SEMINOLE ELECTRIC COOPERATIVE INCORPORATED

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January 10, 1997

Mr. A. A. Linero, P.E.
Administrator, New Source Review Program
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 323399-2400

Re: Seminole Electric Cooperative, Inc.
Palatka Plant Units 1 and 2 Coal and Petroleum Coke Blending
PA 78-10, PSD-FL-018

Dear Mr. Linero:

Enclosed are two documents that were inadvertently left out of the package sent to you on 1/7/97. I hope this has not caused any inconvenience.

Sincerely,

Kenneth L. Bachor, P.E.
Manager of Engineering

Attachments

cc: Syed Arif, FDEP
Buck Oven, FDEP

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SEMINOLE ELECTRIC COOPERATIVE INCORPORATED

January 7, 1997

SENT BY OVERNIGHT MAIL ON 1/7/97

Mr. A. A. Linero, P.E.
Administrator, New Source Review Program
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 323399-2400

Re: Seminole Electric Cooperative, Inc.
Palatka Plant Units 1 and 2 Coal and Petroleum Coke Blending
PA 78-10, PSD-FL-018

Dear Mr. Linero:

Seminole Electric Cooperative, Inc. (Seminole) appreciates having the opportunity to meet with Department staff on December 19th to discuss the coal and petroleum coke blending project proposed for Seminole's electric generating station (Units 1 and 2) located near Palatka, Florida. Responses to the questions raised in the Department's correspondence to Seminole dated November 25, 1996 and additional issues discussed during the December 19th meeting are provided as follows:

A. RESPONSES TO QUESTIONS RAISED IN THE DEPARTMENT'S CORRESPONDENCE TO SEMINOLE DATED NOVEMBER 25, 1996

Question No. 1:

Please submit either 1994 or 1996 and 1995 averaged annual emission rates based on CEMS data for NO_x and SO_2 and based on stack test data for PM and VOC, H_2SO_4, and CO (if only have initial stack test data for CO, VOC, or H_2SO_4, then average this with the baseline data). For pollutants which have not been tested in the past provide the rating and the date of the AP-42 emission factors. State how AOR emission rates were calculated for SO_2.

Response to Question No. 1:

Historical stack test or CEMS data exists for three pollutants: SO_2, NO_x, and PM. Two year (1994/1995) average emission rates for these pollutants, together with the test burn data, for Unit No. 1 are summarized in the following table:

Pollutant	1994/1995 Two-Year Average Emission Rates (lb/MMBtu)	Test Burn[1] (lb/MMBtu)
PM (Stack Tests)	0.023	0.021
SO_2 (CEMS)	0.74	0.73
NO_x (CEMS)	0.48	0.48

[1] Average of 10%, 20%, and 30% petcoke blend tests conducted on 12/2/95, 12/8/95, and 1/8/96.

Response to Question No. 1 (continued)

This comparison of historical and test burn emissions data provides reasonable assurance that a significant net increase in SO_2, NO_x, and PM will not occur due to the use of petroleum coke.

Annual PM and NO_x emission rates due to coal combustion will routinely vary from year-to-year depending on a variety of factors including coal composition, boiler combustion conditions, flue gas desulfurization (FGD) system performance, etc. EPA's June 21, 1992 Wisconsin Electric Power Company (WEPCO) regulations note that ***only*** the emission increases ***due to a modification*** are to be considered in determining whether the modification is subject to PSD review.

As addressed in Appendix E of the permit application, a screening analysis shows no potential for PM or NO_x emissions to increase due to the use of petcoke. The ash content of petcoke (approximately 0.5 percent by weight) is only 5.5% of the ash content of coal (approximately 9 percent by weight). Accordingly, petcoke combustion will generate significantly less fly ash than the combustion of coal. Available coal and petcoke blend test data for NO_x demonstrates that combustion of coal/petcoke fuel blends will not increase NO_x emission rates. In addition, Seminole has elected to be subject to the Federal Acid Rain Program NO_x emission limits contained in 40 CFR §76.5 under the NOx Early Election Program for Group 1, Phase II boilers. Under the NO_x Early Election Program, Seminole is required to meet an annual average NO_x emission limit of 0.50 lb/MMBtu effective January 1, 1997. Seminole's participation in the Acid Rain NO_x Early Election Program provides further reasonable assurance that a significant net increase in NO_x emissions will not occur due to the use of petroleum coke.

Only baseline coal and coal/petcoke blend stack test data exists for H_2SO_4 and CO; i.e., there are no initial stack test data available for these pollutants. These test results are summarized in the following table:

Fuel Type	Test Date	Measured Emission Rates (lb/MMBtu)	
		CO	H_2SO_4
Baseline Coal	1/4/96	0.066	0.031
90%/10% Coal/Petcoke Blend	12/2/95	0.003	0.019
80%/20% Coal/Petcoke Blend	12/8/95	0.006	0.035
70%/30% Coal/Petcoke Blend	1/8/96	0.009	0.030
Three Test Coal/Petcoke Blend Average	N/A	0.006	0.028

This comparison of baseline coal and coal/petcoke blend test burn emissions data provides reasonable assurance that a significant net increase in CO or H_2SO_4 will not occur due to the use of petroleum coke. In addition, confirmation that future CO and H_2SO_4 emissions during the combustion of coal/petcoke blends are equal to or less than baseline coal levels will be made by conducting annual tests (for a five year period) while burning coal and coal/petcoke blends using EPA Reference Methods 10 (for CO) and 8 (for H_2SO_4).

Neither stack test nor CEMS emissions data exist for VOCs. Accordingly, an AP-42 factor was used to estimate VOC emission rates. Specifically, a factor of 0.06 lb of non-methane total organic compounds (NMTOC) per ton of coal burned was used as obtained from AP-42 Fifth Edition, Section 1.1, Table 1.1-11.

Response to Question No. 1 (continued)

This emission factor, which was assumed to also apply to petcoke, has a rating of B. The Fifth Edition of AP-42 is dated January 1995. As discussed in Appendix E of the submitted permit application, a screening analysis indicates that there is no potential for VOC emissions to increase due to the combustion of petcoke. Because emissions of VOCs depend primarily on process operations (i.e., extent of complete combustion) and not on fuel characteristics, no change in VOC emissions (in terms of lb VOC/ton of fuel combusted) is expected due to the substitution of petcoke for coal. In addition, VOC emissions due to coal combustion are relatively low. In the case of the Seminole Palatka Power Plant, actual VOC emissions would need to increase by approximately 35% in order to trigger PSD modification permitting. For these reasons, there is reasonable assurance that a significant net increase in VOCs will not occur due to the use of petroleum coke.

AOR emission rates for SO_2 were developed based on CEMS data.

Question No. 2:

Compare emission rates (TPY) for the 10%, 20% and 30% petcoke blends separately to the historic emission rates referenced in Question No. 1.

Response to Question No. 2

Seminole plans to utilize coal/petcoke blends ranging from 90% coal/10% petcoke to 70% coal/30% petcoke. For this reason, it is felt to be appropriate to estimate future actual emission rates based on the average of the three test burn coal/petcoke blends. Unit No. 1 emissions data for each coal/petcoke blend evaluated during the petcoke test burn together with baseline coal test emissions data are summarized in the following tables for SO_2, NO_x, and PM:

Pollutant	1994/1995 Two-Year Average Emission Rates (lb/MMBtu)	Petcoke Test Burn Emissions (lb/MMBtu)				Baseline Coal Emissions (lb/MMBtu)
		90/10 12/2/95	80/20 12/8/95	70/30 1/8/96	Average	1/4/96
PM (Stack Tests)	0.023	0.027	0.029	0.008	0.021	0.010
SO_2 (CEMS)	0.74	0.74	0.76	0.68	0.73	0.78
NO_x (CEMS)	0.48	0.42	0.44	0.58	0.48	0.55

Response to Question No. 2 (continued)

Pollutant	1994/1995 Two-Year Average Emission Rates (tpy)	Petcoke Test Burn Emissions (tpy)				Baseline Coal Emissions (tpy)
		90/10 12/2/95	80/20 12/8/95	70/30 1/8/96	Average	1/4/96
PM (Stack Tests)	481	565	607	167	446	209
SO_2 (CEMS)	15,480	15,480	15,899	14,225	15,201	16,317
NO_x (CEMS)	10,041	8,786	9,205	12,133	10,041	11,506

Annual emission rates shown above were calculated using the average 1994/1995 heat input for Unit No. 1; i.e., 41,838,863 MMBtu/yr. As mentioned previously, Seminole plans to utilize coal/petcoke blends ranging from 90% coal/10% petcoke to 70% coal/30% petcoke and therefore it is appropriate to estimate future actual emission rates based on the average of the three test burn coal/petcoke blends rather than the individual test burn blend results. Note that the 12/2/95 and 12/8/95 PM test data are not considered to be representative due to potential sample contamination. As mentioned above, annual PM and NO_x emission rates due to coal combustion will routinely vary from year-to-year depending on a variety of factors including coal composition, boiler combustion conditions, FGD system performance, etc. As an example, the baseline coal NO_x test performed on 1/4/96 yielded an emission rate of 0.55 lb/MMBtu which is slightly higher than the 1994/1995 historical two-year average of 0.48 lb/MMBtu. A comparison of test burn emission rates for each coal/petcoke blend tested for CO and H_2SO_4 are provided above in the response to Question No. 1.

With consideration given to the normal variability in emission rates that will occur in the absence of petcoke combustion, the test burn data provides reasonable assurance that a net significant emission increase will not occur for the pollutants of concern over the planned range of coal/petcoke blends. With respect to NO_x emissions, Seminole's participation in the Acid Rain NO Early Election Program provides additional reasonable assurance that a significant net increase in NO_x emissions will not occur due to the use of petroleum coke.

Question No. 3

The application does not provide measured SO_2 emission rates from the test burn. If not provided, please provide all measured emission rates from the test burn.

Response to Question No. 3

Measured test burn SO_2 emission rates are provided in the responses to Questions No. 1 and 2 above. A complete report of the test burn results was provided to the Department in February 1996.

Question No. 4

Appendix E states that Seminole has demonstrated through past operation up to 95% removal efficiency for SO_2. Please provide data which demonstrates this.

Response to Question No. 4

As was discussed during the December 19th meeting, an approximate 2 to 3 percent increase in FGD SO_2 removal efficiency will be needed during the combustion of coal/petcoke blends to ensure that a significant net increase in SO_2 emissions will not occur due to the use of petroleum coke. The precise SO_2 removal efficiency required will depend on the quantity of petcoke blended, the sulfur and heat contents of the petcoke, and coal parameters (coal washing credit and sulfur and heat contents). Based on assumed worst-case conditions of: (a) combustion of a 70/30 percent by weight coal/petcoke blend, (b) petcoke sulfur and heat contents of 7.0 percent by weight and 15,300 Btu/lb (higher heating value, dry), respectively, (c) petcoke SO_2 emission limits of 0.74 and 0.72 lb/MMBtu for Units No. 1 and 2, respectively (these SO_2 emission limits represent the 1994/1995 two-year historical average based on CEMS data), (d) coal sulfur and heat contents of 3.3 percent by weight and 13,700 Btu/lb (higher heating value, dry), and (e) coal washing credit of 5.7 percent (1994 average for contract and spot purchase coals), the required FGD SO_2 removal efficiencies are calculated to be 87.9 and 88.0 percent for Units No. 1 and 2, respectively. The current average FGD SO_2 removal efficiency for Units No. 1 and 2 is approximately 84.5% which, together with a typical coal washing credit of 6.0 percent is sufficient to meet the NSPS Subpart Da 90.0 percent SO_2 removal requirement. Therefore, under a reasonable set of worst-case conditions, a 3.5 percent increase in FGD SO_2 removal efficiency (i.e., from 84.5 to 88 percent) will be necessary to ensure that a significant net increase in SO_2 emissions will not occur due to the use of petroleum coke. Lower SO_2 removal efficiencies will be required for lower blends of petcoke and lower petcoke sulfur contents. For example, use of a 80/20 percent by weight coal/petcoke blend and petcoke sulfur content of 5.0 percent by weight yields required FGD SO_2 removal efficiencies of 85.5 and 85.6 percent for Units No. 1 and 2, respectively.

The attached field test data confirms that the FGD system, without any coal washing credit and with only 4 of 5 scrubber modules in service, has successfully achieved a SO_2 removal efficiency of over 90%. This removal efficiency was demonstrated during original FGD system acceptance testing conducted in November 1985, and also during a flue gas bypass test performed on both units in the fall of 1987. Based on an average annual coal washing credit of 6%, this allows for over 6% of additional FGD SO_2 removal capacity beyond the overall (coal washing credit and FGD) 90% removal required by NSPS Subpart Da. This additional FGD SO_2 removal capacity is available without having to make any adjustments to the operation of the FGD system, such as utilizing the 5th scrubber module or increasing the use of adipic acid. Because the maximum additional SO_2 removal efficiency required for a 30% blend of a 7% sulfur petcoke is 3.7% (reference the tables in the response to Question No. 6), the SO_2 removal capacity of the FGD system is sufficient to process the additional SO_2 emissions generated by the burning of petcoke. Seminole's proven FGD system operation, current surplus FGD SO_2 removal capacity, as well as the ability to bring the 5th scrubber module into service, provides reasonable assurance that Seminole can comply with the proposed SO_2 emission permit limits when burning petcoke at the requested coal/petcoke blend ratios.

B. RESPONSES TO QUESTIONS RAISED IN THE DECEMBER 19TH MEETING

Question No. 5:

Provide calculations of required FGD SO_2 removal efficiencies under worst-case conditions.

Response to Question No. 5:

A discussion of assumed worst-case conditions and required FGD SO_2 removal efficiencies is provided in the Response to Question No 4 above. Specific calculations for Unit No. 1 are provided as follows:

Response to Question No. 5 (continued)

Premises:

Coal Sulfur Content:	3.3	percent by weight
Coal Heat Content:	13,700	Btu/lb, HHV dry
Coal Content of Blend	70	percent by weight
Coal Washing Credit:	5.7	percent
Required Subpart Da SO_2 Removal:	90.0	%
Petcoke Sulfur Content:	7.0	percent by weight
Petcoke Heat Content:	15,300	Btu/lb, HHV dry
Petcoke Content of Blend	30	percent by weight
Petcoke SO_2 Limit:	0.74	lb/MMBtu

Calculations:

1. Petcoke Content of Blend (% by heat input)

= (0.3 * 15,300) * 100 / ((0.3 * 15,300) + (0.7 * 13,700)))

= 32.4 %

2. Coal Content of Blend (% by heat input)

= (0.7 * 13,700) * 100 / ((0.3 * 15,300) + (0.7 * 13,700)))

= 67.6 %

3. FGD Inlet SO_2 Due to Coal Portion of Blend (lb/MMBtu)

= (3.3 / 100) * (1 / 13,700 x 10^{-6}) * 2

= 4.82 lb/MMBtu

4. FGD Inlet SO_2 Due to Petcoke Portion of Blend (lb/MMBtu)

= (7.0 / 100) * (1 / 15,300 x 10^{-6}) * 2

= 9.15 lb/MMBtu

5. Composite FGD Inlet SO_2 Due to Coal and Petcoke Blend (lb/MMBtu)

= (.676 * 4.82) + (.324 * 9.15)

= 6.22 lb/MMBtu

Response to Question No. 5 (continued)

6. Required FGD Outlet SO_2 Due to Coal Portion of Blend (lb/MMBtu)

= ((100 - (90.0 - 5.7)) /100) * 4.82

= 0.756 lb/MMBtu

7. Required FGD Outlet SO_2 Due to Petcoke Portion of Blend (lb/MMBtu)

= 0.74 lb/MMBtu

8. Composite Required FGD Outlet SO_2 Due to Coal and Petcoke Blend (lb/MMBtu)

= (.676 * 0.756) + (.324 * 0.74)

= 0.751 lb/MMBtu

9. Required FGD SO_2 Removal Efficiency (percent)

*= ((6.22 - 0.751) / 6.22) * 100*

= 87.9 %

10. Required FGD thirty day rolling average SO_2 removal efficiency calculated in accordance with 40 CFR 60, Subpart Da.

Question No. 6:

Provide a description of the operational procedures that will be implemented to ensure that the proposed SO_2 emission limits will be met.

Response to Question No. 6:

Fuel composition and usage data and FGD inlet and stack outlet measurements will be utilized to provide reasonable assurance that: (a) SO_2 emissions for coal meet NSPS Subpart Da requirements and (b) required stack SO_2 lb/MMBtu emission rates for the petcoke portion of the fuel blend are fixed at the historical SO_2
emission rate for each unit in accordance with the PSD regulatory program.

Petcoke will be delivered to the Plant utilizing the existing rail and on-site coal handling equipment, and will be stored in an open storage area to the south of the main coal pile. This area is part of the lined coal storage area. Seminole will have multiple petcoke storage piles. When any one petcoke storage pile reaches a pre-determined size (for example, a 30 day burn), a second storage pile will be created. The first storage pile will be sampled and analyzed for sulfur content, heat content, ash, etc. Once these parameters are known, the storage pile will be released for blending.

The petcoke blend ratio will be pre-determined by Plant Operations on a weight basis, and the appropriate blend ratio will be established by varying the speed of the petcoke and coal conveyor belts. This type of conveyor belt speed adjustment has been confirmed by field testing to achieve targeted weight ratios to within

Response to Question No. 6 (continued)

±5%. If a 30% petcoke blend ratio is desired, the conveyor belts will be set for a target of 25% petcoke blend to ensure that the blend ratio is no more than 30%. To illustrate the 30% petcoke blend example, the coal-only conveyor belt could be set to ensure that 1,125 tons per hour of coal are delivered to the fuel silos (as verified by the fuel scales at the crusher tower). At that point, petcoke would be introduced to the combined fuel conveyor belt at a petcoke conveyor belt speed that would ensure a transfer rate of 1,500 tons per hour of blended fuel is being delivered to the fuel silos (i.e., a 25% petcoke blend ratio). This transfer rate would also be verified by the fuel scales at the crusher tower. The fuel scales at the crusher tower are checked against a certified scale on a weekly basis.

Petcoke of known sulfur content from the designated petcoke storage pile will be blended with coal at a daily ratio determined by Plant Operations. Utilizing the SO_2 emission formulas contained in the petcoke permit modification application that limit petcoke SO_2 emissions to historical levels, the FGD removal efficiency will be increased for each day that petcoke is burned in accordance with the tables on the following pages.

A computer will be programmed to perform the emission rate calculations described above. This program will include the various algorithms required to generate SO_2 emission rates on a daily average basis. These daily average emission rates will then be used to produce thirty-day rolling averages as required by NSPS Subpart Da.

Your continued expeditious processing of Seminole's permit modification request will be appreciated. Please contact me at (813) 963-0994 if there are any further questions.

Sincerely,

Kenneth L. Bachor, P.E.
Manager of Engineering

Attachments

cc: Syed Arif, FDEP
Buck Oven, FDEP
cc: Brian Beals, EPA
John Bunyak, NPS
Chris Kirts, NED
Jon Davis, CCT

TABLE 1

Required 30-Day Rolling Average FGD Reduction Efficiency - Unit No. 1

Premises:

Coal Heat Content:	13,700	Btu/lb, HHV dry
Petcoke Heat Content:	15,300	Btu/lb, HHV dry
Required Da Removal	90.0	%
Petcoke SO_2 Limit	0.74	lb/MMBtu

Variables:

Fuel Pretreatment Credit[1]	5.7	%
Coal Sulfur[2]	3.3	% (weight)

Calculations:

Petcoke Blend (%, wt)	Petcoke Blend (%, heat input)	Petcoke Sulfur (%, wt)	FGD Inlet SO_2 (lb/MMBtu)			Req'd FGD Outlet SO_2 (lb/MMBtu)			Required Increase in FGD Removal (%)	Required Total FGD Removal (%)
			Coal	Petcoke	Composite	Coal	Petcoke	Composite		
10	11.0	4.0	4.82	5.23	4.86	0.756	0.740	0.755	0.2	84.5
		5.0	4.82	6.54	5.01	0.756	0.740	0.755	0.6	84.9
		7.0	4.82	9.15	5.30	0.756	0.740	0.755	1.5	85.8
20	21.8	4.0	4.82	5.23	4.91	0.756	0.740	0.753	0.4	84.7
		5.0	4.82	6.54	5.19	0.756	0.740	0.753	1.2	85.5
		7.0	4.82	9.15	5.76	0.756	0.740	0.753	2.6	86.9
30	32.4	4.0	4.82	5.23	4.95	0.756	0.740	0.751	0.5	84.8
		5.0	4.82	6.54	5.37	0.756	0.740	0.751	1.7	86.0
		7.0	4.82	9.15	6.22	0.756	0.740	0.751	3.6	87.9

[1] Fuel pretreatment credit of 5.7% is a historical annual average used as an example.
[2] Coal sulfur content of 3.3% is maximum allowed for any one coal shipment.

TABLE 2

Required 30-Day Rolling Average FGD Reduction Efficiency - Unit No. 2

Premises:

Coal Heat Content:	13,700	Btu/lb, HHV dry
Petcoke Heat Content:	15,300	Btu/lb, HHV dry
Required Da Removal	90.0	%
Petcoke SO_2 Limit	0.72	lb/MMBtu

Variables:

Fuel Pretreatment Credit[1]	5.7	%
Coal Sulfur[2]	3.3	% (weight)

Calculations:

Petcoke Blend (%, wt)	Petcoke Blend (%, heat input)	Petcoke Sulfur (%, wt)	FGD Inlet SO_2 (lb/MMBtu)			Req'd FGD Outlet SO_2 (lb/MMBtu)			Required Increase in FGD Removal (%)	Required Total FGD Removal (%)
			Coal	Petcoke	Composite	Coal	Petcoke	Composite		
10	11.0	4.0	4.82	5.23	4.86	0.756	0.720	0.752	0.2	84.5
		5.0	4.82	6.54	5.01	0.756	0.720	0.752	0.7	85.0
		7.0	4.82	9.15	5.30	0.756	0.720	0.752	1.5	85.8
20	21.8	4.0	4.82	5.23	4.91	0.756	0.720	0.748	0.4	84.7
		5.0	4.82	6.54	5.19	0.756	0.720	0.748	1.3	85.6
		7.0	4.82	9.15	5.76	0.756	0.720	0.748	2.7	87.0
30	32.4	4.0	4.82	5.23	4.95	0.756	0.720	0.745	0.7	85.0
		5.0	4.82	6.54	5.37	0.756	0.720	0.745	1.8	86.1
		7.0	4.82	9.15	6.22	0.756	0.720	0.745	3.7	88.0

[1] Fuel pretreatment credit of 5.7% is a historical annual average used as an example.
[2] Coal sulfur content of 3.3% is maximum allowed for any one coal shipment.