AIR QUALITY ANALYSIS REPORT

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September 26, 2007

TRC Project No. 151501

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A. INTRODUCTION

The proposed 96 megawatt (MW) Waterbury Generation, LLC power plant (the Project or Facility) will have no substantial adverse air quality impact. Rather, the Project is expected to provide some beneficial impacts on local and regional air quality. It will use clean burning natural gas for its primary fuel and ultra low sulfur distillate (ULSD) oil as the backup fuel. It will utilize selective catalytic reduction (SCR) to control its nitrogen oxides (NO_x) emissions and an oxidation catalyst to control its carbon monoxide (CO) and volatile organic compound (VOC) emissions. The Project's air permits will contain enforceable limits on its hourly and annual emissions. On an annual basis, its actual emissions will be much less than the allowable levels, because the Project is expected to actually operate infrequently (i.e., as a peaking unit) for (at least) the first ten years of its useful life. Thereafter, market conditions may result in higher operating rates, which will be allowed by the air permits.

The annual amounts of NO_x and sulfur dioxide (SO_2) that will be emitted by the Project will be small fractions of the amounts emitted by other existing power generating facilities in Connecticut, and the combined total maximum air pollutant concentrations produced by the existing and proposed facilities will be cleaner than the levels that have been established to protect the public health and welfare.

On the basis of pounds per MW of power produced, the proposed Facility will emit NO_x at rates that will be much less than the rates produced by other peaking power generating units, which would be likely to operate in the absence of the proposed Project. The

proposed Facility will also emit carbon dioxide (CO_2) at lower rates than other existing plants. For electric power production, this will result in lower emissions of the pollutants known or believed to be responsible for ozone smog (NO_x) and global warming (CO_2).

The availability of this unit will continue to reduce emissions in Connecticut by displacing older, more polluting units in New Haven and Fairfield counties. Table 1 compares the emission rates of Connecticut Power plants that could have hours of operation lessened due to the availability of the Project. The proposed Project's potential emissions compared to other existing nearby facilities are illustrated in Table 2.

With the possible exception of very cold winter days, the exhaust from the simple-cycle turbine stack will not produce any visible plumes of condensed water vapor.

TABLE 1:
POWER PLANT EMISSION RATE COMPARISONS *

Plant	Emission Rate (lb/MW-hr)		
	SO_2	**CO_2**	**NO_x**
Bridgeport Harbor	2.10	2,352	1.65
Devon Station	4.00	2,078	2.54
Middletown Station	4.34	1,955	3.11
Montville Station	6.23	2,257	3.16
New Haven Harbor	3.45	1,828	1.71
Norwalk Harbor	4.77	2,174	2.28
Waterbury Generation - NG	0.02	1,039	0.08
Waterbury Generation – ULSD	0.01	1,369	0.19

* 2004 U.S. EPA EGRID data for the existing power plants

TABLE 2:
EMISSION RATE COMPARISONS TO OTHER NEARBY FACILITIES *

Pollutant	Facility					
	Waterbury Generation, LLC	O & G Industries, Inc	Waterbury - Water Pollution Control	Borough of Naugatuck	Waterbury Hospital	Naugatuck Valley Community College
			Emission Rates (lbs/hr)			
SO_2	1.72	13.9	15.4	20.6	5.71	11.2
NO_2	9.02	14.5	13.5	18.0	13.7	9.20
			Emission Rates (tons/yr)*			
SO_2	7.53	60.8	67.6	90.2	25.0	49.2
NO_2	39.5	63.4	59.3	78.9	60.0	40.3

*Maximum value of actual or allowable emissions

B. PRESENT CONDITIONS

1. General Climate

West central Connecticut lies in the northern temperate continental climate zone. This zone is characterized by prevailing winds with directions from the west and large-scale, migratory storm systems. The most representative, full-time weather observing station for the Waterbury area is the National Weather Service office at Bradley International Airport in Windsor Locks, Connecticut, about 33 miles northeast of the Project site.[1] The normal (1971-2000) annual precipitation at Bradley is 46.16 inches and the normal annual mean temperature is 50.2 degrees Fahrenheit. July is the hottest month, with normal daily maximum temperatures of 84.9 degrees, and January is the coldest month,

[1] Although there are other airports located in the vicinity of the Project site (in Oxford, Danbury, Hartford and New Haven), the detailed data recommended for air quality permitting analyses are not recorded at those sites.

with normal daily minimum temperatures of 17.2 degrees. Figure 1 shows the frequency distribution of wind directions and speeds measured at Bradley Airport for the years 1987-1991. Bradley Airport and the proposed Project site are both located within river valleys that are oriented roughly north to south.

2. Air Quality Regulations and Standards

Air emissions from the proposed Project are comprehensively regulated in accordance with the federal Clean Air Act and State law administered by the Connecticut Department of Environmental Protection (DEP). For its sources of air emissions, the proposed Project must obtain construction and operating permits from DEP. As part of the DEP permitting process, DEP must determine that the proposed Project meets all applicable regulatory standards, which include both technology-based standards and emission limitations designed to assure that the proposed Facility will not prevent or interfere with the maintenance or attainment of State and federal ambient air quality standards. The following sections of this report summarize the key air quality requirements that apply to the proposed Project.

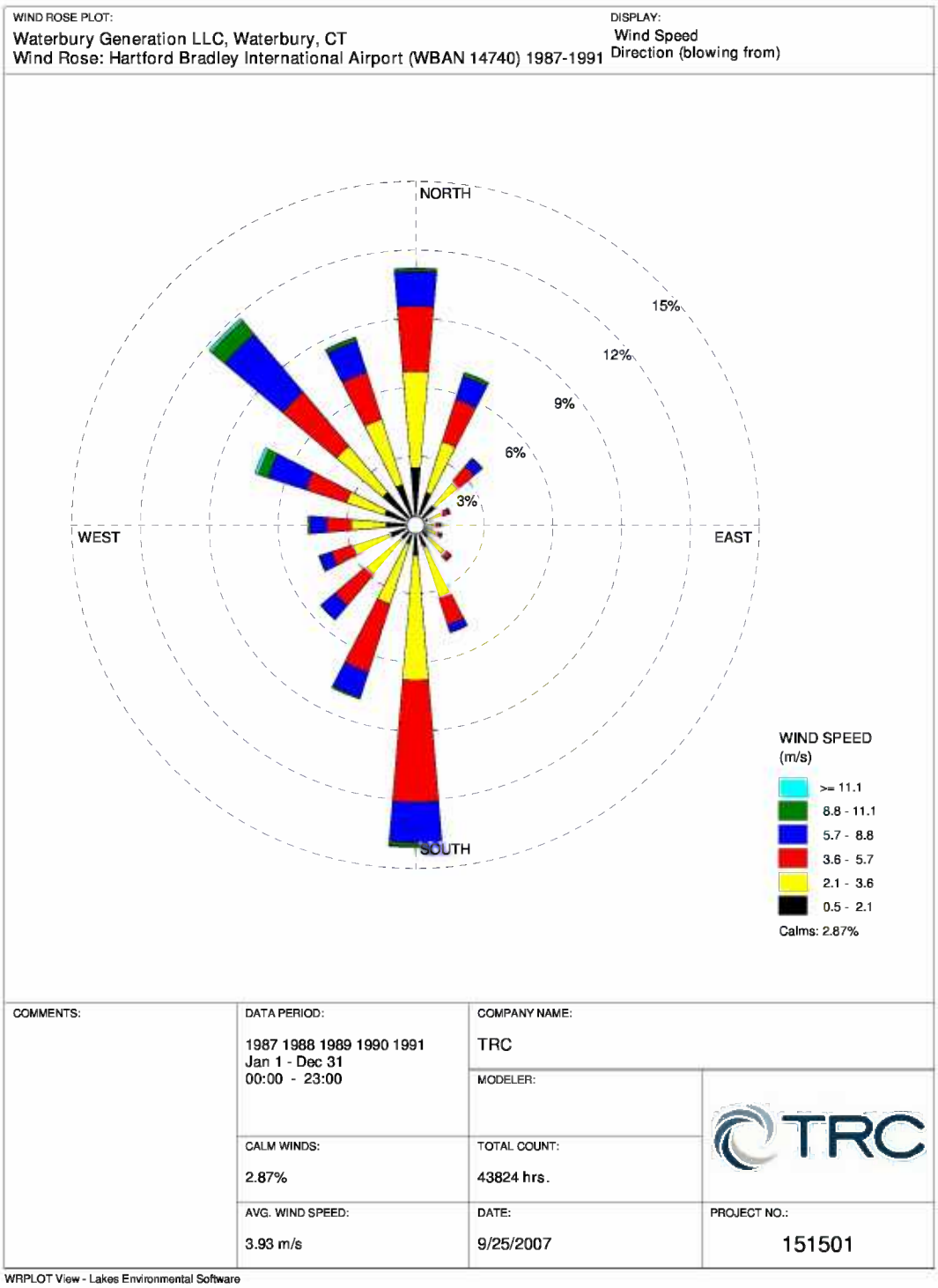


Figure 1: Windrose – Hartford Bradley International Airport

3. Ambient Air Quality Standards

DEP and the U.S. Environmental Protection Agency (EPA) have promulgated ambient air quality standards to protect the public health and welfare. The Connecticut and National Ambient Air Quality Standards (CAAQS/NAAQS) include Primary Standards, which are designed to protect human health, including the health of sensitive subpopulations, such as children or those with chronic respiratory problems. These regulations also contain Secondary Standards designed to protect public "welfare", including economic interests, visibility, vegetation, animal species, and other non-health related concerns.

The NAAQS pertain to seven "criteria" air pollutants: Particulate matter with a nominal aerodynamic diameter of 10 microns (PM_{10}); particulate matter with a nominal aerodynamic diameter of 2.5 microns ($PM_{2.5}$); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); carbon monoxide (CO); ozone (O_3); and lead (Pb). The CAAQS/NAAQS have been set for various durations of exposure.

4. Existing "Background" Air Quality

DEP monitors ambient air quality at several sites throughout the State. In order to establish conservative estimates of the existing or "background" pollutant concentrations, DEP's Ambient Impact Analysis Guideline (1989) recommends that the average concentrations for the nearest three monitoring stations for the most recent three years be used. The most recent data available from DEP are for the monitoring years 2004

through 2006. The background concentrations applicable to the City of Waterbury for the pollutants that will be emitted by the proposed Facility are:

- PM_{10} Annual Average = 20.1 $\mu g/m^3$
- PM_{10}, 24-Hour second high = 48.3 $\mu g/m^3$
- $PM_{2.5,}$ Annual Average = 12.1 $\mu g/m^3$
- $PM_{2.5,}$, 24-Hour eighth high = 32.4 $\mu g/m^3$
- Sulfur Dioxide, Annual Average = 10.1 $\mu g/m^3$
- Sulfur Dioxide, 24-Hour second high = 48.8 $\mu g/m^3$
- Sulfur Dioxide, 3-Hour second high = 96.2 $\mu g/m^3$
- Nitrogen Dioxide, Annual Average = 31.2 $\mu g/m^3$

Connecticut does not monitor carbon monoxide in most areas of the State because the levels are quite low. For dispersion modeling purposes, DEP recommends setting the background concentration for carbon monoxide equal to one-half of the ambient standard. In addition, under the Clean Air Act, major sources of air pollution in areas that comply with the ambient standards must undergo a "Prevention of Significant Deterioration" or "PSD" review. The PSD regulations are designed to assure that there is no significant deterioration of air quality in areas meeting federal standards. These regulations establish increments, which set the maximum allowable increases in air pollutant concentrations permitted for all new sources. In Connecticut, any source that requires an air permit must demonstrate compliance with the PSD increments, whether or not it is a major source. A summary of the ambient air quality standards appears in Table 3.

TABLE 3:
AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$)

Pollutant	Averaging Period	NAAQS		CAAQS		Class II PSD Increment
		Primary	Secondary	Primary	Secondary	
PM_{10}	Annual [1]	50	50	50	50	17 [4]
	24-Hour [2]	150	150	150	150	30 [5]
$PM_{2.5}$	Annual [1]	15	15	--	--	--
	24-Hour [3]	35	35	--	--	--
SO_2	Annual [4]	80	--	80	--	20 [4]
	24-Hour [5]	365	--	365	--	91 [5]
	3-Hour [5]	--	1,300	--	1,300	512 [5]
NO_2	Annual [4]	100	100	100	100	25 [4]
CO	8-Hour [5]	10,000	10,000	10,000	10,000	--
	1-Hour [5]	40,000	40,000	40,000	40,000	--
O_3	8-Hour [2]	157	157	157	157	--
	1-Hour [2]	--	--	235	235	--
Pb	3-Month [4]	1.5	1.5	1.5	1.5	--
Dioxins	Annual [4]	--	--	0.000001	0.000001	--
Hydrocarbons	3-Hour (6-9 AM)	--	--	160	160	--

[1] Not to be exceeded by the arithmetic average of the annual arithmetic averages for three successive years.
[2] Not to be exceeded more than an average of once per year over three years.
[3] 98th percentile of concentrations in a given year, averaged over three years.
[4] Not to be exceeded.
[5] Not to be exceeded more than once per year.
$\mu g/m^3$ = micrograms per cubic meter

Air quality in the Waterbury, Connecticut area meets all the air quality standards presented in Table 3, except the short-term ozone standards, which are exceeded on several days a year during the summer months throughout Connecticut and in much of the northeastern United States. Although the measured air quality in Waterbury,

Connecticut meets the 24-hour hour average $PM_{2.5}$ standards, New Haven County is a designated "non-attainment" area for those standards. Thus, the area is in "attainment" for all pollutants except ozone and $PM_{2.5}$.

Connecticut is considered an ozone "non-attainment" area, as is most of the rest of the northeast. Ozone is created in the atmosphere when NO_x and VOC react in the presence of sunlight. Ozone is a regional problem. Most of the NO_x and VOC that cause Connecticut to be an ozone non-attainment area are emitted upwind in areas like metropolitan New York.

Fairfield and New Haven Counties are also considered non-attainment areas for $PM_{2.5}$. There are numerous sources and constituents of $PM_{2.5}$. Some $PM_{2.5}$ occurs naturally in the environment. A substantial amount is emitted directly from many types of sources. Another large portion is created in the atmosphere when NO_x and sulfur oxides (SO_x) react to produce ammonium nitrate and sulfate salts. As with ozone, much of the various emissions that cause Fairfield and New Haven Counties to be $PM_{2.5}$ non-attainment areas originate in upwind areas like metropolitan New York.

5. Permit And Technology Requirements

The Regulations of Connecticut State Agencies (RCSA), Section 22a-174-3a, set forth permit requirements for new sources of air pollution. These requirements are known as the new source review (NSR) regulations. For each individual air pollutant for which the stationary source has potential emissions equal to or greater than fifteen (15) tons per year (TPY), the owner or operator must include an analysis of the Best Available Control

Technology (BACT). In the Waterbury, Connecticut area, if the source has potential emissions of NO_x or VOC (the two ozone non-attainment pollutants) in excess of 50 TPY, or $PM_{2.5}$ emissions in excess of 100 TPY, the source is considered a major stationary source, and an analysis of the Lowest Achievable Emission Rate (LAER) is required instead of BACT.

Under the NSR regulations, the proposed Facility is subject to BACT for PM_{10}, $PM_{2.5}$, NO_x, CO and VOC because the proposed annual emissions of those pollutants exceed 15 TPY.

The proposed Facility's emission rates cannot exceed any applicable federal New Source Performance Standard (NSPS). EPA has established NSPS for various categories of new sources, including gas turbines, see Subpart KKKK "Standards of Performance for Stationary Combustion Turbines," 40 FR Part 60. Subpart KKKK sets emission standards for SO_x and NO_x applicable to new turbines with combustion turbine heat inputs at peak load greater than 850 million British thermal units per hour (MMBtu/hr). The NSPS limit for SO_x is 0.90 lb/MW-hr or 0.060 lb/MMBtu, while the limits for NO_x are 15 and 42 ppmvd @ 15% O_2, (0.43 and 1.3 lb/MW-hr) when firing natural gas and distillate oil, respectively. The emissions from the proposed Facility meet the NSPS limits.

Under the PSD regulations, new major sources of attainment pollutants, and major modifications to existing major sources of attainment pollutants are subject to PSD

review. The major stationary source threshold is 100 TPY for PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO. The major modification thresholds are 15, 15, 50, 40 and 100 TPY for PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO, respectively. The proposed Project is not subject to PSD review for any air pollutant because its emissions will be less than all the specified thresholds.

The proposed Project will not be subject to non-attainment review for NO_x or VOC since potential emissions of these pollutants will be less than 50 TPY, nor will it be subject to non-attainment review for $PM_{2.5}$ since potential emissions of that pollutant will be less than 100 TPY. Accordingly, the proposed Project is not required to include LAER in the design of its equipment, nor are emission offsets required.

The proposed Project will be subject to the requirements of the federal Acid Rain Program as a "New Affected Unit." As such, the proposed Project must complete and submit an Acid Rain permit application, including a compliance plan before commencing operation. Under the Acid Rain Program, owners and operators of Affected Units must hold enough SO_2 allowances to cover the total expected annual emissions of SO_2. Allowances are traded on the Chicago Board of Trade (CBOT). The Acid Rain Program also requires compliance verification using stack emissions testing or a Continuous Emissions Monitoring System (CEMS) for specified pollutants.

Finally, the NSR regulations require a review of compliance with Connecticut's Hazardous Air Pollutant (HAP) regulations. In accordance with this section of the State

regulations, any source that is required to apply for and obtain a permit to construct and/or operate may not emit any State-regulated HAP in excess of the Maximum Allowable Stack Concentration (MASC). MASCs are calculated using conservative dispersion modeling equations.

C. IMPACTS AND MITIGATION

The design of the proposed Project incorporates several features to minimize air pollution. The proposed Facility will use clean burning natural gas and ULSD oil for fuel, thus minimizing PM_{10}, $PM_{2.5}$, SO_x and NO_x emissions. The plant will utilize a highly efficient simple-cycle GE LMS100 gas turbine. This simple-cycle turbine is 5-10 percent more thermally efficient at generating electricity than a typical steam boiler plant, its NO_x emissions are 20 to 45 times less than a typical steam boiler power plant, and up to 400 times less than internal combustion engines, which are often used to generate peaking power. The turbine will be subject to enforceable air permit conditions, which will include hourly and annual fuel use and emission limits. The turbine will use SCR to meet a NO_x emission limit of 2.0 parts per million (ppm) when burning natural gas. The turbine will use water injection and SCR to limit its NO_x emissions to 5.9 ppm when burning ULSD oil.

1. Facility Air Emissions and Control

Table 4 shows the estimated maximum potential emissions of PM_{10}, $PM_{2.5}$, SO_x, NO_x, CO and VOC from the proposed Project. The calculated maximum potential emissions are based on a maximum of 8,760 hours of operation at maximum capacity per year, including a maximum of 720 hours of operation using ULSD oil per year. These

TABLE 4: MAXIMUM POTENTIAL EMISSIONS OF THE PROPOSED PROJECT	
Pollutant	Maximum Potential Emissions (Tons/year)
PM_{10}	44.3
$PM_{2.5}$	44.3
SO_2	7.5
NO_x	39.5
CO	86.4
VOC	17.6

maximum emissions represent worst-case operating parameters. Since the Facility is actually expected to operate for up to 300 hours per year, actual emissions are expected to be much less than the maximum potential amounts. Because the maximum potential emissions of every pollutant will be less than 100 TPY, the Facility is not subject to PSD review.

2. Criteria Pollutants

a. Sulfur Oxides (SO_x)

Sulfur present in the fuel is converted to SO_x during the combustion process. The best mitigation for this pollutant is through the use of clean fuels. The proposed Project will utilize clean burning natural gas and ULSD oil.

b. Nitrogen Oxides (NO_x)

The proposed Project will utilize a state-of-the-art GE LMS100 turbine with SCR to minimize NO_x emissions when burning natural gas and water injection and SCR to

minimize NO_x emissions when burning ULSD oil. SCR treats the exhaust gases through the injection of ammonia, and then passes the exhaust through a bed of catalytic material. The catalyst promotes the conversion of the NO_x formed during the combustion process to nitrogen (N_2) and water vapor. The proposed Project will achieve NO_x emission limits of 2.0 and 5.9 ppmvd @ 15% O_2 on natural gas and ULSD oil, respectively. These emission rates meet the NSPS for simple-cycle turbines. The Project will utilize a Continuous Emission Monitoring System (CEMS) to demonstrate compliance with its NO_x emission limits.

There is no regulatory requirement to consider the application of any other NO_x control technology, and no other technically feasible control technology can achieve lower NO_x emission rates when applied to the proposed simple-cycle turbine. EM_x (formerly $SCONO_x$), a proprietary NO_x control technology marketed by EmaraChem (formerly Goal Line Technologies) uses a potassium carbonate-coated catalyst to reduce NO_x to N_2 and water (and oxidize CO to CO_2). The EM_x control technology is neither technically nor economically feasible for application to simple-cycle turbines. The maximum temperature of the GE LMS100 turbine exhaust gases is approximately 110 degrees Fahrenheit higher than the maximum recommended operating temperature of the EM_x catalyst material, and it is approximately 300 degrees Fahrenheit higher than the nominal optimal operating temperature of the catalyst material.

c. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

Carbon monoxide and volatile organic compounds are products of incomplete combustion, and are present in the turbine exhaust during the firing of the natural gas and ULSD oil fuels. The proposed Project will use an oxidation catalyst to minimize CO and VOC emissions. No other CO or VOC control technology is warranted or required. The Project will utilize CEMS to demonstrate compliance with its CO emission limits.

d. Particulate Matter

Particulate matter emissions originate from trace quantities of non-combustibles in the fuel. Due to the utilization of SCR and an oxidation catalyst to control emissions of NO_x, CO and VOC, small amounts of additional particulate matter emissions will occur as byproducts in the form of ammonium sulfate salts. Particulate matter emissions are minimized by using clean burning natural gas and ULSD oil. In addition, good combustion practices will limit both PM_{10} and $PM_{2.5}$ emissions.

3. Non-Criteria Pollutants

Table 5 illustrates that the maximum potential emissions from the proposed Project will comply with the HAP emission limits of Section 22a-174-29 of the State regulations.

TABLE 5:
WATERBURY GENERATION, LLC PROJECT
MAXIMUM ALLOWABLE STACK CONCENTRATION CALCULATIONS

Stack Height (ft)	213	**Exhaust Flow (acfm)**	
Distance From Property Line (ft)	32.8	**ULSD Oil**	880,684
Xmax (m)	583	**Natural Gas**	883,844
		V_0(m^3/s)	
		ULSD Oil	416
		Natural Gas	417

Fuel	Pollutant	HLV (µg/m^3)	Source for HLV	Pollutant Emission Rate (lb/hr)	MASC (µg/m^3)	ASC (µg/m^3)	ASC ≤ MASC
ULSD Oil	Formaldehyde	12	Table29-2	0.222	1,458	67.2	Yes
ULSD Oil	Ammonia	360	Table29-3	10.3	43,732	3,119	Yes
ULSD Oil	Sulfuric Acid	20	Table29-3	1.25	2,430	377	Yes
Natural Gas	Formaldehyde	12	Table29-2	0.629	1,453	190	Yes
Natural Gas	Ammonia	360	Table29-3	5.91	43,577	1,784	Yes
Natural Gas	Sulfuric Acid	20	Table29-3	1.73	2,421	523	Yes

D. AMBIENT AIR QUALITY IMPACTS

An assessment of compliance of the proposed Project with ambient air quality regulations (NAAQS, CAAQS, and PSD increments) was performed in accordance with DEP's Ambient Impact Analysis Guideline. The guideline specifies a two-stage air quality dispersion modeling process: screening modeling to determine the "worst-case load conditions" and domain of possible impacts, and refined modeling to assess compliance. The screening modeling and refined modeling are discussed below.

Screening modeling is conducted to identify the operating scenarios for the proposed Project that cause the highest model-predicted concentrations, i.e., the worst-case operating scenario, and the aerial extent of the region to be modeled. The screening concentration predictions themselves are not used to assess compliance. Tables 6 and 7 present the operating conditions and emission rates modeled for the Project. Various load conditions, ambient temperatures and operating scenarios were modeled. The screening modeling results were also used to determine the spacing for the refined modeling receptor array, as specified in DEP's modeling guidance.

For each of the operating scenarios, an array of 656 receptors was modeled for all directions from the plant to a distance of 21.7 kilometers. Both EPA's AERMOD model (applicable to receptor locations at elevations at or below the stack top elevation) and DEP's PTMTPA-CONN model (applicable to receptors above the stack top elevation) were used. The AERMOD model was run using five years of hour-by-hour meteorological data from the Bradley Airport National Weather Service office.

TABLE 6:
WATERBURY GENERATION, LLC PROJECT
GE LMS100 COMBUSTION TURBINE
SOURCE PARAMETER MODELING DATA – NATURAL GAS

Unit No.	Case	Load	Inlet Cooling	Ambient Temp °F	Fuel	Exhaust Stack Parameters						
						Flow Rate (m^3/s)	Velocity (m/s)	Temp (K)	NOx (g/s)	CO (g/s)	SOx (g/s)	$PM_{10}/PM_{2.5}$ (g/s)
LMS 100	1	100%	None	-5	Nat Gas	409	30.8	657	0.988	2.49	0.210	0.948
LMS 100	2	75%	None	-5	Nat Gas	346	26.0	660	0.782	1.90	0.167	0.929
LMS 100	3	50%	None	-5	Nat Gas	278	20.9	669	0.576	1.40	0.123	0.916
LMS 100	4	100%	None	0	Nat Gas	410	30.8	658	0.989	2.41	0.211	0.948
LMS 100	5	75%	None	0	Nat Gas	346	26.0	660	0.783	1.91	0.167	0.929
LMS 100	6	50%	None	0	Nat Gas	278	20.9	670	0.577	1.41	0.123	0.919
LMS 100	7	100%	None	50	Nat Gas	417	31.4	678	1.02	2.48	0.217	1.01
LMS 100	8	75%	None	50	Nat Gas	351	26.4	670	0.800	1.95	0.170	0.954
LMS 100	9	50%	None	50	Nat Gas	282	21.2	680	0.589	1.43	0.125	0.938
LMS 100	10	100%	Evap	90	Nat Gas	411	30.9	695	1.00	2.44	0.213	1.05
LMS 100	11	75%	Evap	90	Nat Gas	346	26.0	683	0.785	1.91	0.167	0.981
LMS 100	12	50%	Evap	90	Nat Gas	278	20.9	691	0.577	1.41	0.123	0.949
LMS 100	13	100%	Evap	100	Nat Gas	402	30.2	700	0.968	2.36	0.206	1.05
LMS 100	14	75%	Evap	100	Nat Gas	338	25.4	688	0.761	1.85	0.161	0.984
LMS 100	15	50%	Evap	100	Nat Gas	273	20.5	695	0.561	1.37	0.119	0.951
LMS 100	16	100%	Evap	105	Nat Gas	393	29.6	705	0.939	2.29	0.199	1.05
LMS 100	17	75%	Evap	105	Nat Gas	332	25.0	693	0.739	1.80	0.157	0.987
LMS 100	18	50%	Evap	105	Nat Gas	268	20.2	702	0.547	1.33	0.116	0.953
LMS 100	19	100%	None	105	Nat Gas	387	29.1	708	0.921	2.24	0.195	1.02
LMS 100	20	75%	None	105	Nat Gas	327	24.6	696	0.725	1.76	0.154	0.963
LMS 100	21	50%	None	105	Nat Gas	264	19.9	705	0.537	1.31	0.114	0.910

Stack Height = 65 m (213 ft); Diameter = 4.11 m (13.5 ft); Base Elevation = 80.0 m (262 ft)
Stack Location (Datum NAD 83 UTM Zone 18) = 663329.7 m East, 4601045.6 m North

TABLE 7:
WATERBURY GENERATION, LLC PROJECT
GE LMS100 COMBUSTION TURBINE
SOURCE PARAMETER MODELING DATA – ULSD OIL

Unit No.	Case	Load	Inlet Cooling	Ambient Temp °F	Fuel	Exhaust Stack Parameters						
						Flow Rate (m^3/s)	Velocity (m/s)	Temp (K)	NOx (g/s)	CO (g/s)	SOx (g/s)	$PM_{10}/PM_{2.5}$ (g/s)
LMS 100	22	100%	None	-5	ULSD	410	30.9	670	2.40	2.48	0.145	3.69
LMS 100	23	75%	None	-5	ULSD	347	26.1	671	1.90	1.96	0.115	2.84
LMS 100	24	50%	None	-5	ULSD	279	21.0	679	1.40	1.44	0.0851	2.11
LMS 100	25	100%	None	0	ULSD	411	30.9	671	2.40	2.48	0.145	3.70
LMS 100	26	75%	None	0	ULSD	347	26.1	672	1.90	1.96	0.115	2.84
LMS 100	27	50%	None	0	ULSD	279	21.0	680	1.40	1.45	0.0851	2.12
LMS 100	28	100%	None	50	ULSD	416	31.3	691	2.46	2.54	0.149	3.73
LMS 100	29	75%	None	50	ULSD	350	26.3	682	1.93	1.99	0.117	2.89
LMS 100	30	50%	None	50	ULSD	281	21.1	691	1.42	1.47	0.0862	2.16
LMS 100	31	100%	Evap	90	ULSD	391	29.4	704	2.26	2.33	0.136	3.74
LMS 100	32	75%	Evap	90	ULSD	330	24.8	692	1.78	1.83	0.107	2.68
LMS 100	33	50%	Evap	90	ULSD	267	20.1	704	1.32	1.36	0.0794	2.01
LMS 100	34	100%	Evap	100	ULSD	382	28.7	709	2.19	2.26	0.132	3.74
LMS 100	35	75%	Evap	100	ULSD	323	24.3	697	1.73	1.78	0.104	2.61
LMS 100	36	50%	Evap	100	ULSD	261	19.7	709	1.28	1.32	0.0771	1.90
LMS 100	37	100%	Evap	105	ULSD	375	28.2	713	2.13	2.19	0.128	3.67
LMS 100	38	75%	Evap	105	ULSD	317	23.9	704	1.68	1.73	0.101	2.49
LMS 100	39	50%	Evap	105	ULSD	257	19.3	716	1.25	1.29	0.0760	1.86
LMS 100	40	100%	None	105	ULSD	368	27.7	716	2.08	2.15	0.126	3.71
LMS 100	41	75%	None	105	ULSD	312	23.5	706	1.65	1.70	0.0987	2.47
LMS 100	42	50%	None	105	ULSD	254	19.1	719	1.23	1.27	0.0737	1.84

Stack Height = 65 m (213 ft); Diameter = 4.11 m (13.5 ft); Base Elevation = 80.0 m (262 ft)
Stack Location (Datum NAD 83 UTM Zone 18) = 663329.7 m East, 4601045.6 m North

PTMTPA-CONN was run using the set of meteorological data shown in Table 8, in accordance with DEP guidance.

TABLE 8:
METEOROLOGICAL CONDITIONS USED IN THE PTMTPA-CONN MODELING

Stability Class	Wind Speed Used for Stability Class (m/sec)	Mixing Height Used for Stability Class (meters)
A	2.5	1,800
B	2.5, 4	1,200
C	2.5, 4, 6, 8, 10	1,200
D	2.5, 4, 6, 8, 10	950
E	2.5, 4	700
F	2.5, 4	700

Table 9 presents the modeled concentrations, background concentrations and total concentrations, as well as the applicable regulatory standards for each pollutant. Each total concentration is the sum of the model-predicted concentration plus the background concentration. Note that in all cases, with the exception of the 24-hour average $PM_{2.5}$ concentrations, the total concentrations are well below the ambient air quality standards, and the maximum modeled concentrations are below both the significant impact levels (SILs) that trigger multi-source modeling requirements and the allowed PSD increments.

The presently predicted total 24-hour average $PM_{2.5}$ concentration is marginally higher (0.4 $\mu g/m^3$) than the ambient air quality standard due to the conservatively calculated background concentration, which accounts for 92 percent of the total. Demonstration of compliance with the 24-hour average $PM_{2.5}$ ambient air quality standard is anticipated

TABLE 9:
WATERBURY GENERATION, LLC PROJECT
REFINED MODELING RESULTS

		Highest Second High** Maximum Predicted Results Single Source Impacts ($\mu g/m^3$)									
		SO_2			NO_2	$PM_{2.5}$		PM_{10}		CO	
Dispersion Model	Source Description	3-Hour	24-Hour	Annual*	Annual*	24-Hour	Annual*	24-Hour	Annual*	1-Hour	8-Hour
AERMOD	GE LMS100 Turbine	0.167	0.0382	3.98E-03	0.0448	0.417	0.0734	0.712	0.0734	5.11	1.25
PTMTPA-CONN	GE LMS100 Turbine	1.42	0.180	0.0253	0.287	2.98	0.457	3.33	0.457	18.6	13.0
Maximum	GE LMS100 Turbine	1.42	0.180	0.0253	0.287	2.98	0.457	3.33	0.457	18.6	13.0
SIL		25	5	1	1	2	0.3	5	1	2,000	500
PSD Increment		512	91	20	25.0	N/A	N/A	30	17	N/A	N/A
Maximum	GE LMS100 Turbine	1.42	0.180	0.0253	0.287	2.98	0.457	3.33	0.457	18.6	13.0
	Background	96.2	48.8	10.1	31.2	32.4	12.1	48.3	20.1	20,000	5,000
	Total	97.6	49.0	10.1	31.5	35.4	12.6	51.6	20.6	20,019	5,013
CAAQS/NAAQS		1,300	365	80.0	100	35.0	15	150	50	40,000	10,000

* Maximum Impacts
N/A = Not Applicable
**Highest Eighth High results are shown for $PM_{2.5}$

following further analysis and refinement of the background $PM_{2.5}$ concentration, and multi-source refined modeling, in accordance with DEP guidance.

Thus, the proposed Project is expected to fully comply with state and federal ambient air quality standards, and do so with an adequate margin of safety.

FirstLight Power Resources

John P. Campbell
Sr. Vice President – Asset Operations
One Corporate Center
20 Church Street, 16th Floor
Hartford, CT 06103
tel: (860) 895-6903
fax: (860) 895-6481

September 4, 2007

DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL PERMIT PROCESSING UNIT

SEP 0 4 2007

RECEIVED BY B.C.

WAT0001

Central Permit Processing Unit
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106

Regarding: ***New Source Review Application for Permit to Construct and Operate A Simple-Cycle Turbine at Waterbury Generation, LLC, in Waterbury, CT***

To Whom It May Concern:

FirstLight Power Resources Services, as agent for Waterbury Generation, LLC, is submitting the attached application for a Permit to Construct and Operate an approximately 96 Megawatt simple-cycle turbine to be constructed at the current Ansonia Copper and Brass facility located at 725 Bank Street in Waterbury, Connecticut.

Attached are three copies of the permit application including a $750 application fee. Public notice for the application will be posted in the Waterbury Republican on September 5, 2007. A copy of the notice will be forwarded under separate cover. A modeling protocol for ambient emission impact will also be submitted under separate cover for the proposed project.

If you have any questions regarding this submittal, please contact Ms. Cynthia Vodopivec, Environmental, Health and Safety Manager at (860) 895-6961.

Best Regards,

John P. Campbell

John P. Campbell
Project Manager, Waterbury Generation, LLC

Attachments

New Source Review Application for Permits to Construct and Operate A Simple-Cycle Turbine at Waterbury Generation, LLC, in Waterbury, CT

Prepared for

Waterbury Generation, LLC

and

FirstLight Power Resources

FirstLight Power Resources Services, LLC

Hartford, Connecticut

Prepared by

21 Griffin Road North
Windsor, Connecticut 06095
Telephone 860-298-9692
Facsimile 860-298-6399

August 2007

Waterbury Generation, LLC
Simple-Cycle Turbine

Table of Contents

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Permit Processing Unit
79 Elm Street
Hartford, CT 06106-5127

DEP USE ONLY

Permit Application Transmittal Form

Please complete this transmittal form in accordance with the instructions in order to ensure the proper handling of your application(s) and the associated fee(s). Print legibly or type.

Part I: Applicant Information

Applicant: **Waterbury Generation, LLC**

Mailing Address: **c/o FirstLight Power Resources Services, LLC, 20 Church Street**

City/Town: **Hartford** State: **CT** Zip Code: **06103**

Business Phone: **860-895-6900** ext.: Fax:

Contact Person: **John Campbell, Project Manager** Phone: **860-895-6903** ext.

Applicant (check one): ☐ individual ☒ company ☐ federal gov't ☐ state agency ☐ municipality

If a Company, list company type (e.g., corporation, limited partnership, etc.):
Limited Liability Company

☐ Check if any co-applicants. If so, attach additional sheet(s) with the required information as supplied above.

Please provide the following information to be used for *billing purposes only*, if different:

Company/Individual Name: **FirstLight Power Resources Services, LLC**

Mailing Address: **20 Church Street**

City/Town: **Hartford** State: **CT** Zip Code: **06103**

Contact Person: **John Campbell** Phone: **860-895-6903** ext.

Part II: Project Information

Brief Description of Project: *(Example: Development of a 50 slip marina on Long Island Sound)*
The project involves the installation of one GE LMS100 PA combustion turbine

Location (City/Town): **Waterbury**

Other Project Related Permits (*not* included with this form):

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #

Part III: Individual Permit Application and Fee Information

New, Mod. or Renew	Individual Permit Applications	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
N	New Source Review	$750.00	1	$750	1 + 0
	Title V Operating Permits	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	$1050.00			1 + 1
	To Sanitary Sewer (POTW)	$1050.00			1 + 1
	To Surface Water (NPDES)	$1050.00			1 + 2
	INLAND WATER RESOURCES-multiple permits 1 + 6 total copies				
	Dam Construction	none			1 + 2
	Flood Management Certification	none			1 + 1
	Inland 401 Water Quality Certification	none			1 + 5
	Inland Wetlands and Watercourses	none			
	Stream Channel Encroachment Lines	★			
	Water Diversion	★			1 + 5
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
	Certificate of Permission	$400.00			1 + 3
	Coastal 401 Water Quality Certification	none			1 + 3
	Structures and Dredging/Tidal Wetlands	$525.00			1 + 3
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	$100.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	$125.00			1 + 0
	RCRA Closure Plan	$3750.00			1 + 0
	RCRA Post Closure	$3750.00			1 + 0
	Solid Waste Facilities	★			1 + 2
	Waste Transportation	★			1 + 0
		Subtotal ➡		$750	
	GENERAL PERMITS and AUTHORIZATIONS Enter subtotals from Part IV, pages 3 & 4 of this form	Subtotals Page 3 ➡ Subtotals Page 4 ➡			
		TOTAL ➡	1	$750	
	☐ Indicate whether municipal discount or state waiver applies.	Less Applicable Discount ➡			
		AMOUNT REMITTED ➡		$750	

Check # ➡ 0574488

Check or money order should be made payable to: "Department of Environmental Protection"

★ See fee schedule on individual application.

Part IV: General Permit Registrations and Requests for Other Authorizations Application and Fee Information

	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
☐	Limit Potential to Emit from Major Stationary Sources of Air Pollution	$5000.00			1 + 0
☐	Ionizing Radiation Registration	$200.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WATER DISCHARGES				
☐	Domestic Sewage	$500.00			1 + 0
☐	Food Processing Wastewater	$500.00			1 + 0
☐	Groundwater Remediation Wastewater to a Sanitary Sewer	$500.00			1 + 0
☐ ☐	Groundwater Remediation Wastewater to a Surface Water Registration Only Approval of Registration by DEP	 $500.00 $1000.00			1 + 0
☐	Minor Non-Contact Cooling and Heat Pump Water	$500.00			1 + 1
☐	Minor Photographic Processing	$100.00			1 + 0
☐	Minor Printing & Publishing Wastewater	$500.00			1 + 0
☐	Minor Tumbling or Cleaning of Parts Wastewater	$1000.00			1 + 1
☐ ☐	Miscellaneous Discharges of Sewer Compatible Wastewater Flow < 5,000 gpd and fire sprinkler system testwater Flow > 5,000 gpd	 $500.00 $1000.00			1 + 1
☐	Stormwater Associated with Commercial Activities	$500.00			1 + 0
☐	Stormwater Associated with Industrial Activities	$500.00			1 + 0
☐ ☐	Stormwater & Dewatering Wastewaters-Construction Activities 5 – 10 acres > 10 acres	 $500.00 $1000.00			1 + 0
☐	Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	$250.00			1 + 0
☐	Swimming Pool Wastewater - Public Pools and Contractors	$500.00			1 + 0
☐ ☐	Vehicle Maintenance Wastewater Registration Only Approval of Registration by DEP	 $500.00 $1000.00			1 + 0
☐	Water Treatment Wastewater	$500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to POTW	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Surface Water	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Groundwater	$1500.00			1 + 0
☐	Other, (please specify):				
	AQUIFER PROTECTION PROGRAM				
☐	Registration for Regulated Activities	$500.00			1 + 0
☐	Permit Application to Add a Regulated Activity	$1000.00			1 + 0
☐	Exemption Application from Registration	$1000.00			1 + 0
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡				

Contact the specific permit program for this information (Contact numbers are provided in the instructions).

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	INLAND WATER RESOURCES				
☐	Dam Safety Repair and Alteration	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Reauthorization Categories	$1000.00			1 + 2
☐	Diversion of Water for Consumptive Use: Authorization Required	$2500.00			1 + 5
☐	Diversion of Water for Consumptive Use: Filing Only	$1500.00			1 + 4
☐	Habitat Conservation	$1000.00			1 + 2
☐	Lake, Pond and Basin Dredging	$1000.00			1 + 2
☐	Minor Grading	$1000.00			1 + 2
☐	Minor Structures	$1000.00			1 + 2
☐	Utilities and Drainage	$1000.00			1 + 2
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
☐	4/40 Docks	$700.00			1 + 1
☐	Non-harbor Moorings	$100.00			1 + 0
☐	Osprey Platforms and Perch Poles	none			1 + 0
☐	Pump-out Facilities (no fee for Clean Vessel Act grant recipients)	$100.00			1 + 0
☐	Remedial Activities Required by Order	$700.00			1 + 0
☐	Residential Flood Hazard Mitigation	$100.00			1 + 0
☐	Swim Floats	$100.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WASTE MANAGEMENT				
☐	Addition of Grass Clippings at Registered Leaf Composting Facilities	$500.00			1 + 0
☐	Asbestos Disposal Authorization	$240.00			1 + 0
☐ ☐	Contaminated Soil and/or Staging Management (Staging/Transfer) Registration Only Approval of Registration by DEP	 $250.00 $1500.00			 1 + 0 1 + 0
☐	Disassembling Used Electronics	$1000.00			1 + 0
☐	Drop-site Recycling Facility	$200.00			1 + 0
☐	Leaf Composting Facility	none			1 + 1
☐	Limited Processing Recycling Facility	$500.00			1 + 0
☐	One Day Collection of Household Hazardous Waste and Hazardous Waste from Certain Generators	$500.00			1 + 0
☐	Recyclables Transfer Facility	$500.00			1 + 0
☐	Single Item Recycling Facility	$500.00			1 + 0
☐	Special Waste Authorization	$525.00			1 + 0
☐	Storage and Distribution of Two (2) Inch Nominal Tire Chip Aggregate	$500.00			1 + 0
☐	Storage and Processing of Asphalt Roofing Shingle Waste and/or Storage and Distribution of Ground Asphalt Aggregate	★			1 + 0
☐	Storage and Processing of Scrap Tires for Beneficial Use	$1000.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡				

★ See fee schedule on application. ★★ Contact the specific permit program for this information.

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certification of Notice Form - Notice of Application

DEP USE ONLY
Division
Application No.

I , **John Campbell, of Waterbury Generation, LLC** , certify that
(Name of Applicant)

the attached notice is a true copy of the notice that appeared in **The Waterbury Republican**
(Name of Newspaper)

on / / .

I also certify that I have provided a copy of the notice to the municipal official(s) listed below as required by CGS Section 22a-6g.

Michael J. Jarjura
(Name of Official)

Mayor
(Title of Official)

City Hall, 235 Grand St., 06702
(Address)

(Name of Official)

(Title of Official)

(Address)

_____ / /
Signature of Applicant *Date*

John Campbell
Name of Applicant (print or type)

Project Manager
Title (if applicable)

Notice of Permit Application

Town(s): Waterbury

Notice is hereby given that Waterbury Generation, LLC, Ansonia, Connecticut has submitted to the Department of Environmental Protection an application under Connecticut General Statutes (CGS) § 22a-174 for a permit to construct, install, enlarge, or establish an air contaminant source or to operate a source regulated under the federal Clean Air Act.

Specifically, the applicant proposes to install one nominal 96-megawatt combustion turbine at the site. The proposed activity will take place at the Ansonia Copper & Brass Site in Waterbury. The proposed activity potentially will affect air resources.

Interested persons may obtain copies of the application from John Campbell, Waterbury Generation, LLC, Project Manager, c/o FirstLight Power Resources Services, LLC, 20 Church Street, Hartford, CT 06103, 860-895-6903

The application is available for inspection at the Department of Environmental Protection, Bureau of Air Management, Permitting Section, 79 Elm Street, 5th Floor, Hartford, CT 06106-5127, (860) 424-4152, from 8:30am to 4:30pm, Monday through Friday.

Waterbury Generation, LLC
Simple-Cycle Turbine

Permit Application for New Source Review

Permit Application for New Source Review Stationary Sources of Air Pollution

Please complete this form in accordance with CGS Section 22a-174, RCSA Sections 22a-174-1 and 3, and the instructions (DEP-AIR-INST-200). Print or type unless otherwise noted.

Part I: Application and Source Type

Please read the instructions (DEP-AIR-INST-200) in order to properly complete the table below. Please reproduce this page if additional space is necessary. You may apply for more than one permit on one application if the sources originate from the same premise. *Each* unit or process line requires a separate permit.

Unit No.	Source Type	App. Type (N, R, M)	If renewal or modification, indicate existing permit/reg. no.	DEP Use Only		
				Application No.	Permit No.	EPE No.
U1	Turbine	N				

Part II: Fee Information

Please note: effective August 21, 2003 an initial fee of $750.00 is to be submitted for *each* permit that you are applying for. *Each* unit or process line requires a separate permit. For municipalities, the 50% discount applies. The application will not be processed without the initial fee. If a permit is required, an invoice will be sent for the permit fee. See RCSA Section 22a-174-26 for information regarding the amount of the permit fee.

Part III: Applicant Information

1. Fill in the name of the applicant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001).

   Applicant: **Waterbury Generation, LLC**

   Applicant's interest in property at which the proposed activity is to be located:

   ☒ site owner ☐ option holder ☐ lessee
   ☐ easement holder ☐ operator ☐ other (specify)

   ☐ Enter a check mark if there are co-applicants. If so, label and attach additional sheet(s) with the required information as supplied above.

2. List primary contact for departmental correspondence and inquiries, during processing of application, if different than the applicant.

   Name: **FirstLight Power Resources Services, LLC**

   Mailing Address: **20 Church Street**

   City/Town: **Hartford** State: **CT** Zip Code: **06103-**

   Business Phone: **860-895-6903** ext. Fax: - -

   Contact Person: **John Campbell** Title: **Project Manager**

3. List primary contact for departmental correspondence and inquiries, after permit is issued, if different than the applicant.

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Contact Person: Title:

4. List attorney or other representative, if applicable.

   Firm Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Attorney Name: Title:

Part III: Applicant Information (continued)

5. List equipment operator, if different than the applicant.

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Contact Person: Title:

6. List equipment owner, if different than the applicant.

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Contact Person: Title:

7. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the application or in designing or constructing the activity. Please enter a check mark if additional sheets are necessary, and label and attach them to this sheet. ☐

   Name: **TRC**

   Mailing Address: **21 Griffin Road North**

   City/Town: **Windsor** State: **CT** Zip Code: **06095-**

   Business Phone: **860-298-6244** ext. Fax: **860-298-6399**

   Contact Person: **Michael K. Anderson** Title: **Principal Scientist**

   Service Provided: **Application Preparation**

Part IV: Premise Information

1. Name of facility, if applicable: **Waterbury Generation, LLC**

   Street Address or Description of Location:

   City/Town: **Waterbury** State: **CT** Zip Code: -

   Latitude and Longitude of the approximate "center of the site" in *degrees, minutes, and seconds*:

   Latitude: **41,32,40 N** Longitude: **73,02,30 W**

   Method of determination (check one): ☐ GPS ☒ USGS MAP ☐ other

   If a USGS Map was used, provide the quadrangle name: **Waterbury**

2. Is or will the premise be located on federally recognized Indian lands? ☐ Yes ☒ No

Part IV: Premise Information (continued)

3. Identify the air quality attainment status of the area in which the premise is or will be located. (Check all that apply. See instructions for the air quality attainment status of Connecticut municipalities).

   Non-Attainment for Ozone Standard: ☐ Severe ☒ Serious

   Carbon Monoxide:

   ☐ Moderate Non-Attainment ☐ Unclassified Non-Attainment ☒ Unclassified Attainment

   Non-Attainment for PM_{10}: ☐

4. SIC Codes:
   Primary **4911** Secondary Other Other

Part V: Supporting Documents

Be sure to read the instructions (DEP-AIR-INST-200) to determine whether the attachments listed are applicable to your specific activity. Please enter a check mark by the attachments as verification that **all applicable** attachments have been submitted with this Permit Application Form. When submitting any supporting documents, please label the documents as indicated in this Part (e.g., Attachment A, etc.) and be sure to include the applicant's name as indicated on the *Permit Application Transmittal Form*.

☒ Attachment A: *Executive Summary* (DEP-AIR-APP-222)

☒ Attachment B: *Applicant Background Information* (DEP-APP-008)

☒ Attachment C: Site Plan

☒ Attachment D: An 8 " X 11" copy of the relevant portion, or a full size original, of a USGS Quadrangle Map indicating the exact location of the facility or site and, if applicable, *Latitude and Longitude* (DEP-APP-003)

☒ Attachment E: Supplemental Application Forms
In the space provided by each supplemental application form, indicate the quantity of each form attached as part of this application. For each supplemental application form submitted, please provide a process flow diagram indicating all units, air pollution control equipment and stacks, as applicable. See sample diagram in instructions (DEP-AIR-INST-200).

☐ *Manufacturing or Processing Operations* (DEP-AIR-APP-201): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable.

☒ *Fuel Burning Equipment* (DEP-AIR-APP-202): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable.

☐ *Stationary Reciprocating Internal Combustion Engine - Compliance Assurance Form*
(DEP-AIR-COMP-001), if applicable.

☐ *Incinerators* (DEP-AIR-APP-203): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable. Also, attach documentation of waste heat contents and waste analysis.

Part V: Supporting Documents (continued)

Attachment E: Supplemental Application Forms (continued)

- ☐ *Volatile Liquid Storage* (DEP-AIR-APP-204): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable. Also, attach a MSDS for each product stored.
- ☐ *Surface Coating or Printing Operations* (DEP-AIR-APP-205): Attach a process flow diagram indicating all applicator identifications, air pollution control equipment, and stacks, as applicable. Also, attach a MSDS for each coating, ink, thinner, catalyst, cleanup solvent, or other compound to be used in this type of operation. Also, attach documentation to support transfer efficiency of spray applicators, if applicable.
- ☐ *Metal Plating and Surface Treatment Operations* (DEP-AIR-APP-206): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable. Also, attach a MSDS for each product stored in a tank.
- ☐ *Metal Cleaning Degreasers* (DEP-AIR-APP-207): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable. Also, attach a MSDS for each solvent used.
- ☐ *Concrete, Asphalt, Aggregate, Coal, Feed, Flour, & Grain* (DEP-AIR-APP-208): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable.
- ☐ *Site Remediation Equipment* (DEP-AIR-APP-209): Attach a process flow diagram indicating all units, air pollution control equipment, and stacks, as applicable. Also, submit documentation, such as pilot test data, which characterizes the site's degree of contamination.
- ☒ *Air Pollution Control Equipment* (DEP-AIR-APP-210), if applicable
- ☒ *Stack Parameters* (DEP-AIR-APP-211)
- ☒ *Unit Emissions* (DEP-AIR-APP-212): Attach all calculations by which emissions were determined.

☐ Attachment F: *Major Premise Pollutant Summary* (DEP-AIR-APP-213), if applicable

☒ Attachment G *BACT Determination Form* (DEP-AIR-APP-214), if applicable

☐ Attachment H: *Emergency Episode Standby Plan*, if applicable

☐ Attachment I: *Operation and Maintenance Plan*, if applicable

☒ Attachment J: *Ambient Air Quality Analysis*, if applicable

☒ Attachment K: *Applicant Compliance Information* (DEP-APP-002)

☒ Attachment L: *Conformance Certification Form* (DEP-AIR-APP-215)

Part VI: Application Certification

The applicant **and** the individual(s) responsible for actually preparing the application must sign this part. An application will be considered incomplete unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief.

I understand that a false statement in the submitted information may be punishable as a criminal offense, in accordance with Section 22a-6 of the General Statutes, pursuant to Section 53a-157b of the General Statutes, and in accordance with any other applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in Section 22a-6g of the General Statutes.

John Campbell — Signature of Applicant

9/4/07 — Date

John Campbell
Name of Applicant (print or type)

Project Manager
Title (if applicable)

Michael K. Anderson — Signature of Preparer

8/31/07 — Date

Michael K. Anderson, QEP
Name of Preparer (print or type)

Principal Scientist
Title (if applicable)

☐ Please enter a check mark if additional signatures are necessary. If so, please reproduce this sheet and attach signed copies to this sheet.

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment A
Executive Summary

Attachment A: Executive Summary

Applicant Name as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

Waterbury Generation, LLC

Location of Facility or Activity: **Waterbury**

Contact Person: **John Campbell** Phone: **860-895-6903**

For Renewals, Modifications, and Revisions provide the following:

Existing Permit or Registration #: Expiration Date: / /

Provide a Table of Contents of the application which includes the *Permit Application Transmittal Form* (DEP-APP-001), the Permit Application Form (DEP-AIR-APP-100 or 200), and a list of all supplemental application forms, plans, drawings, reports, studies, or other supporting documentation which are attached as part of the application, along with the corresponding attachment label and the number of pages (e.g., Executive Summary - Attachment A - 4 pgs.).

(OVER)

Attachment A: Executive Summary (continued)

Provide a brief project description which includes: a description of the proposed regulated activities; a synopsis of the environmental and engineering analyses; summaries of data analysis; a conclusion of any environmental impacts and the proposed timeline for construction. For renewals, modifications, and revisions, provide a list of changes in circumstances or information on which the previous permit was based.

☒ If additional sheets are necessary, please label and attach them to this sheet and enter a check mark.

Waterbury Generation, LLC
Attachment A – Executive Summary

I. Introduction

This application by Waterbury Generation LLC (Waterbury Generation) seeks permits to construct and operate one General Electric (GE) LMS100 PA combustion simple-cycle turbine generator (the Project) at the site of the Ansonia Copper & Brass facility located at 725 Bank Street in Waterbury, Connecticut. The unit will generate a nominal capacity of approximately 96 megawatts (MW) of power. Installation and operation of this new emission unit will help alleviate the peak power shortage in Connecticut with clean power produced with a state-of-the-art combustion turbine generator, natural gas and ultra-low sulfur distillate oil (ULSD) fuels, and highly efficient pollution control equipment.

This Project was one of the four projects selected by the Connecticut Department of Utility Control (DPUC) as a result of the 2005 Energy Independence Act whose goal was to select new power generation projects that would increase the power grid system reliability and reduce federally mandated congestion charges in the State of Connecticut. The Project's DPUC-approved contract with United Illuminating mandates a commercial operation date of July 2009 and construction start date of March 2008.

A. The Facility

The Project site is located in the City of Waterbury adjacent to Washington Avenue to the south and the Naugatuck River to the east at latitude 41°32'40"N, and longitude 73°02'30"W. The Project is proposed to be located on a leased portion of the Ansonia Copper and Brass facility. There are no other emission units proposed for the facility.

A plot plan drawing illustrating the proposed Project within the Ansonia Copper & Brass site is provided in Attachment C.

It should be noted that FirstLight Waterbury Holdings, LLC, an affiliate of FirstLight Power Resources, is currently serving as project manager for the Project and has the option to purchase a 98% ownership interest in Waterbury Generation, subject to receipt of DPUC Change of Control approval. At the time of any such change of control of Waterbury Generation, updated information regarding the ownership of the applicant will be provided to the Department as a revision to this application.

B. **Purpose of this Application**

Waterbury Generation is submitting this application to construct and operate new peaking power production equipment utilizing one GE LMS100 PA combustion turbine. As presented in this application, Waterbury Generation seeks a flexible permit that will:

- limit the nitrogen oxides (NO_x) and other air pollutant emissions of the turbine to less than the levels that define a major stationary source, i.e., 100 tons per year (tpy) each; and
- allow the maximum design capacity operation of the turbine for the equivalent of: a total of 8,760 hours per year when burning natural gas and a total of 720 hours per year when burning ULSD.

Appropriate permit conditions and recordkeeping will give the facility the needed flexibility to meet peak power demands in any manner necessary using either fuel, provided that the total turbine fuel use limits specified herein are not exceeded.

II. NSR Permit Process

A. Permit to Construct and Operate

The Regulations of Connecticut State Agencies (RCSA), i.e., Connecticut's New Source Review (NSR) Regulations, in Sections (§§) 22a-174-1, 2a, and 3a, set forth the procedures to issue NSR permits. These regulations define the requirements necessary to apply for and obtain a Permit to Construct and Operate a new source of air pollution having potential emissions of one or more air pollutants that exceed 15 tpy. These requirements include the submittal of application forms developed for this purpose, and analyses of ambient impacts of criteria and hazardous air pollutants.

Waterbury Generation's proposed installation of the GE LMS100 PA combustion turbine requires an application for an NSR permit. A detailed discussion of the NSR permit review requirements is provided as part of the analysis of Best Available Control Technology (BACT) in Attachment G to this application. In summary, based on the proposed potential emissions of the unit, the proposed Project will be subject to BACT for particulate matter (PM), PM less than

or equal to 10 micrometers in size (PM_{10}), PM less than or equal to 2.5 micrometers in size ($PM_{2.5}$), NO_x , carbon monoxide (CO), and ammonia (NH_3).

B. New Source Performance Standards (NSPS) Applicability

Title 40 of the Code of Federal Regulations (40 CFR) Part 60 Subpart KKKK

The proposed GE LMS100 PA combustion turbine is subject to the requirements of 40 CFR Part 60 Subpart KKKK. Per Table 1 of Subpart KKKK, the turbine is required to comply with a NO_x emission concentration of 25 parts per million by dry volume at 15 percent oxygen (ppm). Application of the BACT controls will result in emissions of 2.5 ppm when burning natural gas and 5.9 ppm when burning ULSD. Subpart KKKK also requires that the natural gas have a sulfur content that results in sulfur dioxide (SO_2) emissions that will be less than 0.060 pounds per million British thermal units (lbs/MMBtu). Waterbury Generation expects that the SO_2 emissions will be approximately 0.0019 lbs/MMBtu when burning natural gas and 0.0015 lbs/MMBtu when burning ULSD.

III. The Proposed Permit Conditions

A. Maximum Flexibility Provision

To facilitate maximum operating flexibility, Waterbury Generation requests that no limits on hours of operation be included in the permit. Alternatively, emission calculations are included in the attached Table A-1 for emission Unit U1 based on the maximum fuel firing rates for natural gas and ULSD. Emission rates used in the preparation of Table A-1 represent the highest hourly values at any ambient temperature from -5 °F to 105 °F at any load over 50 percent. (Operation at loads of less than 50% only occurs during startup and shutdown). Therefore, operation of the turbine at any load over 50 percent using either fuel will not cause its emissions to exceed the maximum allowable annual emission rates. Due to the fact that all operations may not be at 100 percent load, limitations on operating hours would unnecessarily restrict turbine operating hours.

The following fuel use limits and operational restrictions on the natural gas and ULSD fuels will give the required operational flexibility:

Maximum Natural Gas Use: $7{,}417 \times 10^6$ standard cubic feet per year (scf/yr);
Maximum ULSD Use: $4{,}203 \times 10^3$ gallons per year (gals/yr); and

Compliance with these proposed permit conditions will assure compliance with the proposed annual emission limits.

B. Maximum Allowable Stack Concentration Compliance (MASC)

Table A-1 summarizes the criteria and hazardous air pollutant emission rate calculations, fuel use rates, and stack exhaust gas parameters for the proposed unit. Tables A-2 and A-3 summarize the calculations demonstrating compliance with the MASC for each applicable hazardous air pollutant regulated under RCSA Section 22a-174-29. Two tables are provided for the combustion turbine with Table A-2 for natural gas-firing and Table A-3 for ULSD-firing. All results show compliance.

In summary, Waterbury Generation requests NSR permits to construct and operate the proposed new GE LMS100 PA combustion turbine generator, as described in this application. If the Department has any questions or requires any additional information, please contact Waterbury Generation's Project Manager, John Campbell.

Table A-1 Waterbury Generation, LLC, Waterbury
Emissions for the LMS100 PA Combustion Turbine

Annual Operating Hours, Single Turbine	
Minimum Natural Gas	8,760
Maximum Distillate Oil	720
Total (Oil and Natural Gas)	8,760
Fuel Input Rate, Single Turbine (MMBtu/hr, HHV)	
Natural Gas	886.5
Distillate Oil	802.4
Fuel Heating Value (HHV)	
Natural Gas (Btu/scf)	1,047
Distillate Oil (Btu/gal)	137,440
Fuel Consumption, Single Turbine	
Natural Gas (scf/hr)	8.47E+05
Distillate Oil (gal/hr)	5.84E+03
Natural Gas (scf/yr)	7.42E+09
Distillate Oil (gal/yr)	4.20E+06

Stack Parameters, Single Turbine	
Stack ID (ft.)	13.5
Natural Gas	
- Exhaust Flow (acfm)	8.84E+05
- Stack Temperature (°F)	814.6
- Stack Velocity (ft/min)	6,175
- Stack Velocity (ft/sec)	102.9
Distillate Oil	
- Exhaust Flow (acfm)	8.81E+05
- Stack Temperature (°F)	834.7
- Stack Velocity (ft/min)	6,153
- Stack Velocity (ft/sec)	102.5

Pollutant	Distillate Oil Emission Factor (lb/MMBtu, HHV)	Distillate Oil (ppmvd @ 15% O_2)	Source	Natural Gas Emission Factor Factor (lb/MMBtu, HHV)	Natural Gas (ppmvd @ 15% O_2)	Source	Maximum Emission Rate, Single Turbine (lb/hour)		Annual Emission Rate
							Oil Firing	Natural Gas Firing	Single Turbine (tpy)
Criteria Air Pollutants									
NO_x		5.9	1		2.5	1	19.5	8.1	39.5
CO		10.0	1		10.0	1	20.1	19.7	86.4
SO_x [2]	1.47E-03		1	1.94E-03		1	1.2	1.72	7.5
VOC (as CH_4)		5.0	1		4.0	1	4.8	3.9	17.6
$PM_{2.5}$ (Total)	3.70E-02		1	9.43E-03		1	29.7	8.4	44.3
$PM_{2.5}$ (Condensable Portion)	2.09E-03		1	2.66E-03		1	1.7	2.4	10.3
Hazardous Air Pollutants									
1,3 Butadiene	1.58E-05		2	4.19E-07		4	1.27E-02	3.71E-04	6.05E-03
Acetaldehyde			na	3.90E-05		4		3.45E-02	1.51E-01
Acrolein			na	6.23E-06		4		5.53E-03	2.42E-02
Arsenic	2.55E-07		6			na	2.05E-04		7.37E-05
Benzene	5.43E-05		2	1.17E-05		4	4.36E-02	1.04E-02	5.73E-02
Beryllium	2.55E-07		5			na	2.05E-04		7.37E-05
Cadmium	4.74E-06		3			na	3.80E-03		1.37E-03
Chromium	1.09E-05		3			na	8.71E-03		3.14E-03
Ethylbenzene			na	3.12E-05		4		2.76E-02	1.21E-01
Formaldehyde	2.76E-04		2	7.10E-04		4	2.22E-01	6.29E-01	2.76E+00
Lead	1.38E-05		3			na	1.11E-02		3.99E-03
Manganese	2.55E-07		6			na	2.05E-04		7.37E-05
Mercury	1.18E-06		3			na	9.50E-04		3.42E-04
Napthalene	3.45E-05		2	1.27E-06		4	2.77E-02	1.12E-03	1.45E-02
Nickel	4.54E-06		3			na	3.64E-03		1.31E-03
PAH (excluding naphthalene)	5.00E-06		1	9.00E-07		1	4.01E-03	7.98E-04	4.65E-03
Propylene Oxide			na	2.83E-05		4		2.50E-02	1.10E-01
Selenium	2.47E-05		3			na	1.98E-02		7.13E-03
Toluene			na	1.27E-04		4		1.12E-01	4.92E-01
Xylene			na	6.23E-05		4		5.53E-02	2.42E-01
Other Non-Criteria Air Pollutants									
Ammonia	1.28E-02	10.0	1	6.66E-03	5.0	1	10.3	5.9	27.45
Sulfuric Acid	1.55E-03		1	1.95E-03		1	1.25E+00	1.73E+00	7.58
Totals									
Federal HAPs									4.0
Other Non-criteria Pollutants									35.1

1. Annual tons are calculated using vendor data for both fuels and an ambient temperature between -5 and 105 deg F
   PAH is based on AP-42 Table 3.1-4, but naphthalene is subtracted; ULSD fuel oil assumed to contain 15 ppmw sulfur
2. AP-42, 5th Edition Tables 3.1-4, April 2000
3. AP-42, 5th Edition Tables 3.1-5, April 2000
4. AP-42, 5th Edition Tables 3.1-3, April 2000
5. Based on a fuel analysis of distillate fuel with 5 pbb arsenic, beryllium and manganese (See Attachment M)

Table A-2 Waterbury Generation, LLC
MASC Compliance Demonstration the LMS100 PA Combustion Turbine Burning Natural Gas

Pollutants	CAS Number	Hazard Limiting Value (ug/m^3)	Actual Distance to the Property Line (feet)	(meter)	Property Distance Determined by Height $4.47(h-20)^{1.28}$ (meter)	The Greater of Actual Property Line, 10 meters Height Calc	Actual Stack Height to Grade (feet)	(meter)	Exhaust Flowrate (acfm)	(m^3/sec)	Natural Gas Maximum Emission Rate (lb/hr)	Maximum Allowable Stack Conc. (MASC) (ug/m^3)	Actual Stack Conc. (ASC) (ug/m^3)	Pass/Fail
1,3 Butadiene	106-99-0	22000	32.81	10.00	582.67	582.67	213	64.92	883,844	417	3.71E-04	2,663,068	0.112	Pass
Acetaldehyde	75-07-0	3600	32.81	10.00	582.67	582.67	213	64.92	883,844	417	3.45E-02	435,775	10.4	Pass
Acrolein	107-02-8	5	32.81	10.00	582.67	582.67	213	64.92	883,844	417	5.53E-03	605	1.67	Pass
Ammonia	7664-41-7	360	32.81	10.00	582.67	582.67	213	64.92	883,844	417	5.91E+00	43,577	1,784	Pass
Benzene	71-43-2	150	32.81	10.00	582.67	582.67	213	64.92	883,844	417	1.04E-02	18,157	3.13	Pass
Ethylbenzene	100-41-4	8700	32.81	10.00	582.67	582.67	213	64.92	883,844	417	2.76E-02	1,053,122	8.3	Pass
Formaldehyde	50-00-0	12	32.81	10.00	582.67	582.67	213	64.92	883,844	417	6.29E-01	1,453	190	Pass
Naphthalene	91-20-3	1000	32.81	10.00	582.67	582.67	213	64.92	883,844	417	1.12E-03	121,049	0.339	Pass
PAH (excluding Napthalene)	na	0.1	32.81	10.00	582.67	582.67	213	64.92	883,844	417	7.98E-04	12.1	0.241	Pass
Propylene Oxide	75-76-9	1000	32.81	10.00	582.67	582.67	213	64.92	883,844	417	2.50E-02	121,049	7.6	Pass
Sulfuric Acid	7664-93-9	20	32.81	10.00	582.67	582.67	213	64.92	883,844	417	1.73E+00	2,421	523	Pass
Toluene	108-88-3	7500	32.81	10.00	582.67	582.67	213	64.92	883,844	417	1.12E-01	907,864	33.9	Pass
Xylenes	1330-20-7	8680	32.81	10.00	582.67	582.67	213	64.92	883,844	417	5.53E-02	1,050,701	16.7	Pass

Table A-3 Waterbury Generation, LLC
MASC Compliance Demonstration the LMS100 PA Combustion Turbine Burning Distillate Oil

Pollutants	CAS Number	Hazard Limiting Value (ug/m^3)	Actual Distance to the Property Line (feet)	(meter)	Property Distance Determined by Height $4.47(h-20)^{1.28}$ (meter)	The Greater of Actual Property Line, 10 meters Height Calc	Actual Stack Height to Grade (feet)	(meter)	Exhaust Flowrate (acfm)	(m^3/sec)	Distillate Oil Maximum Emission Rate (lb/hr)	Maximum Allowable Stack Conc. (MASC) (ug/m^3)	Actual Stack Conc. (ASC) (ug/m^3)	Pass/Fail
1,3 Butadiene	106-99-0	22000	32.81	10.00	582.67	582.67	213	64.92	880,684	416	1.27E-02	2,672,535	3.84	Pass
Ammonia	7664-41-7	360	32.81	10.00	582.67	582.67	213	64.92	880,684	416	1.03E+01	43,732	3,119	Pass
Arsenic	7440-38-2	0.05	32.81	10.00	582.67	582.67	213	64.92	880,684	416	2.05E-04	6.07	0.06	Pass
Beryllium	7440-41-7	0.01	32.81	10.00	582.67	582.67	213	64.92	880,684	416	2.05E-04	1.215	0.062	Pass
Benzene	71-43-2	150	32.81	10.00	582.67	582.67	213	64.92	880,684	416	4.36E-02	18,222	13.2	Pass
Cadmium	7440-43-9	0.4	32.81	10.00	582.67	582.67	213	64.92	880,684	416	3.80E-03	48.6	1.15	Pass
Chromium	7440-47-3	2.5	32.81	10.00	582.67	582.67	213	64.92	880,684	416	8.71E-03	304	2.64	Pass
Formaldehyde	50-00-0	12	32.81	10.00	582.67	582.67	213	64.92	880,684	416	2.22E-01	1,458	67	Pass
Lead	7439-92-1	3	32.81	10.00	582.67	582.67	213	64.92	880,684	416	1.11E-02	364	3.36	Pass
Manganese	7489-96-5	20	32.81	10.00	582.67	582.67	213	64.92	880,684	416	2.05E-04	2,430	0.06	Pass
Mercury	7439-97-6	1	32.81	10.00	582.67	582.67	213	64.92	880,684	416	9.50E-04	121.5	0.288	Pass
Naphthalene	91-20-3	1000	32.81	10.00	582.67	582.67	213	64.92	880,684	416	2.77E-02	121,479	8.4	Pass
Nickel	7440-02-0	5	32.81	10.00	582.67	582.67	213	64.92	880,684	416	3.64E-03	607	1.10	Pass
PAH (excluding Napthalene)	na	0.1	32.81	10.00	582.67	582.67	213	64.92	880,684	416	4.01E-03	12.15	1.22	Pass
Selenium	na	4	32.81	10.00	582.67	582.67	213	64.92	880,684	416	1.98E-02	486	6.0	Pass
Sulfuric Acid	7664-93-9	20	32.81	10.00	582.67	582.67	213	64.92	880,684	416	1.25E+00	2,430	377	Pass

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment B
Background Information

Waterbury Generation, LLC is a limited liability company and the pertinent information for Attachment B is provided on page 2 of 5 of the form DEP-APP-008.

Applicant Background Information

Please enter a check mark by the entity which best describes the applicant and complete the requested information. **You must choose one of the following.**

☐ **Corporation**

1. Parent Corporation

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Contact Person: Title:

2. Subsidiary Corporation:

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Contact Person: Title:

3. Directors:

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   ☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

4. Officers:

   Name:

   Mailing Address:

   City/Town: State: Zip Code: -

   Business Phone: - - ext. Fax: - -

   ☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Applicant Background Information (continued)

☒ **Limited Liability Company**

1. List each member.

Name: **AW Power Holdings, LLC**

Mailing Address: **75 Liberty Street**

City/Town: **Ansonia** State: **CT** Zip Code: **06401-**

Business Phone: **203-732-6673** ext. Fax: **203-735-3787**

Name: **Sasco River Advisors, LLC**

Mailing Address: **75 Sasco River Lane**

City/Town: **Southport** State: **CT** Zip Code: **06890-**

Business Phone: **203-292-3798** ext. Fax: **203-594-3798**

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

2. List any manager(s) who, through the articles of organization, are vested the management of the business, property and affairs of the limited liability company.

Name: **Raymond McGee**

Mailing Address: **75 Liberty Street**

City/Town: **Ansonia** State: **CT** Zip Code: **06401-**

Business Phone: **203-732-6673** ext. Fax: **203-735-3787**

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Applicant Background Information (continued)

☐ **Limited Partnership**

1. General Partners:

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

2. Limited Partners:

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Applicant Background Information (continued)

☐ **General Partnership**

1. General Partners:

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Applicant Background Information (continued)

☐ Voluntary Association

1. List authorized persons of association or list all members of association.

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

☐ Individual or Other Business Type

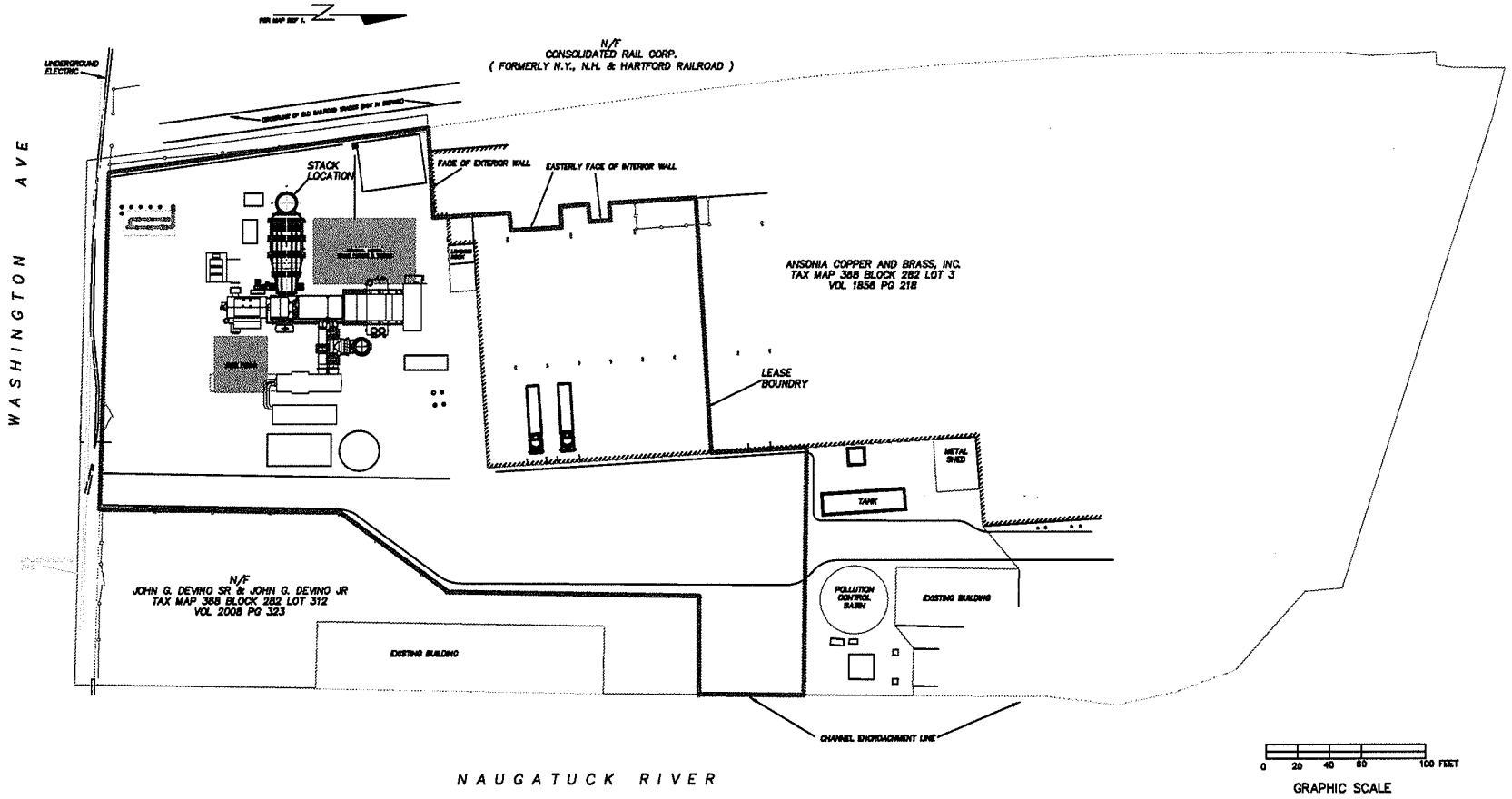
1. Name:
Mailing Address:
City/Town: State: Zip Code: -
Business Phone: - - ext. Fax: - -

2. State other names by which the applicant is known, including business names.
Name:

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment C
Site Plan



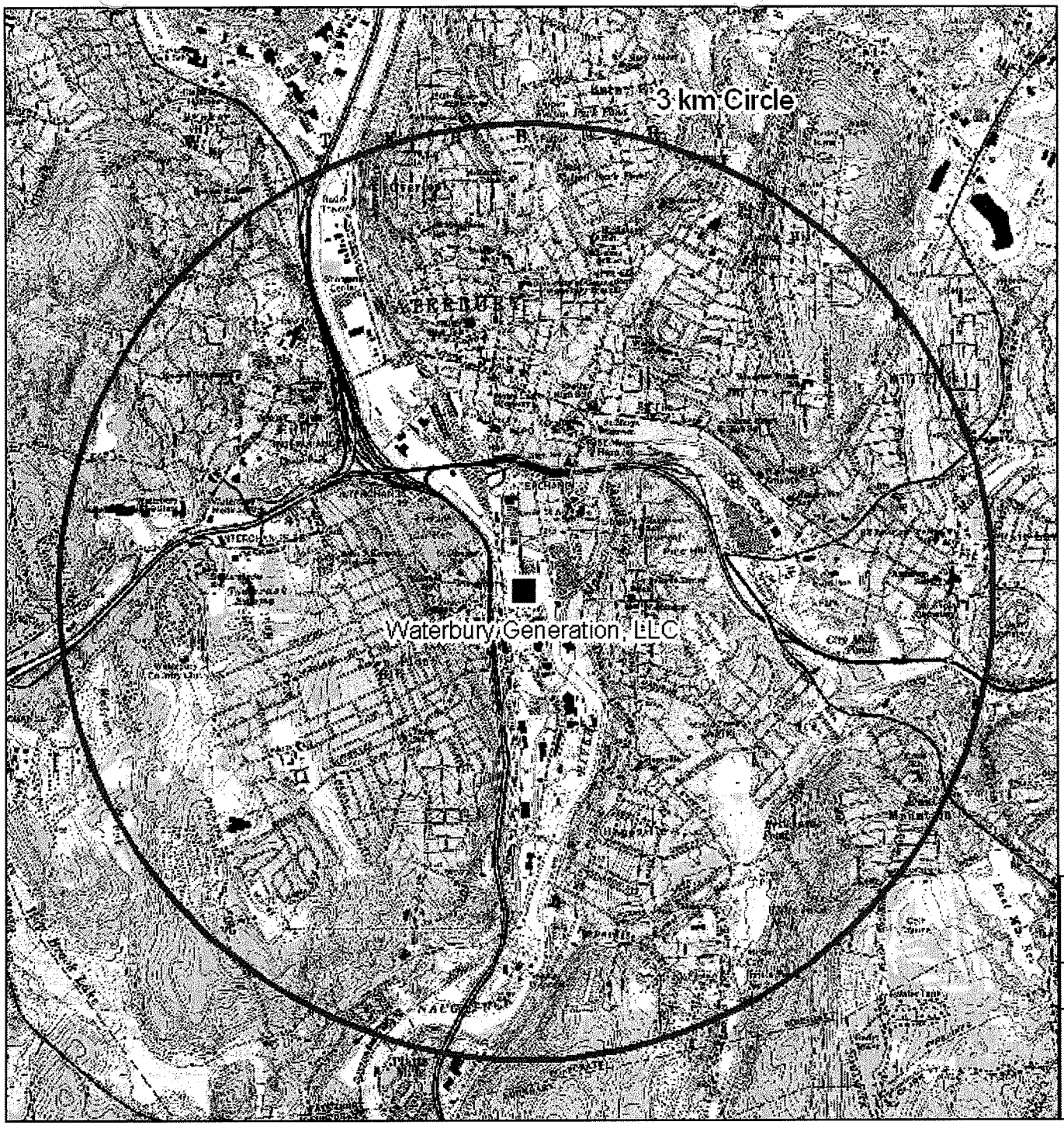
TRC
21 Griffen Road North
Windsor, CT 06095
(860)298-9692

WATERBURY GENERATION, LLC

Appendix C

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment D
USGS Map



0 750 1,500 Meters

TRC
21 Griffin Road North
Windsor, CT 06095
(850) 298-9692

WATERBURY GENERATION, LLC

Attachment D

Latitude and Longitude

Applicant Name: **Waterbury Generation, LLC**
(as indicated on the *Permit Application Transmittal Form*)

Method of latitude and longitude determination (check one):

☐ Global Positioning System (GPS) ☒ USGS Map ☐ Other (please specify)

In the table below, label each point for which latitude and longitude were measured, being consistent with identification numbers assigned throughout the application (e.g., 100, 101, etc.). For renewals or modifications of existing permits, please provide the existing permit number. Also provide: a brief description of the point (e.g., monitoring well, pipe outlet, air stack, etc.); latitude and longitude in degrees, minutes and seconds (e.g., 41E 16' 29"); and the name of the USGS quadrangle map(s) the points described are located on.

ID Number	Permit Number	Description	Latitude	Longitude	Quad Map Name	For DEP Use Only: GIS ID
U1	TBD	LMS100 PA Stack	41, 32', 40" N	73, 02', 30" W	Waterbury	

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment E
Supplemental Application Forms

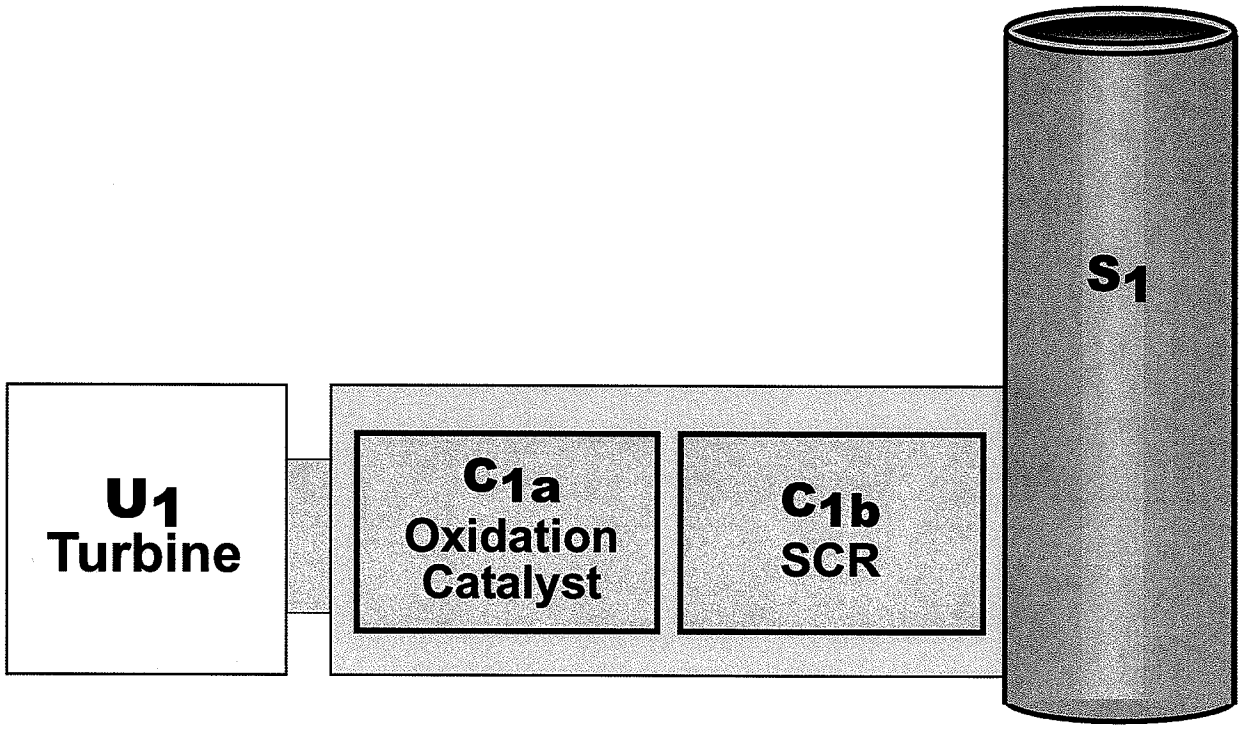
Simple Block Process Flow Diagram

DEP-AIR-APP-202 Fuel Burning Equipment Unit 1
(Note: the units of annual fuel use in Section II are millions of cubic feet and thousands of gallons of oil; the fields on the form contain insufficient space)

DEP-AIR-APP-210 Air Pollution Control Equipment C1a, C1b
The overall control efficiencies listed on page 1 are the minimum control efficiencies and vary with turbine exhaust gas temperature; there is not place to describe this on the DEP form; control efficiencies for CO and VOC are included for the oxidation catalyst and control efficiencies for NO_x for natural gas and oil firing are listed for the SCR.
The control equipment vendors have not been selected at this time.
The inlet gas temperature is the minimum turbine outlet temperature on page 3.

DEP-AIR-APP-211 Stack Parameters
(Note: The maximum exhaust gas flow rate for U1 is 883,884 ACFM
There is insufficient space in the "Flow" field to accommodate this flow rate)

DEP-AIR-APP-212 Unit Emissions Form U1
Emissions of criteria air pollutants are listed on separate forms for natural gas and ULSD fuels. Uncontrolled emissions are based on 8,760 hours per year of operation on either fuel and are presented for completeness only; the detailed emissions calculations found in Attachment A, Tables A-1, A-2, and A-3, include proposed permit restrictions.



TRC
21 Griffin Road North
Windsor, CT 06095
(860) 298-9692

WATERBURY GENERATION, LLC
WATERBURY, CONNECTICUT

ATTACHMENT E
PROCESS FLOW DIAGRAM

Date: 08/07 | **Project No.** 151501.0020.00013

Supplemental Application Form
Fuel Burning Equipment

Applicant Name: **Waterbury Generation, LLC**
(As indicated on the *Permit Application Transmittal Form)*

DEP USE ONLY	
App. No.:	
EPE No.:	

Please complete a separate form for *each* fuel burning unit.
(You may reproduce this form as necessary.)
Unit #: **U1**

Is this unit subject to Title 40 CFR Part 60, NSPS? ☒ Yes or ☐ No

If yes, indicate the subpart(s): **KKKK**

Is this unit subject to Title 40 CFR Part 63, MACT? ☐ Yes or ☒ No

If yes, indicate the subpart(s):

Section I: General

1. Type of Unit (make, model, serial no.): **GE LMS100 PA**
2. Burner (make, model, serial no.): **N/A**
3. Construction Date: **3/1/2008**
4. Unit Rated Capacity - Input (BTU/hr): **886.5 MM**
5. Burner Rated Capacity - Input (if different) (BTU/hr):
6. Engine Brake Horsepower (for internal combustion engines):
7. Equipment is: ☐ Emergency ☒ Non-emergency
8. Maximum Operating Schedule for this Unit: **24** hours/day **8760** hours/year
9. Percentage of Use in Each Category:
   Space Heat: % Process Heat: % Power: **100** %

Section II: Fuel

1. Type of Primary Fuel *(check one)*:
   ☐ Fuel Oil Grade *(check one)* ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6
   ☐ Coal ☒ Natural Gas ☐ Propane ☐ Butane ☐ Wood ☐ Landfill Gas
   ☐ Other *(specify)*:
   a. Maximum Fuel Firing Rate (specify units): **846,723 scfh**
2. List Secondary Fuel(s): **ULSD**
   a. Maximum Fuel Firing Rate for each secondary fuel listed (specify units): **5,838 gals/hr**

Section II: Fuel (continued)

3. Fuel Characteristics

Type	Percent Ash (a)	Percent Sulfur (b)	Percent Nitrogen (c)	Heating Value (d)	Annual Usage (e)
Primary		0.0024	nil	1047	7.4 E+09
Secondary		0.0015	nil	137,440	4.2 E+06
Secondary					
Secondary					

4. Percent of Annual Fuel Use by Quarter:

1st: **25** % 2nd: **25** % 3rd: **25** % 4th: **25** %

Section III: Equipment

1. Oil-Fired/Gas-Fired Unit

☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired

☐ Other (specify):

2. Coal Fired Units

☐ *Pulverized Coal Fired:*

☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired

☐ *Stoker:*

☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed

☐ Other (specify):

☐ *Fluidized Bed Combuster:*

☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace

3. Wood-Fired Unit

☐ Dutch Oven/Fuel Cell Oven ☐ Stoker

☐ Suspension Firing ☐ Fluidized Bed Combustion (FBC)

Section IV: Combustion Controls

1. ☐ Fly Ash Reinjection 2. ☐ Flue Gas Recirculation 3. ☒ Low NOx Burners

4. ☐ Advanced Combustion Controls:

☒ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Other

If other, please specify: **Oxidation Catalyst**

☐ Check here if a *Stationary Reciprocating Internal Combustion Engine – Compliance Assurance Form* (DEP-AIR-COMP-001) is attached.

Supplemental Application Form
Air Pollution Control Equipment

DEP USE ONLY	
App. No.:	
EPE No.:	

Applicant Name: **Waterbury Generation, LLC**
(As indicated on *Permit Application Transmittal Form)*

Section I. Summary Sheet (Make additional copies, if necessary)

Unit Number (1)	Unit Description (2)	Control Equipment		Overall Control Efficiency % (5)	Pollutants Controlled (6)	*Basis (7)	Stack No. (8)
		No. (3)	Type (4)				
U1	GE LMS 100 PA	C1a	Oxidizer	91, 38	CO, VOC	Design	U1
U1	GE LMS 100 PA	C1b	SCR	90, 86	NOx	Design	U1

** Attach supporting documentation with this form, e.g., stack test data, manufacturer's guarantee, etc.*

Section II: Specific Control Equipment

(Complete the appropriate subsection for each *distinct* piece of control equipment you utilize. You may reproduce the pages of the form as necessary.)

Adsorption Device

1a. Designated Reference Number of Adsorption Unit:

1b. Designated Reference Number of Unit which uses Adsorber:

2. Manufacturer:

3. Model Name & Number:

4. Construction Date: / /

5. Adsorbent:

☐ Activated Charcoal Type:

☐ Other (specify):

6. Number of Beds:

7. Dimensions of Bed

Bed No.1

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

Bed No.2

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

Bed No.3

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

8. Inlet Gas Temperature: °F or °C

9. Design Pressure Drop Across Unit: inches H_2O

10. Type of Regeneration

☐ Replacement ☐ Steam ☐ Other (specify):

11. Method of Regeneration

☐ Alternate use of beds ☐ Source shut down ☐ Other (specify):

Describe procedures used to ensure that emissions from regeneration process are treated or minimized:

12. Maximum Operation Time Before Regeneration:

13. Is adsorber equipped with a break-through detector? ☐ Yes ☐ No

14. a) Control Efficiency(s) of Adsorber (%):

b) Collection Efficiency(s) of Adsorber (%):

15. Pollutant(s) Controlled:

Afterburner (Incinerator for Air Pollution Control)

1a. Designated Reference Number of Afterburner: **C1a**

1b. Designated Reference Number of Unit which uses Afterburner: **U1**

2. Manufacturer: **To be determined**

3. Model Name & Serial Number:

4. Construction Date: **11/01/2008**

5. Type of Afterburner: ☐ Thermal ☐ Catalytic ☐ Other (specify):

6. Combustion Chamber Dimensions

   Length (inches): Cross-section area (sq. inches):

7. Inlet Gas Temperature: **730** °F *or* °C

8. Operating Temperature of Chamber: °F *or* °C

9. Type of Auxiliary Fuel: Higher Heating Value:

10. a)% Sulfur: b)% Ash: c)% Nitrogen:

11. Maximum Auxiliary Fuel Usage (specify units): a) Hourly:

    b) Annually:

12. Number of Burners Per Afterburner:

    Burner No. 1 @: BTU per hour

    Burner No. 2 @: BTU per hour

    Burner No. 3 @: BTU per hour

13. Catalyst Used: ☐ Yes ☐ No

    Type of Catalyst:

14. Catalyst Sampling Interval:

15. Heat Exchanger Used: ☐ Yes ☐ No

    Type of Heat Exchanger:

    Heat Recovery:

16. Gas Flow Rate (scfm):

17. Combustion Chamber Design Residence Time (seconds):

18. Moisture Content of Exhaust Gas (%):

19. a) Control Efficiency of Afterburner (%): **91 (CO), 38 (VOC) (Design)**

    b) Collection Efficiency of Afterburner (%):

20. Pollutant(s) Controlled: **CO, VOC**

Condenser

1a. Designated Reference Number of Condenser Unit:

1b. Designated Reference Number of Unit which uses Condenser:

2. Manufacturer:

3. Model Name & Number:

4. Construction Date: / /

5. Heat Exchange Area (sq. ft.):

6. Coolant Flow Rate: ☐ Water: gpm ☐ Air: scfm (at 68° F)

☐ Other (specify) : Type: Flow Rate:

7. Gas Flow Rate: scfm (at 68° F)

8. Coolant Temperature (°F): In: Out:

9. Gas Temperature (°F): In: Out:

10. a) Control Efficiency(s) of Condenser:

b) Collection Efficiency(s) of Condenser (%):

11. Pollutant(s) Controlled:

Electrostatic Precipitator

1a. Designated Reference Number of Electrostatic Precipitator:

1b. Designated Reference Number of Unit which uses Electrostatic Precipitator:

2. Manufacturer:

3. Model Name & Serial Number:

4. Construction Date: / /

5. Collecting Electrode Area (sq ft):

6. Gas Flow Rate (scfm):

7. Voltage Across the Precipitator Plates (kv):

8. Resistivity of Pollutants (ohms):

9. Number of Fields in the Precipitator:

10. Grain Loading (grains/scf @ 68° F): a) Inlet: b) Outlet:

11. a) Control Efficiency(s) of Electrostatic Precipitator (%):

b) Collection Efficiency(s) of Electrostatic Precipitator (%):

12. Pollutant(s) Controlled:

Filter

1a. Designated Reference Number of Filter:
1b. Designated Reference Number of Unit which uses Filter:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Filtering Material:
6. Air to Cloth Ratio (sq ft):
7. Cleaning Method: ☐ Shaker ☐ Reverse Air ☐ Pulse Air
☐ Pulse Jet ☐ Other (specify):
8. Gas Cooling Method: ☐ Ductwork Length (ft): Diameter (inches):
☐ Heat Exchanger ☐ Bleed-in Air ☐ Water Spray ☐ Other (specify):
9. Gas Flow Rate (from source): scfm (at 68□ F)
10. Cooling Gas Flow Rate
Bleed-in Air: scfm (at 68□ F) Water Spray: gpm
11. Inlet Gas Condition Temperature (□F): Dew Point (□F):
12. Grain Loading (grains/scf @ 68° F): a) Inlet: b) Outlet:
13. Design Pressure Drop Across Unit (inches H_2O):
14. a) Control Efficiency of Filter (%):
b) Collection Efficiency of Filter (%):
15. Pollutant(s) Controlled:

Cyclone

1a. Designated Reference Number of Cyclone:
1b. Designated Reference Number of Unit which uses Cyclone:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Type of Cyclone: ☐ Single ☐ Multiple
6. Number of Cyclones in Multiple Cyclone:
7. Gas Flow Rate: scfm (at 68° F)
8. Grain Loading (grains/SCF @ 68° F): a) Inlet: b) Outlet:
9. Design Pressure Drop Across Unit (inches H_2O):
10. a) Control Efficiency of Cyclone (%):
b) Collection Efficiency of Cyclone (%):
11. Pollutant(s) Controlled:

Scrubber

1a. Designated Reference Number of Scrubber:

1b. Designated Reference Number of Unit which uses Scrubber:

2. Manufacturer:

3. Model Name & Serial Number:

4. Construction Date: / /

5. Type of Scrubber: ☐ Venturi ☐ Wet Fan

☐ Packed: Packing Material:

Size: Packed Height (inches):

☐ Spray: Number of Nozzles:

Nozzle No. 1 Pressure (psig):

Nozzle No. 2 Pressure (psig):

Nozzle No. 3 Pressure (psig):

Nozzle No. 4 Pressure (psig):

☐ Other (specify): ***(Attach description and sketch with dimensions)***

6. Design Pressure Drop Across the Scrubber (inches H_2O):

7. Type of Flow: ☐ Concurrent ☐ Countercurrent ☐ Crossflow

8. Scrubber Geometry

Length in direction of Gas Flow (ft): Cross Sectional Area (sq ft):

9. Chemical Composition of Scrubbing Liquid:

10. a. Scrubbing Liquid Flow Rate (gpm):

b. Fresh Liquid Make-Up Rate (gpm):

11. Scrubber Liquid: ☐ One Pass ☐ Recirculated

12. Gas Flow Rate: scfm (at 68 F)

13. Inlet Gas Temperature (°F):

14. a) Control Efficiency(s) of Scrubber (%):

b) Collection Efficiency(s) of Scrubber (%):

15. Pollutant(s) Controlled:

Mist Eliminator

1a. Designated Reference Number of Mist Eliminator:
1b. Designated Reference Number of Unit which uses Mist Eliminator:
2. Manufacturer:
3. Model Name & Number:
4. Construction Date: / /
5. Face Velocity (feet per second):
☐ Vertical Flow ☐ Horizontal Flow ☐ Diagonal
6. Design Pressure Drop Across Mist Eliminator (inches H_2O):
7. a) Control Efficiency of Mist Eliminator at:
1 mm Hg: 5 mm Hg: 10 mm Hg:
b) Collection Efficiency of Mist Eliminator (%):
8. Pollutant(s) Controlled:

Other Type of Control Equipment for Degreasing Equipment

1a. Designated Reference Number of Equipment:
1b. Designated Reference Number of Unit which uses Equipment:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Method of Controls
☐ Refrigerator Chiller ☐ Water Spray ☐ Other (specify):
6. a) Control Efficiency of Other Type of Control Equipment (%):
b) Collection Efficiency of Other Type of Control Equipment (%):
7. Pollutant(s) Controlled:

Other Type of Control Equipment

1a. Designated reference number of other type of control equipment: **C1b**
1b. Designated reference number of unit which uses other type of control equipment: **U1**
2. Manufacturer: **To be determined**
3. Model Name & Serial Number:
4. Construction Date: **11/01/2008**
5. Generic name of other equipment: **Selective Catalytic Reduction**
6. a) Control efficiency of other type of control equipment (%): **90 (Design**
b) Collection efficiency of other type of control equipment (%):**100**
7. Pollutant(s) Controlled: **NOx**

Supplemental Application Form
Stack Parameters

Applicant Name: **Waterbury Generation, LLC**
(As indicated on *Permit Application Transmittal Form)*

DEP USE ONLY
App. No.: _____
EPE No.: _____

Section I. Stack Parameters (Make additional copies, if necessary)

Stack No. (1)	Unit No.(s) (2)	Control Equipment No.(s) (3)	Height ft. (4)	Diameter ft. (5)	Temp °F (6)	Flow ACFM (7)	Exit Dir. H or V (8)	Rain Hat Y or N (9)	Stack Lining (10)	Distance to Property Line ft. (11)
S1	U1	C1,C2	213	13.5	815	*	V	N	M	28

Supplemental Application Form
Unit Emissions

Applicant Name: **Waterbury Generation, LLC**
(As indicated on the *Permit Application Transmittal Form)*

DEP USE ONLY
App. No.:_____
EPE No.:_____

Section I: General Information

Please complete a separate form for each unit. You may reproduce this form as necessary.

1. Unit Number: **U1 (Oil)**
2. Stack Number: **S1**
3. Control Equipment Number(s): **C1a, C1b**

Section II: Stack Emission Information for Listed Pollutants (Exclude Fugitive Emission formation)

Pollutant		(1) Stack Emission Rate (@ *Rated Capacity)*			
		Pounds Per Hour (lb/hr) (a)	Tons Per Year (TPY) (b)	Other (Units) (c)	Basis (d)
Carbon Monoxide (CO)	Uncontrolled potential	113.39	498.63		GE Data
	proposed actual	20.12	88.14		88% Minimum Control
Volatile Organic Compounds (VOC)	uncontrolled potential	7.96	34.88		GE Data
	proposed actual	4.80	21.03		38% Minimum Control
Exempted Volatile Organic Compounds	uncontrolled potential	N/A	N/A		
	proposed actual	N/A	N/A		
Hydrocarbons	uncontrolled potential	9.95	43.60		GE Data
	proposed actual	3.82	16.8		38% Minimum Control
Nitrogen Oxides (NOx)	uncontrolled potential	138.96	608.64		GE Data
	proposed actual	19.50	85.43		86% Control
Sulfur Oxides (SOx)	uncontrolled potential	262.0	1147.56		0.3% S in Fuel
	proposed actual	1.18	5.16		GE Data for ULSD
Particulate Matter (TSP)	uncontrolled potential	28.0	122.6		GE Data
	proposed actual	29.68	130.0		VOC and SCR PM added
Particulate Matter <- 10 Micrometers (PM_{10})	uncontrolled potential	28.0	122.6		GE Data
	proposed actual	29.68	130.0		VOC and SCR PM added
Lead	uncontrolled potential				
	proposed actual				

Supplemental Application Form
Unit Emissions

Applicant Name: **Waterbury Generation, LLC**
(As indicated on the *Permit Application Transmittal Form)*

DEP USE ONLY
App. No.:_____
EPE No.:_____

Section I: General Information

Please complete a separate form for each unit. You may reproduce this form as necessary.

5. Unit Number: **U1 (Gas)**
6. Stack Number: **S1**
7. Control Equipment Number(s): **C1a, C1b**

Section II: Stack Emission Information for Listed Pollutants (Exclude Fugitive Emission formation)

Pollutant		(1) Stack Emission Rate (@ *Rated Capacity)*			
		Pounds Per Hour (lb/hr) (a)	Tons Per Year (TPY) (b)	Other (Units) (c)	Basis (d)
Carbon Monoxide (CO)	Uncontrolled potential	216.33	947.53		GE Data
	proposed actual	19.69	86.25		91% Control
Volatile Organic Compounds (VOC)	uncontrolled potential	7.04	30.84		GE Data
	proposed actual	3.94	17.25		38% Minimum Control
Exempted Volatile Organic Compounds	uncontrolled potential	N/A	N/A		
	proposed actual	N/A	N/A		
Hydrocarbons	uncontrolled potential	35.2	154.13		GE Data
	proposed actual	13.2	57.8		38% Minimum Control
Nitrogen Oxides (NOx)	uncontrolled potential	80.95	354.56		GE Data
	proposed actual	8.1	35.54		90% Control
Sulfur Oxides (SOx)	uncontrolled potential	1.72	7.53		GE Data (Pipeline gas)
	proposed actual	1.72	7.53		GE Data (Pipeline gas)
Particulate Matter (TSP)	uncontrolled potential	6.0	26.28		GE Data
	proposed actual	8.36	36.62		VOC and SCR PM added
Particulate Matter <- 10 Micrometers (PM_{10})	uncontrolled potential	6.0	26.28		GE Data
	proposed actual	8.36	36.62		VOC and SCR PM added
Lead (Pb)	uncontrolled potential				
	proposed actual				

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment F
Major Premise Pollutant Summary

This section does not apply to Waterbury Generation, LLC

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment G
Best Available Control Technology Determination

The control determinations presented herein represent application of the best demonstrated technology for simple-cycle combustion turbines with a power output in excess of 25 MW. Forms DEP-AIR-APP-214 are not included.

Waterbury Generation, LLC

Attachment G – Control Technology Determination

1.0 Introduction and Applicable Requirements

1.1 Overview

This section describes the Best Available Control Technology (BACT) determinations performed for the proposed Waterbury Generation, LLC, electric generating facility (the Project). The Project consists of the installation of one General Electric (GE) LMS100 PA simple-cycle peaking power combustion turbine at the site of the Ansonia Copper & Brass Inc. facility in Waterbury. The determinations are based upon guidance presented in the Northeast States for Coordinated Air Use Management (NESCAUM) BACT Guideline and the draft U.S. Environmental Protection Agency (EPA) document entitled "New Source Review Workshop Manual" (October 1990).

Control technology requirements for each air pollutant depend upon the designated attainment status of the area in which the project is to be located and the source's potential air pollutant emissions. BACT is an element of the Prevention of Significant Deterioration (PSD) rules and is also a requirement of Connecticut regulations. A source must incorporate BACT for each regulated air pollutant whose potential emissions exceed one of the applicable thresholds defined in the Regulations of Connecticut State Agencies (RCSA), Section 22a-174-3a subsections (j) and (k). The determination of the Lowest Achievable Emission Rate (LAER) is an element of the non-attainment new source review (NNSR) rules. A source must incorporate LAER for each non-attainment air pollutant for which it is a major modification or major stationary source as defined in RCSA 22a-174-1 subsections (55) and (57), respectively.

Section 1.2 provides the basis for the BACT requirements applicable to each air pollutant. Section 2.0 presents an overview of the "Top-Down" BACT assessment procedure used in this analysis. Sections 3.0 through 6.0 present control technology determinations for carbon monoxide (CO), volatile organic compounds (VOC), particulate matter (PM), PM with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), PM with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), oxides of nitrogen (NO_x), and ammonia (NH_3) for the proposed simple-cycle LMS100 PA combustion turbine. Section 7.0 summarizes the results of these determinations for each pollutant.

Throughout this Attachment, concentration levels for gaseous air pollutants are in units of parts per million by volume, dry basis, corrected to 15 percent oxygen (ppmvd @ 15% O_2, usually indicated as simply "ppm"), unless otherwise noted. Likewise, emissions in the units of pounds per million British thermal units (lbs/MMBtu) are based upon the higher heating value (HHV) of the fuel.

1.2 Applicability of Control Technology Requirements

1.2.1 Pollutants Subject To BACT

An applicability determination, as discussed in this section, is the process of determining the level of emissions control required for each air pollutant.

BACT is defined as an emission limitation based on the maximum degree of reduction, on a case-by-case basis, taking into account energy, environmental, and economic impacts. RCSA 22a-174-3a(j) subsections (6) and (7) describe the considerations used by the Commissioner of DEP to approve a BACT proposal. The "top-down" BACT approach requires that the analysis begin with consideration of the most stringent controls available and then proceed to include progressively lesser degrees of control.

40 CFR Section 52.21(b)(1)(i)(a) of Title 40 of the Code of Federal Regulations (40 CFR) lists 28 source categories that are major stationary sources if they have the potential to emit more than 100 tons of any pollutant regulated by the Federal Clean Air Act. The proposed Project's potential emissions do not exceed the Connecticut PSD major stationary source threshold of 100 tons per year (tpy). The premises potential NO_x and VOC emissions also do not exceed the NNSR major stationary source thresholds of 50 tpy each. As such, the facility is not a major stationary source for either PSD or NNSR.

A major stationary source or major modification must incorporate BACT for each pollutant whose potential emissions exceed the significant emission rate threshold in RCSA 22a-174-3a Table 3a(k)-1. Also, a unit or modification to a unit must incorporate BACT for each pollutant whose potential emissions exceed 15 tpy.

Waterbury Generation, LLC

Attachment G – Control Technology Determination

Table G-1: Summary of Major Source Thresholds, Significant Emission Rate Thresholds, and Potential Emission Rates

Pollutant	Major Stationary Source Threshold[1] (tpy)	Significant Emission Rate Threshold[2] (tpy)	Project Potential Emission Rate (tpy) (New)
Carbon Monoxide (CO)	100	100	86.4
Nitrogen Oxides (NO_x) (As an ozone precursor)[3]	50	25	39.5
Nitrogen Oxides (NO_x) (NO_2 National Ambient Air Quality Standard)	100	40	39.5
Sulfur Dioxide (SO_2)	100	40	7.5
Particulate Matter (PM)	100	25	44.3
$PM_{10}/PM_{2.5}$	100	15	44.3
Volatile Organic Compounds (VOC) (As an ozone precursor)[3]	50	25	17.6
Volatile Organic Compounds (VOC)	100	40	17.6
Ammonia (NH_3)	100	None	27.4
Sulfuric Acid Mist (H_2SO_4)	100	7	7.6

1. 40 CFR 51.165(a)(1)(iv)
2. 40 CFR 51.166(b)(23)(i) and RCSA 22a-174-3a Table 3a(k)-1
3. RCSA 22a-174-1(57)(B) and RCSA 22a-174-1(55)(A)

Table G-1 summarizes the significant emission rate thresholds and the proposed Project's potential emission rates. As is shown in the table, none of the proposed Project potential emissions exceed the applicable major source threshold of 100 tons per year. Therefore, these pollutants are not subject to PSD BACT. However, all pollutants with the exception of SO_2 and H_2SO_4 are subject to Connecticut BACT under the RCSA Section 22a-174-3a(j) by virtue of proposed potential emissions in excess of 15 tpy. SO_2 and H_2SO_4 and are not subject to PSD or Connecticut BACT because their potential emissions are each below the significant emission rate thresholds, due to the natural gas and ultra low sulfur distillate (ULSD) oil fuels being proposed for the Project.

1.2.2 Pollutants Subject To LAER

LAER applies to air pollutants emitted from a major stationary source (or a major modification to a major stationary source) that is located in an area designated as not being in attainment with ambient air quality standards for those pollutants. LAER is defined as either the most stringent emission limitation contained in a State Implementation Plan (SIP) (unless it is demonstrated to not be achievable) or the most stringent emission limitation that is achieved in practice by the class or category of source (unless it is demonstrated to not be achievable). New Haven County is a serious nonattainment area for ozone. Therefore, each ozone precursor, NO_x or VOC, is subject to LAER if its potential emissions exceed 50 tpy. As is shown in Table G-1, Project potential emissions of NO_x and VOC are less than 50 tpy and therefore are not subject to LAER in addition to BACT.

2.0 Steps in BACT Analysis

2.1 Identification of Technically Feasible Control Options

The first step is identification of the available technically feasible control technology options, including consideration of transferable and innovative control measures that may not have previously been applied to the source type under analysis. The minimum requirement for a BACT proposal is that it meet Federal New Source Performance Standards (NSPS) limits or other minimum State or local requirements that would prevail in the absence of BACT decision-making, such as Reasonably Available Control Technology (RACT) or Connecticut emission standards. After elimination of technically infeasible control technologies, the remaining options are then ranked by control effectiveness from the top controls down.

If there is only one feasible option, or if the applicant is proposing the most stringent alternative, then no further analysis is required. If two or more technically feasible options are identified, the next three steps are applied to identify and compare the economic, energy, and environmental impacts of the options. Technical considerations and site-specific sensitive issues will often play a role in BACT determinations. Generally, if the most stringent technology is rejected as BACT, the next most stringent technology is evaluated, and so on.

In order to identify options for each class of equipment, a search of the various clearinghouses and databases has been performed for simple-cycle turbines. First, the EPA RACT/BACT/LAER Clearinghouse (RBLC) was consulted. This Clearinghouse is a repository for control technology determinations made throughout the United States, and is available to assist in identification of the top controls and other lesser degrees of control.

In recent years dozens of large simple-cycle projects have been proposed or built in the U.S. The RBLC does not list data for many of these projects, and the data are often incomplete for the projects that are included. Also, in recent years NO_x emission limits have decreased such that BACT/LAER

determinations for older turbine projects are less relevant than more recent determinations. Therefore, the RBLC data were supplemented with data for large (greater than 25 MW) simple-cycle turbines obtained from various Federal and State databases and web sites.

2.2 Economic (Cost-Effectiveness) Impact Analysis

The BACT economic analysis consists of a cost-effectiveness calculation for each control technology. The cost of implementing the control equipment or technique includes both the capital cost of the equipment, and the annual operating costs. The total annualized cost of control is determined by amortization of the total capital cost over a period of ten years at present interest rates, plus the annual costs for any fuels, maintenance, operating labor, and other annual costs. This annualized cost is then divided by the reduction in pollutant emissions (typically in units of tons of a pollutant) afforded by implementing the particular controls. Cost-effectiveness ($/ton) of an option is simply the equivalent annual cost ($/yr) divided by the annual pollution controlled (ton/yr).

No economic analysis is required if either the most effective option is proposed or if there are no technically feasible control options. As such, in the case of Waterbury Generation, LLC, the economic impact analysis is not required for any control option because the top available technology is chosen in each case.

2.2 Energy Impact Analysis

The energy impacts of a control technology are examined to determine whether the use of that technology results in any significant or unusual energy penalties or benefits.

2.3 Environmental Impact Analysis

The primary focus of the environmental impact analysis is the reduction in ambient concentrations of the air pollutant being controlled. Increases or decreases in emissions of other criteria or non-criteria air pollutants may occur with some technologies, and should also be identified. Non-air impacts, such as solid waste disposal and increased water consumption/treatment, may be an issue for some projects and control options.

2.5 BACT Proposal

The determination of BACT for each air pollutant and emissions unit is based on a review of the three impact categories and the technical factors that affect the feasibility of the control alternatives under consideration.

3.0 BACT Analysis for Carbon Monoxide and Volatile Organic Compounds

3.1 Control Technologies

CO and VOC are the primary products of incomplete combustion (PICs). Both are subject to Connecticut BACT by virtue of proposed potential emissions in excess of 15 tpy. These PICs are typically treated by conversion to carbon dioxide (CO_2) and water vapor by thermal and/or catalytic methods. The top control for CO and VOC emissions from combustion turbine units is an oxidation catalyst. Exhaust gases from the combustion turbines pass through catalyst honeycomb structures where excess oxygen in the exhaust oxidizes CO to CO_2 and water vapor. During power operation (i.e., at turbine outputs of 50 percent load or greater), at least 91 percent of the CO will be oxidized and at least 38 percent of the VOC will also be destroyed. A benefit of using an oxidation catalyst is the oxidation of VOC as well as CO. A drawback of using an oxidation catalyst is its tendency to oxidize some SO_2 to sulfur trioxide (SO_3). This is not expected to be a significant problem for Waterbury Generation, LLC, which will fire natural gas as its primary fuel and ULSD oil as a backup fuel.

In some BACT determinations, no controls are deemed to be BACT for CO and VOC. Also, good combustion practices are often cited as BACT. While some reduction can be obtained by these good combustion practices, there are penalties associated with combustion modifications due to impacts on combustion efficiency with these techniques.

As stated above, the formation of CO and other PICs in the operation of a gas turbine results from the incomplete combustion of the fuel. Several conditions can lead to incomplete combustion, including insufficient O_2 availability, poor air/fuel mixing, cold wall flame quenching, reduced combustion temperature, decreased combustion residence time and load reduction. By controlling the combustion process carefully, CO emissions can be minimized.

PICs from combustion turbines vary with ambient temperature. At low temperatures, higher CO and VOC emissions result from the reduced combustion temperature and the highest emissions of these pollutants occur at the lowest ambient temperatures. Waterbury Generation, LLC is proposing the top controls for CO and VOC, an oxidation catalyst. The catalyst will be placed in the location that produces optimal oxidation efficiency.

3.2 BACT Proposal for CO and VOC

The proposed turbine BACT CO emission rate limitations for natural gas combustion and ULSD oil-firing are 10.0 and 10.0 ppm for CO and 4.0 and 5.0 ppm for VOC through use of an oxidation catalyst. It is important to note that these represent worst-case emission rates and occur at the lowest ambient temperatures. By selection of the most stringent control technology alternative, no

or environmental analysis is included. The BACT emission rates will be achieved with good combustion practices and an oxidation catalyst.

4.0 BACT for PM, PM_{10}, and $PM_{2.5}$ for Simple-Cycle Combustion Turbines

Particulate matter is referred to herein as PM, which is broken into size fractions. Total PM is further divided into a portion less than or equal to 10 microns in diameter (PM_{10}) and to a portion less than or equal to 2.5 microns in diameter ($PM_{2.5}$). PM emissions from combustion turbines result from ash in the fuel which leads to a filterable portion of PM, and from the collection by condensation and analytical determination of VOC and other condensable substances in the back half of a standard EPA Method 5 (or other) sampling train. Increasing attention has been given to the smaller size fraction of the pollutant $PM_{2.5}$. This size fraction has been deemed of greater importance due to its significantly greater health effects than the larger PM fractions.

Complete speciation of PM from simple-cycle turbines is in large part unavailable. It is typical to make the assumption that only two components exist for natural gas- and distillate fuel oil-fired combustion turbines; filterable and condensable. Condensable PM is that which can pass through the filter and is thus a gas when it condenses in the back-half impingers in the EPA Method 5 sampling train. The breakdown between the filterable and condensable portion differs for natural gas- and distillate oil-fired units as illustrated in EPA's Compilation of Air Pollutant Emission Factors (AP-42), Table 3.1-2a. This reference table lists total PM from natural gas firing as 0.0066 lbs/MMBtu of heat input and from distillate fuel oil-firing as 0.012 lbs/MMBtu. For natural gas-firing, approximately 28.8 percent of this PM is filterable, and 35.8 percent is filterable for distillate fuel oil-firing. This speciation of filterable versus condensable PM shows that the greatest portion of PM is condensable and until recent years, PM was treated as the filterable portion only.

To complicate the situation further, add-on controls can generate additional PM beyond that emanating from fuel combustion in the turbine itself. The oxidation catalyst for control of CO and VOC oxidize sulfur dioxide to the trioxide (SO_2 to SO_3), which combines with water to form sulfuric acid. This becomes part of the condensable PM, and the amount added to the back-half of the Method 5 train depends on many factors. Among these factors are the quantity of sulfur in the fuel, and whether or not a selective catalytic reduction (SCR) system is utilized for the control of NO_x emissions, which can add to the oxidation of the fuel sulfur. Up to 50% of the fuel sulfur can become condensable PM, which portion adds to that from the combustion process in the turbine.

Historically it has been the tacit assumption that PM emissions include only the filterable portion with the condensable portion ignored, however, the new tacit assumption is that PM is now both front and back half portions and therefore, permit limits that were based on filterable PM only are often exceeded if there is misunderstanding between an owner/operator of the turbines and the regulatory agency. Never has there been a greater need for clarity in the specification of permit limits for PM and its components in New Source Review (NSR) permits.

A new (August 21, 2007) CTDEP policy on NSR permitting of sources emitting $PM_{2.5}$ defines permit review requirements for this pollutant. Sources are now required to meet a filterable fraction requirement and will soon be required to demonstrate compliance with a new condensable emission limit within one year of the U.S. EPA proposing a new reference stack testing method for the condensable portion. Accordingly, Table A-1 includes estimates of the total $PM_{2.5}$ and condensable $PM_{2.5}$ in lbs/hr and tpy.

Review of Past Determinations of BACT for PM

The EPA compilation of RACT, BACT, and LAER are included in the RBLC, which serves the entire country with summaries of State agency determinations of what primarily are PSD BACT determinations. While the determinations go back in time to 1970, most permit reviews only consider the most recent determinations that reflect the state-of-the-art technologies for NSR permitting purposes. This present review of BACT determinations for PM includes calendar years 2001 through 2006, a five year period that encompasses the latest determinations where increased emphasis on total PM emissions is evident.

The RBLC allows review of all BACT determinations for particular source categories. For example, a source category (RBLC Process Code 15.100) "Simple Cycle Combustion Turbines > 25 MW" is the pertinent source category for the present application. BACT is defined as an emission rate, but the determinations reported to EPA from the individual States do not provide the data in a standardized metric and so it is difficult to compare many of the determinations. The BACT emission rates are variously reported in units of lbs/MMBtu, lbs/hr, or tpy. Some determinations report the BACT emission rate in one, two, or all three metrics.

The RBLC lists the control technology applicable to each particular air pollutant. For simple-cycle combustion turbines, there are no determinations where add-on control devices are used for PM control of the turbine exhaust. Determinations list the specific control technology as "good combustion practices", "low ash fuel and natural gas", or "natural gas/pipeline quality natural gas" and other slight variations on the theme of clean fuels and efficient combustion. There are 156 determinations of BACT for the source category of large simple-cycle combustion turbines during the most recent 5 year period.

There is little utility to listing the BACT emission rates for all 156 determinations however, sorting of the data from the lowest reported to the highest reported BACT emission rate for natural gas-fired units and distillate fuel oil-fired units is indicative of the range of values appropriately defined as BACT for the source category. Using the metric of lbs/MMBtu, BACT for the source category ranges from 0.0045 to 0.023 lbs/MMBtu for natural gas-fired combustion turbines, and from 0.023 to 0.035 lbs/MMBtu for distillate oil-fired units. These ranges exceed the AP-42 average emission

factors (0.0066 gas, 0.012 distillate fuel); however, the upper bound of the range includes the contribution from back-half condensable PM for both fuels.

The proposed BACT $PM/PM_{10}/PM_{2.5}$ emission rates for Waterbury Generation, LLC for natural gas- and ULSD-firing are 0.0094 and 0.037 lbs/MMBtu, respectively (8.4 and 29.7 lbs/hr, respectively). These proposed BACT emission rates reflect the sums of the filterable and condensable portions of the PM. The condensable portion includes both condensable VOC and ammonium sulfate particulate due to conversion of SO_2 to SO_3 across the catalytic systems and its reaction with ammonia in the SCR.

The use of clean burning fuels, such as natural gas or low-sulfur fuel oils, and good combustion practices are considered to be the most effective means for controlling $PM/PM_{10}/PM_{2.5}$ emissions from combustion turbines. Post-combustion controls, such as fabric filters, wet scrubbers, and electrostatic precipitators are impractical due to the large pressure drops associated with these units and the low concentrations of $PM/PM_{10}/PM_{2.5}$ present in the exhaust gas. A review of PM/PM_{10} emission limits for combustion turbines presented in the EPA RBLC shows that only good combustion techniques and low-sulfur fuel have been used as controls for PM/PM_{10} emissions. The Clearinghouse does not contain PM BACT determinations where contributions to PM from add-on control equipment is applied to gas turbines (nor does it explicitly address $PM_{2.5}$ emissions).

5.2 BACT Proposal for $PM/PM_{10}/PM_{2.5}$

The proposed BACT emission limits for $PM/PM_{10}/PM_{2.5}$ are 0.0094 and 0.0370 lbs/MMBtu when firing natural gas and ULSD oil, respectively. Waterbury Generation, LLC, will fire natural gas and ULSD in the combustion turbines and utilize good combustion practices. By selection of the most stringent control technology alternative, no economic, energy, or environmental analysis is included. These limits are consistent with other recent BACT determinations for simple-cycle turbines; however, these BACT emission rates reflect the sums of both the filterable and condensable PM.

5.0 BACT Analysis for Nitrogen Oxides

5.1 Regulatory Requirement

The combustion turbine is subject to the NSPS contained in 40 CFR 60 Subpart KKKK. The NSPS NO_x emissions limit applicable to the GE LMS100 PA turbine is 15 ppmv @ 15% O_2 for turbines with a maximum combustion turbine heat input at peak load in excess of 850 MMBtu/hr (Reference FR Vol 71, No. 129, Thursday July 6, 2006, p. 38483, Table 1).

The RACT limits (RCSA 22a-174-22 Table 22-2) applicable to large combustion turbines are 55 and 75 ppm for natural gas- and distillate oil-firing, respectively.

5.2 NO_x Formation

NO_x is formed during the combustion processes in the turbine. There are two principal forms of NO_x, designated as "thermal" NO_x and "fuel" NO_x. Thermal NO_x formation is the result of oxidation of atmospheric nitrogen contained in the inlet air in the high-temperature, post-flame region of the combustion zone. The major factors influencing thermal NO_x formation are temperature, concentrations of nitrogen and oxygen in the inlet air and residence time within the combustion zone. Fuel NO_x is formed by the oxidation of fuel-bound nitrogen. Adjusting the combustion process and installing post-combustion controls both serve to limit NO_x formation. The following section provides a technical description of NO_x control technologies.

5.3 Control Technologies

5.3.1 Selective Catalytic Reduction (SCR)

SCR is an add-on NO_x control placed in the exhaust stream after the oxidation catalyst. SCR involves the injection of aqueous ammonia (NH_3) into the exhaust gas stream upstream of a catalyst bed. On the catalyst surface, NH_3 reacts with NO_x contained within the exhaust gas to form nitrogen gas (N_2) and water (H_2O) in accordance with the following chemical equations:

$$4NH_3 + 4NO + O_2 \Rightarrow 4N_2 + 6H_2O$$
$$8NH_3 + 6NO_2 \Rightarrow 7N_2 + 12H_2O$$

The catalyst's active surface is usually a noble metal (platinum), base metal (titanium or vanadium) or a zeolite-based material. Metal-based catalysts are usually applied as a coating over a metal or ceramic substrate. Zeolite catalysts are typically a homogenous material that forms both the active surface and the substrate. The geometric configuration of the catalyst body is designed for maximum surface area and minimum obstruction of the flue gas flow path in order to achieve maximum conversion efficiency and minimum backpressure on the gas turbine. The most common configuration is a "honeycomb" design. In a typical NH_3 injection system, NH_3 is drawn from a storage tank, vaporized and injected upstream of the catalyst bed.

In the late 1980's and early 1990's SCR technology became the standard for combustion turbines. 9 ppm was considered LAER for NO_x from natural gas-fired simple-cycle combustion turbines for several years. As the catalyst manufacturers continued to improve their designs and develop new formulations, the level considered LAER decreased, eventually reaching the present levels of 2.5 ppm for natural gas firing in large simple-cycle turbines.

5.3.2 EM_x

EM_x (formerly $SCONO_x$) is a proprietary NO_x control technology being marketed by EmaraChem (formerly Goal Line Technologies). The EM_x system uses a potassium carbonate-coated catalyst to oxidize CO to carbon dioxide (CO_2) and reduce NO_x to N_2 and water. The EM_x bed preferentially absorbs sulfur compounds. If sulfur is a problem (which it has been even for natural gas-fired facilities using this technology), then another catalyst bed is placed before the EM_x catalyst to capture the sulfur compounds. The process operates at the exhaust of the HRSG in combined-cycle systems where the exhaust temperature is 350 to 450°F. The potassium carbonate must be regenerated frequently with a reducing gas to remain effective. Natural gas is used to generate hydrogen gas, which is then used for regeneration of the catalyst beds. This regeneration requires sophisticated dampers and ductwork. The potassium carbonate catalyst bed is also rejuvenated every 6 months to a year by dipping the catalyst beds in a solution of potassium carbonate.

The EM_x technology has been installed for a number of years on two turbines rated at 5 and 28 MW that fire natural gas-only. The larger of these turbines is owned and operated by one of the parent companies of EmaraChem.

An air permit was issued to PG&E to use either SCR or EM_x for the 510 MW proposed Otay Mesa Generating project. Similarly, an air permit was issued to a PG&E affiliate to use either SCR or EM_x on the La Paloma project. Both projects proceeded with SCR technology because EM_x was determined to pose unacceptable risks. These projects were for combined-cycle units which have lower exhaust gas temperatures that are in general in a range suitable for EM_x. There are no known applications of EM_x technology to simple-cycle peaking turbines.

Therefore, while EM_x technology has in limited applications achieved a NO_x emission rate comparable to those considered LAER at other facilities using SCR, it is not considered technically feasible for the Waterbury Generation, LLC Project. The reasons for this include:

- The catalyst's susceptibility to poisoning by sulfur compounds, which it adsorbs preferentially, the EM_x system is not recommended for and is incompatible with turbines that fire fuel oil, even as a back up fuel.
- The 100 percent power exhaust temperature range of the simple-cycle turbine is approximately 723 to 810 °F over an ambient temperature range of -5 to 105 °F. The operating temperature range for EM_x is limited to 300 to 700°F.
- Banks and financial institutions will not provide financing for large projects using $SCONO_x$ because it is not a proven technology and Alstom Power (who once sold EM_x under license) does not provide the necessary warranties.

5.3.3 Dry Low NO_x

Typical gas turbines are designed to operate at a fuel to air ratio of 1.0. This is the condition at which the highest combustion temperature and quickest combustion reactions (including NO_x formation) occur. Fuel-to-air ratios below 1.0 are referred to as fuel lean mixtures (i.e., excess air in the combustion chamber); fuel-to-air ratios above 1.0 are referred to as fuel-rich (i.e., excess fuel in the combustion chamber). The rate of NO_x production falls off dramatically as the flame temperature decreases.

Based upon this concept, dry low NO_x combustors are designed to operate below the 1:1 fuel-to-air ratio, thereby reducing thermal NO_x formation within the combustion chamber. The lean combustors typically are two-staged pre-mixed combustors designed for use with natural gas fuel and capable of operation on liquid fuel. The first stage serves to thoroughly mix the fuel and air and to deliver a uniform, lean, unburned fuel-air mixture to the second stage. The GE LMS100 PA turbine proposed for Waterbury Generation, LLC utilizes dry low NO_x combustors when firing natural gas.

5.3.4 Water and Steam Injection

Water and steam injection systems inject deionized water or steam extracted from a steam turbine into the combustors of a gas turbine. This has the dual effect of lowering peak flame temperatures and enhancing performance by the large increase in volume associated with the phase change of water or superheating of steam injected to the flame zone. The GE LMS100 PA turbine proposed for Waterbury Generation, LLC, utilizes water injection when firing ULSD oil.

5.4 Recent LAER/BACT Determinations

For a limit to be considered LAER, it requires more than just the issuance of a permit. LAER represents the most stringent emission limitation derived from either (1) the most stringent limitation for that source category contained in any SIP (unless it is demonstrated to not be achievable), or (2) the most stringent emission limitation achieved in practice for that source category.

The RBLC has been updated such that more specific source categories may be searched for BACT determinations. In the past, the category "combustion turbines" was the particular baseline grouping with subcategories for natural gas-fired and distillate fuel-fired being available also. In September 2004, EPA made available an improved RBLC and the category of combustion turbines is now grouped into several additional sub-groupings. The particular grouping for the Project turbine is the group that includes large (> 25 MWe) simple-cycle combustion turbines, Source Code 15.100. In the RBLC, small units are those with a power output of less than 25 MW. The results of the RBLC search of the NO_x emission limits for large simple-cycle turbines are summarized in the paragraphs that follow.

While hundreds of such turbines have been permitted, most were not permitted recently. These older units have emission rates that exceed the levels routinely achieved by the control technologies available today. Many of the turbines listed are large simple-cycle units, as such, they are relevant to the BACT/LAER determination for Waterbury Generation, LLC. There are several BACT determinations for projects in both ozone nonattainment areas and ozone attainment areas that have been permitted with a NO_x emission limitation of 2.5 ppm for natural gas firing. There are no determinations for natural gas-fired simple-cycle turbines with NO_x limitations under 2.5 ppm. With the exception of one project, the most stringent limitation for distillate fuel oil is 5.9 ppm. The City of Tallahassee (RBLC ID No. FL-0261) set a BACT permit limit for a GE LM6000 combustion turbine firing distillate oil at 5.0 ppm, but specified this as a 24-hour average limit.

BACT Proposal for NO_x

The proposed turbine BACT NO_x emission rate limitations for natural gas combustion and ULSD oil-firing are 2.5 and 5.9 ppm, respectively. This proposal is based on the most stringent emission limitation contained in a SIP or achieved in practice for the source category. By selection of the most stringent control technology alternative, no economic, energy, or environmental analysis is included. These levels will be achieved using clean fuel, good combustion practices, dry low NO_x combustors when firing natural gas, water injection when firing ULSD oil, and SCR. These levels are also far less than the applicable NSPS and RACT limits.

6.0 BACT Analysis for NH_3

6.1 Control Technologies

Ammonia emissions are a secondary pollutant which is present exclusively due to the SCR technology for NO_x control. A slight excess of NH_3 is used to optimize the reduction of NO_x and the quantity of injection or reagent varies with ambient temperature and other system variables.

The proposed maximum ammonia slip is 5 ppm when firing natural gas and 10 ppm when firing ULSD oil. These allowable ammonia slip values reflect the ammonia slip at the end of the catalyst life, which may be from three to six years or more. Initially, there will be virtually no ammonia emissions, and the level of slip will only approach the final values near the end of the catalyst life.

6.2 BACT Proposal for NH_3

The proposed turbine NH_3 emission rate limitations for natural gas combustion and ULSD oil firing are 5 and 10 ppm, respectively. These NH_3 emissions are solely a result of the SCR NO_x controls.

7.0 Summary of Control Technology Proposals

Table G-2 summarizes the proposed combustion turbine emission controls and limits for the regulated air pollutants.

TABLE G-2. COMBUSTION TURBINE EMISSION CONTROLS AND LIMITS

Air Pollutant	Emission Limits [1, 2, 3]	Emission Controls	Basis
Carbon Monoxide	10 ppm (natural gas-firing) 10 ppm (ULSD oil-firing)	Good Combustion Practices Oxidation Catalyst	BACT
Particulate Matter/ PM_{10}/ $PM_{2.5}$	0.0094 lb/MMBtu (natural gas-firing) 0.0370 lb/MMBtu (ULSD oil-firing	Good Combustion Practices Clean Fuels	BACT
Nitrogen Oxides	2.5 ppm (natural gas-firing) 5.9 ppm (ULSD oil-firing)	Selective Catalytic Reduction, Water Injection (ULSD oil-firing) Dry Low NO_x (natural gas-firing) Good Combustion Practices Clean Fuels	BACT
Volatile Organic Compounds	4.0 ppm (natural gas-firing) 5.0 ppm (ULSD oil-firing)	Good Combustion Practices Oxidation Catalyst	BACT
Ammonia	5 ppm (natural gas-firing) 10 ppm (ULSD-firing)	This pollutant is emitted due to application of SCR controls	BACT

(1) All proposed BACT limits are worst-case short-term limits
(2) ppm limits are corrected to dry conditions at 15% oxygen
(3) lb/MMBtu limits are based on the Higher Heating Value (HHV) of the fuel

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment H
Emergency Episode Standby Plan

This section does not apply to Waterbury Generation, LLC

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment I
Operation and Maintenance Plan

This section does not apply to Waterbury Generation, LLC

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment J
Ambient Impact Analysis

The ambient impact analysis for this application will be submitted separately at a later date.

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment K
Applicant Compliance Information

Applicant Compliance Information

DEP ONLY
App. No.
Co./Ind. No.

Applicant Name: **Waterbury Generation, LLC**
(as indicated on the *Permit Application Transmittal Form*)

If you answer *yes* to any of the questions below, you must complete the Table of Enforcement Actions on the reverse side of this sheet as directed in the instructions for your permit application.

A. During the five years immediately preceding submission of this application, has the applicant been convicted in any jurisdiction of a criminal violation of any environmental law?

☐ Yes ☒ No

B. During the five years immediately preceding submission of this application, has a civil penalty been imposed upon the applicant in any state, including Connecticut, or federal judicial proceeding for any violation of an environmental law?

☐ Yes ☒ No

C. During the five years immediately preceding submission of this application, has a civil penalty exceeding five thousand dollars been imposed on the applicant in any state, including Connecticut, or federal administrative proceeding for any violation of an environmental law?

☐ Yes ☒ No

D. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal court issued any order or entered any judgement to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

E. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal administrative agency issued any order to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

Table of Enforcement Actions

(1) Type of Action	(2a) Date Commenced	(2b) Date Terminated	(3) Jurisdiction	(4) Case/Docket/ Order No.	(5) Description of Violation

☐ Check the box if additional sheets are attached. Copies of this form may be duplicated for additional space.

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment L
Conformance Certification Form

Attachment L: Conformance Certification Form

I, **John Campbell of Waterbury Generation, LLC** , certify

(Name of applicant)

that each source of air pollution on the land where the subject activity is located conforms to the regulations adopted under Section 22a-174 of the Connecticut General Statutes and does not pose a health hazard.

John Campbell 9/4/07

Signature of Applicant Date

John Campbell
Name of Applicant (print or type)

Project Manager
Title (if applicable)

☐ Please enter a check mark if additional signatures are necessary (i.e., if there are co-applicants). If so, please reproduce this form as necessary and attach the signed copies to this sheet.

Waterbury Generation, LLC
Simple-Cycle Turbine

Attachment M
Supplemental Information

Mt.Tom Generating Co. LLC Analytical Laboratory

15 Agawam Avenue
West Springfield, MA 01089
Phone (413) 787-9064 Fax (413) 787-9056
ail-mshah@firstlightpower.com

Mass Certification - MA-00071
Conn Certification - PH-0520

Report Date April 3, 2007

Customer	Contact	Laboratory Supervisor	eMail
First Light Power	C. Vodopivec	Madhu Shah	shahmp@nu.com

Sample Description
Analysis of # 2 Oil

Samples Analyzed

Enclosed are Report No(s): 904

Thank you for your business

Madhu Shah, Laboratory Supervisor **Date**

Sample	Description	Source	Taken/Time	Received

Sample Analysis

Work Order 07-0321

904 Hess Wethersfield Terminal | First Light Power | 2/23/07 | 2/26/07

arameter		Results	MDL	Method	Analyzed/Time	Tech
per Gravity		0.8408		ASTM D-1298		
ic Total,ppb	Less Than	5.00	5.00	EPA 206.2	03/07/07	dfp
e-Beryllium Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
a-Calcium Totalppb		13.30	10.00	EPA 200.7	03/07/07	dfp
d-Cadmium Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
r-Chromium Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
u-Copper Total,ppb		7.23	5.00	EPA 200.7	03/07/07	dfp
g-Mercury Total,ppb	Less Than	20.00	0.50	EPA 245.1	03/07/07	dfp
-Potassium Total,ppb		23.90	10.00	EPA 200.7	03/07/07	dfp
n-Manganese Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
a-Sodium Total,ppb		167	10.00	EPA 200.7	03/07/07	dfp
i-Nickel Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
b-Lead Total,ppb	Less Than	5.00	5.00	EPA 200.7	03/07/07	dfp
e-Selenium Total,ppb	Less Than	5.00	5.00	EPA 270.2	03/07/07	dfp
PI Gravity @ 60°F		36.80		ASTM D-287		
sh, From Petroleum%	Less Than	0.01		ASTM D-482		
TU/Gal		137,440	500.00	ASTM D-240		
TU/Lb		19,607	100.00	ASTM D-240		
lash Point, °F		154.00	75.00	ASTM D-93		
ydrogen,%		13.50		ASTM D-5291		
articulates mg/1000 ml		2.20		ASTM D-2276		
ounds per Gallon		7.009				
ulfur, in Petroleum ppm		6.00	5.00	ASTM D-5453		
isc ,KinematicCST@ 40°C		2.40		ASTM D-445		
y,SSU @ 100°F		34.00		ASTM D-2161		
Vater % (by volume)	Less Than	0.025	0.03	ASTM D-95		