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.