TECO
TAMPA ELECTRIC

January 10, 2011

Mr. Scott M. Sheplak, P.E.
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, FL 32301

Via FedEx
Airbill No. 7943 0511 0371

Re: Tampa Electric Company
Polk Power Station
Permit # 1050233-026-AV
Sulfuric Acid Mist Emissions Monitor Report
Facility ID No: 1050233

Dear Mr. Sheplak:

Polk Power Station's construction permit #1050233-021-AC permitting the facility to increase the petroleum coke to coal blend ratio. The Florida Department of Environmental Protection requested the submittal of a report detailing the options for continuous SAM emissions monitoring. This report fulfills condition C.20(a) of permit 1050233-026-AV. Although the submittal of this report is later than indicated in condition C.20(b) of 1050233-26-AV, due to the relative timing of commercially available technology, Polk feels it is able to better submit a more thorough and complete analysis of the options for continuous SAM emissions monitoring.

Please contact myself or Julie Ward at 813-228-4740 if you have any questions.

Sincerely,

Byron T. Burrows
Manager – Air Programs
Environmental, Health, & Safety

EHS/rlk/JMW267

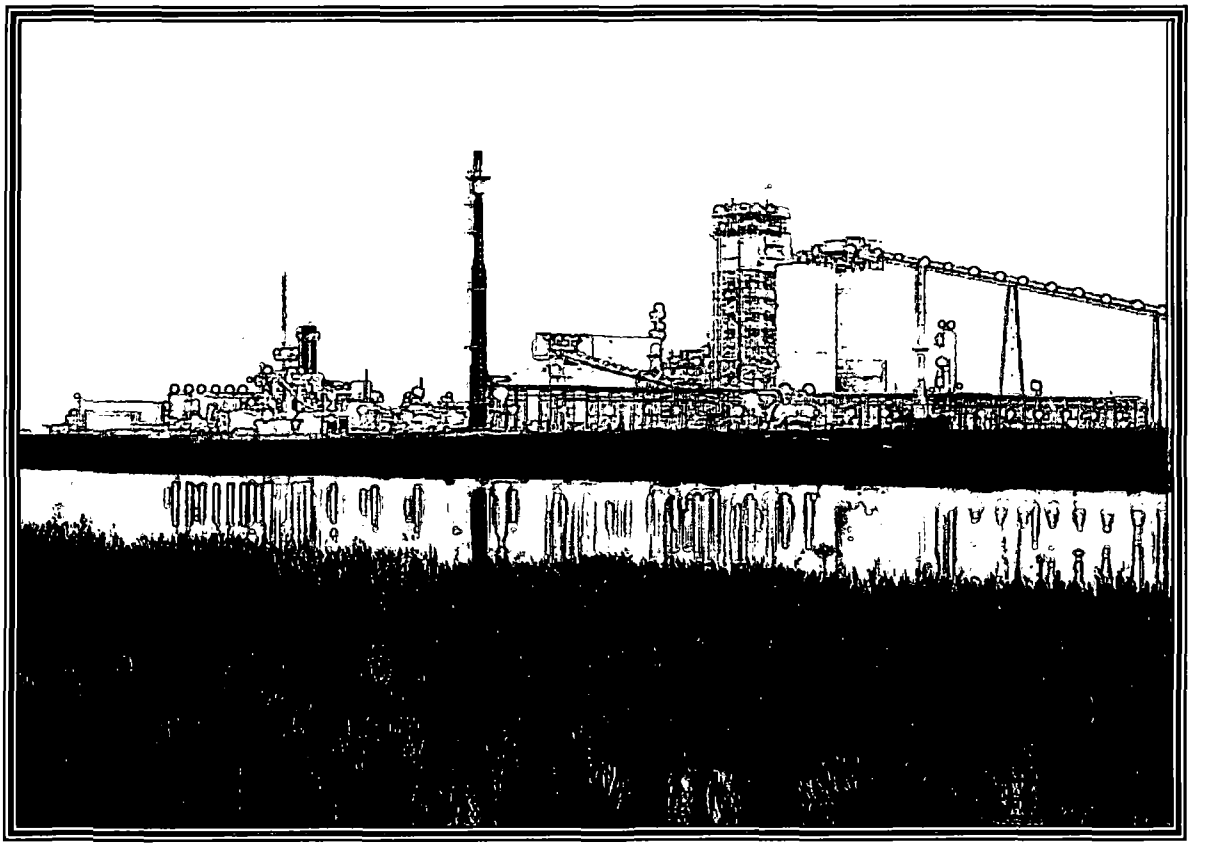
Enclosure

cc: Jonathan Holtom, FDEP
Bill Schroeder, FDEP

TAMPA ELECTRIC COMPANY

SULFURIC ACID MIST EMISSIONS MONITOR REPORT

SULFURIC ACID PLANT
POLK POWER STATION



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1.0 Introduction

Polk Power Station (Polk) received the construction permit #1050233-021-AC/PSD-FL-194H allowing the facility to increase the petroleum coke (petcoke) to coal blend ratio that is allowed to be gasified at the facility from 60%/40% to 85%/15%. With this change, the allowable sulfur content, of blended fuel was also increased from 3.5% to 4.7% sulfur by weight. The Florida Department of Environmental Protection added several monitoring and reporting changes due to the increase of sulfur content and the potential to increase Polk's annual sulfuric acid mist (SAM) emissions beyond the significant increase threshold as defined by Prevention of Significant Deterioration (PSD). In addition to conducting semi-annual SAM stack testing on Emission Unit (E.U.) 001, another requirement of the construction permit was for Polk to submit a report detailing the potential options for continuous SAM emissions monitoring. In 2010, Polk renewed its Title-V operating permit (1050233-026-AV), during which construction permit 1050233-021-AC/PSD-FL-194H was incorporated into the Title-V permit; this report fulfills condition C.20(a) of permit 1050233-026-AV.

2.0 Criteria

Certain criteria must be met in order for the use of a CEMS to demonstrate emission compliance. Among the top needs are for the CEMS to be accurate, reliable, durable, able to operate independent for long periods of time, and auditable.

EPA Guidance

A continuous emission monitoring system (CEMS) is the total equipment necessary for the determination of a gas or particulate matter concentration or emission rate using pollutant analyzer measurements and a conversion equation, graph, or computer program to produce results in units of the applicable emission limitation or standard. CEMS are required under some of the EPA regulations for either continual compliance determination or determination of exceedances of the standards. The individual subparts of the EPA rules specify the reference methods that are used to substantiate the accuracy and precision of the CEMS.

Performance specifications are used for evaluating the acceptability of the CEMS at the time of or soon after installation and whenever specified in the regulations. Quality assurance procedures in 40 CFR Part 60 Appendix F are used to evaluate the effectiveness of quality control (QC) and quality assurance (QA) procedures and the quality of data produced by any CEMS that is used for determining compliance with the emission standards on a continuous basis as specified in the applicable regulation.

Polk Application

The goal of this report is to determine if a continuous SO_3 measurement system that delivers acceptable performance in a package that is easy to use and is appropriate for a power generation facility and is available for utilization at Polk. Measuring the SO_3/SAM is only one element of a feasible SAM CEMS. Adequate detection limits and measurement accuracy are critical considerations. The extraction and sample conditioning/handling characteristics are also critical as accurate SAM measurement is dependent upon temperature, pressure and moisture content. The system needs to be as simple as possible in order to be reliable in the field and provide data on a continuous basis.

Furthermore, as required by 40 CFR 60 Appendix F, audit calibration gases must be available to determine the CEMS accuracy and to provide reasonable assurance of compliance. . This is conducted by challenging the monitor at multiple audit points for a sufficient period of time to assure adsorption-desorption of the CEMS sample transport surfaces has stabilized.

The EPA also requires that audit gases used must have been certified by comparison to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRM's) or NBS/EPA approved gas manufacturer's Certified Reference Materials (CRM's)[1] following EPA Traceability Protocol No. 1. As an alternative to Protocol No. 1 audit gases, CRM's may be used directly as audit gases. A list of gas manufacturers that have prepared approved CRM's is available from EPA at the address shown in the footnote. Procedures for preparation of CRM's are also described, and procedures for preparation of EPA Traceability Protocol 1 materials.

The difference between the actual concentration of the audit gas and the concentration indicated by the monitor is used to assess the accuracy of the CEMS. To date, Tampa Electric Company (TEC) was unable to find any commercial use or application of audit gas (SO_3) as defined above by EPA.

3.0 Current Technology

[1] **40 CFR 60.13 - Monitoring requirements.**

Code of Federal Regulations - Title 40: Protection of Environment
http://cfr.vlex.com/vid/60-13-monitoring-requirements-19790461#ixzz1AdrbwoSX

Currently technology is being further developed to continuously monitor sulfuric acid mist emissions in the field. In this section we will briefly outline technology that has shown the most potential in TEC's review of the available monitors.

Acid Dew Point Temperature Monitor

An Acid Dew Point Temperature monitor is manufactured by Land Instruments. This instrument utilizes the conductivity of sulfuric acid to determine acid concentration in the effluent gas. The instrument consists of a stainless steel probe with a conductive cell mounted at the tip. The cell contains two electrodes which detect acid deposition. The temperature of the detector is controlled by flowing cooling air onto the inner surfaces. The detector is cooled until a steady flow of current exists across the electrodes. The steady current flow is indicative of the acid dew point temperature (ADT).

This system offers a both a fully portable and fixed system. The fixed system has automatic control for the cooling air and utilizes a cleaning system to keep the detector free of soot or other contaminates however the probe is still subject to clogging issues. These analyzers are used throughout the industry to provide a means of monitoring acid dew point for boiler combustion control systems. They are also used to monitor SO_3 slip within Electrostatic Precipitators to improve ash collection efficiency while minimizing acid aerosol emissions. This instrument has proven to be a valuable asset to boiler operators. According to the manufacturer, there is no way to accurately calibrate the instrument or verify calibration drift on a daily basis. No standard exists to perform online calibrations. The instrument is also adversely influenced by moisture changes in the stack gas. Stack moisture could possibly be monitored and in turn used in an algorithm to calculate the actual SO_3 concentration in the stack gas. This algorithm does not currently exist.

SO_3 Conversion Analyzer

Pentol-Enviro manufactures an analyzer that operates on the basis that SO_3 or H_2SO_4 in the gas sample is converted to sulfate ions in an aqueous solution of isopropanol. Isopropanol inhibits the oxidation of SO2, which is invariably present in much larger quantities than SO_3. The solution is passed through a bed of barium chloranilate crystals in which the conversion reaction occurs. The acid chloranilate ions released absorb light preferentially at 535 nm, yielding a purple-colored solution, and their concentration is measured using a

continuous flow photometer. By maintaining a constant ratio of flow rates of the gas sample and absorbing solution, the concentration of acid chloranilate ions is proportional to the sulphate ion concentration in the isopropanol solution and hence to the SO_3 concentration in the gas. As with the previous technology there is currently no way to accurately calibrate the instrument or verify calibration drift on a daily basis. No standard exists to perform online calibrations. There is also a similar analyzer manufactured by Severn Science which poses many of the same issues.

Fourier Transform Infrared Spectroscopy

The Fourier Transform Infrared Spectrometer (FTIR) is an option and currently is capable of measuring SO_3, H_2SO_4, water and SO_2 simultaneously. However, although FTIR is appropriate for discrete emission tests, the equipment is not practicable for continuous monitoring because of the substantial operation and maintenance requirements.

4.0 Final Determination

Tampa Electric believes that none of the current technologies present feasible real world applications of sulfuric acid mist continuous monitoring. Monitors currently in use are primarily used as process monitors and cannot ensure the accuracy need for emission monitoring. The primary reason why the reviewed monitors are not feasible as a continuous emission monitor at Polk is that there is no calibration gas currently available that meets the EPA standards. Tampa Electric will continue to research new technologies as they become available.

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Mr. Scott Sheplak
FDEP
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Administrator - Title V
Tallahassee, FL 32301

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