Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400
Bob Martinez, Governor
Dale Twachtmann, Secretary
John Shearer, Assistant Secretary

June 20, 1990

Mr. Martin A. Smith, Ph.D.
Manager, Environmental Permitting & Programs
Florida Power & Light Company
P.O. Box 078768
West Palm Beach, FL 33407-0768

Dear Mr. Smith:

RE: Orimulsion Test Burn
Sanford Unit #4
PSD-FL-150
AC64-180842

On May 22, 1990, the Department received FP&L's application to construct equipment at the Sanford plant to perform test burns of Orimulsion fuel in Unit #4. The application is deemed incomplete. Additional information is required for further processing of this application.

Within 30 days of receipt of this letter, please respond to the following items of incompleteness:

1. As stated in the application, there was a successful long-term burning of Orimulsion in the 100 MW corner-fired Dalhousie Generating Station Unit 1 in New Brunswick, Canada. Please submit the results of those tests. What were the pollution control devices tested and what were their efficiencies?

2. The requested permitted equipment operating time is 120 full-capacity equivalent burn days when Orimulsion is fired. How much time will each pollution control device spend in operation? Please submit a detailed schedule of testing of the pollution control devices. How long will Unit #4 be burning Orimulsion before the stack emissions are tested? Will the test scale and duration be sufficient to size full-scale equipment or will future tests be necessary?

3. What is the estimated cost to FP&L for the individual components of the proposed pollution control pilot study?

4. What are the model names and expected efficiencies of each of the pollution control devices to be tested?

5. What type of continuous emissions monitors (opacity, SO2, NOX, etc.) will be used on the inlet and outlet pilot test gas streams? Will these be in use the entire time the pilot test control equipment is being operated?

6. What type of continuous emission monitors will be used on the Unit #4 exhaust stack while Orimulsion is being burned? Will these monitors also be used while No. 6 fuel oil is being fired?

7. What is the expected cost of No. 6 fuel oil per BTU during the next year? What is the expected cost of Orimulsion per BTU during the next year?

8. The solid waste generated during the test should go to a lined landfill with a leachate collection system. Is this type of landfill available for disposal of the solid waste?

9. For PSD purposes, potential emission increases from a modification are compared to past actual emissions on a tons per year basis. Why were the potential emissions resulting from any fuel oil burning (which could occur the remainder of the year when Orimulsion is not being burned) not included in the potential emissions?

10. Past actual emissions listed in Table 3-2 do not correspond to values calculated from information submitted in the 1989 annual operating reports. Please explain the discrepancies.

If you have any questions concerning this request for additional information, please contact Cindy Phillips at (904)488-1344.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

cc: Kennard F. Kosky, P.E., KBN
Elsa Bishop, FP&L
William Green, Equire, Hopping Boyd Green & Sams

FPL

P. O. Box 078768, West Palm Beach, FL 33407-0768
6001 Village Blvd.

July 10, 1990

FEDERAL EXPRESS

Ms. Cindy Phillips
Division of Air
Department of Environmental Regulation
2600 Blair Stone Road, Third Floor
Tallahassee, FL. 32399-2400

Re: FPL Orimulsion Test Burn
Sanford, Unit No. 4

Dear Cindy:

By letter dated June 20, 1990, you requested additional information in connection with Florida Power & Light Company's Request for Approval of a Test Burn of Orimulsion at Sanford Unit No. 4. As you know, in order to respond as quickly as possible to some of the questions posed informally by the department, Dr. Marty Smith prepared a submittal information packet which he sent out prior to receiving your June 20 letter. His letter was dated June 22, 1990. Because your letter asked some questions that he did not address, and because some of the information that he provided on June 22 has now been updated, we thought it would be helpful to prepare a complete response to your June 20 letter at this time.

1. DER Request:

As stated in the application, there was a successful long-term burning of Orimulsion in the 100 MW corner-fired Dalhousie Generating Station Unit 1 in New Brunswick, Canada. Please submit the results of those tests. What were the pollution control devices tested and what were their efficiencies?

FPL Response:

The additional test information gathered from the Dalhousie Generating Station Unit 1 in New Brunswick, Canada consisting of three reports was submitted by Dr. Smith in his June 22 letter and is resubmitted as Attachments 1A, 1B & 1C hereto. To our knowledge there has been no further information published in connection with that test.

It is our understanding that an electro-static precipitator achieved 86% removal at full load at the Dalhousie Unit. That removal efficiency, we believe, was the result of an imperfect design and FPL has determined that such a device would not be optimum for a multiple-fuel unit such as Sanford Unit No. 4 would be if permanently converted to the use of Orimulsion. Dalhousie also tested furnance injection of a dry limestone sorbent; although the report for that device has not been completed, FPL is not considering such a device for Sanford No. 4. Thus, the report will not be helpful to us.

2a. DER Request:

The requested permitted equipment operating time is 120 full-capacity equivalent burn days when Orimulsion is fired. How much time will each pollution control device spend in operation?

FPL Response:

The exact time needed to test each pollution control device is presently unknown. The pollution control equipment is expected to begin operation in week no. 2 of the test burn and to continue to operate throughout the test.

2b. DER Request

Please submit a detailed schedule of testing of the pollution control devices.

FPL Response:

An updated schedule of the various phases of the test burn and planned emissions tests is contained in Attachment 2 hereto. Parametric testing of the pollution control modules will begin within the first two weeks of Orimulsion use and will continue throughout the test burn period. The data generated will allow FPL to establish performance trends and the design of full-scale equipment.

2c. DER Request

How long will Unit #4 be burning Orimulsion before the stack emissions are tested?

FPL Response:

FPL intends to begin boiler performance testing within one week of startup on Orimulsion and to conduct particulate emissions stack tests during the following week. The detailed estimated stack testing schedule is also contained in Attachment 2. Continuous emissions monitors (CEM's) will be installed and operated to track CO, O2, NO_x and SO_2 at the economizer outlet of Unit No. 4, and stack opacity will be measured during the entire test burn period.

2d. DER Request:

Will the test scale and duration be sufficient to size full-scale equipment or will future tests be necessary?

FPL Response:

FPL believes that the scale and duration of the proposed tests will be sufficient to enable the design of full scale equipment without the need for future Orimulsion burn tests. It should be noted that an additional thirty full power burn days of testing can be conducted should DER concur that it becomes necessary. The proposed testing of pollution control equipment involves two (2 side streams (or "slip streams"), the use of which has proven

effective at other facilities for test purposes. A brief description of the details of the control equipment to be tested on each slip stream is contained in Attachment 3A and 3B.

FPL also intends to continue testing the pollution control equipment when no. 6 oil is burned, after the burning of Orimulsion is completed. This will enable the Company to obtain more detailed information concerning the performance of the control equipment when burning no. 6 fuel oil, one of the fuel capabilities that the Company wishes to retain even in the event of conversion to Orimulsion. This information will further expand the data base on the equipment in question.

3 and 4. DER Request:

What is the estimated cost to FPL for the individual components of the proposed pollution control pilot study?

What are the model names and expected efficiencies of each of the pollution control devices to be tested?

FPL Response:

Details on the pollution control pilot equipment costs and efficiencies are tabulated for your convenience in Attachment 4.

5. DER Request:

What type of continuous emissions monitors (opacity, SO_2, NO_x, etc.) will be used on the inlet and outlet pilot test gas streams? Will these be in use the entire time the pilot test control equipment is being operated?

FPL Response:

Continuous emissions monitoring proposed on the two slip streams is summarized in Attachment 5 hereto. The lime spray dryer and the alkali scrubber will be fitted with SO_2 monitors. Visible emissions will be tracked with transmissometers. These CEM measuring devices will be in use the entire time that the pilot pollution control units are in operation.

6. DER Request:

What type of continuous emission monitors will be used on the Unit No. 4 exhaust stack while Orimulsion is being burned? Will these monitors also be used while No. 6 fuel oil is being fired?

FPL Response:

CEMs for SO_2, NO_x, CO, O_2 and opacity will be operated at Sanford Unit No. 4 throughout the test period (See response to 2C). Although EPA suggested in their comment letter to DER that CEM's for opacity, NO_x and SO_2 be installed in the stacks of Units No. 3 and 5 at Sanford as well, in subsequent discussions with FPL on this matter EPA indicated that it would reconsider its suggestion.

FPL does not intend to use the Unit No. 4 CEM's when burning No. 6 oil unless such oil is burned intermittently with Orimulsion during the test period.

7. DER Request:

What is the expected cost of No. 6 fuel oil per BTU during the next year? What is the expected cost of Orimulsion per BTU during the next year?

FPL Response:

As noted in the June 22 letter from Dr. Smith, Orimulsion will be marketed at coal-equivalent prices. For FPL, the price of coal received at the St. Johns River Power Park, jointly owned with Jacksonville Electric Authority, is approximately $1.76 per million BTU's of energy content. The price of medium sulfur oil like that currently burned at the Sanford Plant, is approximately $2.63 per million BTU's heat equivalent. Based upon this information 90 full power burn days would require $15.5 Million Dollars worth of Orimulsion fuel as compared with $23.1 Million Dollars worth of NO. 6 oil.

8. DER Request:

The solid waste generated during the test should go to a lined landfill with a leachate collection system. Is this type of landfill available for disposal of the solid waste?

FPL Response:

The Orimulsion test is expected to generate only minimal quantities of solid waste. A small amount of fly ash and lime spray dryer product will be collected from the pilot scale pollution control equipment. Small quantities of bottom ash resulting from Orimulsion combustion will be combined with the fly ash and sold as vanadium ore.

Attachment 6 summarizes the solid and liquid waste sources that will be associated with the pollution control equipment tests and the routes for disposal. The spray dryer/pulse jet fabric filter waste is expected to be disposed of in a DER-approved landfill. The pulse-jet and reverse-air fabric filter fly-ash products will be sold as vanadium ore.

Florida Institute of Technology (FIT) will study the leachability and solubility of the dry lime spray dryer wastes produced during the test. It is expected that these wastes will be mixed with water, or water and a cement-like additive, then compacted or compressed into a form that can be easily handled. After curing, these "shapes" will likely be stored in a dumpster for future off-site disposal.

FPL believes that is can obtain sufficient data from the Orimulsion test burn and the FIT project to enable it to design a leachate collection system for permanent conversion, if such a system is needed. FPL does not intend at this time to develop a landfill cell. Stabilized spray dryer solid waste will be stored on site for characterization and it will then be disposed of off-site in a landfill approved by DER for this type of waste as characterized. It is too early to tell whether or not a lined landfill with a leachate collection system will be necessary.

9. DER Request:

For PSD purposes, potential emission increases from a modification are compared to past actual emissions on a tons per year basis. Why were the potential emissions resulting from any fuel oil burning (which could occur the remainder of the year when Orimulsion is not being burned) not included in the potential emissions?

FPL Response:

A table of revised potential emissions calculations, taking into account EPA's letter to Mr. Clair Fancy of May 22, is enclosed as Attachment 7 hereto.

10. DER Request:

Past actual emissions listed in Table 3-2 do not correspond to values calculated from information submitted in the 1989 annual operating reports. Please explain the discrepancies.

FPL Response:

The emissions calculations listed in Table 3-2 assumed 120 days of operation rather than the unrepresentatively low 27 days per year of operation in 1988-9. The calculations of actual particulate matter emissions employed the permitted emission limitation because the values obtained from historical stack tests were almost the equivalent of the regulatory limit. So_2 emissions calculations assumed that all fuel-bound sulfur is converted into SO_2, a conservative assumption. NO_x emissions were based upon AP-42 values for front-fired boilers.

If you have any questions or need supplemental information, please let me know. Your cooperation and assistance in this matter are very much appreciated.

Sincerely,
Florida Power & Light Company

Elsa A. Bishop
Senior Environmental Coordinator, FPL

cc: Clair Fancy (w/o attachments) - FDER, Tallahassee

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Table 1. Potential Emissions During Orimulsion Test Burn at FPL Sanford Unit No. 4 (Page 1 of 3)

Data	Potential Emissions Oil Firing	Potential Emissions Orimulsion Testing	Total Potential Emissions
Heat Input (10^6 Btu/hr)	4,050	4,050	
Full Power Days	245.0	120	365 days
Sulfur Dioxide			
Emissions Basis	Actual[a]	Proposed[b]	
Emissions Basis (lb/10^6 Btu)	2.2	4.3	
Emissions (lb/hour)	8,901	17,415 OK	26,316
Emissions (tons/year)[c]	26,169	25,078	51,247
Particulate Matter			
Emissions Basis	Allowable[d]	Proposed[e]	
Emissions Basis (lb/10^6 Btu)	0.125	0.338	
Emissions (lb/hour)	506 ok	1,369 OK	1,875 ok
Emissions (tons/year)[c]	1,488 ok	1,971 OK	3,460 OK
Particulate Matter (PM10)			
Emissions Basis	AP-42[f]	Proposed	
Emissions Basis (lb/10^6 Btu)	0.09	0.338	
Emissions (lb/hour)	359	1,369 OK	1,728
Emissions (tons/year)[c]	1,057 ok	1,971 ok	3,028 ok
Nitrogen Oxides			
Emissions Basis	AP-42[g]	AP-42[h]	
Emissions Basis (lb/10^6 Btu)	0.70	0.70 ok	
Emissions (lb/hour)	2,834	2,834	5,668
Emissions (tons/year)[c]	8,332	4,081	12,412
Carbon Monoxide			
Emissions Basis	AP-42	AP-42	
Emissions Basis (lb/10^6 Btu)	0.03	0.03	
Emissions (lb/hour)	135	135 OK	270
Emissions (tons/year)[c]	397	194	591

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Table 1. Potential Emissions During Orimulsion Test Burn at FPL Sanford Unit No. 4 (Page 2 of 3)

Data	Potential Emissions Oil Firing	Potential Emissions Orimulsion Testing		Total Potential
Volatile Organic Compounds				
Emissions Basis	AP-42	AP-42		
Emissions Basis (lb/10^6 Btu)	0.002	0.002	OK	
Emissions (lb/hour)	8	8		15
Emissions (tons/year)[c]	22	11		33
Lead				
Emissions Basis	AP-42	AP-42		
Emissions Basis (lb/10^6 Btu)	2.80E-05	2.80E-05	OK	
Emissions (lb/hour)	0.11	0.11		0.23
Emissions (tons/year)[c]	0	0.16		0.50
Sulfuric Acid Mist				
Emissions Basis	AP-42	AP-42		
Emissions Basis (lb/10^6 Btu)	2.90E-02	5.41E-02	OK	
Emissions (lb/hour)	117	219		337
Emissions (tons/year)[c]	345	316		661
Total Fluorides				
Emissions Basis	EPA (1980)	EPA (1980)		
Emissions Basis (lb/10^6 Btu)	3.47E-04	3.47E-04	OK	
Emissions (lb/hour)	1.40	1.40		2.81
Emissions (tons/year)[c]	4.13	2.02		6.15
Mercury				
Emissions Basis	EPA (1989)	Test Sample[1]		
Emissions Basis (lb/10^6 Btu)	3.28E-06	1.54E-05	OK	
Emissions (lb/hour)	1.33E-02	6.24E-02		0.076
Emissions (tons/year)[c]	0.039	0.09		0.129
Beryllium				
Emissions Basis	EPA (1989)	Test Sample[1]		
Emissions Basis (lb/10^6 Btu)	4.37E-06	1.54E-05	OK	
Emissions (lb/hour)	1.77E-02	6.24E-02		0.080
Emissions (tons/year)[c]	0.052	0.09		0.142

Table 1. Potential Emissions During Orimulsion Test Burn at FPL Sanford Unit No. 4 (Page 3 of 3)

Data	Potential Emissions Oil Firing	Potential Emissions Orimulsion Testing	Total Potential Emissions
Arsenic			
Emissions Basis	EPA (1989)	Test Sample[i]	
Emissions Basis (lb/10^6 Btu)	4.37E-05	3.85E-05	
Emissions (lb/hour)	1.77E-01	1.56E-01	0.333
Emissions (tons/year)[c]	0.520	0.22	0.745

[a]2.0 percent sulfur and 18,200 Btu/lb.
[b]2.8 percent sulfur and 13,000 Btu/lb.
[c]Calculated based on 245 full-power days for oil firing and 120 full-power burn days for Orimulsion testing.
[d]Based on an average emission of 0.1 lb/10^6 Btu for 21 hours and excess emissions of 0.3 lb/10^6 Btu for hours.
[e]Based on an average emission of 0.3 lb/10^6 Btu for 21 hours and excess emissions of 0.6 lb/10^6 Btu for 3 hours.
[f]PM10 emissions is 71 percent of PM emissions (from AP-42).
[g]Based on vertical fired boilers, could be as high as 1 lb/10^6 Btu due to low excess air burners.
[h]Emissions on Orimulsion equivalent to oil firing. Emissions of total reduced sulfur, reduced sulfur compounds, hydrogen sulfide, asbestos, vinyl chloride, benzene, and radionuclides are negligible for oil and orimulsion firing.
[i]Determined from sample analyses. Parameters below the minimum detectable limit of the method.

References

U.S. Environmental Protection Agency (EPA). 1980. Health Impacts, Emissions and Emission Factors for Noncriteria Pollutants Subject to De Minimis Guidelines and Emitted from Stationary Conventional Combustion Processes. Office of Air Quality Planning and Standards. Research Triangle Park, NC. EPA-450/2-80-074

U.S. Environmental Protection Agency (EPA). 1989. Estimating Air Toxics Emissions from Coal and Oil Combustion Sources. Office of Air Quality Planning and Standards. Research Triangle Park, NC. EPA-450/2-89-001

Explanation of Table

Table 1 presents, as additional information, the most conservative interpretation of potential emissions as suggested in EPA's letter dated May 22, 1990. The table presents the potential emissions, assuming 120 full-power burn days, of Orimulsion testing under the conditions proposed by FPL. In addition, potential emissions for 245 full-power burn days when firing No. 6 fuel oil are also presented in Table 1. For oil firing, a typical maximum sulfur content of 2 percent was assumed.