TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Tampa Electric Company
Post Office Box 111
Tampa, Florida 33601-0111

Big Bend Station
Facility ID No. 0570039

PROJECT

Project No. 0570039-070-AC
Application for Minor Source Air Construction Permit
Modification to Units 1 – 4 Natural Gas Igniter Project

COUNTY

Hillsborough County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

April 24, 2014

1. GENERAL PROJECT INFORMATION

1.1. Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control – General Provisions); 62-210 (Stationary Sources – General Requirements); 62-212 (Stationary Sources – Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources – Emissions Monitoring). Specifically, air construction permits are required pursuant to Chapters 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations in Rule 62-204.800, F.A.C.

1.2. Glossary of Common Terms

Because of the technical nature of the project, the permit contains numerous acronyms and abbreviations, which are defined in Appendix A of this permit.

1.3. Facility Description and Location

Tampa Electric Company (TEC) Big Bend Station is an electric power facility consisting of four key fossil fuel fired steam generating boilers (Units 1 – 4). The facility is categorized under Standard Industrial Classification Code No. 4911. The existing Big Bend Station is located in Hillsborough County at 13031 Wyandotte Road in Apollo Beach, Florida. The UTM coordinates of the existing facility are Zone 17, 363.15 kilometers (km) East, and 3074.91 km North. This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS). **Figure 1** shows the location of TEC Big Bend Station in Florida while **Figure 2** shows a view of the Big Bend Station.

Figure 1. Location of TEC Big Bend Station.

Figure 2. TEC Big Bend Station.

The Big Bend Station is a nominal 1,892 megawatt (MW) electric generation facility. This facility consists of four fossil fuel fired boiler electrical generating Units 1 – 4 (EU 001 – EU 004); four steam turbines electrical

generators (STEG); two simple-cycle combustion turbine (SCCT) 4A and 4B (EU 041 and EU 042) sharing a common electrical generator; solid fuels, fly ash, limestone, gypsum, slag, bottom ash storage and handling facilities; and, fuel oil storage tanks.

Units 1 through 4 have a combined electrical generating output of 1,821 MW. Units 1 through 3 each have a design electrical generating capacity of 445 MW. Unit 4 has a design electrical generating capacity of 486 MW. The fuel fired in all four units consists of coal, or a coal/petroleum coke blend containing a maximum of 20% petroleum coke by weight, or coal blended with coal residual generated from the Polk Power Station, or a coal/petroleum coke blend further blended with coal residual generated from the Polk Power Station, and on-site generated fly ash. In addition to the fuels allowed to be burned during normal operation, each unit burns new No. 2 fuel oil during startup, shutdown, flame stabilization, and during the startup of an additional solid fuel mill on an already operating unit.

For each unit, nitrogen oxide (NO_X) emissions are controlled by low-NO_X burners (LNB) and a selective catalytic reduction (SCR) system. Unit 4 also has a separated over fire air system (SOFA) system to further control NO_X emissions. Particulate matter (PM) emissions are controlled by a dry electrostatic precipitator (ESP) while sulfur dioxide (SO_2) emissions are controlled by wet flue gas desulfurization (FGD) system on each unit. Continuous opacity monitoring systems (COMS) are used to measure opacity. Units 1 through 3 are equipped with continuous emissions monitoring systems (CEMS) to measure NO_X, SO_2, and carbon dioxide (CO_2). Unit 4 is equipped with CEMS to measure carbon monoxide (CO), NO_X, SO_2, and CO_2. These units began operation in 1970 (Unit 1), 1973 (Unit 2), 1976 (Unit 3), and 1985 (Unit 4).

The SCCT 4A and 4B (EU 041 and EU 042) consist of one PWPS FT8-3® SwiftPac® aero-derivative SCCT-electrical generator to operate in simple cycle mode. The SwiftPac® consists of two combustion turbines coupled to one common generator having a nominal gross generation capacity of 62 MW. Each SCCT is allowed to fire pipeline-quality natural gas and ultra-low sulfur distillate (ULSD) fuel oil. Each SCCT is equipped with water injection to minimize NO_X emissions and an oxidation catalyst to minimize CO and volatile organic compounds (VOC) emissions.

1.4. Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- The facility operates units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Title V major source of air pollution in accordance with Chapter 62-213, F.A.C.
- The facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.
- The facility does operate units subject to the New Source Performance Standards (NSPS) of 40 CFR 60.
- The facility does operate units subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) of 40 CFR 63.

1.5. Processing Schedule

- 03/19/2014 Received the application for a minor source air pollution construction permit.
- 04/02/2014 Requested additional information.
- 04/11/2014 Received additional information; application complete.
- 04/24/2014 Posted draft permit package.

1.6. Project Description

TEC is requesting authorization to install two natural gas fired process heaters. This project is a modification to Permit No. 0570039-065-AC which was a natural gas igniter's project for Units 1 – 4 at the Big Bend Station. During construction of the igniter project TEC determined that process heaters would be necessary to maintain the temperature of the natural gas above the dew point to prevent condensation in the pipeline during conveyance of

to the Big Bend Station. The process heaters will be used to increase the temperature of the pipeline natural gas from 60 degrees Fahrenheit (°F) to 100°F.

This project will add the following emissions unit.

EU ID	Emission Unit Description
051	Two Process Heaters (6 MMBtu/hour)

1.7. TERI, Model 7500 Process Heaters

Each process heater will have the following specifications:

- The process heaters are indirect bath heaters (see **Figure 3**) designed with a heater shell that contains the process coil, firetube (combustion chamber) and heat media. The firetube transfers heats the surrounding media (a mixture of ethylene or propylene glycol and water) which in turn heats the process stream within the process coil. The expansion tank allows the hot medium to be contained for the thermal expansion due to the temperature increases.
- Each process heater will a maximum heat input rate of 6 MMBtu/hour.
- Each process heater will be fired exclusively with natural gas.
- Each process heater will have a stack diameter of 24-inches and a stack height of 27.1 feet.

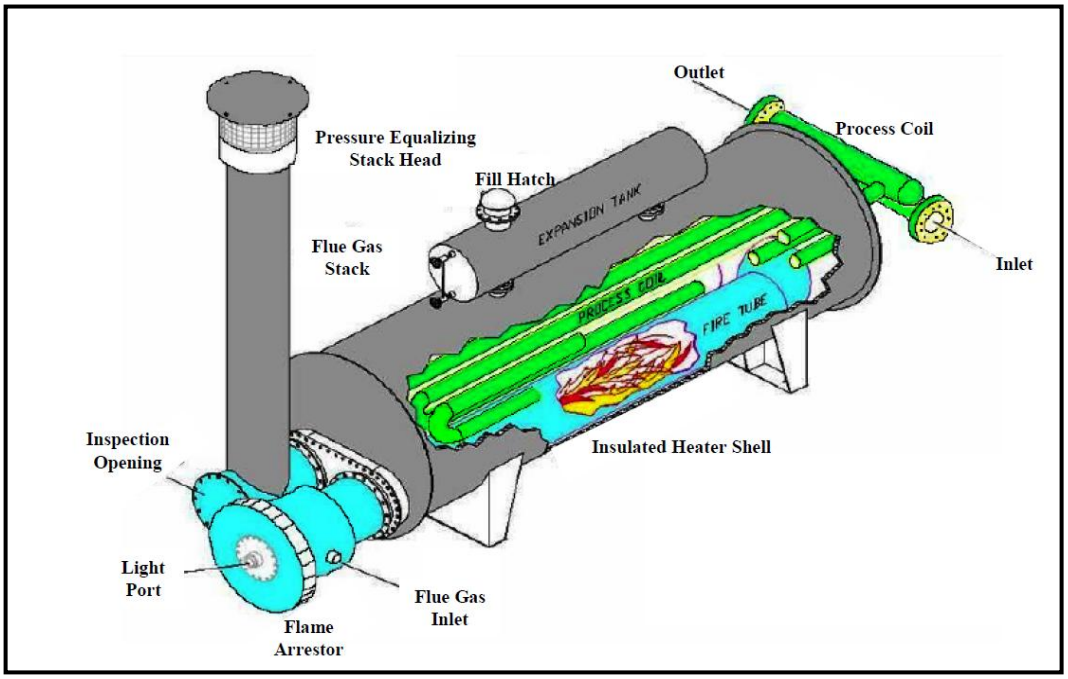

Figure 3. TERI, Model 7500, Process Heaters.

Initially, only one process heater will be installed. The second process heater will be installed in approximately 2 years.

2. PSD APPLICABILITY

2.1. General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal ambient air quality standards (AAQS) or areas designated as "unclassifiable" for certain regulated pollutants. Commonly addressed PSD pollutants for electrical generating facilities such as the Big Bend Station

include: CO, NO_X, PM, PM with a mean diameter of 10 microns or less (PM_{10}), PM with a mean diameter of 2.5 microns or less $PM_{2.5}$, SO_2, VOC and sulfuric acid mist (SAM).

Additional PSD pollutants that are more common to certain other industries include: lead (Pb), mercury (Hg), hydrogen sulfide (H_2S), total reduced sulfur (TRS) including H_2S, reduced sulfur compounds (RSC) including H_2S, municipal waste combustor (MWC) organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (dioxin/furan), MWC metals measured as PM; MWC acid gases measured as SO_2 and HCl, and municipal solid waste (MSW) landfill emissions as non-methane organic compounds (NMOC).

As defined in Rule 62-210.200(Definitions), F.A.C., a stationary source is a "major stationary source" (major PSD source) if it emits or has the potential to emit (PTE):

- 250 tons per year (tons/year) or more of any PSD pollutant; or
- 100 tons/year or more of any PSD pollutant and the facility belongs to one of the 28 listed PSD major facility categories.

The list given in the citation includes the category of "Electric Services". The given category applies to the facility before and after the proposed project. The Big Bend Station is a major stationary source based on actual emissions of and potential to emit 100 tons/year or more of several individual PSD pollutants.

For major stationary sources such as the Big Bend Station, PSD applicability for modification projects is based on thresholds known as the significant emission rates (SER) as defined in Rule 62-210.200(Definitions), F.A.C. Any "net emissions increase" as defined in Rule 62-210.200(Definitions), F.A.C. of a PSD pollutant from the project that equals or exceeds the respective SER is considered "significant". SER also means any emissions rate or any net emissions increase of a PSD pollutant associated with a major stationary source or major modification which would construct within 10 km of a Class I area and have an impact on such area equal to or greater than 1 gram per cubic meter, 24-hour average.

Although a facility may be "major" (i.e. emits or has the potential to emit 100 or 250 tons/year (TPY) as applicable) for only one PSD pollutant, a project must include Best Available Control Technology (BACT) controls for any PSD pollutant that exceeds the corresponding significant emission rates given in **Table 1** below.

TABLE 1 - LIST OF SER BY PSD-POLLUTANT. [a, b]

Pollutant	SER (TPY)	Pollutant	SER (TPY)
CO	100	NO_X	40
$PM/PM_{10}/PM_{2.5}$	25/15/10	Ozone (VOC) [b]	40
$PM_{2.5}$ (NO_X)	40	$PM_{2.5}$ (SO_2)	40
Ozone (NO_X) [b]	40	SAM	7
SO_2	40	Pb	0.6
Hg	0.1	GHG (CO_2e)	75,000 [c]

a. Excluding fluoride and those pollutants defined for Pulp and Paper, MWC, MSW landfills.
b. Ozone (O_3) is regulated by its precursors (VOC and NO_X). PSD for $PM_{2.5}$ can be triggered by its precursors (NO_X and SO_2).
c. Federal SER of 75,000 TPY for GHG (as CO_2e) for PSD sources and has not been incorporated into Department rules.

According to 40 CFR 52.21, six greenhouse gases (GHG), are also be subject to regulation at new stationary sources that will emit or have the potential to emit 100,000 tons/year (SER equal to 75,000 tons/year) expressed as the carbon dioxide equivalent emissions (CO_2e). This requirement has not been incorporated into Department rules but is a separate requirement of the EPA.

2.2. PSD Applicability for Project

The project is located in Hillsborough County which is in an area that is currently in attainment with the AAQS or is otherwise designated as unclassifiable. As provided in the application, **Table 2** below summarizes potential emissions and PSD applicability for the project.

TABLE 2 - SUMMARY OF THE APPLICANT'S PSD APPLICABILITY ANALYSIS.

Pollutant	Annual Emissions, Tons/Year				Subject to PSD?
	Igniter Project Increase	Projected Actual[a]	Increase	Significant Emissions Rate	
CO	-417.9	4.33	-413.57	100	No
NO_X	39.1	0.00	39.1	40	No
$PM/PM_{10}/PM_{2.5}$[b]	-54.9	0.39	-54.51	25/15/10	No
SO_2	-1,718.7	0.03	-1,718.67	40	No
VOC	39.1	0.28	39.38	40	No

a. The projected emissions are based on the worst-case scenario operating the process heaters 8,760 hours/year. The applicant based the potential annual emissions of CO, $PM/PM_{10}/PM_{2.5}$, SO_2, and VOC on EPA's AP-42, Chapter 1.4, and requested an emissions CAP for the project of 39.1 tons/year for NO_X.
b. Filterable/condensable $PM/PM_{10}/PM_{2.5}$. All condensable PM is assumed to be less than 1.0 microns in diameter.

As shown in **Table 2**, total project emissions will not exceed the PSD significant emissions rates; therefore, the project is not subject to PSD preconstruction review.

3. DEPARTMENT REVIEW

3.1. Original Natural Gas Igniters for Units 1 through 4 Project - Background

Fossil Fuel Fired Steam Generator Units 1 – 4 (EU 001 – EU 004) have a combined electrical generating output of 1,821 MW. The primary fuel fired in these boilers is coal. In addition to coal, No. 2 fuel oil is fired in the units during startup, shutdown, flame stabilization, and during the start of an additional solid fuel mill feed on an already operating unit. On August 2, 2013, Project No. 0570039-065-AC was issued authorizing the removal of the existing fuel oil igniters and the installation of new igniters and associated equipment that will allow Units 1 through 4 to burn natural gas instead of fuel oil during startup, shutdown, flame stabilization, and as a supplemental fuel. The new ignition system has the capacity to co-fire with natural gas or operate on natural gas only during low loads, which increases the use of natural gas as a supplemental fuel.

Based on the analysis provided for the natural gas igniter project, the change in emissions would have been minimal if natural gas was substituted with fuel oil under the current operating conditions. However, the project included an increase in the use of firing natural gas during low-load operation and as a supplemental fuel, where natural gas will be co-fired with coal. The project also included annual heat input limits when firing natural gas during low load operation and when co-firing natural gas with coal. Based on the increase in firing natural gas, the applicants PSD analysis showed an increase in NO_X and VOC emissions of 39.1 tons/year for each pollutant, which is just below the PSD SER of 40 tons/year for both pollutants. Since heat input limits were taken to avoid PSD preconstruction review, TEC is required to compute and report the actual annual VOC and NO_X emissions for Units 1 – 4 for a period of five years in accordance with Rule 62-212.300(1)(e), F.A.C.

3.2. Modification of Units 1 – 4 Natural Gas Igniter Project Emissions

This project is a modification to the previously issued natural gas igniter project and involves the installation and operation of two 6 MMBtu/hour process heaters that fire natural gas exclusively. Based on the application, the addition of the two process heaters will place the original project above the PSD significant emissions rates for NO_X. The applicant contends that the NO_X emissions rate will be much lower than the estimated potential emissions since TEC is looking to make some changes in the different modes of operation. Therefore, TEC is requesting a NO_X emission cap of 39.1 tons/year for this project.

Units 1 - 4 are equipped with a NO_X CEMS, which will provide reasonable assurance that NO_X emissions are continuously monitored. Compliance with this NO_X emissions cap will be demonstrated on a 12-month rolling basis using the following equation:

$$[\text{Units } 1-4_{CEMS}] + [(EF_{heater}/NG_{HHV})(6\text{ MMBtu/hour})(\text{ton}/2000\text{ lb})(\text{Heater1}_{hours} + \text{Heater2}_{hours})] \leq 39.1\text{ TPY, } NO_X$$

Where:

$Units\ 1 – 4_{CEMS}$ = Rolling 12-month total of combined NO_X emissions in TPY from Units 1-4 from data collected from the CEMS during all operating modes minus baseline emissions of 4,700.4 TPY.

EF_{heater} = NO_X emission factor from AP-42, Table 1.4-1 (100 pound/10^6 standard cubic feet (lb/10^6 scf)).

NG_{HHV} = Natural gas higher heating value (HHV) in Btu/scf.

$Heater_{hours}$ = Rolling 12-month total of operating hours for each process heater (EU 051)

If necessary, the applicant is required to adjust the operation of the process heaters to comply with the NO_X emissions cap. The applicant is required to report the annual actual emissions obtained from the NO_X CEMS and calculate the emissions of NO_X for the process heaters for a period of five years to ensure NO_X emissions will not exceed the NO_X emission cap of 39.1 tons/year as well as the PSD significant emission rate of 40 tons/year.

3.3. Project Applicable Regulations

3.3.1. State Rules for the Process Heaters

The process heaters are subject to the applicable visible emissions limitation in accordance with Rule 62-296.406, F.A.C., Fossil Fuel Steam Generators with Less than 250 MMBtu/hour Heat Input, New and Existing Emission Units. The visible emission limitation will be used as BACT for PM and SO_2 pursuant to Rule 62-296.406(1)-(3), F.A.C.

The applicant estimated the total emission of PM for both process heaters to be 0.39 tons/year. The projected actual emissions were based on EPA AP-42, Chapter 1.4. Pursuant to Rule 62-296.700(2)(c), F.A.C., Reasonably Available Control Technology (RACT) PM, any emission unit which has a total allowable emissions of PM of less than one ton/year is exempt from the provisions of this rule.

3.3.2. NESHAP Provisions for the Process Heaters

The process heaters are subject to, and shall comply with, the applicable provisions in NESHAP Subpart A (General Provisions) and NESHAP Subpart DDDDD (Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters) of 40 CFR 63, which are identified in Appendix E and F of the permit.

4. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. No air quality modeling analysis is required because the project does not result in a significant increase in emissions. Tammy McWade is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting the project engineer by email at the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, by phone at (850) 717-9086 or by email at tammy.mcwade@dep.state.fl.us.