



TAMPA ELECTRIC

February 28, 2006

Mr. Bruce Mitchell  
Florida Department of  
Environmental Protection  
Division of Air Resource Management  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

Via FedEx  
Airbill No. 7913 8948 8039

RECEIVED

MAR 02 2006

Re: **Tampa Electric Company  
Polk Power Station Unit 1  
100% Petcoke Test Burn Request  
Permit No. 1050233-016-AV  
AIRS #1050233, EU ID #001**

BUREAU OF AIR REGULATION

Dear Mr. Mitchell:

Tampa Electric Company (TEC) has received your letter of incompleteness dated July 23, 2004 addressing the proposed request to conduct a test burn at Polk Power Station (PPS) Unit 1 under the authority of the current Title V Air Operation Permit No. 1050233-016-AV. The test burn would be conducted to test the feasibility of firing syngas produced from the gasification of up to 100% petcoke fuel (with a flux) at a maximum sulfur content of 6 percent by weight.. This correspondence is intended to provide the responses to each question raised by the Florida Department of Environmental Protection (FDEP).

**FDEP Question 1**

**Since the request will affect a Title V facility, please have the response signed by the Responsible Official.**

**TEC Response 1**

The Air Construction Application enclosed as Attachment 1 is signed by Mark Hornick, the Responsible Official of Polk Power Station.

**FDEP Question 2**

**All of the technical information in the request must be sealed by a Professional Engineer registered in Florida, and that person will also be required to oversee the technical aspects of the proposed project and the performance tests.**

**TEC Response 2**

The Air Construction Application enclosed as Attachment 1 is sealed by Tom Davis, a Professional Engineer registered in Florida. Mr. Davis will oversee the technical aspects of the proposed project and performance tests.

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**FDEP Question 3**

**Because of the PSD concerns in the change in potential emissions, simultaneous performance tests will have to be conducted on the sulfuric acid plant while testing Unit 1 for both the baseline test and the 100% petcoke test.**

**TEC Response 3**

TEC will conduct simultaneous performance tests on the sulfuric acid plant while testing Unit 1 for both the baseline test and the petcoke test as suggested by the FDEP.

**FDEP Question 4**

**For Unit 1, please provide the proposed testing methods that will be conducted and the pollutants (should include all of the criteria pollutants, with any exceptions explained away) to be tested for at the baseline level and at 100% petcoke. In addition, provide a sketch showing the locations where testing will occur.**

**TEC Response 4**

As you are aware, TEC received authorization from the FDEP to conduct performance tests while firing syngas produced from a maximum of 70 percent (% by weight) petcoke and coal blends on December 13, 1999. The nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub>) pollutant emissions from these performance tests were used to request a permit modification to combust syngas produced from a fuel blend containing no greater than 60% petcoke and 40% coal, which was authorized on November 17, 2000 through the Air Construction Permit No. 1050233-004-AC/PSD-FL-194E. Similar to the past petcoke/coal fuel blend test burns, TEC proposes to conduct the performance tests in the Test Burn Scenario (Table 1) below and evaluate NO<sub>x</sub>, SO<sub>2</sub>, and H<sub>2</sub>SO<sub>4</sub> emissions as a result of firing syngas produced from the gasification of up to 100% petcoke fuel (with a flux).

**Table 1. Performance Test Burn Scenarios**

<b>TEST</b>	<b>SULFUR%</b>	<b>PETCOKE%</b>
Baseline Test - 10 Days	3.0 -3.5	55 - 60
Test 1 - 28 days	3.5 - 6	65 - 75
Test 2 - 28 days	4 - 6	75 - 85
Test 3 - 28 days	4 - 6	85 - 95
Test 4 - 28 Days	4 - 6	95 - 100

The syngas generated from the baseline coal/petcoke blend and supplied to the combustion turbine (CT) will be comparable to the syngas generated from up to 100% petcoke gasification. Stack testing of particulate matter (PM), volatile organic compounds (VOC), carbon monoxide (CO), and lead (Pb) is not considered necessary for the following reasons:

### **1.0 PARTICULATE MATTER (PM)**

The ash content of petcoke is significantly lower than the baseline coal; approximately zero to one weight percent for petcoke compared to five to fifteen for baseline coal. Accordingly, PM loading to the gasification process with up to 100% petcoke will be at a maximum around 30 times lower compared to baseline coal. This significantly lower PM loading provides reasonable assurance that there will not be a significant increase in PM emissions from Unit 1 as a result of combusting syngas derived from up to 100% petcoke. Fuel samples of baseline coal, petcoke, and syngas will be taken during the test burn and analyzed to confirm their ash contents.

### **2.0 VOLATILE ORGANIC COMPOUNDS (VOC) AND CARBON MONOXIDE (CO)**

Because emissions of CO and VOC from Unit 1 depend primarily on combustion conditions (i.e., extent of incomplete combustion) rather than fuel characteristics, no significant change in VOC or CO emissions would be expected in combusting syngas derived from up to 100% petcoke. Combustion turbines, such as Unit 1, operate with very high levels of excess air resulting in low levels of CO and VOC. Unit 1 will continue to operate at high excess air rates while combusting syngas derived from up to 100% petcoke with essentially no change in VOC or CO emissions.

### **3.0 LEAD (Pb)**

The Pb content of petcoke is approximately one order of magnitude lower than baseline coal. Accordingly, no increase in Pb emissions would be expected from Unit 1 while combusting syngas derived from up to 100% petcoke. Fuel samples of baseline coal, petcoke, and syngas will be taken during the test burn and analyzed to confirm their Pb contents.

### **TESTING/MONITORING METHODS**

The NO<sub>x</sub>, SO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub> performance test burn data will be collected and analyzed using the methodologies found in Table 2. Continuous emissions monitors (CEMs), located in the Polk Unit 1 CT stack, will be used to collect representative data for NO<sub>x</sub> and SO<sub>2</sub> emissions during the test burn. CEMs will be quality assured pursuant to 40 CFR 75, Appendix B. The data assessment report from 40 CFR 60, Appendix F, for the most recent relative accuracy test audit (RATA) and most recent cylinder gas audit (CGA), will be submitted with the test burn report. H<sub>2</sub>SO<sub>4</sub> sampling and analysis will be performed in accordance with USEPA Reference Method 8 "Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources" (40 CFR Part 60, Appendix A), Method 8A "Determination of Sulfuric Acid Vapor or Mist and Sulfur Dioxide Emissions from Draft Recovery Furnaces", Method 8B "Determination of Sulfur Oxides including Sulfur Dioxide, Sulfur Trioxide, and Sulfuric Acid Vapor and Mist from Stationary Sources using a Controlled Condensation Sampling Apparatus", or Method 320

“Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy” (40 CFR Part 63, Appendix A).

**Table 2. Summary of Testing/Monitoring Methodology to be Used During the Test Burns.**

Test	SO <sub>2</sub>	NO <sub>x</sub>	H <sub>2</sub> SO <sub>4</sub>
Baseline Test - 10 Days	CEM Data <sup>1</sup>	CEM Data <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 1 - 28 days	CEM Data <sup>1</sup>	CEM Data <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 2 - 28 days	CEM Data <sup>1</sup>	CEM Data <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 3 - 28 days	CEM Data <sup>1</sup>	CEM Data <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 4 - 28 Days	CEM Data <sup>1</sup>	CEM Data <sup>1</sup>	Approved Test Method <sup>2</sup>

<sup>1</sup>Equivalent CEM data will be used in lieu of stack test data.

<sup>2</sup>Sulfuric Acid Mist sampling and analysis will be performed in accordance with USEPA Reference Method 8, 8A, 8B, or 320.

#### TIME PERIOD FOR PROCESS ACCLIMATION

The baseline test burn will evaluate NO<sub>x</sub>, SO<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub> emissions as a result of firing syngas produced from the gasification of a petcoke and coal fuel blend consisting of up to 60% petcoke. This baseline test will last for up to ten days to facilitate collection of representative data. It takes 3 days from the moment the fuel blend is entered into the gasifier before the process acclimates completely. Then the rest of the 10 day time period will be needed to complete simultaneously a set of testing at the Polk Unit 1 stack and Sulfuric Acid Plant (SAP) stack

The performance tests in Table 1 above will evaluate NO<sub>x</sub>, SO<sub>2</sub>, and H<sub>2</sub>SO<sub>4</sub> emissions as a result of firing syngas produced from the gasification of up to 100% petcoke fuel (with a flux). TEC requests authorization to conduct the comparison test burn for a period of up to 28-days. This window will provide TEC the necessary amount of time to evaluate the impacts of the material on the fuel handling systems and other associated process equipment as well as evaluate the effects, if any, of firing syngas produced from the gasification of a higher petcoke blend and other currently permitted fuels. In addition, syngas fuel analysis must be retrieved and analyzed. For these reasons, these test burns will last for up to 28 days in order to facilitate collection of representative data.

TEC will use approximately 65,100 tons of fuel stock for each test burn scenario. Any residual fuel stock that is on hand after the test burn will be consumed immediately after the test burn is completed. TEC will make every effort to limit the amount of fuel needed.

A sketch showing the locations where testing will occur for Polk Unit 1 has been provided as Attachment 2.

**FDEP Question 5**

**Referencing Issue #4, above, provide the same information for the sulfuric acid plant.**

**TEC Response 5**

For the SAP, TEC proposes to conduct the performance tests in the Table 1 Performance Test Burn Scenario above and evaluate SO<sub>2</sub>, and H<sub>2</sub>SO<sub>4</sub> emissions as a result of firing syngas produced from the gasification of up to 100% petcoke fuel (with a flux).

**1.0 NITROGEN OXIDES (NO<sub>x</sub>)**

The SAP process involves the combustion of gases containing H<sub>2</sub>S. The combustion process will generate thermal NO<sub>x</sub> (as do all combustion process). However, the combustion chamber temperature is not expected to change as a result of increased petcoke gasification, therefore no significant changes in thermal NO<sub>x</sub> would be expected.

**2.0 VOLATILE ORGANIC COMPOUNDS (VOC) AND CARBON MONOXIDE (CO)**

The inlet H<sub>2</sub>S stream has extremely low concentrations of CO and organic compounds, which would also result in low CO and VOC emissions. This is not expected to change with higher petcoke in the fuel. CO/VOC is a function of combustion conditions (i.e., extent of incomplete combustion) rather than fuel characteristics; no significant change in VOC or CO emissions would be expected in combusting syngas derived from up to 100% petcoke.

**3.0 PARTICULATE MATTER (PM) AND LEAD (Pb)**

As previously stated under the Polk Unit 1 section above, it is logical to assume that the other criteria pollutants including PM and Pb will not be affected by the increase of petcoke gasification.

Therefore, TEC does not plan on testing NO<sub>x</sub>, CO, VOC, PM, or Pb.

**TESTING/MONITORING METHODS**

The SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> performance test burn data will be collected and analyzed using the methodologies found in Table 3. Prior to blending, fuel testing will be conducted on the standard fuel blend. Sampling and analyzing for SO<sub>2</sub> will be performed in accordance with USEPA Reference Method 6C "Determination of Sulfur Dioxide Emissions From Stationary Sources (Instrumental Analyzer Procedure)" (40 CFR Part 60, Appendix A), while and H<sub>2</sub>SO<sub>4</sub> will be performed in accordance with USEPA Reference Method 8 "Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources" (40 CFR Part 60, Appendix A), Method 8A "Determination of Sulfuric Acid Vapor or Mist and Sulfur Dioxide Emissions from

Draft Recovery Furnaces”, Method 8B “Determination of Sulfur Oxides including Sulfur Dioxide, Sulfur Trioxide, and Sulfuric Acid Vapor and Mist from Stationary Sources using a Controlled Condensation Sampling Apparatus”, or Method 320 “Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy” (40 CFR Part 63, Appendix A).

**Table 3. Summary of Testing/Monitoring Methodology to be Used During the Test Burns.**

Test	SO <sub>2</sub>	H <sub>2</sub> SO <sub>4</sub>
Baseline Test - 10 Days	EPA Test Method 6C <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 1 - 28 days	EPA Test Method 6C <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 2 - 28 days	EPA Test Method 6C <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 3 - 28 days	EPA Test Method 6C <sup>1</sup>	Approved Test Method <sup>2</sup>
Test 4 - 28 Days	EPA Test Method 6C <sup>1</sup>	Approved Test Method <sup>2</sup>

<sup>1</sup> Sulfur Dioxide sampling and analysis will be performed in accordance with USEPA Reference Method 6C

<sup>2</sup> Sulfuric Acid Mist sampling and analysis will be performed in accordance with USEPA Reference Method 8, 8A, 8B, or 320.

TEC has provided as Attachment 3 a sketch showing the locations where testing will occur for the SAP.

Upon completion of all testing, TEC will compile test results in a report to be submitted to the FDEP within 60 days of completion of the test burn.

TEC appreciates the Department’s cooperation and consideration in this matter. If you have any questions or comments pertaining to this request, please direct them to Raiza Calderon at (813) 228-4369.

Sincerely,



Byron Burrows, P.E. BCEE  
Manager - Air Programs  
Environmental, Health, and Safety

EA/tik/RC210

c/enc: Mr. Jerry Kissel, FDEP SW District