Section 4.0

BACT LAER Analysis

4.0 BACT LAER ANALYSIS

Air emissions from BELD's Thomas A. Watson generating facility (Watson Station) will be controlled very efficiently to extremely low levels by the control methods described in this section.

4.1 Emissions Summary

BELD proposes to install two Rolls Royce Trent 60 WLE dual-fuel simple-cycle turbines. The LAER and BACT emission limits for the turbines at this facility are summarized in Table 4-1 and are discussed in greater detail in Sections 4.2 and 4.3.

Table 4-1 BACT/LAER Summary

Fuel	Natural Gas		ULSD		
Pollutant	ppm[1]	lb/MMBtu	ppm[1]	lb/MMBtu	Method
NO_x	2.5	0.0091	5.0	0.019	Water injection and SCR
CO	5.0	0.011	5.0	0.012	Combustion Controls and Oxidation Catalyst
VOC	1.0-2.5	0.0013-0.0031	1.5-4.5	0.0020-0.0059	Combustion Controls and Oxidation Catalyst
$PM_{10}/PM_{2.5}$[2]	NA	0.01-0.02	NA	0.03-0.05	Use of natural gas and ULSD
SO_2	NA	0.0024[3]	NA	0.0015[4]	Use of natural gas and ULSD

1 All turbine emissions reported in ppm are in units of ppmvd @ 15% O_2.
2 Emissions based on guarantee of 5 lb/hr on natural gas and 15 lb/hr on ULSD.
3 Emission rate conservatively assumes 0.8 gr/ccf sulfur content.
4 Emission rate uses ULSD sulfur content of 15 ppm.

BELD conducted a LAER analysis and a top-down BACT analysis for several types of emissions reduction technology, consistent with EPA and DEP guidance. The results of this analysis are described on a pollutant-specific basis in Sections 4.2 and 4.3 and confirm that the above emission limits meet the definition of LAER and BACT.

4.2 Lowest Achievable Emission Rate Analysis

LAER is defined as "the most stringent emission limitation contained in the implementation plan of any State for such class or category of source, or the most stringent emission limitation achieved in practice by such class or category of source" (US EPA, 1990). The Massachusetts Department of Environmental Protection (DEP) defines LAER in 310 CMR 7.00 as,

. . . for any source, the more stringent rate of emissions based on the following:

(a) The most stringent emissions limitation which is contained in any state SIP for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or

(b) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within a stationary source.

LAER is expressed as an emission rate, and may be achieved from one or the combination of: (1) change in the raw material processes; (2) a process modification; and (3) add-on controls. Each technique for achieving LAER is evaluated below.

LAER is specified as both a numerical emissions limit (lb/MMBtu) and an emissions rate (lb/hr). In evaluating LAER, BELD reviewed EPA's recommended sources of information for determining LAER, specifically:

- State Implementation Plan (SIP) limits for that particular class or category of sources;
- Pre-construction or operating permits issued in nonattainment areas; and
- The RACT/BACT/LAER Clearinghouse (RBLC).

4.2.1 Evaluation of Emissions Limiting Techniques

This section reviews potential emissions limiting techniques to determine their applicability to Watson Station.

4.2.1.1 Change in Raw Materials

This emission limiting technique is typically considered for industrial processes that use chemicals such as solvents where substitution with a lower emitting chemical may be technically feasible. In this case, the "raw material" is a fuel to be combusted for the generation of electricity. The only fuels for this project will be natural gas as the main fuel and ULSD as the alternate fuel, which are the fossil fuels that result in the lowest uncontrolled NO_x emissions.

4.2.1.2 Process Modifications

Process modifications are typically considered for industrial processes that use chemicals where a change in the process methods or conditions may result in lower emissions. In this case, the "process" is a combustion turbine firing natural gas as the main fuel and ULSD as the alternate fuel. Watson Station will use the Rolls Royce Trent 60, a very advanced aeroderivative simple-cycle combustion turbine with low-NO_x combustor using water injection for additional NO_x control. This simple-cycle turbine is highly efficient and is designed to be at full power in 10 minutes. These combustors can be considered a "process modification" compared to earlier simple-cycle combustor designs that required more time to reach full power.

Another process modification that has been used to reduce emissions is a dry low-NO_x combustor. A dry low-NO_x combustor does not use water injection to achieve its NO_x limits. However, dry low-NO_x combustors are not available for burners firing both natural gas and ULSD. Additionally, it should be noted that a dry low-NO_x burner for this unit would not result in a lower NO_x emission rate because it provides the same emissions as a water injected unit.

4.2.1.3 Add-on Controls

In addition to the use of a low-NO_x combustor with water injection for additional NO_x control, BELD will install an SCR system. This add-on technology is considered LAER for this type of application.

Two other add-on technologies were considered, but were determined not to be technically feasible of LAER for BELD. These are: 1) Catalytica's combustion based technology, XONON for NO_x control and 2) Emerachem's EMx (SCONOx) system for NO_x control. Neither of these technologies is available for simple-cycle combustion turbines of this size, (*i.e.*, 58 MW firing natural gas and ULSD).

4.2.2 Sources Used to Evaluate LAER

A number of different sources were used to evaluate LAER emission limits. The first step was to perform a search on the EPA's RBLC. The RBLC was searched using the "Find Lowest Emission Rate" option for sources similar to the proposed source: Simple-Cycle Turbines (<25 MW) firing Natural Gas and No. 2 Fuel Oil and Simple-Cycle Turbines (>25 MW) firing Natural Gas and No. 2 Fuel Oil. The BACT analysis reviewed all turbines firing in the simple-cycle mode with power outputs less than 100 MW. The results needed to be edited since a number of the returned limits were actually combined-cycle sources.

The RBLC summarizes the source, the emission limit, and the type of emission limit. The results of these searches are summarized in Appendix D. Where applicable, the results of these searches were further verified at each individual air permitting agency to determine if the source was constructed, operating and meeting its permit limits. After this first step, the other sources used for research included:

- Recent permits issued by the DEP;
- South Coast Air Quality Management District BACT Determinations;[14] and
- California Air Resource Board's ("CARB") BACT Clearinghouse Database.[15]

4.2.3 Oxides of Nitrogen

NO_x is formed during the combustion process due to the reaction between nitrogen and oxygen in the combustion air at the high temperatures ("thermal NO_x") and the reaction of nitrogen bound in the fuel with oxygen ("fuel NO_x"). Fuel NO_x is minimal from the combustion of natural gas or ULSD. NO_x can be controlled by SCR, dry low-NO_x, and water injection. An evaluation of BACT for NO_x follows.

4.2.3.1 Selective Catalytic Reduction

SCR is an add-on pollution control technology that injects either anhydrous or aqueous ammonia into the flue gas over a vanadium pentoxide catalyst. The NO_x within the flue gas combines with the ammonia to form water and nitrogen. The general chemical reaction is:

$$4\,NO + 4\,NH_3 + O_2 \rightarrow 4\,N_2 + 6\,H_2O$$

The reaction has a relatively narrow flue gas temperature window; below approximately 650°F the reaction is too slow, while above 800°F the catalyst is progressively destroyed. New advances in high temperature catalysts allow exhaust temperatures up to 850-900°F using low-Vanadium catalysts and up to 1000°F using Vanadium-free catalysts. Typically, SCR units are installed with a tempering air system (*i.e.*, injection of ambient air to cool the flue gas temperature) to lower temperature to less than 850°F.

The SCR process begins with the injection of ammonia into the flue gas stream by means of an injection grid upstream of a SCR section. Typically, the reactor consists of honeycomb ceramic or metal based panels with a thin catalyst coating (2 mils). The injection grid and reactor is located prior to the exhaust stack, within the optimum temperature range for the reaction (650°F-850°F). The ammonia reagent for the SCR reaction is stored in an on-site tank. Aqueous ammonia was chosen for the Watson Station for safety reasons.

The use of water injection and SCR technology represents LAER for NO_x emissions. NO_x emissions from the facility will be controlled to 2.5 ppmvd when firing natural gas and 5.0

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14 http://www.aqmd.gov/bact/AQMDBactDeterminations.htm

15 http://www.arb.ca.gov/bact/bact.htm

ppmvd when firing ULSD. Ammonia emissions (slip) are guaranteed to be 5.0 ppmvd when firing natural gas and ULSD.

4.2.3.2 Gas-Fired Determinations

The most stringent level of NO_x control ("top level") that has been permitted for gas-fired simple-cycle turbines are listed in the following section.

Recent Massachusetts Determinations

There are three recent BACT determinations in Massachusetts for different types of simple-cycle facilities. Two of the facilities are permitted as baseload facilities, similar to the proposed Watson Station, while one was permitted to the equivalent of 4,840 hours per year of operation.

Peabody Power LLC ("Peabody Power") proposed a 99-MW facility consisting of one Alstom Model GT11N2 that was permitted in 2005. The turbine is limited to 3.5 ppm NO_x firing natural gas. This facility is permitted to operate 8,760 hours per year with up to 720 hours on back up oil. The emission limits and operating limitations result in annual emissions of 49 tons of NO_x per year, the maximum amount to avoid NSR requirements of applying LAER technology and purchasing emissions offsets. This facility has not been constructed.

Lowell Power LLC ("Lowell Power") proposed a 96-MW facility consisting of two GE LM6000 turbines that was permitted in 2001. The turbines are limited to 2.0 ppm NO_x firing natural gas. This facility is permitted to operate 7,300 hours per year. These emission limits and operating limitations result in an annual emissions increase of 24.1 tons of NO_x per year, avoiding the major modification threshold and the NSR requirements of applying LAER technology and purchasing emissions offsets. This facility has not been constructed.

Consolidated Edison proposed a 99-MW facility expansion of its West Springfield facility consisting of two GE LM6000 turbines that was permitted in 2001 for operation on gas and in 2003 for operation on oil. This facility was permitted for the equivalent of 4,840 hours per year of operation. The turbines are limited to 3.5 ppm NO_x firing natural gas. This facility is currently operating and meeting its emission limits.

Facilities Outside of Massachusetts Using SCR

The most stringent level of NO_x control ("top level") that has been permitted for gas-fired simple-cycle turbines in the RBLC is 2.5 ppm NO_x for several simple-cycle facilities including: the Lambie Energy Center ("Lambie") in California and PPL Wallingford Energy in Wallingford, Connecticut (CT) consisting of five simple-cycle units totaling 243 MW. Both of these facilities were permitted using SCR as the NO_x pollution control system.

In the BACT determination on the CARB website, the Lambie NO_x emission limit was volunteered by the applicant in order to minimize the amount of emissions offsets required. The facility met these emission levels during stack testing conducted in 2003. The BACT determination states that the CARB believes that a NO_x concentration of 5 ppm @ 15% O_2 is LAER for simple-cycle facilities. Lambie began operating in 2004.

According to the CT DEP, PPL Wallingford Energy limited its NO_x emission levels to 2.5 ppm NO_x and restricted its hours of operation to 4,000 hours per year in an effort to avoid NSR. According to EPA records, in calendar year 2005, each of the five PPL Wallingford Energy turbines operated approximately less than ten percent of their maximum annual allowable heat input. PPL Wallingford Energy began operating in 2001.

Other determinations not listed in the RBLC include the following facilities: The New York Power Authority ("NYPA") permitted 10 sites in New York City to provide peak capacity during the summer. These units were permitted at 2.5 ppm NO_x in order to avoid the requirements of NSR and purchase emissions offsets. According to the EPA, the NYPA facilities were permitted to operate continuously throughout the year. Additionally, Florida Power and Light ("FPL") permitted two simple-cycle peaking facilities in Queens, NY at 2.5 ppm NO_x to avoid NSR and purchase emissions offsets. The FPL facilities are currently permitted at baseload levels, similar to the proposed operations for Watson Station.

Other Determinations

There are a number of other natural gas-fired determinations with NO_x emission limits ranging from 3.5 ppm to 15 ppm NO_x. The majority of the 9 to 15 ppm NO_x determinations are from facilities that are greater than 50 MW that are achieving their NO_x limit using Dry Low-NO_x technology since no SCR units are listed as control devices. Dry Low-NO_x technology is not available for the proposed turbines for Watson Station. The remaining natural gas fired facilities use water injection to achieve 25 ppm NO_x when firing natural gas.

4.2.3.3 Oil-Fired Determinations

A description of the most stringent level of NO_x control ("top level") that has been permitted for No. 2 oil-fired simple-cycle turbines follows.

Massachusetts Facilities

There are two recent BACT determinations in Massachusetts for a simple-cycle facility permitted to fire on oil. The Consolidated Edison West Springfield facility is limited to 6 ppm NO_x firing No. 2 oil using SCR. As noted above, this facility is operating and is meeting its emission limits. The Peabody Power's project is limited to 9 ppm NO_x firing No. 2 oil using SCR. As noted above, this facility has not been constructed.

Facilities in Operation Outside of Massachusetts Using SCR

There is one facility listed in the RBLC that uses SCR to achieve its NO_x limit when firing oil. The Arvah B. Hopkins Generating Station in Tallahassee, FL installed a GE LM6000 with the identical emission limit of 5 ppm NO_x when firing either natural gas or No. 2 oil. The facility's annual emissions are calculated assuming 4,000 hours firing No. 2 oil and 1,840 hours firing natural gas.

Additionally, one of the FPL simple-cycle facilities was also permitted with a NO_x emission limit of 6 ppm using SCR, primarily to avoid NSR and the purchase of emissions offsets. The FPL facility is permitted to operate more than 3,000 hours per year firing No. 2 oil. As described previously, these operations profiles are similar to the proposed baseload profile for the Watson Station.

In the RBLC, the Duke Energy Sandersville LLC is listed as having an emissions limit of 10 ppm NO_x when firing No. 2 oil or natural gas. This facility consists of eight 80-MW GE 7EA turbines that use dry low-NO_x to meet these emission limits on gas and water injection when firing No. 2 oil. However, after reviewing the facility's actual permit online,[16] the permit indicates the oil limit is 42 ppm NO_x, consistent with BELD's uncontrolled oil-fired emissions. The remaining oil-fired RBLC determinations have NO_x emission limits of 42 ppm, with water injection listed as the control method.

4.2.3.4 LAER Determination

BELD is proposing to use SCR to control its NO_x emissions to 2.5 ppm when firing gas and 5 ppm when firing ULSD for the Watson Station. These emissions levels meet the most stringent permitted NO_x emission rates of simple-cycle gas turbines that are currently in operation.

4.3 Best Available Control Technology Analysis

BACT is defined in the 310 CMR 7.00 as,

. . . an emission limitation based on the maximum degree of reduction of any regulated air contaminant emitted from or which results from any regulated facility which the Department, on a case-by-case basis taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques for control of each such contaminant. The best available control technology determination

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16 http://www.air.dnr.state.ga.us/airpermit/permits/APL12594/psd12594/apl12594fp.pdf

shall not allow emissions in excess of any emission standard established under the New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants or under any other applicable section of 310 CMR 7.00, and may include a design feature, equipment specification, work practice, operating standard, or combination thereof.

The DEP requires a "top-down" approach to a BACT analysis. The process begins with the identification of control technology alternatives for each pollutant.[17] Technically infeasible technologies are eliminated and the remaining technologies are ranked by control efficiency. These technologies are evaluated based on economic, energy and environmental impacts. If an alternative, starting with the most stringent, is eliminated based on these criteria, the next most stringent technology is evaluated until BACT is selected. BELD commits to controlling its project to BACT levels.

4.3.1 Sources Used to Evaluate BACT

The same sources of permitted emissions data used for the LAER analysis were also used in the BACT analysis.

4.3.2 Carbon Monoxide

CO emissions are formed during the incomplete combustion of any fuel in the combustion process. CO emissions are also elevated when turbines use water injection as the NO_x control method, and at lower ambient temperatures. CO increases at lower ambient temperatures since combustion is more inefficient due to lower air temperatures which produce additional incomplete combustion and consequently higher CO. An evaluation of BACT for CO is presented in the following section.

4.3.2.1 Oxidation Catalyst

For conventional low-NO_x burners or burners with water injection, the top level of CO control that can be achieved is with an oxidation catalyst. The flue gas exhaust from a turbine passes through a honeycomb catalyst which oxidizes the CO to form carbon dioxide. This type of emission control technology is considered a technically feasible method of reducing CO emissions. The proposed oxidation catalyst is designed to reduce CO emissions by approximately 85-96%, depending on the fuel, load and ambient temperature.

Recent Massachusetts Determinations

The Lowell Power facility is permitted with an oxidation catalyst to achieve its CO emissions limit of 5 ppm when the ambient temperature is greater than or equal to 42°F

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17 The DEP applies BACT to all pollutants, not just the PSD pollutants.

and 10 ppm when the ambient temperature is lower than 42°F. The permit states the oxidation catalyst has a control efficiency of 95 percent (*i.e.*, uncontrolled CO emissions are approximately 100-200 ppm, consistent with the proposed turbines).

The Consolidated Edison West Springfield facility is permitted with an oxidation catalyst CO emissions limit of 5 ppm when the ambient temperature is greater than or equal to 42°F and 10 ppm when the ambient temperature is lower than 42°F. The permit also states the oxidation catalyst has a control efficiency of 95 percent.

Peabody Power is not permitted with an oxidation catalyst to achieve its 5 ppm CO emission limit when firing natural gas or No. 2 oil. It is included here since its emission limit is identical to the controlled Lowell Power turbine. This facility would have inherently lower CO emissions since it does not use water injection to reduce NO_x emissions.

As stated previously, The Consolidated Edison facility in West Springfield is operating and meeting its emission limits while neither the Lowell Power nor the Peabody Power facility have been constructed.

RBLC Determinations

There are multiple determinations in the RBLC (provided in Appendix D) that use oxidation catalysts to control CO during natural gas firing. The emissions limits from these facilities range from 6 to 16 ppm CO. Only one facility firing oil was listed as using an oxidation catalyst, the Arvah B. Hopkins Generating Station with a CO limit of 6 ppm.

The vast majority of CO emission levels for low-NO_x burner turbine applications ranged from 20 to 25 ppm when firing natural gas. There were also several determinations for CO emissions greater than 100 ppm when firing natural gas or oil. Typically, these determinations were for turbines using water injection for NO_x controls.

4.3.2.2 BACT Determination

BELD is proposing to use an oxidation catalyst to control its CO emissions to 5 ppm when firing natural gas and ULSD for the Watson Station. These emissions levels meet the most stringent permitted CO emission rates of simple-cycle gas turbines that are currently in operation.

4.3.3 Volatile Organic Compounds

VOC emissions are formed during the incomplete combustion of any fuel in the combustion process. Like CO, VOC emissions increase when incomplete combustion increases (*e.g.*, increased water injection, lower ambient temperatures, and lower load levels). At 100% load at 59°F, the controlled VOC emission rates in the Rolls-Royce Trent 60 are 1 ppm when firing natural gas and 1.5 ppm when firing ULSD. At 100% load at 9°F, the controlled VOC emissions increase to 1.7 ppm when firing natural gas and to 1.6

ppm when firing ULSD. At 50% load, when incomplete combustion is greater, the controlled VOC emission rates range from 1.3 to 2.5 ppm when firing natural gas and 2.5 to 4.5 ppm when firing ULSD. VOC increases at lower ambient temperatures since combustion is more inefficient due to lower air temperatures which produce additional incomplete combustion and consequently higher VOC. An evaluation of BACT for VOCs is presented in the following section.

4.3.3.1 Oxidation Catalyst

The top level of VOC control that can be achieved is with an oxidation catalyst. The oxidation catalyst is the same as the oxidation catalyst described in Section 4.2.3.1. The flue gas exhaust from the turbine would pass through a honeycomb catalyst where the VOC would react with oxygen to form carbon dioxide and water. This type of emission control technology is considered a technically feasible method of reducing VOC emissions. The proposed oxidation catalyst is designed to reduce VOC emissions by approximately 50-57%, depending on the fuel, load and ambient temperature.

Massachusetts Determinations

Lowell Power is permitted to use an oxidation catalyst to achieve its VOC emissions of 3 ppm when firing natural gas. The air permit does not state the control efficiency of the oxidation catalyst.

The Consolidated Edison West Springfield facility is permitted to use an oxidation catalyst to achieve its VOC emissions of 3 ppm when firing natural gas or 12 ppm when firing No. 2 oil. The air permit does not state the control efficiency of the oxidation catalyst.

Peabody Power is not permitted to use an oxidation catalyst to achieve its 1 ppm VOC emission limit when firing natural gas or 3 ppm when firing No. 2 oil. It is included in this section since its emission limit is lower than the controlled Lowell Power permit.

As stated previously, the Consolidated Edison West Springfield facility is operating and meeting its emission limits while the Lowell Power and Peabody Power facilities have not been constructed.

RBLC Determinations

The determinations in the RBLC (Appendix D) that use oxidation catalysts presumably use the catalysts to also control VOC emissions. The emission limits from these facilities range from 1.4 to 8 ppm VOC. The Arvah B. Hopkins Generating station was the only facility listed as using an oxidation catalyst to control VOCs with an emission limit of 3 ppm.

For units not using oxidation catalysts, the majority of the VOC emission levels for low-NO_x turbine applications ranged from 1.2 to 10 ppm when firing natural gas. There were a number of other limitations that ranged as high as 20 ppm VOC when firing natural gas. The oil-fired determinations ranged from 1.6 to 12 ppm VOC.

4.3.3.2 BACT Determination

BELD is proposing to use an oxidation catalyst to control its VOC emissions for the Watson Station to 1.0-2.5 ppm when firing natural gas and 1.5-4.5 ppm when firing ULSD, depending on the load and ambient temperature. These emissions levels meet the most stringent permitted VOC emission rates of simple-cycle gas turbines that are currently in operation. Therefore, this emission rate is BACT for the proposed units.

4.3.4 Particulate Matter

Natural gas and ULSD have relatively low $PM_{10}/PM_{2.5}$ emission rates. $PM_{10}/PM_{2.5}$ emissions are typically generated from high molecular weight hydrocarbons that are not fully combusted. The turbine manufacturer, Rolls Royce, guarantees its $PM_{10}/PM_{2.5}$ emission rate firing on each fuel to a specific hourly emission limit over all loads and ambient temperatures. In this case, the $PM_{10}/PM_{2.5}$ emission rates are 5.0 lbs/hr when firing natural gas and 15.0 lbs/hr when firing ULSD based on EPA Test Methods 5 and 202 (*i.e.*, front and back half catch). At 100% load, the $PM_{10}/PM_{2.5}$ emission rates are approximately 0.01 lb/MMBtu firing natural gas and 0.03 lb/MMBtu when firing ULSD. At 50% load, the $PM_{10}/PM_{2.5}$ emission rates are approximately 0.02 lb/MMBtu firing natural gas and 0.05 lb/MMBtu when firing ULSD.

The emission rates at 100% load are consistent with the gas-fired rates permitted by Lowell Power and lower than the emission limits proposed for Peabody Power. Consolidated Edison's West Springfield facility's PM_{10} emissions are 0.008 lb/MMBtu when firing natural gas and 0.0307 lb/MMBtu when firing oil. However, the facility's PM emission rates are determined solely using Method 5 which would result in a lower emission rate.

Although fabric filters, Electrostatic Precipitators and cyclones can be used to reduce $PM_{10}/PM_{2.5}$ emissions, these methods are not technically feasible to further reduce $PM_{10}/PM_{2.5}$ emissions from the turbines. Therefore, the emission limits ranging from 0.01-0.02 lb/MMBtu when firing natural gas and from 0.03-0.05 lb/MMBtu when firing ULSD are considered BACT.

4.3.5 Sulfur Dioxide

BELD will fire only natural gas or ULSD in its turbines at the Watson Station, resulting in minimal SO_2 emissions. BELD has proposed SO_2 emission rates of 0.0024 lb/MMBtu when firing natural gas and 0.0016 lb/MMBtu when firing ULSD at the Watson Station. Although

Flue Gas Desulfurization (wet and dry) can be used to reduce SO_2 emissions, these methods are not technically feasible methods to further reduce SO_2 emissions from the turbines. Therefore, the proposed emission limits are considered BACT.

4.3.6 Oxides of Nitrogen

The NO_x determination for BACT for the Watson Station is the same as its LAER emission limit, 2.5 ppm when firing natural gas and 5.0 ppm when firing ULSD.

4.3.7 Non-Criteria Pollutants

The non-criteria pollutant emission rates are separated into two main categories: organic and metallic. The organic based non-criteria emissions are VOCs. BACT for these non-criteria emissions is equivalent to that for VOCs, an oxidation catalyst.

The metallic based non-criteria emissions are best characterized as Particulate Matter. Since there are no technically feasible methods to further control particulate from a gas turbine exhaust, the proposed BACT method is the clean burning fossil fuels (i.e., natural gas and ULSD).

4.4 BACT Summary for Turbines

The BACT emission limits for the turbines are summarized in Table 4-2.

Table 4-2 BACT Summary

		Fuel		
Pollutant	Units	Natural Gas	ULSD	Control Method
NO_x	ppm	2.5	5.0	Water injection and SCR
CO	ppm	5.0	5.0	Combustion Controls and Oxidation Catalyst
VOC	ppm	1.0-2.5	1.5-4.5	Combustion Controls and Oxidation Catalyst
PM_{10}/ $PM_{2.5}$	lb/hr	5.0	15.0	Natural gas and ULSD as the permitted fuels
	lb/MMBtu	0.01-0.02	0.03-0.05	
SO_2	lb/MMBtu	0.0024	0.0015	Natural gas and ULSD as the permitted fuels

4.5 Alternate Fuel

Since the beginning of deregulation of the electricity markets, all new large power projects were permitted to fire either exclusively natural gas or with a maximum of 30 days of back-up fuel oil. Several of these gas turbine projects have recently applied to obtain increased fuel oil firing capabilities.

These applications to modify fuel limits were the result of recent dialogue between the Northeast Energy and Commerce Association, the New England Independent System Operator (ISO-NE) and the DEP to evaluate methods to avoid potential natural gas shortages during winter months. These shortages could be the result of increased natural gas demand from heating and power generation. While such shortages did not materialize in the winter of 2005-6 due to unseasonably warm temperatures, ISO-NE and the Massachusetts Division of Energy Resources continue to be concerned with this issue for next winter and beyond.

Due to these potential shortages, as well as having fuel diversity, BELD is seeking to permit ULSD as an alternate fuel for the equivalent of 120 days of full load operation for firing ULSD for the Watson Station. This fuel limit will provide significant operating flexibility for BELD. Since the Watson Station turbines are capable of switching the fuels "on the fly," BELD will also be able to respond instantaneously to requests to curtail gas use. BELD will have an optimal ULSD capacity situation since they will have a pipeline directly from the adjacent CITGO Oil Terminal to supply ULSD to the Watson Station. This operating flexibility will allow BELD to generate power at the Watson Station at the lowest possible cost for its customers. Therefore, BELD proposes a ULSD permit limit of 22.0 million gallons firing of ULSD per 12 consecutive month period for the Watson Station. Additionally, BELD proposes a monthly (i.e., 31-day) ULSD permit limit of 5.69 million gallons for both Watson Station turbines.