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BUREAU OF AIR REGULATION

September 5, 2003

Mr. Gregory DeAngelo
Florida Department of
Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, FL 32301

Re: Tampa Electric Company
Big Bend Station, Units 1-4
Application No. 0570039-013-AV
Request for Additional Information

Dear Mr. DeAngelo:

Tampa Electric Company (TEC) has received the Florida Department of Environmental Protection's (the Department's or FDEP) request for additional information (RAI), dated June 12, 2003, addressing TEC's Big Bend Station Title V permit revision application. The FDEP granted the extension on December 18, 2002 to allow the continued evaluation of the impact that coal residual combustion has on nitrogen oxides (NO_X) and carbon monoxide (CO) emissions.

This correspondence is intended to provide a response to each specific issue raised by the Department in the RAI. For your convenience, TEC has restated each point and provided a response below each specific issue.

FDEP Comment 1

Please submit a detailed history of when coal residual fuel was fired in each unit, such as a daily or (preferably) hourly "yes/no" summary for whether the coal residual was fired in each boiler.

TEC Response

Enclosed in Attachment A is the summary for whether the coal residual was fired in each boiler.

FDEP Comment 2

At a minimum, provide the date that the coal residual fuel was first blended into the fuel stream for each unit, and identify for each unit any significant time periods since that date during which no coal residual fuel was fired.

TEC Response

Coal residual was first blended into the fuel stream on January 30, 1998 for Big Bend Unit 1 through 3. Coal residual was first blended into the fuel stream of Big Bend Unit 4 on March 10, 2003.

Enclosed in Attachment B are the time periods in which no coal residual fuel was fired.

TEC appreciates the cooperation and consideration of the Department in this matter. If you have any questions, please contact Ms. Greer Briggs or me at (813) 641-5034.

Sincerely,

Greer Briggs for,

Laura R. Crouch
Manager - Air Programs
Environmental Affairs

EA/bmr/DNL186

Enclosure

cc: Mr. Scott Sheplak, FDEP
Mr. Jerry Kissel, FDEP-SW
Mr. Sterlin Woodard, EPCHC

FILE

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

CERTIFIED MAIL - Return Receipt Requested

August 29, 2002

Mr. Darryl Scott
General Manager
Big Bend Station
Tampa Electric Company
P.O. Box 111
Tampa, FL 33601-0111

RE: Request for Additional Information for Title V Permit Revision
Application No. 0570039-013-AV
Big Bend Station, Hillsborough County

Dear Mr. Scott:

The referenced permit application is incomplete. In order to continue processing this permit application, the Department will need the following additional information:

1. The NO_x and CO testing required by Specific Condition No. 4 (Permit No. 0570039-012-AC) has not been completed. According to the application, TEC does not anticipate the completion of the testing until October 2002. Because TEC has not provided reasonable assurance that the burning of coal residual will not cause a significant net emissions increase, processing of the permit revision application can not be completed until the required tests have been conducted, submitted, and reviewed by Department and/or EPC personnel.

2. On page 10 of the application, Facility Supplemental Information, a waiver was requested for items 2 through 5 (Facility Plot Plan, Process Flow Diagram(s), Precautions to Prevent Emissions of Unconfined Particulate Matter, and Fugitive Emissions Identification). The comment field states "Items 1. through 5. previously submitted – reference Big Bend Station initial Title V operation permit application." However, since the current revision application is to incorporate the handling and firing of coal residual, which includes the construction of a storage and handling building, items 2 through 5 should be resubmitted to include the new building and conveyor system(s).

3. The Control Equipment/Method Description on page 77 of the application, states that the "Building is enclosed on three sides with natural, draft ventilation provided for safety reasons." Are there any openings in the building besides the unenclosed fourth side? If so, please give a more detailed description of these openings, including type, size, number, and height from ground.

4. Please submit an Operation and Maintenance Plan for the coal residual fuel storage building and conveyors as specified in 62.296.700(6)(c).

5. In accordance with Rule 40 CFR 64.5 (a)(2), a CAM Plan must be submitted as part of an application for a significant permit revision. Please submit a CAM Plan for Boiler Units 1 through 4, or submit a justification for not doing so.

6. The conclusion to the submitted Corrective Action Plan states that TEC has installed low NO_x burners on Unit 1 and a neural network on Unit 2. When were these projects done, and under what authority?

Sincerely,

Cindy L. Phillips

Cindy L. Phillips, P.E.
Title V Section
Bureau of Air Regulation

c: Laura R. Crouch, TEC
Thomas W. Davis, P.E., ECT
Rob Kalch, EPCHC
Eric Peterson, SWD

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Cindy L. Phillips, P.E.
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Thomas W. Davis, P.E., ECT
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Eric Peterson, SWD

3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

3.4.1 General

The primary domestic use of large stationary diesel engines (greater than 600 horsepower [hp]) is in oil and gas exploration and production. These engines, in groups of 3 to 5, supply mechanical power to operate drilling (rotary table), mud pumping, and hoisting equipment, and may also operate pumps or auxiliary power generators. Another frequent application of large stationary diesels is electricity generation for both base and standby service. Smaller uses include irrigation, hoisting, and nuclear power plant emergency cooling water pump operation.

Dual-fuel engines were developed to obtain compression ignition performance and the economy of natural gas, using a minimum of 5 to 6 percent diesel fuel to ignite the natural gas. Large dual-fuel engines have been used almost exclusively for prime electric power generation. This section includes all dual-fuel engines.

3.4.2 Process Description

All reciprocating internal combustion (IC) engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 ignition methods used in stationary reciprocating IC engines, compression ignition (CI) and spark ignition (SI). In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder. Although all diesel- fueled engines are compression ignited and all gasoline- and gas-fueled engines are spark ignited, gas can be used in a CI engine if a small amount of diesel fuel is injected into the compressed gas/air mixture to burn any mixture ratio of gas and diesel oil (hence the name dual fuel), from 6 to 100 percent diesel oil.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.4.3 Emissions And Controls

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the atmosphere from the exhaust. Crankcase blowby is minor because TOCs are not present during compression of the charge. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels. In general, evaporative losses are also negligible in engines using gaseous fuels because these engines receive their fuel continuously from a pipe rather than via a fuel storage tank and fuel pump.

The primary pollutants from internal combustion engines are oxides of nitrogen (NO_x), hydrocarbons and other organic compounds, carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. The other pollutants, HC, CO, and smoke, are primarily the result of incomplete combustion. Ash and metallic additives in the fuel also contribute to the particulate content of the exhaust. Sulfur oxides also appear in the exhaust from IC engines. The sulfur compounds, mainly sulfur dioxide (SO_2), are directly related to the sulfur content of the fuel.[2]

3.4.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The predominant mechanism with internal combustion engines is thermal NO_x which arises from the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most thermal NO_x is formed in the high-temperature region of the flame from dissociated molecular nitrogen in the combustion air. Some NO_x, called prompt NO_x, is formed in the early part of the flame from reaction of nitrogen intermediary species, and HC radicals in the flame. The second mechanism, fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Gasoline, and most distillate oils, have no chemically-bound fuel N_2 and essentially all NO_x formed is thermal NO_x.

3.4.3.2 Total Organic Compounds -

The pollutants commonly classified as hydrocarbons are composed of a wide variety of organic compounds and are discharged into the atmosphere when some of the fuel remains unburned or is only partially burned during the combustion process. Most unburned hydrocarbon emissions result from fuel droplets that were transported or injected into the quench layer during combustion. This is the region immediately adjacent to the combustion chamber surfaces, where heat transfer outward through the cylinder walls causes the mixture temperatures to be too low to support combustion.

Partially burned hydrocarbons can occur because of poor air and fuel homogeneity due to incomplete mixing, before or during combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; excessively large fuel droplets (diesel engines); and low cylinder temperature due to excessive cooling (quenching) through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.[2]

3.4.3.3 Carbon Monoxide -

Carbon monoxide is a colorless, odorless, relatively inert gas formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to CO_2 cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the cylinder is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.[2-3]

3.4.3.4 Smoke, Particulate Matter, and PM-10 -

White, blue, and black smoke may be emitted from IC engines. Liquid particulates appear as white smoke in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines. The primary constituent of black smoke is agglomerated carbon particles (soot).[2]

3.4.3.5 Sulfur Oxides -

Sulfur oxide emissions are a function of only the sulfur content in the fuel rather than any combustion variables. In fact, during the combustion process, essentially all the sulfur in the fuel is oxidized to SO_2. The oxidation of SO_2 gives sulfur trioxide (SO_3), which reacts with water to give sulfuric acid (H_2SO_4), a contributor to acid precipitation. Sulfuric acid reacts with basic substances to give sulfates, which are fine particulates that contribute to PM-10 and visibility reduction. Sulfur oxide emissions also contribute to corrosion of the engine parts.[2,3]

Table 3.4-1 contains gaseous emission factors for the pollutants discussed above, expressed in units of pounds per horsepower-hour (lb/hp-hr), and pounds per million British thermal unit (lb/MMBtu). Table 3.4-2 shows the particulate and particle-sizing emission factors. Table 3.4-3 shows the speciated organic compound emission factors and Table 3.4-4 shows the emission factors for polycyclic aromatic hydrocarbons (PAH). These tables do not provide a complete speciated organic compound and PAH listing because they are based only on a single engine test; they are to be used only for rough order of magnitude comparisons.

Table 3.4-5 shows the NO_x reduction and fuel consumption penalties for diesel and dual-fueled engines based on some of the available control techniques. The emission reductions shown are those that have been demonstrated. The effectiveness of controls on a particular engine will depend on the specific design of each engine, and the effectiveness of each technique could vary considerably. Other NO_x control techniques exist but are not included in Table 3.4-5. These techniques include internal/external exhaust gas recirculation, combustion chamber modification, manifold air cooling, and turbocharging.

3.4.4 Control Technologies

Control measures to date are primarily directed at limiting NO_x and CO emissions since they are the primary pollutants from these engines. From a NO_x control viewpoint, the most important distinction between different engine models and types of reciprocating engines is whether they are rich-burn or lean-burn. Rich-burn engines have an air-to-fuel ratio operating range that is near stoichiometric or fuel-rich of stoichiometric and as a result the exhaust gas has little or no excess oxygen. A lean-burn engine has an air-to-fuel operating range that is fuel-lean of stoichiometric; therefore, the exhaust from these engines is characterized by medium to high levels of O_2. The most common NO_x control technique for diesel and dual fuel engines focuses on modifying the combustion process. However, selective catalytic reduction (SCR) and nonselective catalytic reduction (NSCR) which are post-combustion techniques are becoming available. Control for CO have been partly adapted from mobile sources.[5]

Combustion modifications include injection timing retard (ITR), preignition chamber combustion (PCC), air-to-fuel ratio, and derating. Injection of fuel into the cylinder of a CI engine initiates the combustion process. Retarding the timing of the diesel fuel injection causes the combustion process to occur later in the power stroke when the piston is in the downward motion and combustion chamber volume is increasing. By increasing the volume, the combustion temperature and pressure are lowered, thereby lowering NO_x formation. ITR reduces NO_x from all diesel engines; however, the effectiveness is specific to each engine model. The amount of NO_x reduction with ITR diminishes with increasing levels of retard.[5]

Improved swirl patterns promote thorough air and fuel mixing and may include a precombustion chamber (PCC). A PCC is an antechamber that ignites a fuel-rich mixture that propagates to the main combustion chamber. The high exit velocity from the PCC results in improved mixing and complete combustion of the lean air/fuel mixture which lowers combustion temperature, thereby reducing NO_x emissions.[5]

The air-to-fuel ratio for each cylinder can be adjusted by controlling the amount of fuel that enters each cylinder. At air-to-fuel ratios less than stoichiometric (fuel-rich), combustion occurs under conditions of insufficient oxygen which causes NO_x to decrease because of lower oxygen and lower temperatures. Derating involves restricting engine operation to lower than normal levels of power production for the given application. Derating reduces cylinder pressures and temperatures thereby lowering NO_x formation rates.[5]

SCR is an add-on NO_x control placed in the exhaust stream following the engine and involves injecting ammonia (NH_3) into the flue gas. The NH_3 reacts with the NO_x in the presence of a catalyst to form water and nitrogen. The effectiveness of SCR depends on fuel quality and engine duty cycle (load fluctuations). Contaminants in the fuel may poison or mask the catalyst surface causing a reduction or termination in catalyst activity. Load fluctuations can cause variations in exhaust temperature and NO_x concentration which can create problems with the effectiveness of the SCR system.[5]

NSCR is often referred to as a three-way conversion catalyst system because the catalyst reactor simultaneously reduces NO_x, CO, and HC and involves placing a catalyst in the exhaust stream of the engine. The reaction requires that the O_2 levels be kept low and that the engine be operated at fuel-rich air-to-fuel ratios.[5]

3.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the memoranda describing each supplement or the background report for this section.

Supplement A, February 1996

No changes.

Supplement B, October 1996

- The general text was updated.
- Controlled NO_x factors and PM factors were added for diesel units.
- Math errors were corrected in factors for CO from diesel units and for uncontrolled NO_x from dual fueled units.

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES[a]

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel[b] (SCC 2-02-004-02)		
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO_x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013[c]	1.9[c]	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO_x[d]	8.09 E-03S_1	1.01S_1	B	4.06 E-04S_1 + 9.57 E-03S_2	0.05S_1 + 0.895S_2	B
CO_2[e]	1.16	165	B	0.772	110	B
PM	0.0007[c]	0.1[c]	B	ND	ND	NA
TOC (as CH_4)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	f	f	E	3.97 E-03	0.6	E
Nonmethane	f	f	E	1.32 E-03	0.2[g]	E

[a] Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

[b] Dual fuel assumes 95% natural gas and 5% diesel fuel.

[c] References 8-26. Controlled NO_x is by ignition timing retard.

[d] Assumes that all sulfur in the fuel is converted to SO_2. S_1 = % sulfur in fuel oil; S_2 = % sulfur in natural gas. For example, if sulfer content is 1.5%, then S = 1.5.

[e] Assumes 100% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

[f] Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

[g] Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Filterable particulate[b]	
< 1 µm	0.0478
< 3 µm	0.0479
< 10 µm	0.0496
Total filterable particulate	0.0620
Condensable particulate	0.0077
Total PM-10[c]	0.0573
Total particulate[d]	0.0697

[a] Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter ≤ 10 micrometers (µm) aerometric diameter.

[b] Particle size is expressed as aerodynamic diameter.

[c] Total PM-10 is the sum of filterable particulate less than 10 µm aerodynamic diameter and condensable particulate.

[d] Total particulate is the sum of the total filterable particulate and condensable particulate.

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene[b]	7.76 E-04
Toluene[b]	2.81 E-04
Xylenes[b]	1.93 E-04
Propylene	2.79 E-03
Formaldehyde[b]	7.89 E-05
Acetaldehyde[b]	2.52 E-05
Acrolein[b]	7.88 E-06

[a]Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.
[b]Hazardous air pollutant listed in the *Clean Air Act.*

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene[b]	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,l)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

[a] Based on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.

Table 3.4-5. NO_x REDUCTION AND FUEL CONSUMPTION PENALTIES FOR LARGE STATIONARY DIESEL AND DUAL-FUEL ENGINES[a]

Control Approach		Diesel (SCC 2-02-004-01)		Dual Fuel (SCC 2-02-004-02)	
		NO_x Reduction (%)	ΔBSFC[b] (%)	NO_x Reduction (%)	ΔBSFC (%)
Derate	10%	ND	ND	<20	4
	20%	<20	4	ND	ND
	25%	5 - 23	1 - 5	1 - 33	1 - 7
Retard	2°	<20	4	<20	3
	4°	<40	4	<40	1
	8°	28 - 45	2 - 8	50 - 73	3 - 5
Air-to-fuel	3%	ND	ND	<20	0
	±10%	7 - 8	3	25 - 40	1 - 3
Water injection (H_2O/fuel ratio)	50%	25 - 35	2 - 4	ND	ND
SCR		80 - 95	0	80 - 95	0

[a] References 1,27-28. The reductions shown are typical and will vary depending on the engine and duty cycle. SCC = Source Classification Code. ΔBSFC = change in brake-specific fuel consumption. ND = no data.

References For Section 3.4

1. H. I. Lips, *et al.*, *Environmental Assessment Of Combustion Modification Controls For Stationary Internal Combustion Engines*, EPA-600/7-81-127, U. S. Environmental Protection Agency, Cincinnati, OH, July 1981.

2. *Standards Support And Environmental Impact Statement, Volume I: Stationary Internal Combustion Engines*, EPA-450/2-78-125a, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1979.

3. M. Hoggan, et. al., *Air Quality Trends in California's South Coast and Southeast Desert Air Basins, 1976-1990*, "Air Quality Management Plan, Appendix II-B", South Coast Air Quality Management District, July 1991.

4. *Limiting Net Greenhouse Gas Emissions In the United States, Volume II: Energy Responses*, report for the Office of Environmental Analysis, Office of Policy, Planning and Analysis, Department of Energy (DDE), DOE/PE-0101 Volume II, September 1991.

5. Snyder, R. B., *Alternative Control Techniques Document—NO_x Emissions from Stationary Reciprocating Internal Combustion Engines*, EPA-453/R-93-032, U. S. Environmental Protection Agency, Research Triangle Park, July 1993.

6. C. Castaldini, *Environmental Assessment Of NO_x Control On A Compression Ignition Large Bore Reciprocating Internal Combustion Engine, Volume I: Technical Results*, EPA-600/7-86/001a, U. S. Environmental Protection Agency, Cincinnati, OH, April 1984.

7. *Pooled Source Emission Test Report: Oil And Gas Production Combustion Sources, Fresno And Ventura Counties, California*, ENSR # 7230-007-700, Western States Petroleum Association, Bakersfield, CA, December 1990.

8. *Final Report For An Emission Compliance Test Program On Two Standby Generators Located At American Car Company*, Greenwich, CT, York Services Corp., 1987.

9. *Final Report For An Emission Compliance Test Program On A Standby Diesel Generator At South Central Connecticut Regional Water Authority*, West Haven, CT, York Services Corp., 1988.

10. *Air Emission From Stationary Diesel Engines For The Alaska Rural Electric Cooperative Association*, Environmetrics, 1992.

11. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator,* St. Mary's Hospital, Waterburg, CT, TRC Environmental Consultants, 1987.

12. *Compliance Measured Particulate Emissions From An Emergency Diesel Generator, Silorsky Aircraft, United Technologies*, Stratford, CT, TRC Environmental Consultants, 1987.

13. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, Colonial Gold Limited Partnership, Hartford, CT, TRC Environmental Consultants, 1988.

14. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, CIGNA Insurance Company, Bloomfield, CT, TRC Environmental Consultants, 1988.

15. *Compliance Test Report For Particulate Emission From A Waukesha Diesel Generator*, Bristol Meyers, Wallinsford, CT, TRC Environmental Consultants, 1987.

16. *Compliance Test Report For Particulate Emissions From A Cummins Diesel Generator*, Connecticut General Life Insurance, Windsor, CT, TRC Environmental Consultants, 1987.

17. *Compliance Measured Particulate Emissions From An Emergency Diesel Generator*, Danbury Hospital, Danbury, CT, TRC Environmental Consultants, 1988.

18. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator*, Colonial Metro Limited Partnership, Hartford, CT, TRC Environmental Consultants, 1988.

19. *Compliance Test Report For Particulate Emissions From A Caterpillar Diesel Generator*, Boehringer -Ingelheim Pharmaceuticals, Danbury, CT, TRC Environmental Consultants, 1988.

20. *Compliance Test Report For Emissions Of Particulate From An Emergency Diesel Generator*, Meriden - Wallingford Hospital, Meriden, CT, TRC Environmental Consultants, 1987.

21. *Compliance Test Report Johnson Memorial Hospital Emergency Generator Exhaust Stack*, Stafford Springs, CT, ROJAC Environmental Services, 1987.

22. *Compliance Test Report Union Carbide Corporation Generator Exhaust Stack*, Danbury, CT, ROJAC Environmental Services, 1988.

23. *Compliance Test Report Hartford Insurance Company Emergency Generator Exhaust Stack*, Bloomfield, CT, ROJAC Environmental Services, 1987.

24. *Compliance Test Report Hartford Insurance Group Emergency Generator Exhaust Stack*, Hartford, CT, ROJAC Environmental Services, 1987.

25. *Compliance Test Report Southern New England Telephone Company Emergency Generator Exhaust Stack*, North Haven, CT, ROJAC Environmental Services, 1988.

26. *Compliance Test Report Pfizer, Inc. Two Emergency Generator Exhaust Stacks*, Groton, CT, ROJAC Environmental Services, 1987.

27. L. M. Campbell, *et al.*, *Sourcebook: NO_x Control Technology Data, Control Technology Center*, EPA-600/2-91-029, U. S. Environmental Protection Agency, Cincinnati, OH, July 1991.

28. *Catalysts For Air Pollution Control*, Manufacturers Of Emission Controls Association (MECA), Washington, DC, March 1992.

August 26, 2002

Ms. Cindy Phillips, P.E.
Department of Environmental Protection, Bureau of Air Regulation
2600 Blair Stone Road
Mail Station 5505
Tallahassee, FL 32399-2400

Re: Hillsborough County - AP
DEP File No. 0570039-013-AV

Dear Ms. Phillips:

Thank you for forwarding a copy of the Draft Title V Air Operation Permit Revision Application for TEC Big Bend to EPC staff for review. After reviewing the application, EPC staff offers the following comments for your consideration:

1. The NO_x and CO testing required by Specific Condition No. 4 (Permit No. 0570039-012-AC) has not been completed. According to the application, TEC does not anticipate the completion of the testing until October 2002. (See Page Nos. 26, 42, 58, and 74 of the application). Because TEC has not provided reasonable assurance that the burning of the material will not cause a significant net emissions increase, EPC staff believes the permit revision should be held incomplete until the required tests have been conducted, submitted, and reviewed by Department and/or EPC personnel. [Rule 62-4.070, F.A.C.]

2. On Page No. 10, Fields 1 through 6 (Area Map Showing Facility Location, Facility Plot Plan, Process Flow Diagram(s), Precautions to Prevent Emissions of Unconfined Particulate Matter, Fugitive Emissions Identification, and Supplemental Information for Construction Permit Application) a waiver was requested. A note at the bottom of the page referenced the Initial Title V Operation Permit Application as the reason for not resubmitting the information. The current revision application is to incorporate the handling and firing of residual fuel, which also includes the construction of a storage and handling building. Therefore, Fields 2, 3,

4, and

5 (Facility Plot Plan, Process Flow Diagram(s), Precautions to Prevent Emissions of Unconfined Particulate Matter, and Fugitive Emissions Identification) should be resubmitted to include the new building and conveyor systems(s). Additionally, the changes that are currently being made in accordance with the Consent Decree and Consent Final Judgement need to be reflected in the supplemental information. [Rule 62-4.070, F.A.C.]

3. On Page No. 11, Fields 8, 9, 10, 11, and 12 (List of Proposed Insignificant Activities, List of Equipment/Activities Regulated under Title VI, Alternative Methods of Operation, Alternative Modes of Operation (Emissions Trading), and Identification of Additional Applicable Requirements) were left blank. A note at the bottom of the page referenced the Initial Title V Operation Permit Application as the reason for not resubmitting the information. Although this information is not critical for the processing of the Title V Revision, please request that TEC personnel complete these fields in order to ensure that no changes or modifications have occurred to these activities that would change their status.

4. On Page Nos. 13, 29, 45, and 61, Emissions Unit Details, Field No. 1 (Package Unit, Manufacturer, Model Number) was left blank. Although these are not critical for the processing of the Title V Revision, please request that TEC personnel complete these fields in order to ensure that the emission units have not been modified.

5. Page Nos. 15, 31, 47, and 63, Emissions Unit Regulations, were left blank. A note at the bottom of the page referenced the initial Title V Operation Permit Application. Although these are not critical for the processing of the Title V Revision, please request that TEC personnel complete these fields.

6. Page Nos. 22, 24, 25, 38, 40, 41, 54, 56, 57, 70, 72, and 73, Emissions Unit Pollutant Detail Information, Visible Emissions Information, and Continuous Monitor Information (Sections G, H, and I), were left blank. A note referenced the Initial Title V Operation Permit Application as the reason for not resubmitting the information. However, Rule 62-213.420(1)(b)(a), F.A.C. requires the submission of information concerning fugitive and stack emissions. Please request TEC personnel complete these fields.

7. Page Nos. 27, 43, 59, and 75, Additional Supplemental Requirements for Title V Air Operation Permit Applications, Fields 11, 13, and 15 (Alternative Methods of Operation, Identification of Additional Applicable Requirements, and

Acid Rain Part Application) were left blank. A note at the bottom of the page referenced the Initial Title V Operation Permit Application. Although these are not critical for the processing of the Title V Revision, please request that TEC personnel complete these fields.

8. On Page No. 77, Emissions Unit Control Equipment, Field No. 1 contains a description of the storage building for the residual coal. Please have TEC personnel revise the description to include a better quantitative description of the openings in the building. [Rule 62-4.070, F.A.C.]

9. On Page Nos. 79, 84, 91, and 96, Emissions Unit Regulations and Visible Emissions Information, Rule 62-297.620(4), F.A.C. is referenced. Please note, Rule 62-297.620(4) addresses those emissions units which have a baghouse for a control device. It allows the waiver of a particulate matter test in lieu of an opacity standard of less than 5%. The building has no baghouse or control device. Therefore, the rule cite is not appropriate. Although the particulate matter emissions are not declared, EPC staff believes Rule 62-296.711, F.A.C. is appropriate. Additionally, please request TEC personnel complete Section G, Emissions Unit Pollutant Detail Information, (Page Nos. 83 and 95) for Emissions Unit Nos. 037 and 038. [Rules 62-4.070, and 62-296.711, and DEP Form 62-210.900(1), F.A.C.]

10. On Pages 86 and 98, Emissions Unit Supplemental Information, Field No. 5, Compliance Test Report, should be filled out. EPC staff is aware the NO_x and CO testing is not yet completed; however field no. 5 should be filled out. [DEP Form 62-210.900(1), F.A.C.]

11. On Pages 86 and 98, Emissions Unit Supplemental Information, Field No. 7 (Operation and Maintenance Plan) indicates an Operation and Maintenance Plan (O&M) is not applicable. EPC staff believes the Operation and Maintenance Plan should include the storage building and any activities conducted within the storage building. [Rules 62-296.700 and 62-4.070, F.A.C.]

12. Appendix DOC.II.C.14 and DOC.II.C.15 is unsigned. Please request that TEC personnel submit a signed copy of DEP Form 62-213.900(7), F.A.C.

13. EPC staff noted the application did not contain a CAM Plan for Units 1 through 4. Because these units are considered to be "Large Pollutant-Specific Emissions Units", a CAM Plan should be submitted as part of an application for a significant permit revision in accordance with Rule 40 CFR

64.5(a)(2).

Thanks again for the opportunity to provide comments. If you have any questions, please feel free to contact Rob Kalch at (813) 272-5530.

Sincerely,

Sterlin Woodard, P.E.
Assistant Director

rsk

cc: Darryl Scott, TEC
Dru Latchman, TEC, Air Programs, Environmental Affairs

September 24, 2004

Mr. Cindy Phillips, P.E.
Florida Department of Environmental Protection
Division of Air Resource Management
111 South Magnolia, Suite 4
Tallahassee, FL 32301

Re: Tampa Electric Company
Big Bend Station
Title V Air Operation Permit Renewal
Request of Additional Information
Permit No. 0570039-013-AV

Dear Ms. Phillips:

Tampa Electric Company (TEC) has received and reviewed the questions addressing the Title V Air Operation Permit Renewal application to allow for the continuing operation of Big Bend Station. This correspondence is intended to provide the responses to each question raised by the Florida Department of Environmental Protection (FDEP).

FDEP Question 1

The Application Comment on page 2 states that the listed emissions units are no longer in operation.

a) **Is there going to be no abrasive blasting at the facility anymore, or just no abrasive blasting in the abrasive blasting booth? If there is still going to be abrasive blasting at the facility, where will it be done, and how will it be confined to reduce emissions of particulate matter?**

b) **Has the Abrasive Blasting Media Storage building been removed from the facility? If not, is it going to be used for any purpose?**

c) **On the basis of your request, all methods of ship surface coating will be prohibited in the Title V permit renewal. Is this what you are actually requesting? Because of the USEPA policy of "Once in, always in", Big Bend can not surface coat ships as an "insignificant" activity.**

TEC Response 1

After a thorough discussion concerning E.U. ID 032 Surface coating of miscellaneous metal parts, E.U. ID 033 Abrasive Blast Booth with baghouse, E.U. ID 034 Abrasive Blast Media Storage with baghouse, and E.U. ID 035 Surface coating of ships, TEC has decided to keep these units within the Title V Air Operation Permit. Please disregard the request to have these emission unit ids deleted from the permit.

FDEP Question 2

On page 11 of the application, the pollutant PB (lead) is given the classification of "B" (Facility-regulated pollutant, not major or synthetic minor.) The major source threshold for lead is 5 tons per year. However, the year 2000 Annual Operating Report (AOR) that was submitted for Big Bend stated that actual emissions of lead were 30 tons per year. Have potential facility-wide lead emissions actually been reduced to below 5 tons per year? Please explain.

TEC Response 2

Each year, TEC reviews and updates the AOR calculations to make the emissions more accurate and plant specific. In 2000, as a result of the additional Hazardous Air Pollutants (HAPs) reporting, TEC made many updates to the emission factors used to calculate emissions. The emission factor for lead was updated on the internal calculation tables used for the Big Bend AOR, but was not updated consistently on the Electronic Annual Operating Report (EAOR) for the 2000 reporting year. This is the reason why the lead emissions for the 2000 AOR state they were approximately 30 tons per year for Big Bend Units 1-4, when it should be approximately 1 ton per year. The 2000 AOR shows a lead emission factor of 0.133 lb/ton of coal combusted, which is not accurate or specific to BB Units 1-4 (SCC 1-01-002-01 & 1-01-002-12). The controlled (ESP + Scrubber) lead emission factor of 0.00042 lb/ton of coal combusted used in both the Title V Renewal application and the 2000-2003 AOR calculation tables have been from AP-42 Table 1.1-18 (9/98). The Maximum Big Bend Station fuel yard throughout rate is 6,228,030 tons/year based on a prior study of fuel yard particulate matter emissions. Using the AP-42 factor and this conservative fuel throughput rate, possible lead emissions from coal combustion are 1.3 tons per year (tpy). Accordingly, the 2000 AOR estimate will be re-submitted to FDEP with the correct lead emissions as stated below.

BIG BEND STATION PB EMISSIONS
2000

BIG BEND FUEL TYPES	SCC Code	Unit 1 (tons)	Unit 2 (tons)	Unit 3 (tons)	Unit 4 (tons)	TOTAL (tons)
Coal	1-01-002-01	6.92	7.55	6.81	9.38	30.66

BIG BEND STATION PB EMISSIONS - Corrected
2000

BIG BEND FUEL TYPES	SCC Code	Unit 1 (tons)	Unit 2 (tons)	Unit 3 (tons)	Unit 4 (tons)	TOTAL (tons)
Coal	1-01-002-01	0.22	0.24	0.22	0.30	0.97

FDEP Question 3

Item No. 15 on the requested List of Insignificant Activities (see application attachment II.D.5) lists "Fuel oil processing/treating equipment". Please explain what this is.

TEC Response 3

This activity refers to miscellaneous fuel oil equipment that performs physical treatment such as filtration, water separation, etc. Fugitive VOC emissions from low volatility fuel oil equipment leaks will be negligible.

FDEP Question 4

Engineers at EPC also reviewed the renewal application. They told me that they did not get the same PM emissions as you did for 008-Fly Ash Silo No. 1 Baghouse, and 009-Fly Ash Silo No. 2 Baghouse, on Pages EU-008-8 and EU-009-8, respectively. Using the Maximum Dry Standard Flow Rate of 11,470 dscfm in Section 11 of Pages EU-008-4 and EU-009-4, and the Allowable Emissions and Units of 0.03 grains/dscf in Section 3 of Pages EU-008-8 and EU-009-8, they got an Equivalent Allowable Emissions of 2.95 lb/hr or 12.92 tons/year as follows:

11,470 dscfm x 0.03 grains/dscf x 60 min/hr x 1 lb/7,000 grains = 2.95 lb/hr or 12.92 tons/year

However, in Section 4 on Pages EU-008-8 and EU-009-8, the Equivalent Allowable Emissions is given as 5.16 lb/hr or 22.62 tons/year. Why are TEC's numbers higher?

TEC Response 4

The renewal application particulate matter (PM) emission rates for E.U. ID 008 and E.U. ID 009 (5.16 lb/hr and 22.62 tpy) were taken from the current Title V permit; see Condition D.5. of the Title V Air Operation Permit No. 0570039-013-AV. Consistent with the source of this data, Emission Method Code "0" (allowable emissions) was shown in the renewal application. The fly ash silo exhaust flow rate data shown in the renewal application was erroneously taken from the original 1996 application, which was subsequently revised. As stated in Condition D.5., the maximum dry standard flow rate for Fly Ash Silos 1 and 2 is 20,081 dscfm instead of the 11,470 dscfm shown in the renewal application. Use of the correct exhaust flow rate results in the permit PM limits of 5.16 lb/hr and 22.62 tpy.

TEC appreciates the cooperation and consideration of the Department in this requested Title V permit renewal application for Big Bend Station. If you have any questions or comments pertaining to this request, please direct them to Raiza Calderon at (813) 228-4369.

Sincerely,

(No Electronic Signature Available)
Raiza Calderon for

Laura R. Crouch
Manager - Air Programs
Environmental, Health and Safety

c/enc: Mr. Al Linero, FDEP
Mr. Jerry Kissel, FDEP SW District
Mr. Jerry Campbell – EPCHC

EA/bmr/RC193

Enclosure