



United States  
Environmental Protection  
Agency New England

One Congress Street, Suite 1100  
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## **Fact Sheet**

**Braintree Electric Light Department  
150 Potter Road  
Braintree, MA 02184**

**for the**

**Thomas A. Watson  
Generating Station  
Draft PSD Permit Number  
049-119-MA10**

**Acronyms and Abbreviations**

|                   |  |
|-------------------|--|
| BELD              | Braintree Electric Light Department                  |
| BTU               | British thermal unit                                 |
| CFR               | Code of Federal Regulations                          |
| CO                | carbon monoxide                                      |
| DEP               | Massachusetts Department of Environmental Protection |
| EPA               | Environmental Protection Agency                      |
| ft <sup>3</sup>   | cubic feet   |
| hr                | hour   |
| lb                | pound  |
| MMBtu             | million British thermal units                        |
| NO <sub>x</sub>   | nitrogen oxides                                      |
| PM <sub>10</sub>  | particulate matter less than 10 microns in diameter  |
| PM <sub>2.5</sub> | particulate matter less than 2.5 microns in diameter |
| ppmv              | parts per million by volume                          |
| SO <sub>2</sub>   | sulfur dioxide                                       |
| SUSD              | startup and shutdown                                 |
| tpy               | tons per year  |
| VOC               | volatile organic compounds                           |

**I. GENERAL INFORMATION**

Name of Source: Braintree Electric Light Department, Potter Road

Name of Project: Thomas A. Watson Generating Plant

Location: 150 Potter Road  
Braintree, Massachusetts

Applicant's Name and Address: Braintree Electric Light Department  
150 Potter Road  
Braintree, MA 02184

Application Prepared By: Epsilon Associates, Inc.  
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PSD Permit Number: 049-119-MA10

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## II. INTRODUCTION

On May 8, 2007, the Braintree Electric Light Department (BELD) in accordance with the Clean Air Act (CAA), Subchapter I, Part C (42 U.S.C. Section 7470, *et seq.*), filed an application with the Environmental Protection Agency (EPA) Region 1 office for a Prevention of Significant Deterioration (PSD) permit under 40 CFR 52.21. BELD proposes to construct, install and operate a new 116 mega-watt (MW) quick-start, simple cycle, dual-fuel generating facility at its Potter Road location in (East) Braintree, Massachusetts. The new facility will be known as the Thomas A. Watson Generating Station (“Watson Station” or the “Facility”). After reviewing the May, 2007 Air Plan Approval/NSR/PSD Application Transmittal No. W120070, EPA Region 1 prepared the following Fact Sheet and draft PSD permit for the proposed Watson Station project.

EPA’s permit decisions are based on the information and analysis provided by the applicant and its (EPA’s) own technical expertise. This Fact Sheet documents the information and analysis EPA used to support the PSD permit decisions. It includes a description of the existing facility, the proposed modification, the applicable PSD requirements, and an analysis demonstrating how the permit decisions comply with those requirements.

EPA Region 1 has concluded that BELD’s application is complete and provides the necessary information showing that Watson Station project meets the federal PSD regulations. As such, EPA is making the May 8, 2007 permit application part of the official record for this Fact Sheet and PSD permit. The permit application is available on-line at EPA New England’s web site.

Please note that this project is also subject to the Massachusetts Department of Environmental Protection’s (DEP) Plan Approval requirements under *Commonwealth of Massachusetts Regulations* (CMR); specifically 310 CMR 7.00 *et seq.* The DEP is issuing BELD a Plan Approval that regulates all pollutants emitted by the proposed facility, including particulate matter less than 10 micrometers (PM<sub>10</sub>)<sup>1</sup> and nitrogen oxides (NO<sub>x</sub>) emissions regulated under this permit. EPA has worked closely with the DEP to ensure this PSD permit does not conflict with the DEP’s Plan Approval requirements. BELD must comply with both the federal PSD permit and the DEP’s Plan Approval.

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<sup>1</sup> As of this date, EPA has yet to promulgate regulations to implement the New Source Review program for PM<sub>2.5</sub>. In an October 23, 1997 memorandum from John Seitz, Office of air Quality Planning and Standards, EPA addressed the interim use of PM<sub>10</sub> as a surrogate for PM<sub>2.5</sub> in meeting NSR requirements under the CAA. EPA Region 1 is relying upon this memorandum and will use PM<sub>10</sub> as a surrogate in this permit.

### **III. DESCRIPTION OF THE PROPOSED FACILITY**

Braintree Electric Light Department (BELD), a municipal utility serving the Town of Braintree, proposes to construct and operate a quick-start, simple-cycle, dual-fuel 116-megawatt (MW) generating unit called Watson Station at its Potter Road site in East Braintree, Massachusetts. BELD's 23-acre site currently houses the Potter II Station, an operating dual-fuel (natural gas or No. 2 distillate) combined-cycle power plant with a nominal rating of 95 MW, a 2.25 MW diesel generator set, and a 115 kV switchyard. The BELD facility will consist of the proposed Watson Station and the existing Potter II Station.

The proposed Watson Station will consist of two quick-start, simple cycle 58 MW Rolls-Royce Trent 60 WLE gas turbine generators with associated inlet air filters, an ammonia injection skid, an exhaust stack, a main step-up transformer, an auxiliary transformer and a switchgear. BELD will control emissions using a Selective Catalytic Reduction (SCR) system and an oxidation catalyst. Additional components will include a control center, gas compressor station, trailer mounted demineralizer system, lube oil-cooling skid, a 400,000 gallon demineralized water storage tank, a 15,000 gallon fully diked vertical aqueous ammonia storage and a perimeter access road. The requisite ancillary facilities will include the interconnections for approximately 300 feet of 115 kV overhead transmission lines, a short run high-pressure gas line and an upgrade of existing oil pipeline.

Upon startup and certification of the Watson Station, BELD will permanently replace the type of fuel used at the existing Potter II facility from NO.2 fuel oil to ultra low sulfur distillate (ULSD). The DEP is proposing to make the fuel change and resulting emission reductions permanent and federally enforceable as part of its Plan Approval. The modeling has assumed the emission reductions resulting from the fuel change at the Potter II facility. However, since the major modification that requires PSD review is the construction of the proposed Watson Station, the PSD permit only applies to Watson Station and does not impose any conditions on Potter II Station.

#### IV. PSD PROGRAM APPLICABILITY

As shown in 40 CFR 81.322, EPA currently classifies Eastern Massachusetts as a *moderate nonattainment area* for ground level ozone and *attainment* for all other criteria pollutants. Under these classifications, the Massachusetts Department of Environmental Protection (DEP) administers the nonattainment NSR program to regulate emissions of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO<sub>x</sub>) as a precursor to ground level ozone. EPA Region 1 administers the PSD program that applies to significant emission increases of all other regulated criteria pollutants.

In brief, EPA determined that the Watson Station project is a major modification for NO<sub>x</sub> and PM<sub>10</sub> under the federal PSD program. EPA used the PSD applicability test found in 40 CFR 52.21(a)(2)(iv)(d), “the actual to potential test for projects that only involve construction of a new emission unit(s),” to determine the project’s emission increase. This test refers to the definition of “Baseline Actual Emissions” for new emission units at 40 CFR 52.21(b)(48)(iii) to determine if “a significant emission increase of a regulated NSR pollutant is projected to occur” from this project. For new emission units, “Baseline actual emissions” is the sum of each turbine’s “potential to emit.”

Table 4-1 provides the “Baseline Actual Emissions” summary for Watson Station. The summary is based on the following operations and restrictions:

1. The two (2) 58 MW gas turbine generators operating at 100% at full load of 116 MW.
2. Both turbines operating for 8,776 hours (hrs) per year burning both natural gas and ULSD.
3. In addition, combustion of ULSD shall not exceed 2,880 hrs per year.
4. The hourly emission rates are based on 100% load and normalized to a standard ambient temperature of 59°F.
5. The lbs/hr and lbs/MMBtu emission rates are based on a 1-hour block average.

**Table 4-1 Baseline Actual Emissions Summary, Watson Station**

| Fuel             | Natural Gas Per 58 MW Turbine |         |               | ULSD Per 58 MW Turbine |         |               | Emissions Tons Per Year (tpy) |                     | Emission Control Method                                   |
|------------------|-------------------------------|---------|---------------|------------------------|---------|---------------|-------------------------------|---------------------|---|
|                  | Pollutant                     | lb/hr   | ppm           | lb/MMBtu               | lb/hr   | ppm           | lb/MMBtu                      | 2 Turbines (116 MW) |   |
| NO <sub>x</sub>  | 4.95                          | 2.5     | 0.0091        | 10.32                  | 5.0     | 0.019         | 58.8                          | 40                  | Water injection and SCR                                   |
| CO               | 6.02                          | 5.0     | 0.011         | 6.28                   | 5.0     | 0.012         | 53.5                          | 100                 | Combustion Controls and Oxidation Catalyst                |
| VOC              | 1.14                          | 1.0-2.5 | 0.0013-0.0031 | 1.85                   | 1.5-4.5 | 0.0020-0.0059 | 7.6                           | 40                  | Combustion Controls and Oxidation Catalyst                |
| PM <sub>10</sub> | 5.0                           | NA      | 0.01-0.02     | 15                     | NA      | 0.028-0.05    | 72.9                          | 25                  | Use of natural gas and Ultra Low Sulfur Distillate (ULSD) |
| SO <sub>2</sub>  | 1.31                          | NA      | 0.0024        | 0.81                   | NA      | 0.0015        | 11.5                          | 40                  | Use of natural gas and ULSD.                              |

As shown, the Watson Station’s “Baseline Actual Emissions” calculations will result in a significant emission increase of two regulated NSR pollutants: NO<sub>x</sub> and PM<sub>10</sub>. Under EPA’s definition for Major Modification at CFR 52.21(b)(2), BELD could take credit for emission decreases from the Potter II facility and possibly avoid PSD review. However, BELD decided not to take credit for any emission decreases. Therefore, Watson is defined as a major modification for NO<sub>x</sub> and PM<sub>10</sub>.

BELD’s May 8, 2007 application did not include Startup and Shutdown (SUSD) emission rates for NO<sub>x</sub> and PM<sub>10</sub> emissions. Therefore, these rates in lb/hr are not included in the table 4-1. On November 27, 2007, BELD submitted a supplemental permit application that addressed SUSD operations. The supplemental application requested the NO<sub>x</sub> and PM<sub>10</sub> SUSD emission rates shown in Table 4-2. EPA notes that the emissions of the other pollutants listed in Table 4-1 would increase only slightly after adjusting for SUSD, and will not exceed any PSD thresholds.

**Table 4-2: SUSD Emission Rates**

| <b>Natural Gas</b> |                      | Shut Down<br>lb/MMBtu | Start Up<br>lbs/hr | Shut Down<br>lbs/hr |
|--------------------|----------------------|-----------------------|--------------------|---------------------|
| Pollutant          | Start Up<br>lb/MMBtu |                       |                    |                     |
| NO <sub>x</sub>    | 0.092                | 0.047                 | 6.14               | 6.06                |
| PM <sub>10</sub>   | 0.020                | 0.020                 | 5.00               | 5.00                |

| <b>ULSD</b>      |                      | Shut Down<br>lb/MMBtu | Start Up<br>lbs/hr | Shut Down<br>lbs/hr |
|------------------|----------------------|-----------------------|--------------------|---------------------|
| Pollutant        | Start Up<br>lb/MMBtu |                       |                    |                     |
| NO <sub>x</sub>  | 0.124                | 0.060                 | 11.15              | 10.95               |
| PM <sub>10</sub> | 0.061                | 0.079                 | 15.00              | 15.64               |

Notes for SUSD Emission Rates:

- a. For the SUSD emission rates operations, the start up period is defined as the period from the beginning of turbine operations to a turbine operating at 50% or more of full rated power and shall not exceed 10 minutes. The shutdown period is defined as the period from the moment a turbine's operations falls to below 50% of full rated power to the end of operations and shall not exceed 5 minutes.
- b. The start up lb/MMBtu limit is the average emissions limit over a 10 minute start up period.
- c. The shut down lb/MMBtu is the average emissions limit over a 5 minute shutdown period.
- d. The startup lbs/hr startup emission rate reflects start up emissions during the first ten minutes of the hour and the subsequent 50 minutes of emissions at 50% or greater load.
- e. The shutdown lbs/hr emission rate reflects shutdown emissions during the last five minutes and full (50% or greater) load operation for the preceding 55 minutes of operation.

**V. APPLICABLE PSD REQUIREMENTS**

The PSD program requires the applicant to demonstrate that the Watson Station gas turbine generators will incorporate air pollution control technologies representative of BACT, and that the resulting emissions will not cause or contribute to a violation of applicable ambient air quality standards or PSD allowable increments. The applicant is also required to assess the project's impacts on soils, visibility and secondary growth. The complete list of applicable

federal PSD program regulations is shown below:

1. 40 CFR 52.21(j) Control Technology Review (Best Available Control Technology)
2. 40 CFR 52.21(k) Source Impact Analysis (Air Quality Impact Assessment)
3. 40 CFR 52.21(l) Air Quality Models
4. 40 CFR 52.21(m) Air Quality Analysis
5. 40 CFR 52.21(n) Source information
6. 40 CFR 52.21(o) Additional Impact Analysis (Additional Impact Analysis)
7. 40 CFR 52.21(p) Federal Class I Area Impacts (Air Quality Impact Assessment)

## **VI. BEST AVAILABLE CONTROL TECHNOLOGY (BACT) (40 CFR 52.21(j))**

Major new sources and major modifications to existing major sources are required to apply BACT pursuant to the PSD regulations at 40 CFR 52.21(j) (2) and (3). BACT is defined as “an emissions limitation ... based on the maximum degree of reduction for each pollutant subject to regulation under [the Clean Air] Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques ... for control of such pollutant.” 40 CFR 52.21(b)(12); Clean Air Act (CAA) § 169(3), 42 U.S.C. § 7479(3).

In determining BACT for the Watson Station, a top-down approach was used as outlined in the *draft 1990 New Source Review Workshop Manual* as guidance. The top-down approach includes the following five steps: a) Identify all control technologies, b) Eliminate technically unfeasible control options, c) Rank remaining control technologies by control effectiveness, d) Evaluate most effective controls and document results, e) Select BACT. EPA examined the BACT analysis presented in BELD’s application, and agrees that it represents BACT limits for PM<sub>10</sub> and NO<sub>x</sub>.

### ***BACT for PM<sub>10</sub>***

The May 8, 2007 BELD application provides the complete BACT analysis for Watson Station. In summary, the analysis determined that BACT for Watson Station is the use of natural gas and ULSD. EPA reviewed the analysis and agreed with the results. Regarding the proposed emission rate, BELD provided information showing that the highest emission rate in lbs/MMBtu occurred at 50% for each turbine. Normally, EPA would have selected the lower emission rate that occurred at 100% load. However, EPA notes that the emission rate is not tied to the performance of a control device other than the use natural gas and ULSD. EPA will ensure that BELD will only use these fuels. In addition, BELD has shown that it cannot meet the lower emission rate on a continuous basis for all operations. Therefore, EPA will accept the BACT emission limit at 50% load for all operations.

For each turbine at Watson Station, BELD shall comply with the proposed emissions rates summarized in Table 4-3(a) for PM<sub>10</sub>. In addition, BELD will combust only natural gas or ULSD.

**Table 4-3(a): BACT Emission Rates for PM<sub>10</sub>**

|  | <b>Natural Gas<br/>PM<sub>10</sub></b> | <b>Ultra Low Sulfur<br/>Distillate PM<sub>10</sub> (ULSD)</b> |
|--|--|---|
| <b>Each Trent 60 WLE Emission Unit</b> | 0.02 lbs/MMBtu<br>5 lbs/hr             | 0.05 lbs/MMBtu<br>15 lbs/hr                                   |

Notes

- a) The hourly emission rates are based on 100% load and normalized to a standard ambient temperature of 59°F
- b) The lbs/hr and lbs/MMBtu emission rates are based on a 1-hour block average.

***BACT for NO<sub>x</sub>***

The May 8, 2007 BELD application provides the complete BACT analysis for Watson Station. In summary, the analysis concluded that NO<sub>x</sub> BACT for Watson station is the use of SCR, the use of low NO<sub>x</sub> burners, and the use of natural gas and ULSD. EPA has reviewed the analysis and agrees with the results. EPA notes that this is the most stringent BACT result for a simple cycle turbine. Therefore, EPA finds that BACT for Watson Station is the continuous use of SCR systems, the use of low-NO<sub>x</sub> burners and the use of natural gas and/or ULSD.

For each turbine, BELD shall comply with the proposed emissions rates summarized in Table 4-3(b).

**Table 4-3(b): BACT Emission Rates for NO<sub>x</sub>**

|  | <b>Fuel Specific NO<sub>x</sub> Emissions Limits</b> |  |
|--|--|--|
|  | <b>Natural Gas<br/>NO<sub>x</sub></b>                | <b>Ultra Low Sulfur Distillate<br/>NO<sub>x</sub> (ULSD)</b> |
| <b>Each Trent 60 WLE Emission Unit</b> | 2.5 ppmvd<br>5.00 lbs/hr                             | 5.0 ppmvd<br>10.30 lbs/hr                                    |

Note

All turbine emissions reported in ppmvd @ 15% O<sub>2</sub>.

## VII. AIR QUALITY IMPACT ASSESSMENT

Section 52.21(k) of 40 CFR Part 52 requires the applicant to demonstrate that the allowable emissions from the Watson Station project will not cause or contribute to a violation of the applicable National Ambient Air Quality Standard (NAAQS) or PSD increment. In addition, the applicant must demonstrate that the Watson Station emissions will not adversely affect air quality related values in any Class I area (national parks and wilderness areas). 40 CFR 52.21(p).

EPA New England has reviewed and approved BELD's dispersion modeling demonstration and results. In brief, BELD followed EPA's *Guideline on Air Quality Models* (EPA, 2005) that outline EPA's recommended air quality modeling protocols. Table 4-3 compares the maximum modeled impact for PM<sub>10</sub> and NO<sub>x</sub> to the corresponding PSD increment and NAAQS levels. The table shows that BELD's maximum PM<sub>10</sub> and NO<sub>x</sub> impacts from the project will remain below the applicable NAAQS and increment levels. The full dispersion modeling analysis is documented in the air quality modeling protocol submitted to the EPA- New England in BELD's May 8, 2007 PSD application and is on file.

**Table 4-3: Maximum Modeled Impacts Compared To Class 2 Increment And NAAQS**

| Pollutant        | Emission increase tpy | Time Period | Maximum Modeled Impact Microgram per cubic meter (ug/m <sup>3</sup> ) | Class 2 Increment Threshold ug/m <sup>3</sup> | NAAQS ug/m <sup>3</sup> |
|------------------|-----------------------|-------------|---|---|-------------------------|
| NO <sub>x</sub>  | 58.5                  | Annual      | 0.02  | 25  | 100                     |
| PM <sub>10</sub> | 72.9                  | 24-hour     | 3.82  | 30  | 150                     |
|                  |                       | Annual      | 0.04  | 17  | 50                      |

### Note

Although the modeling run did not account for startup and shutdown, EPA reviewed the SUSD emission factors and determined that it would not alter the model results sufficiently to change any of the conclusions.

## VIII. CLASS I AREA ANALYSIS (40 CFR 52.21(p))

The CAA also requires PSD applicants to ensure that proposed PSD sources do not degrade Air Quality Related Values (AQRV) including visibility in Class I areas (national parks and wilderness areas). The federal government has designated class I areas as pristine natural

environments. In brief, Federal Land Managers (FLM) have jurisdiction over Class I areas and set the AQRVs for these areas. The FLMs of the Class I areas are representatives of the National Park Service (NPS) or the U.S. Forest Service (USFS), or the U.S. Fish and Wildlife Service (FWS) depending on the specific Class I area of interest. EPA has not been informed by the FLMs of any AQRVs other than visibility.

To show that Watson station would not degrade visibility of any Class I areas, BELD conducted a visibility analysis of the proposed project's plume using the EPA VISCREEN program. The VISCREEN model provides the capability of assessing plume contrast and plume perceptibility against two backgrounds, sky and terrain. The VISCREEN analysis was performed on the nearest Class I area, Lye Brooke Wilderness area in southern Vermont. Results indicate no further assessment being required for the Lye Brook Wilderness Area. The full analysis can be found in BELD's application. BELD addressed all relevant correspondence to USFS (Ms. Ann Acheson). This correspondence is on file. EPA has reviewed the visibility analysis in the application and other information provided by BELD and the state (all of which is in the permit file), and agrees with the conclusions.

## **IX. ADDITIONAL IMPACT ANALYSES**

The PSD regulations require BELD to conduct additional impact analyses to consider the project's impact to visibility, soils, and vegetation. In addition, BELD must also include an analysis of the commercial, residential industrial and other growth associated with the project and the potential air quality impact from this growth. (40 CFR 52.21(o))

BELD provided detailed visibility, soils and vegetation, and growth analyses in Sections 6.7 through 6.9 of the May 8, 2007 application. In brief, the visibility and the soils and vegetation analyses showed that potential impacts from the project are well below all significant threshold levels. The growth analysis did not predict any significant growth associated with the project or any significant air quality impacts from growth associated with the project. EPA has reviewed BELD's analyses and agrees with the conclusions.

## **X. EMISSIONS COMPLIANCE**

This section describes the monitoring, recordkeeping and reporting requirements BELD will conduct as part of its permit to ensure compliance with emission limitations.

### **X.A Monitoring**

#### NO<sub>x</sub>

EPA will require BELD to install NO<sub>x</sub> Continuous Emissions Monitoring (CEMs) for each turbine that meet the federal performance standards under 40 CFR part 70 and 75. The CEMS will show compliance with the applicable NO<sub>x</sub> emission rates.

