3.0 Basis of Combustion Turbine BACT Analysis

This section describes the basis for the Combustion Turbine Unit 4 BACT analysis. Information is provided on the BACT methodology and approach used as well as the parameters and factors used in developing the analysis. The BACT analysis for Combustion Turbine Unit 4 is based on certain regulatory requirements and project assumptions. The following is a summary of the requirements and assumptions on which this BACT analysis is based.

3.1 Regulatory and Methodology Basis

As defined in the air permit application, operation of the Project will result in a significant increase in the potential to emit emissions of NO_x, PM/PM_{10}, SO_2, and H_2SO_4 (sulfuric acid mist) in excess of the major modification PSD threshold levels set for these pollutants. As required by PSD, a BACT analysis is required for those pollutants with potential emission increases greater than the applicable major modification threshold. Project potential CO and VOC emissions are less than the PSD major modification threshold levels for these pollutants. As a result, CO and VOC emissions were not evaluated as part of the BACT process.

BACT is defined in Rule 62-210.200(37), F.A.C. as:

""Best Available Control Technology" or "BACT" – An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes, and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant."

However, BACT cannot be less stringent than the emissions limits established by an applicable New Source Performance Standard (NSPS), which for NO_x is estimated to be 106 ppmv (at the Combustion Turbine Unit 4 heat rate of 10.20 kJ/watt-hr and a fuel-bound nitrogen F value of zero).

To bring consistency to the BACT process, the United States Environmental Protection Agency (USEPA) has authorized the development of a guidance document (March 15, 1990) on the use of the "top-down" approach to BACT determinations. The first step in a top-down BACT analysis is to determine, for the pollutant in question, the control technology alternatives that are technically feasible for the source category in question. Technologies required under the Lowest Achievable Emission Rate (LAER)

for the source category must be considered when determining the control technology for the pollutant in question. LAER determinations, although not applicable to Combustion Turbine Unit 4, represent the top control alternatives under the BACT analysis process. A LAER determination would be required if Combustion Turbine Unit 4 was located in a nonattainment area.

Federal and state ambient air quality standards, emission limitations, and other applicable regulations must be met by the technology chosen as BACT. The following criteria are given in Rule 62-212.400(6)(a), F.A.C.:

"(6) Best Available Control Technology (BACT).

(a) BACT Determination. Following receipt of a complete application for a permit to construct an air emissions unit or facility which requires a determination of Best Available Control Technology (BACT), the Department shall make a determination of Best Available Control Technology during the permitting process. In making the BACT determination, the Department shall give consideration to:

1. Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169 of the Clean Air Act, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).

2. All scientific, engineering, and technical material and other information available to the Department.

3. The emission limiting standards or BACT determinations of any other state.

4. The social and economic impact of the application of such technology."

As previously noted, BACT cannot be less stringent than an applicable NSPS standard. The Federal NSPS for combustion turbines with a heat input greater than 10 mmBtu/h (40 CFR 60 Subpart GG) establishes applicable NO_x and SO_2 emission limits or standards. No NSPS emission limits have been established for PM/PM_{10} and H_2SO_4. The following standards have been established by NSPS for Subpart GG units:

- NO_x allowable limit = 106 ppmvd at 15 percent O_2 (based on a heat rate of 10.20 kJ/watt-hr and accepting a fuel-bound nitrogen F-value of zero).
- SO_2 standard consisting of a fuel sulfur limit of 0.8 percent sulfur by weight.

3.2 Operations/Emissions Basis

As mentioned previously, the proposed operating scenario for Combustion Turbine Unit 4 is a maximum low sulfur fuel oil usage of 13.567 million gallons per year (equivalent to 4,422 hours per year at full load operation). Table 3-1 shows the baseline emission rates for low sulfur fuel oil operation for Combustion Turbine Unit 4 at 100 percent base load at an average annual site temperature of 78°F. The emissions shown in Table 3-1 are controlled with water injection. The lb/mmBtu values are based on the higher heating value (HHV) of the expected fuel oil to be fired. This unit is expected to cycle with frequent startups (over 200 per year) and will be operated at 50 to 100 percent of full load for up to 8,760 hours per year.

Table 3-1
Baseline Emission Rates for Combustion Turbine Unit 4

Emission Parameter	Combustion Turbine Unit 4[a,b]
NO_x, ppmvd at 15% O_2	42
NO_x, lb/h	69.7
NO_x, lb/mmBtu (HHV)	0.1643
PM/PM_{10} (front and back), lb/h	25.0
PM/PM_{10} (front and back), lb/mmBtu (HHV)	0.0589
SO_2, lb/h	21.63
SO_2, lb/mmBtu (HHV)	0.051
H_2SO_4, lb/h	6.62
H_2SO_4, lb/mmBtu	0.0156

[a]Emissions are based on firing low sulfur fuel oil at 100 percent of baseload at an ambient temperature of 78° F.
[b]NO_x emissions with water injection and without any post-combustion control equipment.

3.3 Economic Basis

The economic analyses used to determine the capital and annualized costs of the control technologies were based on USEPA methodologies shown in the USEPA "Best Available Control Technology Draft Guidance Document" (October 1990), ""Top Down" Best Available Control Technology Guidance Document" (March 1990), The

Office of Air Quality Planning and Standards (OAQPS) *Control Cost Manual* (February 1996, Fifth Edition), internal owner cost factors, and vendor budgetary cost quotes.

Table 3-2 lists the economic criteria used in the analysis of BACT alternatives. The capital recovery factor was calculated based on the real interest rate and economic life of the equipment or the assumed catalyst life.

Table 3-2
Project Economic Evaluation Criteria

Economic Parameters	Value
Contingency, percent	20
Real Interest Rate, percent	7.0
Economic Life, years	15
Capital Recovery Factor, (15 years)	0.1098
Labor Cost, $/man-hour	35
Fuel Oil Cost, $/mmBtu	5.24
Aqueous Ammonia Cost, $/ton (2004)	750
Energy Cost, $/kWhr (2004)	0.05925
Sales Tax, percent	7.25
SCR Catalyst Life, years	1