ATTACHMENT 1

Florida Power & Light Company, Port Everglades Plant
P.O. Box 13118, Fort Lauderdale, FL 33316

May 1, 2009

Mrs. Trina Vielhauer - Chief
Bureau of Air Regulation
Department of Environmental Protection
2600 Blair Stone Road
Mail Station #5505
Tallahassee, FL 32399-2400

Re: Title V Permit Modification; Port Everglades Power Plant, 0110036-008AV;

Dear Mrs. Vielhauer,

FPL requests a modification to the above referenced permit to incorporate a revision to the Port Everglades Plant CAM Plan.

The original CAM Plan submitted to the Department in the fall of 2007 contained minimum Secondary Power values as a demonstration of compliance that were calculated by the Original Equipment Manufacturer from their engineering data. During the course of the Title V permit renewal in 2008 which incorporated the CAM Plan, the Department requested minimum power values that were associated with compliance testing, rather than OEM calculated values. FPL provided the Department a revised copy of the CAM Plan (Rev 1 November 2008) which contained power values that were observed during the original commissioning tests in 2005 and 2007. When the revision was supplied to the Department, FPL recognized that the minimum power values were overly conservative by a considerable margin. At the time, they were the only data available coincident with compliance testing and were not optimized for minimum power scenarios.

In March of this year FPL conducted a series of Particulate Matter tests to optimize the minimum number of TR sets in service, and the minimum Secondary Power values needed to demonstrate compliance with the PM standard of 0.03 lb/mmbtu. The CAM Plan has been revised (Rev. 2 April 22, 2009) to incorporate the new minimum power values and minimum number of TR sets in service to assure compliance with the PM standard for Units 3&4.

This CAM Plan revision (Rev 2) also contains revised minimum Secondary Power values for Units 1&2. During the analysis of the recent test data, FPL discovered that the minimum power values for Units 1&2 found in Rev 1 of the Plan were incorrect. FPL has included the correct Secondary Power values corresponding to the tested PM emissions from the 2005 tests in this revision.

FPL requests that the Title V permit, Appendix CAM, be revised to incorporate the new minimum Secondary Power values and minimum number of TR sets in service as follows:

From:
Appendix CAM, Page 8 of 9, II. Indicator Range, Indicator 1 - *For Units 001 and 002, an excursion is defined as any hourly average of the ESP power level less than 264 kilowatts. For Units 003 and 004, an excursion is defined as any hourly average of the ESP power level less than 524 kilowatts. An excursion will trigger an investigation of the occurrence, corrective actions, and a reporting/documentation requirement.*

To:
Appendix CAM, Page 8 of 9, II. Indicator Range, Indicator 1 - For Units 001 and 002, an excursion is defined as any hourly average of the ESP Secondary Power level less than 46 kilowatts. For Units 003 and 004, an excursion is defined as any hourly average of the ESP Secondary Power level less than 88 kilowatts. An excursion will trigger an investigation of the occurrence, corrective actions, and a reporting/documentation requirement.

And,
From:
Appendix CAM, Page 9 of 9, III Performance Criteria, G. Operational Requirements, Indicator 1 and Indicator 2 - *At least six (6) of the eight (8) TR sets installed on each of the four (4) ESP units shall be in service at all times when 100% fuel oil is being fired.*

To:
Appendix CAM, Page 9 of 9, III Performance Criteria, G. Operational Requirements, Indicator 1 and Indicator 2 - At least six (6) of the eight (8) TR sets installed on Units 001& 002 shall be in service at all times when 100% fuel oil is being fired. At least two (2) of the eight (8) TR sets installed on Units 003 & 004 shall be in service at all times when 100% fuel oil is being fired.

Included with this request are the revised CAM Plan (Rev 2 April 22, 2009), Purpose of Application, Responsible Official Certification, Professional Engineer Certification, and an updated Compliance Statement.

Thank you for your assistance in this matter, and, if you should have any questions, please do not hesitate to contact me at (954) 527-3601 or Kevin Washington at (561) 691-2877

Respectfully yours,

Jeff Smith
Plant General Manager/ Responsible Official
Florida Power & Light Port Everglades Plant

Attachments: (5)

Florida Power & Light Company, Port Everglades Plant
P.O. Box 13118, Ft. Lauderdale, FL 33316

Submitted Electronically

July 29, 2009

Trina Vielhauer - Chief
Bureau of Air Regulation
Department of Environmental Protection
2600 Blair Stone Road
Mail Station #5505
Tallahassee, FL 32399-2400

Re: Title V Permit Modification; Port Everglades Power Plant, 0110036-008AV;

Dear Ms. Vielhauer,

In May of this year FPL requested a modification to the above referenced permit to incorporate a revision to the Port Everglades Plant CAM Plan [Attachment 1]. Within several days of the request FPL asked that the processing of the request be postponed as there would be an additional revision to the CAM Plan to incorporate Unit 1 & 2 testing results [Attachment 2]. By way of this letter FPL is providing the Department with an updated revision to the Port Everglades CAM Plan [Attachment 3] and requests that the processing of the modification to the Title V permit resume.

As further information, the original CAM Plan submitted to the Department in the fall of 2007 contained minimum Secondary Power values as a demonstration of compliance that were calculated by the Original Equipment Manufacturer from their engineering data. During the course of the Title V permit renewal in 2008 which incorporated the CAM Plan, the Department requested minimum power values that were associated with compliance testing, rather than OEM calculated values. FPL provided the Department a revised copy of the CAM Plan (Rev 1 November 2008) which contained power values that were observed during the original commissioning tests in 2005 and 2007. When the revision was supplied to the Department, FPL recognized that the minimum power values were overly conservative by a considerable margin. At the time, they were the only data available coincident with compliance testing and were not optimized for minimum power scenarios.

In March and June of this year FPL conducted a series of Particulate Matter tests to optimize the minimum number of TR sets in service, and the minimum Secondary Power values needed to demonstrate compliance with the PM standard of 0.03 lb/mmbtu. The CAM Plan has been revised (Rev. 2a June 25, 2009) to incorporate the new minimum power values and minimum number of TR sets in service to assure compliance with the PM standards for Units 1&2 and Units 3&4.

FPL requests that the Title V permit, Appendix CAM, be revised to incorporate the new minimum Secondary Power values and minimum number of TR sets in service as follows:

From:
Appendix CAM, Page 8 of 9, II. Indicator Range, Indicator 1 - *For Units 001 and 002, an excursion is defined as any hourly average of the ESP power level less than 264 kilowatts. For Units 003 and 004, an excursion is defined as any hourly average of the ESP power level less than 524 kilowatts. An excursion will trigger an investigation of the occurrence, corrective actions, and a reporting/documentation requirement.*

To:
Appendix CAM, Page 8 of 9, II. Indicator Range, Indicator 1 - For Units 001 and 002, an excursion is defined as any hourly average of the ESP Secondary Power level less than 82 kilowatts. For Units 003 and 004, an excursion is defined as any hourly average of the ESP Secondary Power level less than 88 kilowatts. An excursion will trigger an investigation of the occurrence, corrective actions, and a reporting/documentation requirement.

And,
From:
Appendix CAM, Page 9 of 9, III Performance Criteria, G. Operational Requirements, Indicator 1 and Indicator 2 - *At least six (6) of the eight (8) TR sets installed on each of the four (4) ESP units shall be in service at all times when 100% fuel oil is being fired.*

To:
Appendix CAM, Page 9 of 9, III Performance Criteria, G. Operational Requirements, Indicator 1 and Indicator 2 - At least two (2) of the eight (8) TR sets installed on Units 001& 002 shall be in service at all times when 100% fuel oil is being fired. At least two (2) of the eight (8) TR sets installed on Units 003 & 004 shall be in service at all times when 100% fuel oil is being fired.

Included with the original request in May were the Purpose of Application, Responsible Official Certification, Professional Engineer Certification, and an updated Compliance Statement. We trust that they will still be sufficient to continue the processing.

Thank you for your assistance in this matter, and, if you should have any questions, please do not hesitate to contact me at (954) 527-3601 or Kevin Washington at (561) 691-2877

Respectfully yours,

Jeff Smith
Plant General Manager/ Responsible Official
Port Everglades Plant

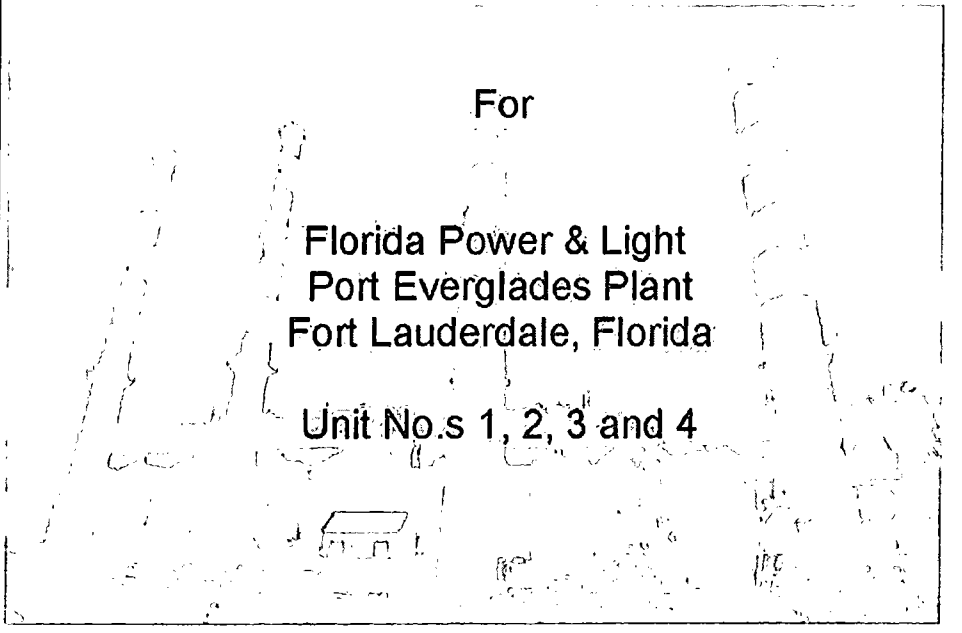
Attachments: (3)

COMPLIANCE ASSURANCE MONITORING (CAM) PLAN

For

Florida Power & Light
Port Everglades Plant
Fort Lauderdale, Florida

Unit No.s 1, 2, 3 and 4



HRC Ref: C1144

Hamon Research-Cottrell, Inc.

Rev. 2a by FPL June 25, 2009

Table of Contents

1

INTRODUCTION

As part of the electrostatic precipitator (ESP) installations at the Port Everglades Plant, Florida Power & Light (FPL) is required to submit a Compliance Assurance Monitoring (CAM) plan that will be used to provide continuous assurance that the particulate matter (PM) emission standard is being met. The Units at Port Everglades are two 200 MW class steam boilers by Combustion Engineering designated as Units 1&2 , and two 400 MW class steam boilers by Foster Wheeler designated as Units 3&4. Each unit is capable of firing No. 6 residual fuel oil, natural gas, on-specification used oil, or a combination of each of these fuels. The particulate emission limits for each boiler is 0.03 lb./mmbtu steady state operation, and 0.1 lb./mmbtu while sootblowing. The operation of the ESP will be monitored, using power levels, to assure continuous compliance with the PM standard. This report discusses the theory and actual operation of this ESP, with regard to setting the minimum level of electrical operation to assure adequate ESP performance.

The impact of ESP power variations on particulate emissions is dependent on the range of power input. At moderate to high power levels, the ESP performance is relatively "flat" vs. power level. Further, certain conditions of low dust level or low process load can reduce ESP voltage, thereby actually reducing total ESP power levels, even though emissions are in fact lower. Therefore, although power levels are a reasonable indicator of ESP performance, operating conditions and power magnitude must be considered as well. The following report will discuss methodology for monitoring ESP power levels in order to demonstrate PM compliance.

2

DISCUSSION

Theory

The operation of ESPs involves three (3) primary steps; 1) the suspended fly ash must be negatively charged, 2) then the fly ash is collected on grounded collecting plates, and 3) finally the fly ash is rapped off of the collecting plates into hoppers for transport to disposal. The fly ash charging is accomplished using an alternating series of negatively charged discharge electrodes and grounded collecting plates. A high voltage is applied to the discharge electrodes, typically in the 15-110 KVpeak range using electrical transformer-rectifiers (TRs). This high voltage forces electrons off of the discharge electrodes onto gas molecules, creating gas ions. These ions actually glow at the corona generating tips of the discharge electrodes. Then as the negatively charged ions migrate toward the collecting plates, they encounter and charge dust particles in the inter-electrode gap. Once charged, the dust particles also migrate toward the grounded collecting plates. The dust then collects or forms a loose dust layer on the collecting plates. Lastly a series of rappers vibrate the internals to shake this dust layer off of the collecting plates and down into hoppers (under the influence of gravity). Ash conveying systems then carry the collected dust to disposal.

The ESP is a DC device utilizing TRs to convert low voltage AC power to high voltage DC. The TR can be compared to a fluid flow pump in that electrical current flow (Amperes) is equivalent to pump flow (gallons/min), and electrical voltage is equivalent to pumping pressure. Thus like a fluid flow pump, flow depends on applied pressure and resistance to flow. The applied TR voltage will thus fluctuate depending on a number of variables;

- electrode geometry
- dust levels in the flue gas
- flue gas temperature
- quantity of flue gas
- build-ups on internal electrodes
- dust resistivity and ESP sparking

The ESP is not designed to, and does not operate at a constant static condition of voltage and current. Instead it has automatic controls to adjust power to variations in the above conditions, and to hold power tight up against the sparking level in the ESP. In an ESP sparking is controlled primarily from the resistivity of the fly ash. If the resistivity is low or optimum, the electricity can flow through the collected dust layer to the grounded collecting plate. However, if the resistivity is high, the collected dust layer resists the flow of electricity. This results in a high voltage on the surface of the dust layer, in close proximity to zero voltage on the collecting plate. An electrical breakdown occurs in the collected dust layer, and this disturbance then creates a spark back to the negatively charged electrode from the grounded electrode. The conditions of resistivity and sparking, are what control the power input levels possible with an ESP.

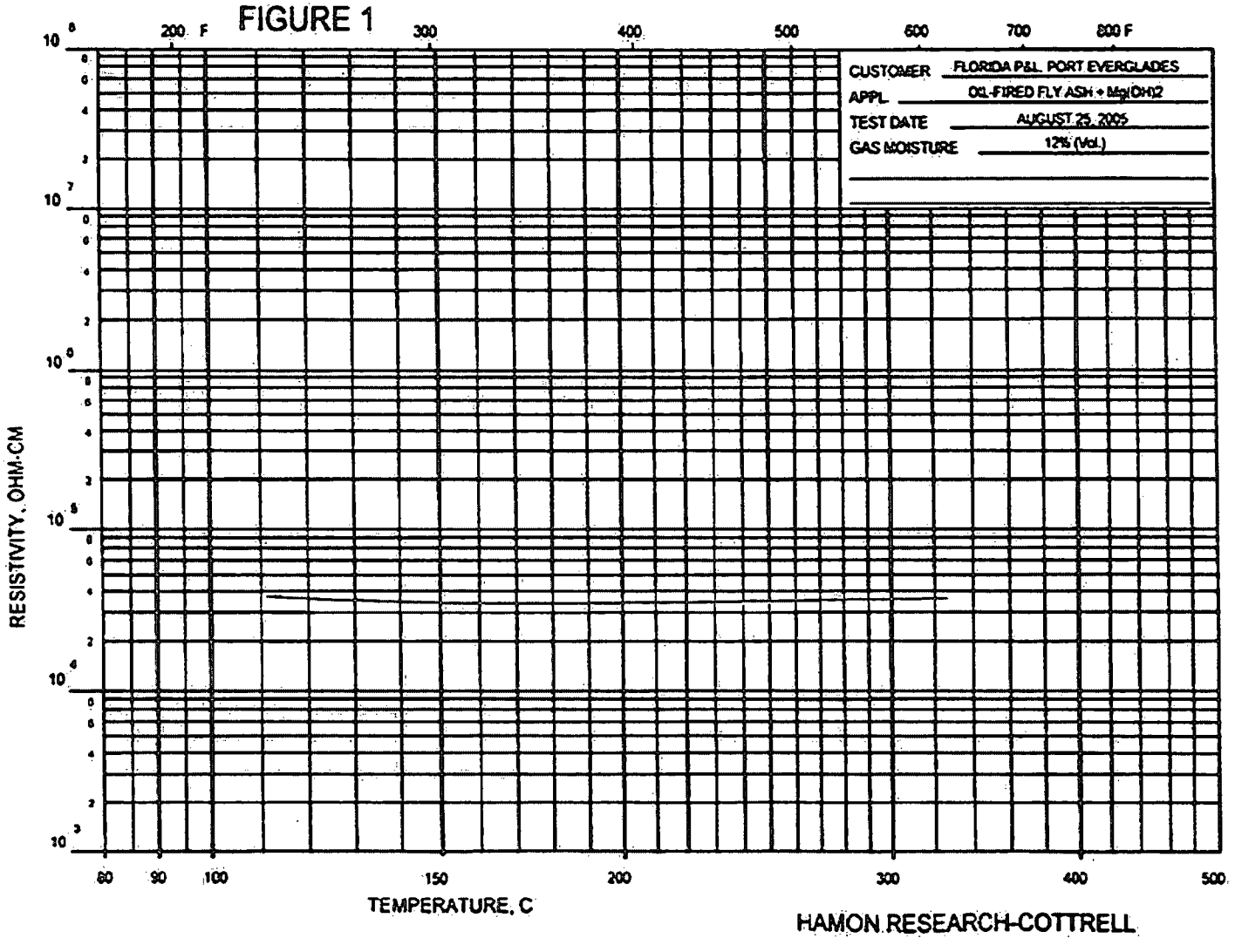
In modern ESPs, spark control is accomplished by control algorithms. Here the automatic voltage control responds automatically to sparking inside the ESP. It then adjusts TR power levels down and up depending on the internal condition of the ESP process.

Again drawing analogy to other common devices, the ESP in general works somewhat like a fluorescent light bulb in that a certain minimum or starting voltage is required for the device to function. At low voltages (less than about 18 KV for the particular electrode geometry at FPL), the ESP does not function electrically at all. Below this corona starting voltage, there is no electrical flow across the air gap between the discharge and collecting electrodes. Once the voltage increases above this level, then there is a constant cause and effect relationship that increased voltage (or pushing strength) causes increased current (or flow). However the corona starting point and the slope of this curve will depend on the amount of particulate in the flue gases. A low dust loading actually causes the ESP to operate at lower voltage (Note that power, kilowatts, is the product of current x voltage x cosine of conduction angle). This means that a lower power at low process load or with lower ash content oil, could erroneously be judged to imply higher particulate emissions (i.e. because the voltage is lower) when in fact lower particulate emissions were occurring.

A second incongruity in looking at power levels as a predictor of particulate emissions is that the size of the ESP is not taken into account. ESPs are sized depending upon particulate resistivity. If the resistivity is increased, then there is more sparking and lower power in the TRs. The ESP must be larger to get the same particulate emissions, with higher sparking levels. In the case of actual operation, this process occurs quite often. This happens each time the boiler load on the ESP is reduced. When boiler load (or the resulting flue gas volume) drops, the ESP gets proportionally larger in treatment time. However, the gas temperature generally drops because there is proportionally more heat exchange surface to flue gas volume ratio in the boiler.

Looking at Figure 1, resistivity measurements on Florida Power & Light, Port Everglades oil-fired fly ash, the resistivity can be seen to be very low and fairly flat across the temperature range. Every process observed to date, has shown lower particulate emissions at low boiler flue gas volume than high. This is because the increase in treatment time of the ESP is a greater impact on particulate emissions, than the power level. This implies that the ESP is performing more poorly per unit of collecting surface. However, this does not mean that the ESP is performing poorly, in terms of particulate emissions. This is because the performance of ESPs is related both to power density on the collecting surface, and the size of the ESP. Thus, even though the power is lower, this is occurring at a time when the boiler flue gas volume is greatly reduced. In effect during these time periods when the boiler is at 20 - 70% load, the ESP is proportionally 1.5 to 4 times larger.

FIGURE 1


200 F
300
400
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CUSTOMER FLORIDA P&L PORT EVERGLADES
APPL OIL-FIRED FLY ASH + Mg(OH)2
TEST DATE AUGUST 25, 2005
GAS MOISTURE 12% (Vol.)
RESISTIVITY, OHM-CM
TEMPERATURE, C
60
90
100
150
200
300
400
500
HAMON RESEARCH-COTTRELL

Studies have been conducted on Hamon Research-Cottrell ESPs of similar electrode geometry, fly ash inlet loading (note that oil-firing has a low ESP inlet fly ash loading because there is very low ash content in oil), and oil-fired fly ash resistivity. These studies start with laboratory analysis of different electrode types and geometries. This is followed up with installations similar to the FPL Port Everglades' ESP installations. Many ESPs with the same electrode design used at FPL, were installed by HRC during the time frame 1976 to 2005. HRC has compiled considerable data on the power consumed by a properly operating ESP, and in fact have sizing standards concerning how low an ESP can go in power and still have good operation.

For the FP&L-Port Everglades Unit No.s 1 and 2, the boilers are equipped with an ESP for each boiler. The ESP has a total of 154,176 FT2 of collecting surface, with all fields in-service. Compliance with the Particulate Matter emission standard of 0.03 LB/MMBTU was demonstrated with six (6) TRs (out of eight total) out-of-service.

FP&L will consider six (6) TRs (out of 8 total) out of service as compliance with particulate matter emission standard. Thus the collecting surface in service will be 2/8 x 154,176 = 38,544 FT2.

For the FP&L-Port Everglades Unit No.s 3 and 4, the boilers are equipped with an ESP for each boiler. The ESP has a total of 254,534 FT2 of collecting surface, with all fields in-service. Compliance with the Particulate Matter emission standard of 0.03 LB/MMBTU was demonstrated with six (6) TRs (out of eight total) out-of-service.

FP&L will consider six (6) TRs (out of eight total) out of service as compliance with the Particulate Matter Emission Standard. Thus the collecting surface in service will be 2/8 x 254, 534 = 63,634 FT2.

Actual Data - Unit No.s 1 and 2

Actual test data from the site was obtained during PM tests performed in June, 2009. This data showed the ESP to be able to achieve particulate emissions compliance, which is less than 0.03 LB/MMBTU with multiple TR sets out of service and at very low power levels.

TRs In Service	Secondary Power Level (Kw)	Particulate Emissions (LB./MMBTU)
All (8)	Not Measured	Not Measured
6	237	0.0001
4	177	0.0011
2	82	0.0046

The above particulate emissions were obtained using EPA Method 17.

Actual Data - Unit No.s 3 and 4

Actual test data from the site was obtained during 100% oil, full-load tests performed in March, 2009. This data showed the ESP to be able to achieve particulate emission compliance well below the limit of 0.03 LB/MMBTU with multiple TR sets out of service and at very low power levels.

TRs In Service	Secondary Power Level (Kw)	Particulate Emissions (LB./MMBTU)
All (8)	535	0.004
6	384	0.003
4	240	0.001
2	88	0.002

The above particulate emissions were obtained using EPA Method 17.

3

PROCEDURE

The following procedure shall be utilized to assure the ESP is operating properly, within normal variations in power. Note that this procedure is written in terms of secondary kilowatts. Monitoring secondary kilowatts reflects both current and voltage values. If either secondary voltage is low or secondary current is low, the product secondary kilowatts will also be low.

I. The permittee shall monitor and record the following on a "daily" basis, during any operation of the boiler/ESPs. This results in a maximum of 365 recorded power levels per year. Recording power levels up to 365 times per year is quite sufficient to see trends occurring in the performance of the unit. The following will be recorded;

A. The total power in secondary kilowatts, to the ESP system for each day (the sum of all TR sets operating at the time of the reading).

B. Unit power output (MW).

C. Unit percent oil burn.

II. Operational Requirements

A. At least two (2) of the eight (8) TRs installed on Units 1 & 2, will be in service at all times when 100% oil is being fired. At least two (2) of the eight (8) TRs installed on Units 3& 4, will be in service at all times when 100% oil is being fired.

B. The total combined secondary power input (in kilowatts) to all fields of the Unit 1 & 2 ESP system, for any day when the emissions unit is in operation at 70% to 100% of full boiler load firing 100% oil, shall be no less than 82 kilowatts.
The total combined secondary power input (in kilowatts) to all fields of the Unit 3 & 4 ESP system, for any day when the emissions unit is in operation at 70% to 100% of full boiler load firing 100% oil, shall be no less than 88 kilowatts.

C. During periods when the boiler is at reduced load (0 - 70%) while firing 100% oil, secondary power deviations (below 82 kilowatts for Units 1 and 2, and 88 kilowatts for Units 3 and 4) are not significant. The proportional large size of the ESP during low load conditions is more than sufficient to offset any variations in power consumption.

D. When the total combined secondary power is found to be less than 82 kilowatts per ESP for Units 1 and 2 and 88 kilowatts per ESP for Units 3 and 4, with the unit at 70 -100% of full load and while firing 100% oil fuel, FPL will investigate the cause and take corrective action.

E. FPL, at its discretion, can reduce load or replace 100% oil firing with a portion of natural gas firing.

ATTACHMENT 2

Washington, Kevin

From: Washington, Kevin
Sent: Thursday, May 07, 2009 4:47 PM
To: trina.vielhauer@dep.state.fl.us
Cc: Smith, Jeff; Stokes, Idayna
Subject: REQUEST TO MODIFY PORT EVERGLADES PLANT TITLE V PERMIT

Trina,
This week Jeff Smith, Port Everglades Plant Manager and R.O., sent a Request to Modify the Port Everglades Plant Title V permit to your attention. The request was made in order to incorporate a revision to the Unit 3&4 portion of plant's CAM Plan as a result of some recent PM emissions tests. Within the last several days, plans to test Units 1&2 in the upcoming weeks have surfaced. Therefore, FPL would like the Department to refrain from processing the recent Request to Modify until Units 1&2 data can be incorporated into the CAM Plan revision. After the testing, FPL will incorporate the new emissions information into a further revision to the CAM Plan and will ask the Department to proceed with the permit modification.

Thank you for your attention in this matter. If you have questions or need additional information you can reach me at (561) 691-2877.

Kevin Washington
Project Manager
FPL Environmental Services

CERTIFIED MAIL™

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FL Department of Environmental Protection
Division of Air Resources Management
2600 Blair Stone Rd., MS 5505
Tallahassee, FL 32399
Attn: TRINA Vielhauer