

US EPA ARCHIVE DOCUMENT

Prevention of Significant Deterioration Permit
For
Northeast Energy Associates
92B Depot Street
Bellingham, MA

Nominal 304 MW Combustion Turbine Combined Cycle
Generating Facility

EPA proposed Permit Number
CR-88-PSD-R-001

Pursuant to the provisions of the Clean Air Act (CAA) chapter I, Part C (42 U.S.C. Section 7470, *et. seq*) and the regulations found at the Code of Federal Regulations Title 40, Section 52.21, the United States Environmental Protection Agency New England (EPA) is modifying a Prevention of Significant Deterioration (PSD) air quality permit to Northeast Energy Associates, LP, 92B Depot Street, Bellingham, MA (NEA). NEA operates a nominal 304 MW combustion turbine combined cycle plant in Bellingham, MA.

The design, construction and operation of the revised NEA project shall be subject to the attached permit conditions and permit limitations. This permit shall be effective 30 days from receipt of notice from EPA of permit issuance. This permit does not relieve NEA from the obligation to comply with applicable state and federal air pollution control rules and regulations. All terms and conditions of the permit are enforceable by EPA and citizens under the CAA.

Stephen S. Perkins, Director
Office of Ecosystem Protection

Date of issuance

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Definitions

1. Opacity: means that characteristic of matter which renders it capable of interfering with the transmission of rays of light and causes a degree of obscuration of an observer's view.
2. NEA: Northeast Energy Associates, 92B Depot Street Bellingham, Ma
3. Particulate: Total particulate also means total PM-10.
4. Startup: Unit startup commences when fuel is first ignited and shall not exceed 120 minutes for either turbine.
5. Shutdown: Unit shutdown is the time period from steady state operation to cessation of combustion turbine firing. Shutdown shall not exceed 120 minutes for either turbine.
6. Steady state operations: means all operations except for startup, shutdown, and fuel type switching.

Background

This permit includes conditions from the original PSD permit, and new and revised conditions associated with NEA's request to change its method of operation. EPA included new condition numbers B.3, C.1 (Tables III and IV), C.3, C.4, D.1, and D.2. EPA revised and renumbered condition numbers C.2 to C.5. EPA removed several conditions involving activities that occurred during the first year of operations. EPA also added new monitoring, reporting, and record keeping requirements and revised several existing conditions in Section E of the permit. From the date of this permit issuance, this permit will supersede the PSD permit number CR-88-PSD-C-001 issued by the Commonwealth of Massachusetts on February 1, 1989.

EPA's new and revised permit conditions were based on NEA's "Actual-to-Projected Actual" applicability test. The test showed that NEA's proposed changes to the existing emission units' operations will not result in a significant net emission increase. The following table provides NEA's projected actual emission rates. If NEA exceeds any of these rates during any twelve month period, the change in the method of operation being permitted here would be a major modification.

Pollutant	Projected Actual Emission Rate (tons/year)
Nitrogen Oxides	978
Carbon Monoxide	315
Sulfur Dioxide	46
Volatile Organic Compounds	46
Particulate Matter	51

A. General Requirements

1. Construction and operation of the facility shall be undertaken in accordance with the documents as listed on Attachment I.
2. All requirements of this permit which apply to NEA shall also apply to all subsequent owners and/or operators of the facility.
3. Construction and operation of the facility shall comply with all applicable state and federal air pollution control regulations including the requirements of the New Source Performance Standards (40 CFR Part 60) and the Standards of Performance of stationary gas turbines (40 CFR Part 60, Subpart GG).
4. The various notifications, testing, monitoring and record keeping provisions of 40 CFR Part 60 are applicable to this facility. (see condition A.3)

B. Operating Conditions and Restrictions

1. Exclusive of startup and shutdown, the NO_x control system will be fully operational.
2. After the effective date of this permit, any new shipments of fuel oil at the permitted facility shall meet a sulfur content of 15 ppm or less on a weight basis. NEA will be allowed to combust the remaining distillate oil in its tank after the effective date of this permit provided that NEA remains within its projected SO₂ emissions in any 12 month period.

C. Emission Limits

1. NEA shall not exceed the following emission limits shown in Tables I through V at all applicable operating times:

Table I
Natural Gas Fired

POLLUTANT	PER TURBINE (lbs/MMBtu)	PLANT TOTAL (lbs/hr)
Sulfur Dioxide	0.0016	4.0
Nitrogen Oxides	0.0859 ¹	220.0
Particulate	0.0047	12.0
Carbon Monoxide	0.0516	132.0
Volatile Organic Compounds	0.0043	11.0

Table II²
Distillate Oil Fired

POLLUTANT	PER TURBINE (lbs/MMBtu)	PLANT TOTAL (lbs/hr)
Sulfur Dioxide ³	0.2136	528.0
Nitrogen Oxides	0.1497 ⁴	370.0
Particulate	0.0647	160.0
Carbon Monoxide	0.3277	810.0
Volatile Organic Compounds	0.0151	37.4

Table III

¹ NO_x equivalent to 25 ppm (@15% O₂)

² The limits for distillate oil shall only apply while NEA burns existing fuel oil as of December 4, 2007.
After the existing fuel is consumed, the emission limits in Table II will cease to apply.

³ Restricted to low sulfur (0.2% S, or less) distillate fuel oil.

⁴ NO_x equivalent to 42 ppm (@ 15% O₂)

Ultra Low Sulfur Diesel
(15 ppm sulfur by weight)

POLLUTANT	PER TURBINE (lbs/MMBtu)	PLANT TOTAL (lbs/hr)
Sulfur Dioxide	0.0016	4.0
Nitrogen Oxides	0.1497	370.0
Particulate	0.0647	160.0
Carbon Monoxide	0.3277	810.0
Volatile Organic Compounds	0.0151	37.4

Table IV
When Firing ULSD
Special Emission Limits During Startup and Shutdown
Limited to Two Hours for Each Separate Event

Pollutant	PER TURBINE LBS/MM BTU ^a	PLANT TOTAL (LBS/HR) ^a
Nitrogen Oxides	Start-up 0.700; shutdown 0.874	Startup – 865 pounds/hour; Shutdown – 1080 pounds/ hour
Carbon Monoxide	0.655	810 pounds/hour
Volatile Organic Compounds	0.030	75 pounds/hour

When Firing Natural Gas
Special Emission Limits During Startup and Shutdown
Limited to Two Hours for Each Separate Event

Pollutant	PER TURBINE LBS/MM BTU ^a	PLANT TOTAL (LBS/HR) ^a
Nitrogen Oxides	Start-up 0.676; shutdown 0.844	Startup – 865 pounds/ hour; Shutdown – 1080 pounds/ hour
Carbon Monoxide	0.113	132 pounds/hour
Volatile Organic Compounds	0.0086	11 pounds/hour

a. Both mass base and concentration base emission limits are averaged over 2 hours.

- In addition to the above fuel specific emission limits, the combined emissions from EU 001 and EU 002 through the common stack cannot exceed the following emission limits averaged over any 12 consecutive month period.

Table V
Stack emission limits

POLLUTANT	Stack Emissions Tons per Year
Sulfur Dioxide	206
Nitrogen Oxides	1017
Particulate	106
Carbon Monoxide	822
Volatile Organic Compounds	58

3. Opacity shall not exceed 10%, exclusive of uncombined water, when combusting natural gas.
4. Opacity shall not exceed 10%, exclusive of uncombined water, when combusting oil at steady state operations.
5. During the first 20 events (an event is defined as either a startup or shutdown on oil, or a fuel switch) from the issuance of this permit, NEA shall evaluate the operating parameters that affect opacity during startup on oil and during fuel switches between oil and gas. Within 30 days from the end of the 20th event, NEA shall submit to EPA a report that identifies the operational parameters that affect opacity, the operational ranges that minimize opacity, and the opacity readings during the events. After reviewing this data, EPA will propose an amendment to this permit that may include an alternative opacity limit and/or requirement(s) to monitor and record certain operating parameter(s) and ranges for any proposed operating parameters. In no event shall the resulting opacity limits exceed levels provided for in the Massachusetts State Implementation Plan, 310 CMR 7.06(1)(b).

D. Testing Requirements

1. All emission testing shall comply with the test methods in accordance with requirements contained in 40 CFR Parts 72 and 75 and as noted in Table VI.

Table VI –Test Methods	
POLLUTANT	40 CFR PART 60 TEST METHODS
NO _x	Method 20 or Method 7E
CO	Method 10 (gas filter correlation (GFC) method)
VOC	Methods 25A and 18
Opacity	Method 9
SO ₂	Method 20 (fuel test option)
PM	Method 5

2. NEA shall conduct an initial stack test while firing fuel oil on both turbines at base load for PM-10 and VOC emissions using EPA's emission test methods 1-5 for PM-10 and either methods 18 or 25A for VOCs, as contained in 40 CFR part 60, Appendix A. The initial test will be conducted within the first 250 hours in which either or both turbines combust fuel oil after the effective date of this permit or within 90 calendar days thereafter if additional time is needed to schedule the test. Except as provided below, the initial test and any future required testing pursuant to this permit condition requires the testing of each turbine separately. If the test results the initial test for each turbine are less than 50 % of the applicable emission limit and within 0.0200 lbs/MMBtu of each other, NEA shall have the option of meeting any future required testing pursuant to this paragraph by testing either turbine alone or in combination. If the result from the initial test for either turbine is greater than 50% of the applicable emission limit and within 0.0100 lbs/MMBtu of each other, NEA shall have the option of meeting any future required testing pursuant to this paragraph by testing either turbine alone or in combination. After the initial test, NEA shall use the same test methods to determine the rate of PM-10 and VOC emissions prior to every interval of 600 operating hours in which either or both turbines combust fuel oil. The requirement to conduct testing in this context will expire after the fifth year following the effective date of this permit or after three separate stack tests, whichever comes last.

E. Monitoring and Record Keeping Requirements

1. Continuous Emission Monitors and Recorders

- a. Continuous monitors and recorders shall be installed in the common stack, calibrated, tested and operated to measure and record emissions of Carbon Monoxide, Nitrogen Dioxide, Oxygen (or Carbon Dioxide) and the Opacity of the flue gas from the units. Notwithstanding the requirements of 40 CFR 60 Subpart GG 60.334, the equipment shall conform to the EPA monitoring specifications in 40 CFR Part 60.13 and 40 CFR Part 60 Appendices B and F.
- b. NEA shall conduct a Relative Accuracy Test Audit (RATA) on the NO_x and CO CEMS at a frequency determined in accordance with 40 CFR 75 Appendix B, Section 2.3.1, which shall supersede the test frequency contained in 40 CFR 60 Appendix F, Section 5.1.1.
- c. Using equation numbers one and two in Appendix A, NEA shall attribute emissions to each combustion turbine by prorating the common stack emissions using the electrical output from each combustion turbine. Prorating will not be done when one combustion turbine is in either startup and/or shutdown mode and the other combustion turbine is operating at steady state. All stack emissions will be attributed to one combustion turbine if the other combustion turbine is completely shutdown.

In the event the procedure set forth in Appendix A indicates an exceedance of an applicable emission limit, NEA may rebut any calculated lb/MMBtu exceedances with credible evidence. For example, if the formula indicates that both units exceeded the applicable limit, NEA may provide credible evidence to show that only one unit was in exceedance. Such evidence may include the results of parametric monitoring and shall be provided to EPA and DEP as part of NEA's quarterly CEMS reports. The burden of providing such credible evidence and of proving that a calculated exceedance is not an exceedance in fact shall be on NEA.

- d. Phase-in Period. Commencing on the effective date of this permit amendment and continuing for a period of 12 months, NEA shall evaluate the equations and procedures as outlined in Appendix A, but calculated exceedances shall only constitute credible evidence of exceedances for the purposes of compliance with permit limits. NEA shall submit that evaluation to EPA. At any time during this 12 month period, NEA may propose alternate methods of determining compliance, including but not limited to revised calculations or changes to the CEMS. At the conclusion of the 12 month period, compliance shall be determined using Appendix A, unless and until alternate methods are approved by DEP and EPA and

implemented by NEA. Nothing in this section (E.1.) limits the use of results from stack tests conducted in accordance with test methods in section D of this permit.

2. Continuous Operating Parameter Monitors and Recorders

- a. NEA shall monitor the total sulfur content of the fuel being fired in the turbines in accordance with 40 CFR 60.334(h) and 40 CFR 60.334(i).
- b. NEA shall operate a continuous monitoring system consistent with the requirements of 40 CFR 75 Appendix D to monitor and record the fuel oil and gas consumed by the turbines.

3. Operating and Maintenance Logs

NEA shall keep accurate records (electronic and/or hardcopy) of the following information:

- a. Date and hours of operation of each combustion turbine.
- b. Date and time of start-up and shutdown of each combustion turbine.
- c. Date, time and specifications of all maintenance performed on each the combustion turbine, steam injection system and continuous monitoring devices and the type or a description of the maintenance performed and the date and time the work was completed.
- d. Calibration of all CEM monitoring devices including the date, time and the name of contractor who performed the calibrations.
- e. Record of any upsets or failures associated with the CEMs.
- f. Combustion equipment, emission control or monitoring device malfunctions, time and date of malfunction, description of event, time and date of corrective action taken and description of said action.
- g. Total fuel consumption of natural gas in cubic feet per hour and total fuel consumption of fuel oil in gallons per hour.
- h. Total pounds steam flow per hour for each hour of the day.
- i. Total hours of operation on natural gas per day and fuel oil per day.
- j. Hourly gross electrical output (MWe) produced for each hour of the day for each combustion turbine.
- k. Hourly heat input (MMBtu) to each combustion turbine.
- l. Hourly NO_x, CO, SO₂, VOC, and PM Emissions on a lbs/MMBtu basis for each combustion turbine and lb/hr basis on a plant-wide basis.

4. NEA shall maintain records of the amount of fuel oil and natural gas combusted in each month and for each twelve month period.
5. NEA shall use the following methodology for calculating mass emissions for each pollutant:
 - a. PM-10: NEA shall multiply the results from the most recent stack test (in terms of lb/MMBtu) by the fuel consumed (in terms of MMBtu) to determine the PM-10 mass emissions from natural gas and fuel oil. The amount of fuel consumed (in terms of MMBtu) shall be determined in accordance with 40 CFR 75 Appendix D.
 - b. Carbon Monoxide and Nitrogen Oxides: NEA shall use emission data from the existing continuous emission monitoring system.
 - c. Sulfur Dioxide: NEA shall use the sulfur content determined by 40 CFR 75 Appendix D.
 - d. Volatile Organic Compounds: NEA shall multiply the results from the most recent stack test (in terms of lb/MMBtu) by the fuel consumed (in terms of MMBtu) to determine the VOC mass emissions from natural gas and fuel oil. The amount of fuel consumed (in terms of MMBtu) shall be determined in accordance with 40 CFR 75 Appendix D.
6. NEA shall calculate mass emissions for each twelve month rolling period by adding the emissions in the current month to the emissions in the preceding eleven months for each pollutant in condition E.5.
7. NEA shall comply with New Source Performance Standards Subpart A-General Provisions, Section 60.7 -Notification and Record Keeping and 40 CFR Part 60.334.
8. NEA shall submit quarterly CEMS reports in writing to EPA New England. The reports will be submitted by January 30th, April 30th, July 30th and October 30th of each year and will contain at least the following information:
 - a. The reports from the facility CEMS shall identify any periods of excess emissions; and
 - b. For each period of excess emissions or excursions from allowable operating conditions, NEA shall list the duration, cause, the response taken, and the amount of excess emissions. Periods of excess emissions shall include periods of start-up, shutdown, malfunction, emergency, equipment cleaning, and upsets or failures associated with the emission control system or CEMS; and
 - c. A tabulation of common stack operating hours per reporting period.

9. After the effective date of this permit, NEA shall submit a summary of the 12-month rolling emissions required by Condition E.6 to EPA on a semi-annual basis. Reports will be due January 31st and July 31st of each year and shall continue for five (5) years following the effective date of this permit. Records, including all monitoring and stack test data, and any other supporting information, shall be maintained for ten (10) years following the effective date of this permit and shall be made available for EPA during any inspection.
10. Except as required by condition E.9., all other supporting information, records and logs shall be maintained for at least five years. The most recent two years of data shall be readily available at the facility for state or EPA inspection.

ATTACHMENT I

Pertinent Information

Design Data Sheet: DDS-1 Fossil Fuel Facility; received by Massachusetts on 6/22/88

Design Data Sheet: DDS-8 Survey of Noise Potential; received by Massachusetts on 1/13/88

Document: Typical Operating Procedures for a W-501D5 Combustion turbine; received by Massachusetts on 6/22/88

Document: Preventive Maintenance Manual...W501D5; received by Massachusetts on 6/22/88

Document: PSD Permit Application for N.E.A. Cogeneration Project in Bellingham, MA (Sigma Research Document A039, revised version: June 1988; received by Massachusetts on 6/22/88

Letter from Sigma Research Corp. (9/9/88); received by Massachusetts on 9/12/88

Letter from IEC dated 12/6/88; received by Massachusetts on 12/9/88

<u>Drawing #</u>	<u>Plan</u>	<u>Rev. #</u>	<u>Date</u>
ECSC-0012	Site Plan	A	6/17/88
ECSC-0013	Site Plan	A	6/17/88
FP-00-1000	Gen'l Arrangement, Turbine Bldg and Water Treatment...Profiles	F	11/21/88
FP-00-1001	Gen'l Arrangement, North Elev. & East Elevation		11/21/88
FP-00-1002	Gen'l Arrangement, South Elev. & West Elevation	B	11/21/88
CA-00-0601	Stack...Plans, Section and Design Data	B	6/15/88
FP-00-0001	Gen'l Arrangement, Turbine Bldg, Ground Floor Plan	B	11/21/88
FP-00-0002	Gen'l Arrangement, Turbine Bldg, Ground Floor Plan	F	11/21/88

Pertinent Information (continued)

<u>Drawing 4 #</u>	<u>Plan</u>	<u>Rev. #</u>	<u>Date</u>
FP-00-0003	Gen'l Arrangement, Turbine Bldg, Partial Plan, Water Treatment Building and Pump House	E	11/21/88
FP-00-0004	Gen'l Arrangement, Turbine Building -Sections	F	11/21/88

Topographic Map of Franklin (MA) Quadrangle

Appendix A

CEM readings will be attributed to each turbine by using approved methods from EPA's Acid Rain Program for combined stack emissions. Forty CFR Part 75, Appendix F, Section 5.6.1 calculates heat input for each turbine based on electric generation. The following equation shall be used to determine the heat input for each turbine when the turbines are burning the same fuel.

$$\text{Eq.1 } HU_1 = HU_{cs}(T_{cs}/T_1)(MW_{1T1}/(MW_{1T1}+MW_{2T2}))$$

Where:

HU_1 = Heat input rate for unit 1, MMBtu/hr.

HU_{cs} = Heat input rate at the common pipe, MMBtu/hr.

MW_1 = Gross electrical output for unit 1, MWe.

MW_2 = Gross electrical output for unit 2, MWe.

T_1 Unit operating time for turbine 1, in 1/60th of an hour.

T_2 Unit operating time for turbine 2, in 1/60th of an hour.

T_{cs} = Common stack or common pipe operating time, in 1/60th of an hour.

The combined emissions determined in the common stack will also be allocated according to the electricity each turbine produces.

$$\text{Eq. 2 } EU_1 = EU_{cs}(T_{cs}/T_1)(MW_1*PL_1*T_1/(MW_1*PL_1*T_1+MW_2*PL_2*T_2))$$

Where:

EU_1 = Emission rate for unit 1, lbs/hr.

EU_{cs} = Emission rate at the common stack, lbs/hr.

MW_1 = Gross electrical output for unit 1, MWe.

MW_2 = Gross electrical output for unit 2, MWe.

PL_1 =Depending on firing oil or natural gas, the appropriate emission limit from Tables I or 2 in lbs/MMBtu for unit 1

PL_2 =Depending on firing oil or natural gas, the appropriate emission limit from Tables I or 2 in lbs/MMBtu for unit 2

T_1 Unit operating time for turbine 1, in 1/60th of an hour.

T_2 Unit operating time for turbine 2, in 1/60th of an hour.

T_{cs} = Common stack or common pipe operating time, in 1/60th of an hour.