



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

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Commissioner

October 11, 2012

Mr. Peter Frey
Dartmouth Power Associates, L.P.
One Energy Road
Dartmouth, MA 02747

RE: DARTMOUTH
Transmittal No.: X252287
Application No.: SE-12-032
Class: *OP*
FMF No.: 205295
AIR QUALITY PLAN APPROVAL

Dear Mr. Frey:

The Massachusetts Department of Environmental Protection (“MassDEP”), Bureau of Waste Prevention, has reviewed your Limited Plan Application (“Application”) listed above which was received by the MassDEP on July 20, 2012, with a revision received on October 5, 2012. The Application concerns the proposed alteration and operation of the existing wet cooling tower at your power generating facility located at One Energy Road in Dartmouth, Massachusetts (“Facility”).

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 “Air Pollution Control,” regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP’s review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator (“Permittee”) must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

FACILITY DESCRIPTION

The Permittee operates a merchant power production facility situated on 5 acres of a 40-acre (industrially zoned) parcel of land in North Dartmouth and produces wholesale electric power for purchase by area utilities. The existing facility consists of a 68 MW dual fuel (natural gas and ULSD) combustion turbine operating in combined cycle mode and a 24.7 MW dual fuel (natural gas and ULSD) simple cycle combustion turbine. The facility has been in operation since the second quarter of 1992 and is presently composed of the following emission units (EU) as listed in Air Quality Operating Permit No. 4V08060 (issued November 8, 2011):

- EU-1 General Electric (GE) Frame 6 Combustion Turbine (546 MMBtu/hr heat rate input) with Heat Recovery Steam Generator;**
- EU-2 Nooter Erickson Duct Burner (110 MMBtu/hr heat rate input – natural gas fired);**
- EU-3 Detroit Diesel Starter engine (4.70 MMBtu/hr heat rate input);**
- EU-4 Ecodyne Mechanical Draft Cooling Tower (24,000 gal/min);**
- EU-5 General Electric LM 2500 PE, simple cycle combustion turbine (maximum heat input of 267.1 MMBtu/hr firing natural gas and 261.7 MMBtu/hr firing Ultra Low Sulfur distillate (ULSD) and a maximum generator output of 24.7 MW);**
- EU-6 Cleaver Brooks Model CB 200-100, No. 2 fuel oil fired, auxiliary boiler with a maximum heat input rating of 4.18 MMBtu/hr;**
- EU-7 2 small (< 3 MMBtu/hr heat rate input), No. 2 fuel oil fired boilers;**
- EU-8 208 HP (155kW) diesel fired, fire pump engine**

In addition to EU-1 through EU-8 the facility consists of ancillary equipment to support the operation of the power plant including:

- **Combustion turbine electric generator**
- **Condensing steam turbine electric generator**
- **424,000 gallon fuel oil storage tank**
- **Various storage tanks**
- **Boiler make-up water/steam chemical treatment/cooling water treatment**

As noted at EU-4 above, the Permittee operates a 3-cell, wet, mechanical induced draft, cooling tower. In a wet, mechanical draft, cooling tower, warm water is circulated to the tower cells and distributed over fill material where it is cooled by evaporation. A fan in each tower cell provides the air flow to draw ambient air past the circulating water for the evaporative heat transfer to occur. The air flow is warmed somewhat by contact with the circulating water. The cooled circulating water is directed back through the plant to the indirect equipment heat exchangers and steam condenser (non-contact). The tower discharge consists primarily of warm moist air. A small fraction of the circulating water is entrained in the exhaust air stream and is emitted to atmosphere. This small fraction is known as “drift”. The circulating water contains dissolved solids that concentrate in the tower. As the liquid “drift” leaves the tower and evaporates any dissolved solids in the drift are

emitted as PM, PM₁₀, and PM_{2.5}. The cooling tower was installed as approved equipment under Plan Application No. 4P90045 with drift eliminators designed to limit water mist to 0.005% of the circulating water flow, however there were no PM emission limits established in that approval.

PURPOSE OF APPLICATION

The Permittee has proposed a change in operation of the existing Ecodyne cooling tower which will reduce the amount of cooling tower circulating water discharged (blowdown), but will increase the total dissolved solids (TDS) concentration in the cooling tower circulating water and result in an increase in the potential uncontrolled emissions of PM, PM₁₀ and PM_{2.5}. In order to mitigate the increase in potential emissions, the Permittee will modify the cooling tower by installing, as Best Available Control Technology (BACT), new drift eliminators designed to limit water mist to 0.0005% of the cooling tower circulating water flow. The result of the increased TDS concentration and the increased control efficiency of the retro-fitted drift eliminators will be a reduction in emissions of PM, PM₁₀ and PM_{2.5}.

2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1			
EU#	Description	Design Capacity	Pollution Control Device (PCD)
EU 4	<u>Cooling Tower:</u> Ecodyne Manufacturer No. 3CFF-607408L- 2806-10	Design flow rate: ≤ 24,000 Gal/min	Brentwood Industries Model No. CF-80 Max Cellular Drift Eliminators: 0.0005% of Drift

Table 1 Key:
 EU# = Emission Unit Number
 Gal/min = gallons per minute
 No. = number
 PCD = Pollution Control Device
 ≤ = less than or equal to
 % = percent

3. APPLICABLE REQUIREMENTS

A. OPERATIONAL, PRODUCTION and EMISSION LIMITS

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2 below:

Table 2			
EU#	Operational / Production Limit	Air Contaminant	Emission Limit
EU 4	1. Total dissolved solids (TDS) concentration in circulating water limited to ≤ 4000 ppmw	PM, PM ₁₀ , PM _{2.5}	0.24 lb/hr 0.1 TPM 1.1 TPY (note 1) (note 2)
	2. Maintain circulating water flow rate at or below 24,000 gallons per minute.		

Note 1: Cooling tower PM emissions are based on unrestricted operation with a maximum circulating water flow rate of 24,000 gallons per minute, a maximum total dissolved solids (TDS) concentration of 4,000 ppmw and a maximum drift rate of 0.0005%.

Note 2: At a circulating water TDS concentration of 4,000 ppmw, PM₁₀ and PM_{2.5} emissions are estimated to be not greater than 39% of total PM based on “*Calculating Realistic PM₁₀ Emissions from Cooling Towers*” J.Reisman and G.Frisbie.

Table 2 Key:

- EU# = Emission Unit Number
- ppmw = parts per million, by weight
- lb/hr = pound(s) per hour
- PM = Particulate Matter
- PM₁₀ = Particulate Matter less than or equal to 10 microns in diameter
- PM_{2.5} = Particulate Matter less than or equal to 2.5 microns in diameter
- TDS = total dissolved solids
- TPM = tons per month
- TPY = tons per consecutive 12-month period

B. COMPLIANCE DEMONSTRATION

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5 below:

Table 3	
EU#	Monitoring and Testing Requirements
EU 4	1. The Permittee shall continuously monitor and record (in ppmw units) the total dissolved solids (TDS) in the circulating water in the cooling tower basin using a continuous conductivity meter. Electrical conductivity is measured as a parametric for TDS.

Table 3	
EU#	Monitoring and Testing Requirements
EU 4	<p>2. If the cooling tower circulating water conductivity monitoring shows a TDS that is outside of the normal operating range, as determined by the Permittee, a grab sample of the cooling tower circulating water shall be taken within eight (8) hours from the measurement outside of the normal operating range and analyzed as specified below at Table 3, Condition 3., to verify the accuracy of the conductivity measurement and determine the TDS content of the cooling tower circulating water.</p>
	<p>3. The Permittee shall take a grab sample of the cooling tower system circulating water on a monthly basis while operating and determine TDS. This monitoring shall be used to verify the accuracy of the conductivity results with respect to the TDS concentration. To determine TDS, the Permittee shall use Part 2540C as published in the latest edition of <i>Standard Methods For the Examination of Water and Wastewater</i> as published by the American Public Health Association, American Waterworks Association and Water Pollution Control Federation or by an equivalent method approved by the MassDEP.</p>
	<p>4. Upon request of the Permittee, the MassDEP may change the frequency of the grab sample monitoring to a quarterly basis once enough data has been established to verify compliance. It is the MassDEP's position that a minimum of six (6) months of data correlating the conductivity monitoring to the TDS grab sample will need to be established to verify compliance. MassDEP will reserve the right to revert back to the sampling and analysis frequency as specified above in Table 3, Condition 3.</p>
	<p>5. The Permittee shall monitor and record the cooling tower system operating hours for each day of operation.</p>
	<p>6. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.</p>
	<p>7. If and when MassDEP requires it, the Permittee shall conduct emission testing in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13</p>

Table 3 Key:
 CMR = Code of Massachusetts Regulations
 EU# = Emission Unit Number
 ppmw = parts per million by weight
 TDS = total dissolved solids
 USEPA = United States Environmental Protection Agency

Table 4

EU#	Record Keeping Requirements
EU 4	<ol style="list-style-type: none"> <li>1. The Permittee shall maintain a record of the total dissolved solids (TDS) in units of parts per million, by weight (ppmw) in the cooling tower circulating water. <li>2. The Permittee shall, for each day while in operation, maintain a record of the hours of operation of the cooling tower system. <li>3. The Permittee shall maintain a record of the results of each grab sample TDS analysis. <li>4. The Permittee shall maintain adequate records on-site to demonstrate compliance with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve month period (current month plus prior eleven months). These records shall be compiled no later than the 15th day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at http://www.mass.gov/dep/air/approvals/aqforms.htm#report . <li>5. The Permittee shall maintain records of monitoring and testing as required by Table 3. <li>6. The Permittee shall maintain a copy of this Plan Approval, underlying Application, vender specifications verifying maximum flow rates (e.g. pump curves) and drift eliminator control efficiencies, and the most up-to-date SOMP for the EU approved herein on-site. <li>7. The Permittee shall maintain a record of routine maintenance activities performed on the approved EU, PCD and monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed. For monitoring equipment this requirement includes any calibrations and/or accuracy certifications. <li>8. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on the approved EU(s) and monitoring equipment. At a minimum, the records shall include: date and time the malfunction occurred; description of the malfunction; corrective actions taken; the date and time corrective actions were initiated and completed; and the date and time emission rates and monitoring equipment returned to compliant operation. <li>9. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration. <li>10. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.

Table 4	
EU#	Record Keeping Requirements
	11. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

Table 4 Key:

CMR = Code of Massachusetts Regulations
 e.g. = *exempli gratia* (for example)
 EU# = Emission Unit Number
 gpd = gallons per day
 PCD = Pollution Control Device
 SOMP = Standard Operating and Maintenance Procedure
 USEPA = United States Environmental Protection Agency

Table 5	
EU#	Reporting Requirements
EU 4	<ol style="list-style-type: none"> 1. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a “Responsible Official” as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c). 2. The Permittee shall notify the Southeast Regional Office of MassDEP, BWP Compliance & Enforcement (C&E) Chief by telephone (508) 946-2878, email, sero.air@state.ma.us or fax (508) 947-6557, as soon as possible, but no later than one (1) business day after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to the C&E Chief at MassDEP within three (3) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s). 3. The Permittee shall report annually to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval. 4. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30-days from MassDEP’s request. 5. The Permittee shall submit to MassDEP for approval a stack emission pretest protocol, at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements. 6. The Permittee shall notify, in writing, the Southeast Regional Office of MassDEP, BWP Permit Chief upon completion of the modifications approved herein.

Table 5	
EU#	Reporting Requirements
	7. The Permittee shall submit to MassDEP a final stack emission test results report, within 45 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.

Table 5 Key:

BWP = Bureau of Waste Prevention
 C&E = Compliance and Enforcement
 CMR = Code of Massachusetts Regulations
 EU# = Emission Unit Number

4. SPECIAL TERMS AND CONDITIONS

The Permittee is subject to, and shall comply with, the following special terms and conditions:

- A. The Permittee shall comply with the Special Terms and Conditions as contained in Table 6 below:

Table 6	
EU#	Special Terms and Conditions
EU 4	1. The Permittee shall not exceed a total dissolved solids concentration of 4,000 parts per million by weight (ppmw) in the circulating water contained in the cooling tower basin.
	2. The Permittee shall ensure that any monitoring equipment used to determine conductivity as a parametric for TDS be installed, operated and maintained in accordance with manufacturer's recommended installation, operating and maintenance practices.
	3. The cooling tower shall be equipped with drift eliminators designed (manufacturers design guarantee) to limit water mist drift to 0.0005% of the cooling tower circulating water flow.
	4. The Permittee shall not use any chromium-based water treatment chemicals in the cooling tower system.
	5. The cooling tower water circulation rate shall not exceed 24,000 gallons per minute.
	6. The installation of the retrofit drift eliminators and subsequent operation shall be in accordance with the manufacturer's recommendations and guidelines to ensure maximum drift reduction.

Table 6	
EU#	Special Terms and Conditions
	7. The modifications approved herein will be a “Minor Modification” to the Permittee’s Air Quality Operating Permit pursuant to 310 CMR 7.00 Appendix C: Operating Permit Program. In accordance with 310 CMR 7.00: Appendix C(8), the Permittee shall submit, within thirty (30) days of the implementation of the modifications approved herein, an Operating Permit modification application that reflect this Approval and any other requirements that apply to the Facility.
	8. Any prior Plan Approvals issued under 310 CMR 7.02 shall remain in effect unless specifically changed or superseded by this Plan Approval. The Facility shall not exceed the emission limits and shall comply with approved conditions specified in the prior Plan Approval(s) unless specifically altered by this Plan Approval.

Table 6 Key:

CMR = Code of Massachusetts Regulations
 EU# = Emission Unit Number
 % = percent
 ppmw = parts per million, by weight
 TDS = total dissolved solids

- B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including but not limited to rain protection devices known as “shanty caps” and “egg beaters.” The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7 below, for the Emission Units that are regulated by this Plan Approval:

Table 7				
EU#	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions (feet)	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (°F)
EU 4	29	30.0	≤ 20	32-95

Table 7 Key:

EU# = Emission Unit Number
 °F = Degree Fahrenheit

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

- A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the

Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

- B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.
- C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.
- D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.
- E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.
- F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.
- G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.
- H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.
- I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.
- J. The Permittee shall conduct emission testing, if requested by MassDEP, in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13. If required, a pretest protocol report shall be submitted to MassDEP at least 30 days prior to emission testing and the final test results report shall be submitted within 45 days after emission testing.
- K. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain “Fail-Safe Provisions,” which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars (\$100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Peter Russell by telephone at 508-946-2821, or in writing at the letterhead address.

**This final document copy is being provided to you electronically by the
Department of Environmental Protection. A signed copy of this document
is on file at the DEP office listed on the letterhead.**

Thomas Cushing
Permit Chief
Bureau of Waste Prevention

C/PR

Enclosure

ecc: Board of Health, Dartmouth, MA
Fire Department, Dartmouth, MA
Yi Tian, MassDEP-Boston
Steven Babcock, P.E., AMEC Environment and Infrastructure
Laura Black, MassDEP-SERO
Charles Kitson, MassDEP-SERO
Peter Russell, MassDEP-SERO