



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 2  
290 BROADWAY  
NEW YORK, NY 10007-1866

JUN - 3 2008

James R. Adams  
Director of Utilities  
Cornell University  
Humphreys Service Bldg.  
Ithaca, New York 14853-3701

Re: Prevention of Significant Deterioration of Air Quality (PSD)  
Cornell Combined Heat and Power Project

Dear Mr. Adams:

On March 12, 2008, the U.S. Environmental Protection Agency (EPA), Region 2 Office, received a complete PSD application from Cornell University to construct a combined heat and power project at the Central Heating Plant on its campus in Ithaca, New York.

On April 10, 2008, EPA issued a preliminary determination, subject to public review, to approve the PSD permit. The 30-day public comment period for this draft permit commenced upon publication of EPA's preliminary determination in the *Ithaca Journal* on Wednesday, April 16, 2008 and extended until Friday, May 16, 2008. The EPA did not receive any comments during this time period.

The EPA concludes that this final permit meets all applicable requirements of the PSD regulations codified at 40 CFR § 52.21, and the Clean Air Act (the Act). Accordingly, I hereby approve Cornell's PSD permit for the Combined Heat and Power Project. This letter and its attachment represent EPA's final permit decision. The permit conditions are delineated in Enclosure I.

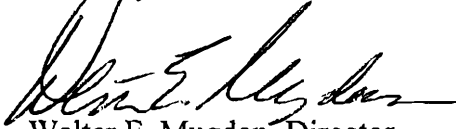
Final permit decisions may generally be challenged under the Consolidated Permit Regulations, codified at 40 C.F.R. part 124, which apply to EPA's processing of this permit decision. However, since no comments were submitted during the public comment period and no changes were made from the preliminary determination to the final permit decision, administrative review pursuant to § 124.19 is not available in this case.

For purposes of judicial review under the Act, final agency action occurs when a final PSD permit is issued or denied and the administrative review procedures are exhausted. Notice of the Agency's final action with respect to this permit will be published in the Federal Register. Judicial review of final actions may generally be sought by filing a petition for review in the United States Court of Appeals for the appropriate circuit within 60 days of the date of the Federal Register notice. However, only those persons who petitioned EPA under the administrative procedures may

petition for review in the Court of Appeals. Since no administrative review is available in this case, review in the Court of Appeals is also not available. Under section 307(b) of the Act, this final agency action shall not be subject to judicial review in civil or criminal proceedings for enforcement.

This final permit is effective as of the date of this correspondence. If you have any questions regarding this letter, please call Mr. Steven C. Riva, Chief, Permitting Section, Air Programs Branch, at (212) 637-4074.

Sincerely,



Walter E. Mugdan, Director  
Division of Environmental Planning and Protection

Enclosure

cc: R. Parker, NYSDEC Region 7  
C. Horney, Cornell University  
T. Peer, Cornell University  
G. Stine, ENSR  
D. Stillwell, U.S. Dep't. of Interior  
I. Powless, Jr., Chief, Onondaga Nation  
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G. Wheeler, Cayuga Nation  
J. Heath, Esq.  
D. Arquette, HETF

**ENCLOSURE I**

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The Cornell Combined Heat and Power Project is subject to the following conditions:

**I. Permit Expiration**

This PSD Permit shall become invalid if construction:

- A. has not commenced (as defined in 40 CFR Section 52.21(b)(9)) within 18 months of the effective date of this permit;
- B. is discontinued for a period of 18 months or more; or
- C. is not completed within a reasonable time.

**II. Notification of Commencement of Construction and Startup**

The Regional Administrator (RA) shall be notified in writing of the anticipated date of initial startup (as defined in 40 CFR Section 60.2) of each combustion turbine not more than sixty (60) days nor less than thirty (30) days prior to such date. The RA shall be notified in writing of the actual date of both commencement of construction and startup of each combustion turbine within fifteen (15) days after such date.

**III. Plant Operations**

All equipment, facilities and systems, including the combustion and electric generation units, installed or used to achieve compliance with the terms and conditions of this PSD Permit, shall at all times be maintained in good working order and be operated as efficiently as possible so as to minimize air pollutant emissions.

**IV. Right to Entry**

Pursuant to Section 114 of the Clean Air Act (Act), 42 U.S.C. § 7414, the Administrator and/or his/her authorized representatives have the right to enter and inspect for all purposes authorized under Section 114 of the Act. The permittee acknowledges that the RA and/or his/her authorized representatives, upon the presentation of credentials shall be permitted:

- A. to enter at any time upon the premises where the source is located or in which any records are required to be kept under the terms and conditions of this PSD Permit;

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- B. at reasonable times to access and to copy any records required to be kept under the terms and conditions of this PSD Permit;
- C. to inspect any equipment, operation, or method referenced in this PSD Permit; and
- D. to sample emissions from the source relevant to this permit.

**V. Transfer of Ownership**

In the event of any changes in control or ownership of facilities to be constructed, this PSD Permit shall be binding on all subsequent owners and operators. The applicant shall notify the succeeding owner and operator of the existence of this PSD Permit and its conditions by letter, a copy of which shall be forwarded to the Regional Administrator.

**VI. Operating Requirements and Stack Parameters**

A. Combustion Turbines:

1. The primary fuel for each Solar Titan 130 combustion turbine shall be pipeline grade natural gas. Ultra low sulfur distillate fuel oil may be fired as a secondary fuel. Any combustion turbine shall not fire multiple fuels, except during periods of fuel switching.
2. Each Solar Titan 130 combustion turbine unit shall be limited to a maximum fuel consumption rate of 170,200 standard cubic feet (scf) per hour of natural gas, based on 1,025 British Thermal Units (Btu) per scf, at the fuel's higher heating value (HHV), or 1,168 gallons per hour of distillate fuel oil (based on 135,000 Btu per gallon, HHV), based on fuel capacity at zero (0) degrees F. Compliance with these fuel consumption rates shall be computed as a 24-hour block average. The combustion turbines' combined consumption of distillate fuel oil shall not exceed 2,086,000 gallons for any 12-month rolling period.
3. Fuel switching for each Solar Titan 130 combustion turbine is defined as the period of time beginning with the firing of an authorized fuel other than the initial fuel and ending when the firing of the initial fuel ceases. The applicable emission limits in sections VII.A and VII.B become effective upon completion of a fuel switch.
4. The distillate fuel oil fired in the combustion turbines shall contain no more than 0.0015 percent sulfur by weight.

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5. Combustion turbines shall not use bypass stacks to vent exhaust gases.
  6. At all times, Cornell shall, to the extent practicable, maintain and operate the two Solar Titan 130 combustion turbines, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to EPA and/or DEC which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the plant.
- B. Duct Burners:
1. Each duct burner shall be limited to a maximum design heat input of 115 MMBtu/hr. The duct burners shall only fire pipeline grade natural gas, at a maximum fuel consumption rate of 112,000 scf per hour, based on 1,025 Btu per scf, HHV. Compliance with this fuel consumption rate shall be computed as a 24-hour block average.
- C. Emergency Diesel Generators:
1. The maximum design capacity of each Emergency Diesel Generator (EDG) shall be 1,000 kilowatts.
  2. Each EDG shall be limited to a maximum fuel consumption rate of 72 gallons per hour of distillate fuel oil.
  3. Each EDG shall solely use distillate fuel oil which contains no more than 0.0015 percent sulfur by weight.
  4. The operating hours of the EDG shall be limited as follows:
    - a. The combined total of both EDG shall not exceed 800 hours in each 12-month rolling period; and
    - b. Each EDG shall operate no more than 500 hours in any 12-month rolling period.

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2. The EDG may operate concurrently with the combustion turbines if either of the following conditions are met:
    - a. The normal utility-provided power is not available or grid electrical supply is otherwise restricted, subject to the limits on hours in VI.C.4 above, or
    - b. Non-emergency operation solely for maintenance checks and readiness testing purposes shall be limited to less than 100 hours in each 12-month rolling period, and shall be included in the total hours in VI.C.4, above.
- D. Stack Parameters
1. Each combined cycle unit, consisting of a combustion turbine and a heat recovery steam generator with duct burner, shall exhaust to a stack that rises to 180 feet above grade (base elev. is 832 ft msl) with an exit diameter of 6 feet.
  2. Each emergency diesel generator shall exhaust to a stack that rises 91 feet above grade with an exit diameter of 7 inches.

**VII. PSD BACT Emission Limitations**

The emission limits in sections VII.A, VII.B and VII.C apply at all times the temperature is zero degrees F or above, excluding fuel switching but including startup and shutdown.

A. Emission Limitations for Each Solar Titan 130 Combustion Turbine

1. Particulate Matter (PM)<sup>1</sup>, Particulate Matter < 10 microns (PM<sub>10</sub>) and Particulate Matter < 2.5 microns (PM<sub>2.5</sub>) (average of three 1-hour tests)
  - a. The PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions<sup>2</sup> shall not exceed
    - (i) 3.9 lb/hr when firing natural gas
    - (ii) 6.3 lb/hr when firing distillate fuel oil
  - b. The PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions shall not exceed:
    - (i) 0.023 lb/MMBtu (HHV) while firing natural gas

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1 PM is defined as filterable particulate matter emissions as measured with EPA Reference Test Method 5.

2 All PM<sub>10</sub> emissions are presumed potentially equivalent to PM<sub>2.5</sub> emissions.

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(ii) 0.040 lb/MMBtu (HHV) while firing distillate fuel oil

2. Sulfuric Acid Mist ( $H_2SO_4$ )

a. Emissions of  $H_2SO_4$  shall not exceed 0.001 lb/mmBtu (average of three 1-hour tests) nor shall they exceed:

- (i) 0.24 lb/hr when firing natural gas
- (ii) 0.096 lb/hr when firing distillate fuel oil

3. Opacity limitation: When firing natural gas, opacity of emissions shall not exceed 10% from the turbines. When firing distillate fuel oil, opacity of emissions shall not exceed 20%, except for one period of not more than six (6) minutes in any sixty (60) minute interval when the opacity shall not exceed 27%.

**B. Emission Limitations When Firing the Duct Burner at Each Heat Recovery Steam Generator (HRSG) for Each Solar Titan 130 Combustion Turbine**

1. Particulate Matter (PM), Particulate Matter < 10 microns ( $PM_{10}$ ) and Particulate Matter < 2.5 microns ( $PM_{2.5}$ ) (average of three 1-hour tests)

a. The  $PM/PM_{10}/PM_{2.5}$  emissions shall not exceed

- (i) 6.5 lb/hr when firing natural gas
- (ii) 8.3 lb/hr when turbine is firing distillate fuel oil

b. The  $PM/PM_{10}/PM_{2.5}$  emissions shall not exceed:

- (i) 0.022 lb/MMBtu (HHV) while firing natural gas
- (ii) 0.031 lb/MMBtu (HHV) while turbine is firing distillate fuel oil

2. Sulfuric Acid Mist ( $H_2SO_4$ )

a. Emissions of  $H_2SO_4$  shall not exceed 0.005 lb/mmBtu (average of three 1-hour tests) nor shall they exceed:

- (i) 1.4 lb/hr when firing natural gas
- (ii) 0.93 lb/hr when turbine is firing distillate fuel oil

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3. Opacity limitation: When firing natural gas, opacity of emissions shall not exceed 10% from the turbines and HRSG. When firing distillate fuel oil, opacity of emissions shall not exceed 20%, except for one period of not more than six (6) minutes in any sixty (60) minute interval when the opacity shall not exceed 27%.

**C. Emission Limitations for the Emergency Diesel Generators**

1. Particulate Matter (PM), Particulate Matter < 10 microns (PM<sub>10</sub>) and Particulate Matter < 2.5 microns (PM<sub>2.5</sub>) (average of three 1-hour tests)

The PM/PM<sub>10</sub>/PM<sub>2.5</sub> emissions from each EDG shall not exceed 0.19 lb/hour.

2. Sulfuric Acid Mist (H<sub>2</sub>SO<sub>4</sub>)

Emissions of H<sub>2</sub>SO<sub>4</sub> from each EDG shall not exceed 0.002 lb/hr.

3. Opacity Limitation: Opacity of emissions shall not exceed 20%, except for one period of not more than six (6) minutes in any sixty (60) minute interval when the opacity shall not exceed 27%.

**VIII. Best Available Control Technology: Controls**

**A. BACT for Each Solar Titan 130 Combustion Turbine**

Each Solar Titan 130 combustion turbine shall continuously operate in accordance with its specified design combustion parameters. This includes continuously operating all proposed control devices in a manner consistent with good air pollution control practice for minimizing emissions.

1. To minimize particulate matter emissions, Cornell shall, in addition to use of the fuels specified in condition VI.A, above:
  - a. Install and maintain air inlet filters;
  - b. Install and maintain a lube oil vent coalescer; and
  - c. Monitor ammonia (NH<sub>3</sub>) emissions and adjust ammonia injection rates to the selective catalytic reduction system, as necessary to minimize use of



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excess ammonia.

2. To minimize sulfuric acid mist emissions, Cornell shall only use the fuels specified in condition VI.A, above.

**B. BACT for Each Duct Burner**

Each duct burner shall always be operated in accordance with the manufacturer's specified combustion parameters, and shall be limited to use of natural gas as specified in condition VI.B.1, above.

**C. BACT for Each Emergency Diesel Generator**

Each emergency diesel generator shall always be operated in accordance with the manufacturer's specified combustion parameters, and shall be limited to use of the fuel specified in condition VI.C.3, above.

**IX. Continuous Monitoring System (CMS) Requirements**

- A. Prior to the date of startup and thereafter, Cornell shall install, calibrate, maintain and operate the following continuous monitoring systems for each of the combustion turbine/HRSG units.
  1. Continuous monitoring systems to measure and record each combustion turbine's fuel flows.
  2. Continuous monitoring systems to measure and record each duct burner's fuel flows.
  3. Cornell shall install, calibrate, maintain and operate each fuel flow meter in accordance with the manufacturer's specifications.

**X. Performance Testing Requirements**

- A. Within 60 days after achieving the maximum production rate of the combustion turbines, but no later than 180 days after initial startup as defined in 40 CFR § 60.2, and at such other times as specified by the EPA, Cornell shall conduct performance tests for PM, PM<sub>10</sub>, PM<sub>2.5</sub>, H<sub>2</sub>SO<sub>4</sub> and opacity at the HRSG stacks and for PM, PM<sub>10</sub>, PM<sub>2.5</sub> and opacity at each emergency diesel generator. All performance tests

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shall be conducted at maximum load conditions and/or other loads specified by EPA.

- B. Three test runs shall be conducted for each authorized fuel at a load condition that is within plus or minus 10 percent of 100 percent of peak load. Cornell may perform testing at the highest achievable load point, if at least 90 percent of peak load cannot be achieved in practice. Compliance for each operating mode shall be based on the average emission rate of the three runs. Tests shall be conducted with duct burners firing at maximum load as well as with duct burners off.
- C. At least 60 days prior to actual testing, Cornell shall submit to the EPA a Quality Assurance Project Plan detailing methods and procedures to be used during the performance stack testing. A Quality Assurance Project Plan that does not have EPA approval may be grounds to invalidate any test and require a re-test.
- D. As part of an approvable Quality Assurance Project Plan, Cornell shall include a detection limit calculation, demonstrating that the detection limit for each pollutant is less than or equal to one third of the applicable limit.
- E. As part of an approvable Quality Assurance Project Plan, Cornell shall include procedures to perform a complete fuel sulfur analysis on at least two samples of the facility's natural gas supply. Cornell shall use ASTM method D3246 or other similar method that detects sulfur in the range present in the fuel.
- F. Cornell shall use the following test methods, or an alternate test method which would be applicable at the time of the test and detailed in a test protocol approved by EPA:
  - 1. Performance tests to determine the stack gas velocity, sample area, volumetric flow rate, molecular composition, excess air of flue gases, and moisture content of flue gas shall be conducted using 40 CFR part 60, Appendix A, Methods 1, 2, 3, and 4.
  - 2. Performance tests for the emissions of PM shall be conducted using either 40 CFR part 60, Appendix A, Method 5 or 40 CFR part 51, Appendix M, Method 201 (exhaust gas recycle) or Method 201A (constant flow rate).
  - 3. Performance tests for the emissions of PM<sub>10</sub> shall be conducted using 40 CFR part 51, Appendix M, Method 201 (exhaust gas recycle) or Method 201A (constant flow rate), and Method 202.

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4. Performance tests for the emissions of PM<sub>2.5</sub> shall be conducted using 40 CFR part 51, Appendix M, Method 201 (exhaust gas recycle) or Method 201A (constant flow rate), and Method 202.
  5. Performance tests for the emissions of H<sub>2</sub>SO<sub>4</sub> from the turbines and HRSG shall be conducted using 40 CFR part 60, Appendix A, Method 8.
  6. Performance tests for the visual determination of the opacity of emissions from the stack shall be conducted using 40 CFR part 60, Appendix A, Method 9 and the procedures stated in 40 CFR § 60.11.
- G. Additional performance tests or test runs may be required at the discretion of the EPA or DEC for any or all of the above pollutants.
- H. For performance test purposes, sampling ports, platforms and access shall be provided by Cornell on each of the combustion turbine units in accordance with 40 CFR § 60.8(e).
- I. Compliance with the Emergency Diesel Generator H<sub>2</sub>SO<sub>4</sub> emission limit shall be determined by fuel sulfur analysis and the following formula:

$$F \times S \times 1.5 = \text{H}_2\text{SO}_4 \text{ in lb/hr}$$

Where:

F = fraction of maximum firing rate actually attained (decimal between 0 and 1);

S = actual weight percent of sulfur in the fuel

1.5 = conversion factor derived from manufacturer's data, assuming 10 percent of the sulfur in the fuel converts to H<sub>2</sub>SO<sub>4</sub>

- J. Cornell shall submit a written report to EPA of the results of all emission testing within 60 days of the completion of the performance test.
- K. Operations during periods of startup, shutdown, malfunction and fuel switching shall not constitute representative conditions for the purpose of a performance test.
- XI. Record keeping Requirements**
- A. Logs shall be kept and updated periodically as specified to record the following:

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1. the gallons of distillate fuel oil fired on a daily basis at each Solar 130 combustion turbine and emergency diesel generator;
  2. the amount of natural gas consumed in scf or MMBtu HHV on a daily basis at each Solar 130 combustion turbine and each duct burner;
  3. the hours of operation of each Solar 130 combustion turbine for each fuel;
  4. the sulfur content of all fuel oil burned, as represented by the fuel oil vendor certifications;
  5. the amount of electrical output (MW) on a daily basis from each Solar 130 combustion turbine;
  6. any non-automated adjustments and maintenance performed on each Solar 130 combustion turbine;
  7. any non-automated adjustments and maintenance performed on monitoring systems; and
  8. all calculations (including, but not limited to rolling averages) and information related to emission determinations.
- B. All monitoring records, fuel sampling test results, calibration test results and logs must be maintained for a period of five years after the date of record, and made available upon request.

**XII. Reporting Requirements**

- A. For purposes of this permit, excess emissions includes fuel consumption rates above the levels allowed by section VI of this permit, on a temperature-adjusted basis, as well as exceedances of limits on hours of operation, as calculated for the specified averaging times.
- B. Cornell shall submit a written report of all excess emissions to EPA semiannually. All reports shall be postmarked by the 30th day following the end of each six-month reporting period and shall include the information specified below:

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1. The nature and cause of any malfunction (if known) and the corrective action taken or preventive measures adopted shall also be reported.
2. The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks and the nature of the system repairs or adjustments.
3. When no excess emissions have occurred or the monitoring systems have not been inoperative, repaired, or adjusted, such information shall be stated in the report.
4. Any failure of air pollution control equipment, process equipment, or of a process to operate in a normal manner which results in an increase in emissions above any allowable emission limit stated in this permit and any corrective actions and/or preventative measures taken on any unit must be included in the semiannual report and reported by telephone within 2 business days to:

Air Compliance Branch  
Division of Enforcement and Compliance Assistance  
U.S. Environmental Protection Agency  
Region 2  
290 Broadway - 21<sup>st</sup> Floor  
New York, New York 10007-1866  
(212)637-3000

If any failure results in a release of emissions of a hazardous air pollutant(s) that continues for more than an hour in excess of any applicable limit; or in a release of any other regulated pollutant that continues for more than 2 hours in excess of any applicable limit, the EPA must be notified within 24 hours. In addition, this information must be included in the semiannual report.

- B. In addition, the U.S. EPA's Air Compliance Branch shall be notified in writing within fifteen (15) days of any such failure referenced in item A.4 above. This notification shall include a description of the malfunctioning equipment or abnormal operation; the date of the initial failure; the period of time over which emissions were increased due to the failure; the cause of the failure; the estimated resultant emissions in excess of those allowed under this permit; and the methods utilized to restore normal operations. Compliance with this malfunction notification provision shall not excuse or otherwise constitute a defense to any

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violations of this permit or of any law or regulations which such malfunction may cause.

- C. All reports and Quality Assurance Project Plans required by this permit shall be submitted to:

Chief, Air Compliance Branch  
U.S. Environmental Protection Agency  
Region 2  
290 Broadway - 21<sup>st</sup> Floor  
New York, New York 10007

- D. Copies of all reports and Quality Assurance Project Plans shall also be submitted to:

Chief, Air Programs Branch - Permitting Section  
U.S. Environmental Protection Agency  
Region 2  
290 Broadway - 25<sup>th</sup> Floor  
New York, NY 10007

Region 2 CEM Coordinator  
U. S. Environmental Protection Agency  
Air and Water Q/A Team  
Monitoring & Assessment Branch  
2890 Woodbridge Avenue - MS – 220  
Edison, New Jersey 08837-3679

Regional Air Pollution Control Engineer  
New York State Department of Environmental Conservation  
Region 7  
615 Erie Boulevard West  
Syracuse, NY 13204-2400

**XIII. Other Requirements**

Cornell shall meet all other applicable federal, state and local requirements, including but not limited to those contained in the New York State Implementation Plan (SIP), the applicable provisions of the New Source Performance Standards (NSPS) (40 CFR Part 60,

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Subparts A, IIII and KKKK) and the applicable provisions of the NESHAP for Stationary Combustion Turbines (40 CFR 63 subpart YYYY).