

# TABLE OF CONTENTS

---

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1-1</b>
1.1	Project Overview	1-1
1.2	Regulatory Summary	1-3
1.3	Outline of Application	1-3
<b>2.0</b>	<b>PROJECT DESCRIPTION AND EMISSIONS</b>	<b>2-1</b>
2.1	Project Description	2-1
2.1.1	Gas Turbine	2-7
2.1.2	AC Generator	2-7
2.1.3	Air Pollution Control System	2-7
2.1.4	Water Supply and Demineralization System	2-12
2.1.5	Aqueous Ammonia Storage	2-14
2.1.6	Facility Noise Control Features	2-14
2.2	Emissions Summary	2-14
2.2.1	Criteria Emissions	2-14
2.2.2	Non-Criteria Emissions	2-16
<b>3.0</b>	<b>REGULATORY REQUIREMENTS</b>	<b>3-1</b>
3.1	Overview of Applicability of Federal Regulations	3-1
3.1.1	Nonattainment New Source Review	3-2
3.1.2	Prevention of Significant Deterioration (PSD)	3-4
3.1.3	Ambient Air Quality Standards	3-5
3.1.4	New Source Performance Standards	3-6
3.1.5	Title IV Sulfur Dioxide Allowances and Monitoring (40 CFR 72 and 75)	3-7
3.2	Massachusetts Regulations and Policies ( <b>DEP Only</b> )	3-7
3.2.1	Air Plan Approval	3-7
3.2.2	Noise Control Regulation and Policy	3-8
3.2.3	Emission Limitations for Fossil Fuel Utilization	3-9
3.2.4	Visible Emissions	3-9
3.2.5	Short-term NO <sub>2</sub> Policy	3-9
3.2.6	Operating Permit	3-10
3.2.7	Emission Offsets	3-10
3.2.8	Intent to Comply with DEP Clean Air Construction Initiative (construction stage)	3-10
<b>4.0</b>	<b>BACT LAER ANALYSIS</b>	<b>4-1</b>
4.1	Emissions Summary	4-1
4.2	Lowest Achievable Emission Rate Analysis	4-1
4.2.1	Evaluation of Emissions Limiting Techniques	4-2

## TABLE OF CONTENTS (CONTINUED)

	4.2.1.1	Change in Raw Materials	4-2
	4.2.1.2	Process Modifications	4-3
	4.2.1.3	Add-on Controls	4-3
	4.2.2	Sources Used to Evaluate LAER	4-3
	4.2.3	Oxides of Nitrogen	4-4
	4.2.3.1	Selective Catalytic Reduction	4-4
	4.2.3.2	Gas-Fired Determinations	4-5
	4.2.3.3	Oil-Fired Determinations	4-6
	4.2.3.4	LAER Determination	4-7
4.3		Best Available Control Technology Analysis	4-7
	4.3.1	Sources Used to Evaluate BACT	4-8
	4.3.2	Carbon Monoxide	4-8
	4.3.2.1	Oxidation Catalyst	4-8
	4.3.2.2	BACT Determination	4-9
	4.3.3	Volatile Organic Compounds	4-9
	4.3.3.1	Oxidation Catalyst	4-10
	4.3.3.2	BACT Determination	4-11
	4.3.4	Particulate Matter	4-11
	4.3.5	Sulfur Dioxide	4-11
	4.3.6	Oxides of Nitrogen	4-12
	4.3.7	Non-Criteria Pollutants	4-12
4.4		BACT Summary for Turbines	4-12
4.5		Alternate Fuel	4-12
<b>5.0</b>		<b>PROJECT SITE CHARACTERISTICS</b>	<b>5-1</b>
	5.1	Land Use Analysis	5-1
	5.1.1	Urban/Rural Analysis	5-1
	5.2	Topography	5-4
	5.3	Meteorological Data for Dispersion Modeling	5-4
	5.4	Background Air Quality Data	5-9
	5.4.1	Sulfur Dioxide (SO <sub>2</sub> )	5-9
	5.4.2	Carbon Monoxide (CO)	5-10
	5.4.3	Nitrogen Dioxide (NO <sub>2</sub> )	5-10
	5.4.4	Ozone (O <sub>3</sub> )	5-10
	5.4.5	Particulates (PM <sub>10</sub> )	5-10
	5.4.6	Particulates (PM <sub>2.5</sub> )	5-10
	5.5	Source Data	5-11
	5.6	Good Engineering Practice Stack Height Determination	5-12

## TABLE OF CONTENTS (CONTINUED)

---

<b>6.0</b>	<b>AIR QUALITY MODELING</b>	<b>6-1</b>
6.1	Air Quality Model Selection	6-1
6.1.1	SCREEN3	6-2
6.1.2	AERMOD PRIME	6-3
6.2	Screening Modeling Analysis	6-4
6.2.1	Simple Terrain Screening	6-4
6.2.2	Intermediate/Complex Terrain Screening	6-7
6.3	Refined Receptor Grid	6-12
6.4	Refined Modeling	6-12
6.4.1	AERMOD	6-12
6.5	Ambient Air Quality Modeling Results	6-13
6.6	PSD Increment Consumption <b>(EPA only)</b>	6-15
6.7	Visibility Analysis <b>(EPA only)</b>	6-15
6.8	Soils and Vegetation <b>(EPA only)</b>	6-17
6.9	Growth Analysis <b>(EPA only)</b>	6-18
6.10	Background Air Quality/Pre-construction Waiver <b>(EPA only)</b>	6-19
6.11	Non-Criteria Pollutant Modeling <b>(DEP only)</b>	6-19
6.12	Accidental Release Modeling <b>(DEP only)</b>	6-21
<b>7.0</b>	<b>SOUND LEVEL ASSESSMENT (DEP ONLY)</b>	<b>7-1</b>
7.1	Regulatory Requirements	7-1
7.1.1	Massachusetts State Regulations	7-1
7.1.2	Local Regulations	7-2
7.2	General Sound Level Descriptors	7-2
7.3	Existing Condition Sound Level Measurements	7-3
7.4	Future Operational Sound Levels	7-6
7.4.1	Noise Sources and Reference Sound Data	7-6
7.4.2	Gas Turbine Generator Package	7-7
7.4.3	Gas Turbine Air Inlet	7-7
7.4.4	Gas Turbine SCR System	7-8
7.4.5	Gas Turbine Stack Exhaust	7-8
7.4.6	Transformers	7-8
7.4.7	Gas Compressors	7-8
7.4.8	Lube Oil Cooling Skid	7-9
7.4.9	Ammonia Injection Skid	7-9
7.5	Sound Model	7-9
7.5.1	Predicted Operational Sound Levels - Base Case	7-10
7.5.2	Additional Mitigation Case	7-11
7.5.3	Regulatory Evaluation	7-12

## TABLE OF CONTENTS (CONTINUED)

7.6	Noise Control Summary	7-17
7.7	Cumulative Sound Level Analysis – Potter II Station	7-17
7.8	Noise BANCT Analysis	7-19
	7.8.1 Introduction	7-19
	7.8.2 Primary Noise Sources	7-20
	7.8.3 Potential Additional Controls	7-20
	7.8.4 Revised Operational Noise Modeling	7-21
	7.8.5 Conclusion	7-22
7.9	Construction Noise	7-23
<b>8.0</b>	<b>PROPOSED PERMIT CONDITIONS</b>	<b>8-1</b>
8.1	Facility Description	8-1
	8.1.1 Site Description	8-1
	8.1.2 Project Description	8-1
8.2	Emission Limits	8-2
	8.2.1 Limits During Normal Operation	8-2
	8.2.2 Limits During Emergency, Malfunction, Start-up/Shutdown, Fuel Transfers, Maintenance	8-4
	8.2.3 Annual Emissions	8-5
	8.2.4 Averaging Time	8-5
	8.2.5 Fuel Sulfur Limits	8-5
8.3	Modeling Analysis	8-5
	8.3.1 Source Interactive Modeling Analysis	8-5
	8.3.2 Air Toxics Analysis ( <b>DEP only</b> )	8-6
	8.3.3 Accidental Release Modeling of Aqueous Ammonia ( <b>DEP only</b> )	8-6
8.4	Emission Offsets and Non-Attainment	8-6
	8.4.1 Non-Attainment Review/LAER	8-6
	8.4.2 Offset Requirements	8-7
8.5	Prevention of Significant Deterioration (PSD) ( <b>EPA only</b> )	8-8
	8.5.1 PSD Baseline Analysis	8-8
	8.5.2 PSD Consumption Analysis	8-8
8.6	New Source Performance Standards (NSPS)	8-9
	8.6.1 NO <sub>x</sub> Limits	8-9
	8.6.2 SO <sub>2</sub> Limits	8-9
8.7	Title IV Sulfur Dioxide Allowances and Monitoring	8-9
8.8	Noise ( <b>DEP only</b> )	8-9
	8.8.1 General Information	8-9
	8.8.2 Department Noise Policy (90–001)	8-10
	8.8.3 Noise Limits	8-10

## TABLE OF CONTENTS (CONTINUED)

---

8.9	Special Conditions	8-11
8.10	Monitoring Requirements	8-12
8.11	Recordkeeping Requirements	8-14
8.12	Reporting Requirements	8-15
8.13	Testing Requirements	8-17
8.14	General Requirements	8-19
8.15	Construction Requirements	8-20

## LIST OF APPENDICES

---

Appendix A	Permit Forms <b>(DEP only)</b>
Appendix B	Rolls Royce Documentation
Appendix C	Supporting Calculations
Appendix D	RBLC Summary Tables
Appendix E	Sound Level Measurement Report <b>(DEP only)</b>
Appendix F	Letter Formalizing Discussions Between BELD and CITGO <b>(DEP only)</b>
Appendix G	GEP Building Dimensions
Appendix H	VISCREEN Input/Output Files
Appendix I	Air Modeling Files (CD ROM – provided to DEP and EPA)

## LIST OF FIGURES

---

Figure 1-1	Project Site Area
Figure 2-1	General Equipment Arrangement
Figure 2-2	Rolls-Royce Trent 60 WLE Rendering
Figure 2-3	Rolls-Royce Trent 60 WLE Rendering-View from BELD offices/parking Lot
Figure 2-4	Rolls-Royce Trent 60 WLE Rendering-View from Weymouth
Figure 2-5	Performance Curve Trent 60 (Gas and Oil)
Figure 2-6	Start-up Sequence
Figure 2-7	Photo of Gas Turbine Enclosure

## **LIST OF FIGURES (CONTINUED)**

---

Figure 2-8	Inlet Filter
Figure 2-9	SCR System and Oxidation Catalyst
Figure 5-1	Land Use Evaluation within 3 KM of the site
Figure 5-2	MassGIS Land Use Classes
Figure 5-3	Refine MassGIS Land Use Evaluation within 3KM of the site
Figure 5-4	Composite Annual Windrose from Boston, MA
Figure 6-1	Offsite Consequence Analysis
Figure 7-1	Sound Level Monitoring Summary Data
Figure 7-3	Typical Construction Equipment Sound Levels – dBA at 50 feet

## **LIST OF TABLES**

---

Table 2-1	BACT/LAER Emissions Summary, Watson Station
Table 2-2	Potter II Emissions Summary (existing 95 MW combined-cycle unit)
Table 2-3	Non-Criteria Emission Rates (Hazardous Air Pollutants)
Table 2-4	Other Non-Criteria Emission Rates
Table 3-1	Maximum Potential Annual Emissions for the Proposed Watson Station
Table 3-2	PSD Baseline, Potter II Past Actual vs. Watson Future Potential Emissions
Table 3-3	National and Massachusetts Ambient Air Quality Standards
Table 4-1	BACT/LAER Summary
Table 4-2	BACT Summary
Table 5-1	Identification and Classification of Land Use
Table 5-2	AERMET Processing Assumptions
Table 5-3	Observed Ambient Air Quality Concentrations and Selected Background Levels
Table 5-4	Stack Characteristics for the BELD Watson Station Combustion Turbines
Table 5-5	Stack Characteristics for the BELD Potter II Station

## LIST OF TABLES (CONTINUED)

---

Table 5-6	Emission Rates for the BELD Potter II Station
Table 6-1	SCREEN3 Full Meteorological Conditions
Table 6-2	SCREEN3 Simple Terrain Receptors and Elevations
Table 6-3	SCREEN3 Simple Terrain Results for All Operating Conditions
Table 6-4	Maximum Predicted SCREEN3 Concentrations for Simple Terrain Receptors Compared with Significant Impact Levels
Table 6-5	SCREEN3 Intermediate/Complex Terrain Receptors
Table 6-6	SCREEN3 VALLEY Results for Intermediate/Complex Terrain Results for All Operating Conditions
Table 6-7	SCREEN3 VALLEY Results for Complex Terrain Maximum Concentrations Using simple terrain algorithms for All Operating Conditions
Table 6-8	Maximum Predicted SCREEN3 Concentrations for Intermediate/Complex Terrain Receptors
Table 6-9	Comparison of Maximum Predicted AERMOD PRIME Modeling Results with Significant Impact Levels
Table 6-10	Predicted Cumulative Impact Concentrations with Air Quality Standards
Table 6-11	VISCREEN Model Results for Visual Impacts Inside the Lye Brook Class I Area
Table 6-12	VISCREEN Model Results for Visual Impacts Outside the Lye Brook Class I Area
Table 6-13	Vegetation Sensitivity Screening for SO <sub>2</sub> Concentrations
Table 6-14	PSD Monitor Thresholds
Table 6-15	Non-Criteria Modeling Results
Table 6-16	Offsite Consequence Analysis for Aqueous Ammonia
Table 7-1	Sound Power Level Input Data for BELD Noise Modeling – Base Case Except Where Noted (per unit) (dB)
Table 7-2	Sound Level Modeling Results – Thomas A. Watson Generating Station Plus Background – Base Case
Table 7-3a	Sound Level Evaluation – Thomas A. Watson Generating Station with additional mitigation-- Nighttime Background

## **LIST OF TABLES (CONTINUED)**

---

Table 7-3b	Sound Level Evaluation – Thomas A. Watson Generating Station with additional mitigation – Weekday Daytime/Evening Background
Table 7-4	Sound Level Modeling Results by Octave Band – Thomas A. Watson Generating Station Only – With Additional Mitigation
Table 7-5a	Sound Level Evaluation – Thomas A. Watson Generating Station plus Potter II – Daytime/Evening Background
Table 7-5b	Sound Level Evaluation – Thomas A. Watson Generating Station plus Potter II – Nighttime Background
Table 7-6	Equipment-Specific Components of Total Sound Level at 108 Glenrose Ave. (R2A)
Table 8-1	Emissions Summary, Watson Station
Table 8-2	Maximum Potential Annual Emissions for the Proposed Watson Station
Table 8-3	PSD Baseline, Potter II Past Actual vs. Watson Future Potential Emissions
Table 8.4	Pollutant Compliance Test for Emission Limits