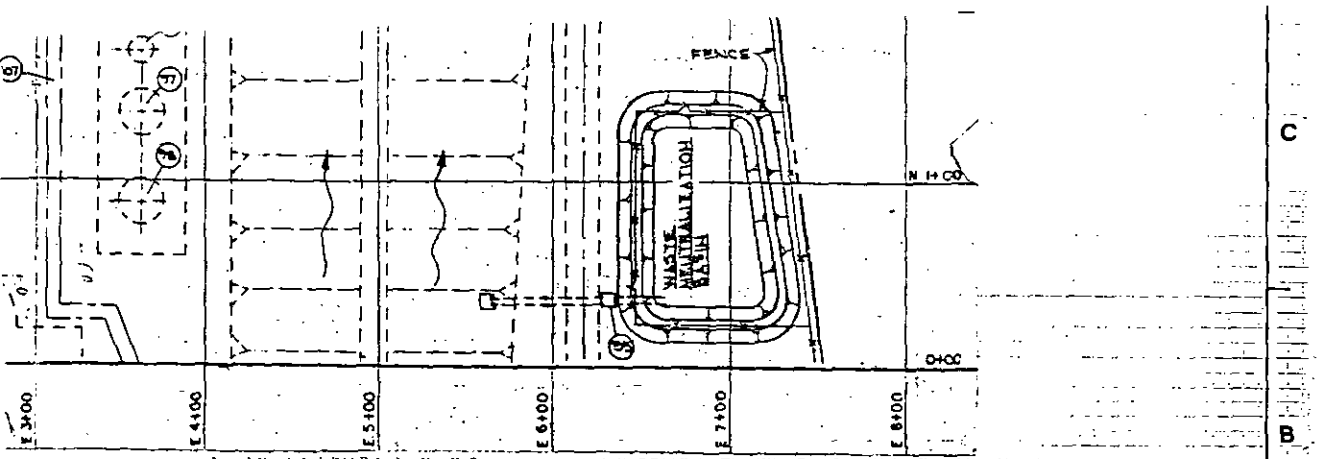
8/13/97

Note to File:

Large Blue Print & 4 Drawings
Project is in Martin Costello's office



C

B

A

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For				
For Construction	X			

STATUS: 6/18/90

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Nuc		
Dwng	Chkd	SI

Reviewed By: Manager – Design & Drafting

Approved for Construction: Chief Engineer

FLORIDA POWER & LIGHT
SANFORD UNIT 4

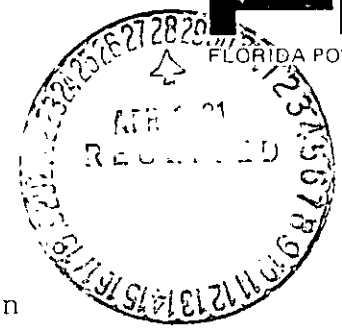
PLOT PLAN

BURNS AND ROE COMPANY
Engineers and Constructors — Oradell, NJ
A Component of Burns and Roe Enterprises, Inc.

Date	Work Order	Drawing No	Rev
Scale	6530	SM101	A

Post Office Box 529100, Miami
Florida 33152

FPL
FLORIDA POWER & LIGHT COMPANY



April 27, 1981

Mr. Steve Smallwood
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Volusia County - AP
Florida Power & Light Company
Sanford Coal Handling & Pulverizing Facility
Permit No. A064-36999

Dear Steve:

In accordance with Specific Condition No. 10 of the above permit, enclosed is a monthly summary of the records reflecting the hours of operation, coal and oil inputted to the pulverizer and mixer, amount of coal/oil mixture produced, and the amount of fuel consumed.

Sincerely,

W. J. Barrow, Jr.
Manager of Environmental
Permitting & Programs

WJB/gs
Enclosure

cc: M. Surabian, P.E.
Bectel Power Corporation

A. Senkevich, P.E.
District Manager,
Orlando DER

REPORT ON C.O.M. FACILITY PRODUCTION

MONTH	YEAR	HOURS OF PULVERIZING OPERATION	AMOUNT OF COAL TO MIX TON'S	AMOUNT OF OIL TO MIX TON'S	AMOUNT OF OIL TO MIX BARRELS	AMOUNT OF GAS CONSUMED. MCF.	AMOUNT OF C.O.M. PRODUCED TON'S
APRIL	1980	73.5	521	4232	24957	208	4855
MAY	1980	288.5	4416	12056	71017	2139	16755
JUNE	1980	50.5	1189	3164	18613	219	4371
JULY	1980	464.0	4961	5545	32508	1027	10729
AUGUST	1980	184.5	7644	8577	50181	1914	16637
SEPTEMBER	1980	397.5	8983	10424	61124	2268	19847
OCTOBER	1980	198.0	4739	6136	36090	1093	11117
NOVEMBER	1980	79.0	2349	2613	15362	653	5053
DECEMBER	1980	685.0	21401	31338	184271	6439	53737
JANUARY	1981	640.5	22606	32327	187306	7468	55959
FEBRUARY	1981	672.0	20069	27874	160947	5850	48834
MARCH	1981	672.0	24973	32025	185084	6719	58091
APRIL	1981	168	8186	16120	92908	1659	24764
TOTAL		4573	132037	192431	1,120,368	37656	330749

P.O. BOX 529100 MIAMI, FL 33152

CERTIFIED MAIL RETURN
RECEIPT REQUESTED

April 27, 1981

Mr. Tommie Gibbs
Chief, Air Facilities Branch
Air and Hazardous Materials Division
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30308

Re: PSD-FL-047, FPL Sanford COM
(Coal/Oil Mixture) Test Project

Dear Mr. Gibbs:

In accordance with Special Condition Number 5 of the above referenced permit, the 365-day "test" period referred to in Special Condition Number 2 has ended. We hereby certify that the operations approved in the above permit were discontinued at 9:05 am on Sunday, April 19, 1981.

Sincerely,

W. J. Barrow, Jr.
Manager of Environmental
Permitting & Programs

WJB:RTK:sal

cc: Mr. Steve Smallwood, Florida Department of Environmental Regulation, Tallahassee, Florida

HOPPING BOYD GREEN & SAMS
ATTORNEYS AND COUNSELLORS
SUITE 420, LEWIS STATE BANK BUILDING
POST OFFICE BOX 6526
TALLAHASSEE, FLORIDA 32301
(904) 222-7500

CARLOS ALVAREZ
WILLIAM L. BOYD, IV
WILLIAM H. GREEN
WADE L. HOPPING
RICHARD D. MELSON
GARY P. SAMS

BRIAN H. BIBEAU
CALVIN J. LIVINGSTON
WILLIAM D. PRESTON

COUNSEL,
W. ROBERT FOKES
JOHN C. WHITE

April 27, 1981

HAND DELIVERED THIS DATE

Victoria J. Tschinkel, Secretary
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Proposed Coal/Oil Mixture Burn Continuance at FPL's Sanford Unit 4 - ERC Rulemaking

Dear Vicki:

Please find enclosed a copy of a document entitled "Proposed Coal/Oil Mixture Burn Continuance at Florida Power & Light Company's Sanford Plant Unit 4," prepared by FPL in connection with the above-referenced matter. The information contained in the document covers the areas of particular interest to the Department as outlined by your staff.

We believe this document, together with information already in the possession of the Department, will allow the Department to arrive at a position on the proposed rule in the immediate future. We would appreciate the opportunity to discuss this with you and answer any questions that might come up on the attached, prior to the issuance of the public notice for the June 10th ERC hearing.

The continued cooperation of you and your staff is sincerely appreciated.

Very truly yours,

Bill

William H. Green
Counsel for Florida Power & Light Company

WHG/gs
Enclosures

cc: Steve Smallwood
Mary F. Clark, Esquire

4/27/81

PROPOSED

COAL/OIL MIXTURE BURN CONTINUANCE

AT FLORIDA POWER & LIGHT COMPANY'S

SANFORD PLANT UNIT 4

PROPOSED
COAL/OIL MIXTURE BURN CONTINUANCE
AT FLORIDA POWER & LIGHT COMPANY'S
SANFORD PLANT UNIT 4

TABLE OF CONTENTS

SECTION I

INTRODUCTION

Florida Power & Light ("FPL") estimates that in order to meet projected customer demand through 1990, its residual oil consumption would have to increase substantially over the next decade, reaching levels of approximately 55 million barrels per year. (This projection takes into account the effect of new generating capacity, availability of natural gas, nuclear generating capacity, and conservation measures; it represents FPL's estimate of the approximate quantity of oil that would be needed in the absence of the successful utilization of alternative fuels at existing units.) It is difficult to estimate the quantity of fuel oil that will be available over the next decade. The possibility exists that changes in the world oil market, decisions by oil producers and refiners, and international political developments, will reduce the availability of fuel oil. Prices of residual oil have increased well in excess of the most pessimistic projections, by more than doubling in the last two years. Moreover, it appears that the price of all grades of oil will continue to rise.

The 1980 Florida legislature authorized the Florida Public Service Commission ("PSC") to adopt statewide goals for electric utilities for decreasing the use of expensive resources, such as petroleum fuels. The PSC has adopted such rules which provide that "The use of oil as a generating fuel shall be reduced to the greatest practicable and cost effective extent. The overall goal for the 1980-85 period is to develop or implement programs to reduce the use of oil by 25% by 1989. . ."

The Federal Powerplant and Industrial Fuel Use Act of 1978 prohibits electric utilities from burning natural gas after 1990. FPL's natural gas supplies under existing firm contracts will begin to dwindle in 1983, and the complete loss of all gas suppplied under such contracts is expected by mid-1988. Thus, there is a substantial chance that

all natural gas supplies (presently equivalent to 14 million barrels of oil per year) will be unavailable to FPL in 1990. In addition, the aforementioned oil reduction programs of the Florida Public Service Commission would envision displacement of another ten million barrels of oil per year for a total of 24 million equivalent barrels of oil that may have to be supplied by some other fuel.

Coal is the only apparent alternative fuel source that will be available in sufficient quantities to offset the reduction in oil and gas supplies over the next decade and beyond. The political, regulatory, and licensing lead-time problems associated with nuclear power plant construction, the technological status of synthetic fuel use, and the limits of voluntary conservation eliminate the possibility that these alternatives can successfully mitigate the fuel oil dependency during this time frame. Construction of new coal-fired power plants could likely be accelerated, but this alternative also requires considerable time and expense. The fact is that FPL must begin to take steps to utilize coal, if possible, in its existing oil-fired generating units or be subjected to extraordinary increases in costs and potential disruption of fuel supplies. Unless the projected reliance on oil is significantly decreased, substantial economic hardship for the citizens of Florida and periodic unavailability of supplies of electricity could result.

In recognition of this problem, on January 2, 1980, DER Secretary Jacob D. Varn issued a variance allowing FPL relief from emission limitations at its Sanford Unit 4 to enable a test burn of coal/oil mixutres ("COM") to be conducted. This was the first such test in kind and duration at a large generating unit. The recently completed test burn was a major success. It demonstrated that Sanford Unit 4 is capable of accommodating the burning of COM on a long term basis.

FPL now proposes to continue the use of COM at Sanford Unit 4, and to eventually attempt to burn up to 100% coal at Sanford Units 4 and 5 on a permanent basis. Permission is sought to burn COM over a period of approximately 30 months (following all necessary state and federal approvals) while an electrostatic precipitator is being retrofitted. Once retrofitted, Unit 4 will comply with all of the present SIP emission limitations applicable to existing oil-fired units.

FPL also proposes to conduct up to 90 full-power-burn days of tests at Sanford Unit 4, during the 30-month pre-precipitator period. The tests would involve the burning of coal and/or various mixtures of coal and oil and/or water.

So that this project may go forward, FPL has requested that the Florida Environmental Regulation Commission amend Chapter 17-2, Florida Administrative Code, by specifying emission limitations which would apply when: a) burning COM during 30-month pre-precipitator period, b) conducting fuel experiments during the 90 full-power-burn days, and c) burning COM or coal after precipitator installation. FPL is also seeking the Commission's concurrence that the proposed switch to coal-based fuel(s) should not cause the units to be treated as "new sources," so long as the units will return to compliance with the present emission limitations for oil-fired units, subsequent to the 30-month period.

During the retrofit period, particulate emissions from the Sanford plant as a whole will be restrained to levels that are less than the maximum allowed under the 1979 fuel oil variance. In addition, the 90 full-power-burn day tests will not produce emissions which exceed the interim limitations previously allowed by Secretary Varn's order for COM. In all cases, the projected emissions will not threaten ambient air quality standards or Prevention of Significant Deterioration growth increments.

FPL's proposal will result in an estimated annual fuel savings to its customers in excess of $20,000,000 per year, by burning COM in Sanford Unit 4.

SECTION II

TEST DATA ON PRIOR COM TEST BURN

A. Particulate Stack Emission Tests

Table II-1 lists the results of the various stack tests on particulate taken during the prior COM test. These data show that emissions were less than one-half of the expected worst-case allowable level. It is anticipated that continued use of COM during the pre-precipitator period would not exceed the 0.7 pound per million BTU level.

B. Figure II-1 is a map of the Sanford area showing the location of ambient air monitors. Figures II-2 and II-3 show the quarterly average results for particulate. Figures II-4 and II-5 show the quarterly maximum particulate results. Figures II-6 and II-7 show the quarterly SO_2 average measurements. Figures II-8 and II-9 show the quarterly SO_2 maximums.

As can be seen, Florida particulate and ambient air quality standards were never violated during the test period.

Table II-1

SUMMARY OF SANFORD #4 PARTICULATE EMISSIONS TESTS

DATE	% COM (COAL/OIL)	MAXIMUM OPACITY (MONITORS)	MAXIMUM OPACITY (VISUAL)	AVERAGE PARTICULATE (LBS./HOUR)	AVERAGE PARTICULATE (LBS./10^6 BTU)
4/18/80	0/100	23%	-	466	.122
5/ 7/80	20/80	29%	-	849	.227
5/28/80	30/70	38%	42%	1,072	.327
7/21/80	40/60	48%	43%	1,599	.428
8/ 5/80	45/55	55%	-	1,857	.493
9/11/80	50/50	45%	49%	1,724	.531
12/ 2/80	40/60	40%	38%	2,111	.587
1/ 6/81	40/60	43%	45%	1,897	.562
1/27/81	40/60	46%	44%	2,153	.577
2/17/81	40/60	47%	44%	2,047	.590
3/ 4/81	40/60	48%	52%	1,596	.460
3/18/81*	40/60	57%	50%	2,484	.714
4/ 7/81	40/60	54%	55%	1,508	.490

NOTE:

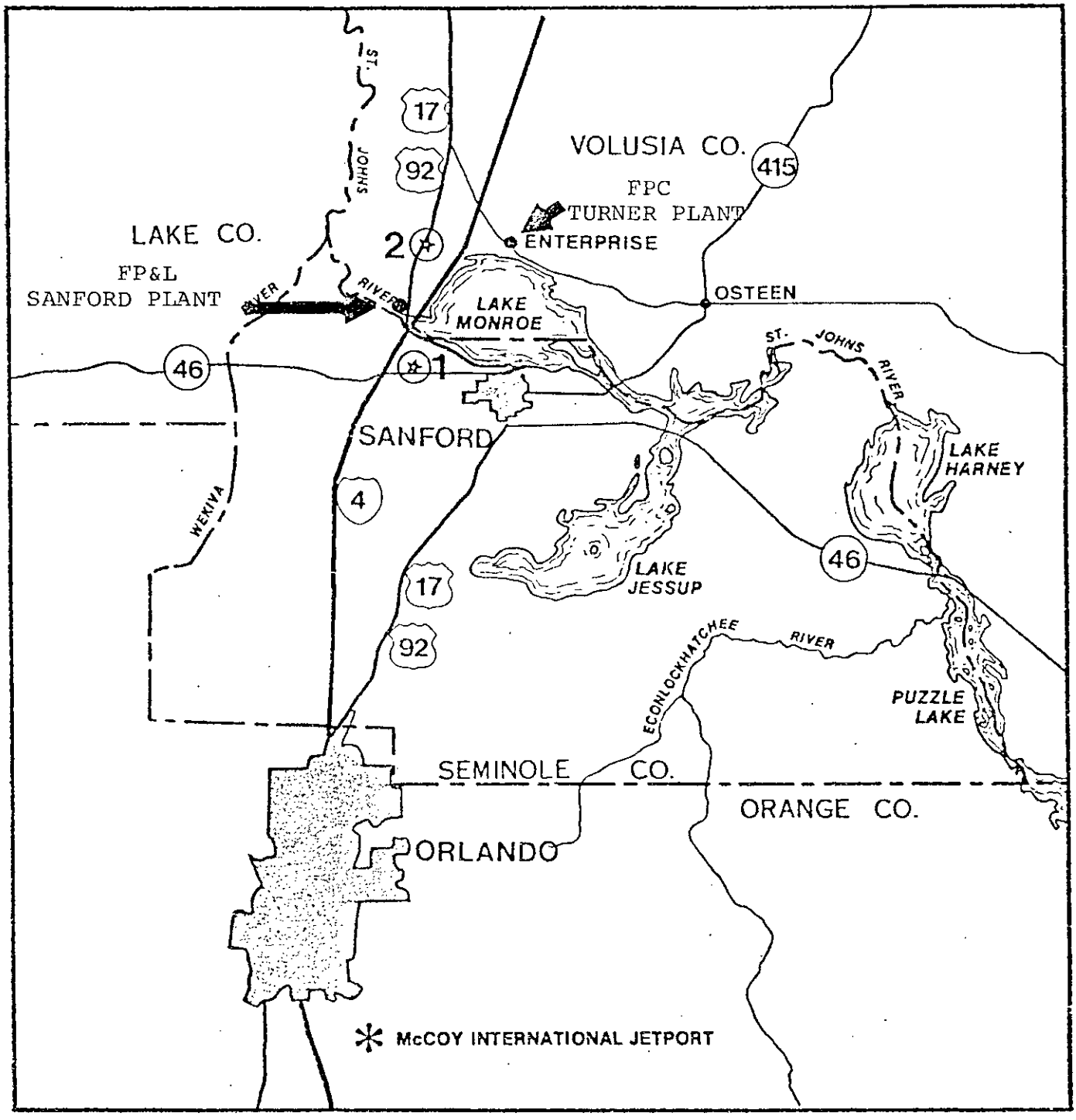
The above information is a summary of particulate emission tests conducted on Sanford Unit No. 4 burning COM (Coal/Oil Mixture). Only the full load test emissions are listed above. Other lower load tests were also run, which resulted in lower emissions.

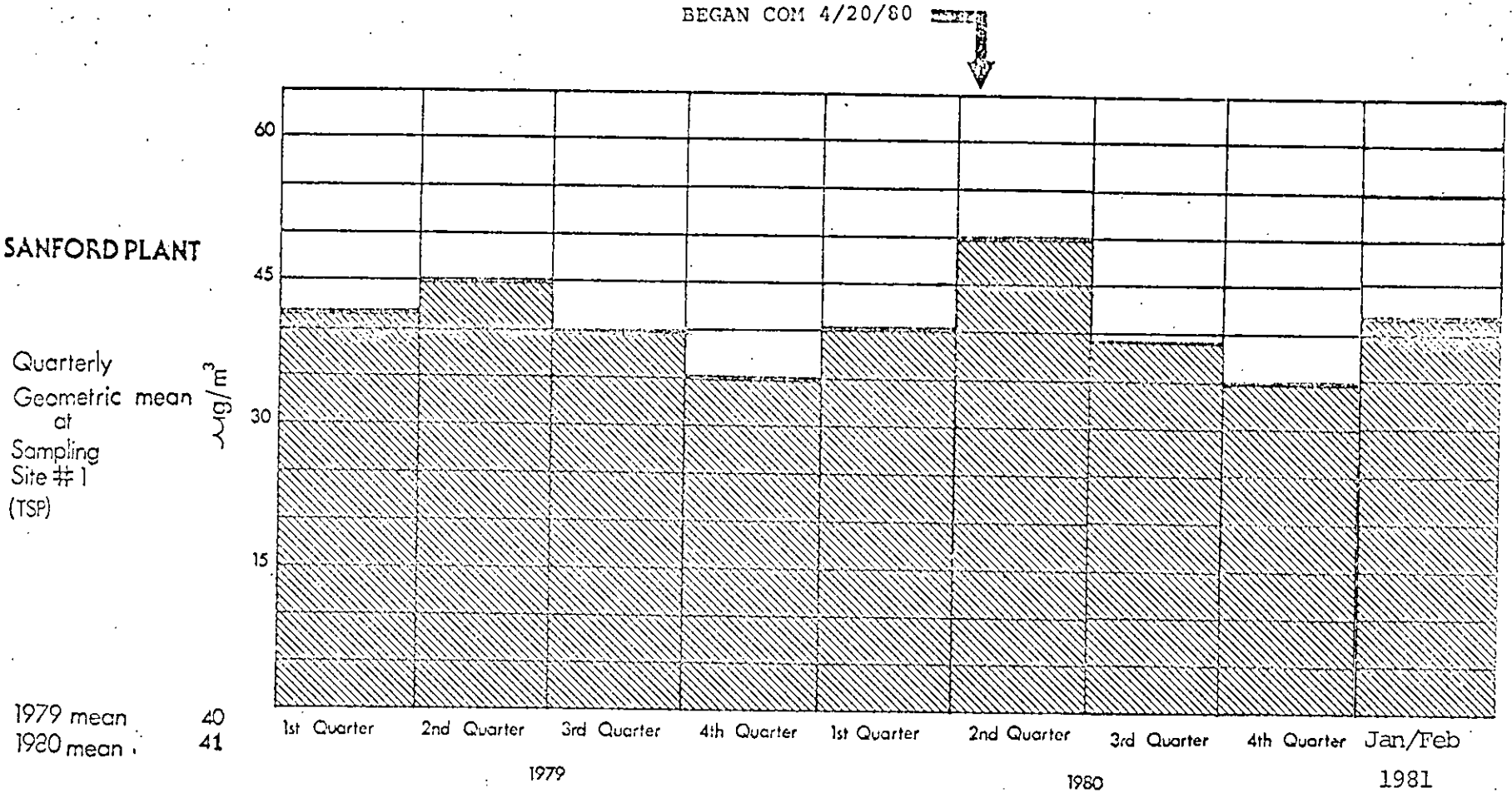
Full reports of all tests and backup information have been filed with the Department of Environmental Regulation in Tallahassee and the Environmental Protection Agency, Region IV, in Atlanta, with the exception of the 3/18/81 and 4/7/81 tests. These will be filed as soon as the full test reports are received from the consultant.

*One of the test runs conducted on this date indicated higher than normal particulate emissions. This was believed to be a combination of new burners being tested and resulting problems with combustion.

FIGURE II-1

SANFORD PLANT
AMBIENT AIR MONITORING STATIONS





Note: Annual Geometric mean standard for TSP = 60μg/m³

FIGURE II-2

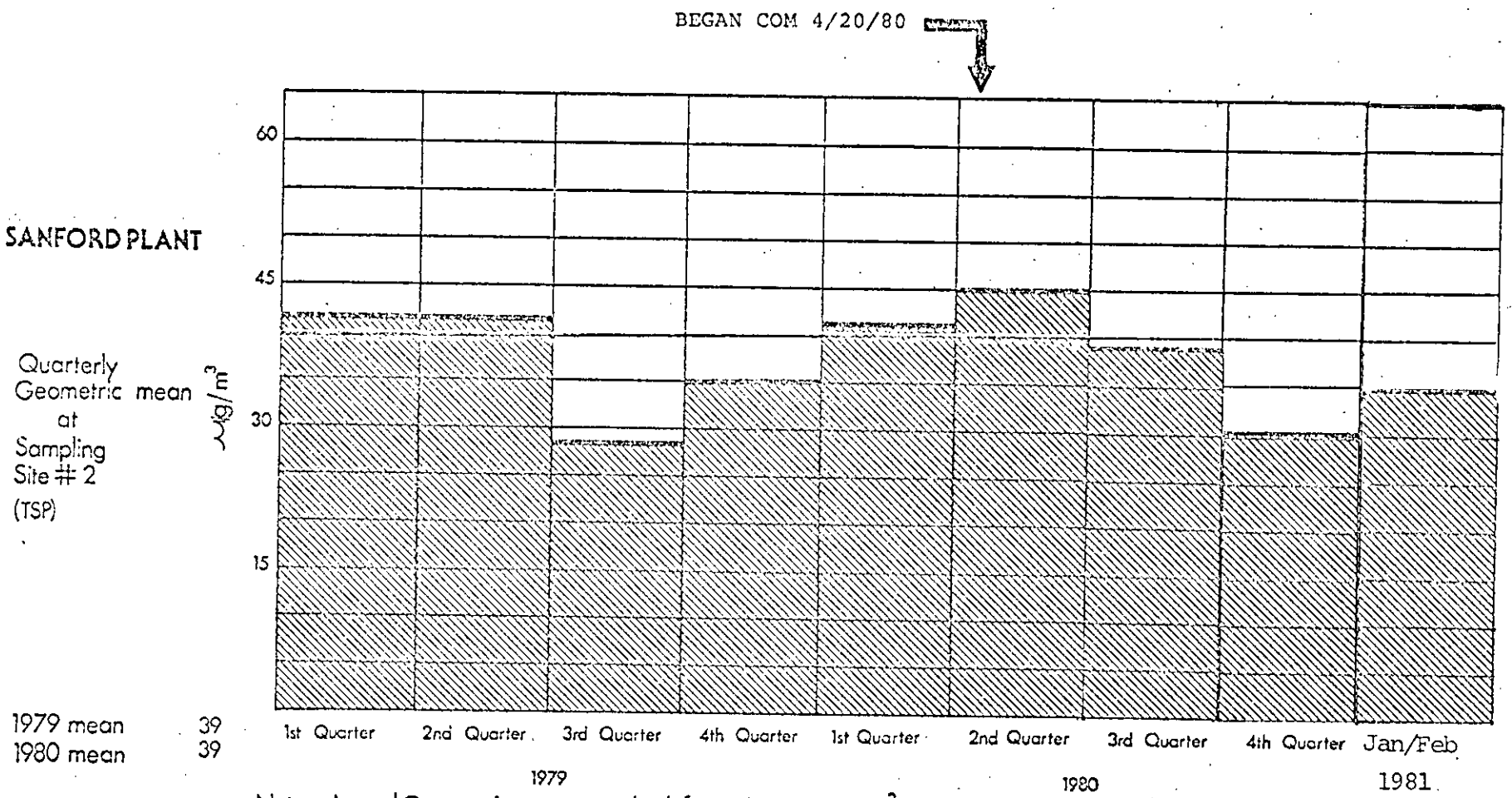

BEGAN COM 4/20/80
SANFORD PLANT
Quarterly Geometric mean at Sampling Site # 2 (TSP)
μg/m³
60
45
30
15
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
Jan/Feb
1979
1980
1981
1979 mean 39
1980 mean 39
Note: Annual Geometric mean standard for TSP = 60μg/m³

FIGURE II-3

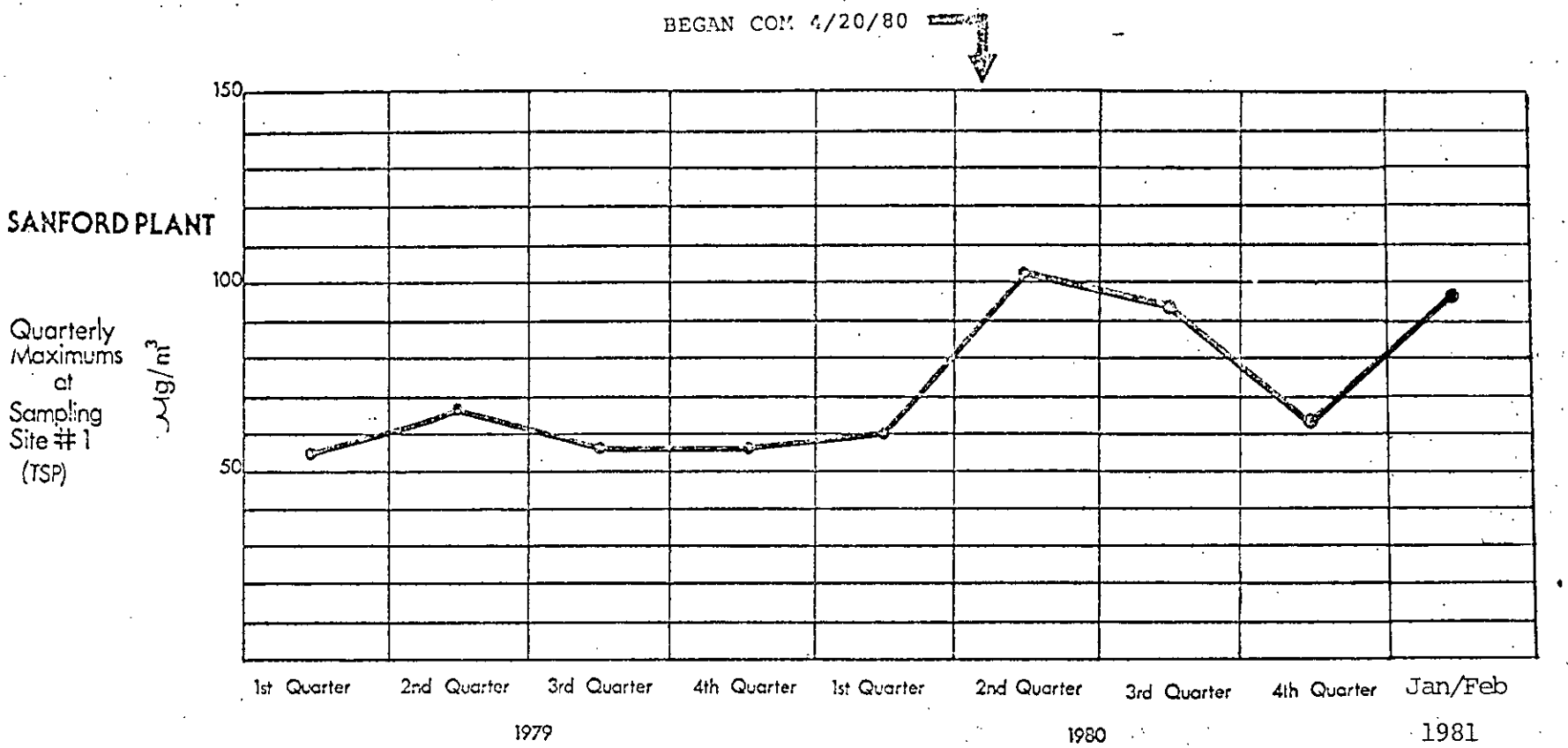
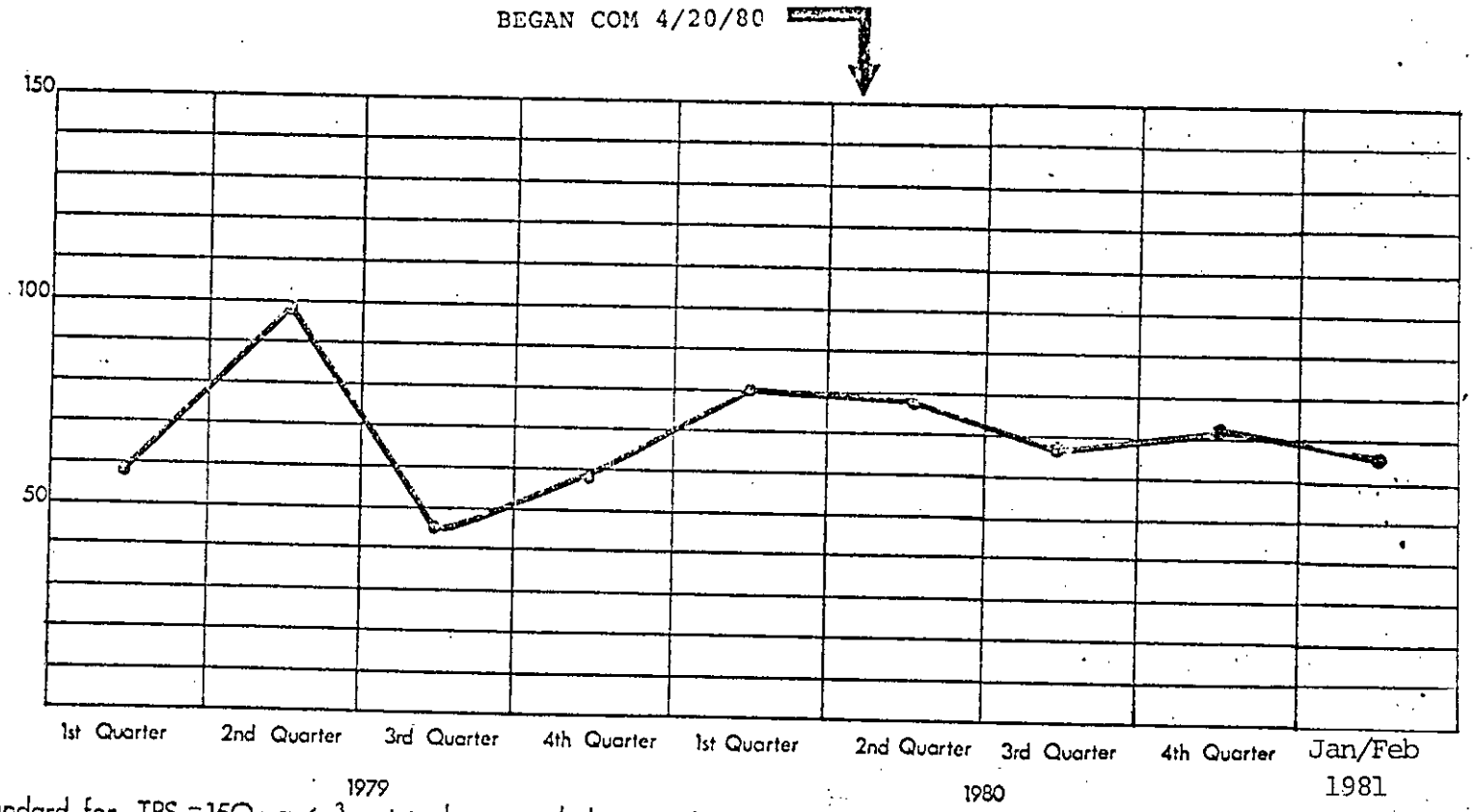


FIGURE II-4

Note: 24-hour standard for TPS = 150 μg/m³ not to be exceeded more than once per year

SANFORD PLANT



Note: 24-hour standard for TPS = 150 $\mu g/m^3$ not to be exceeded more than once per year

FIGURE II-5

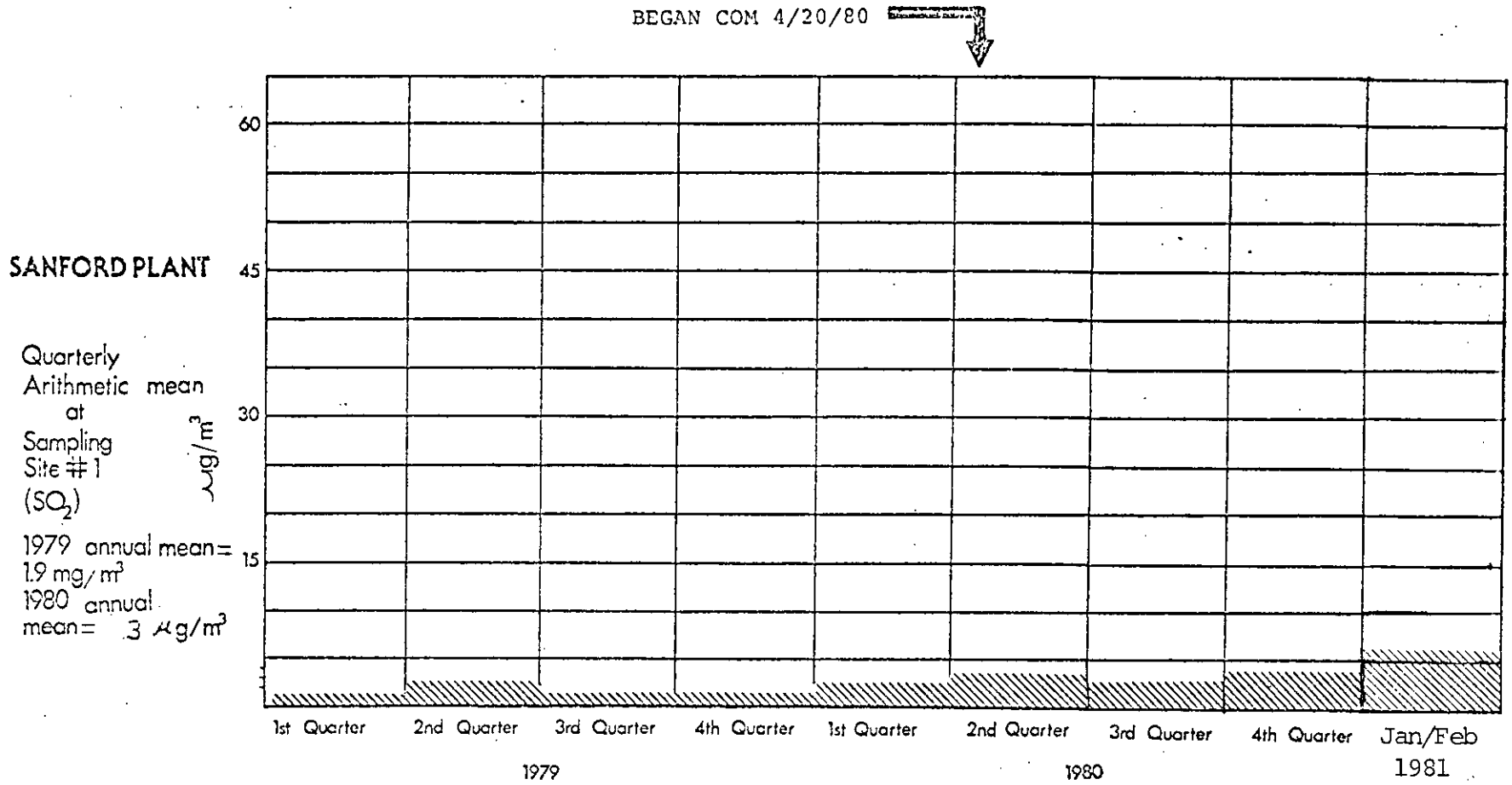
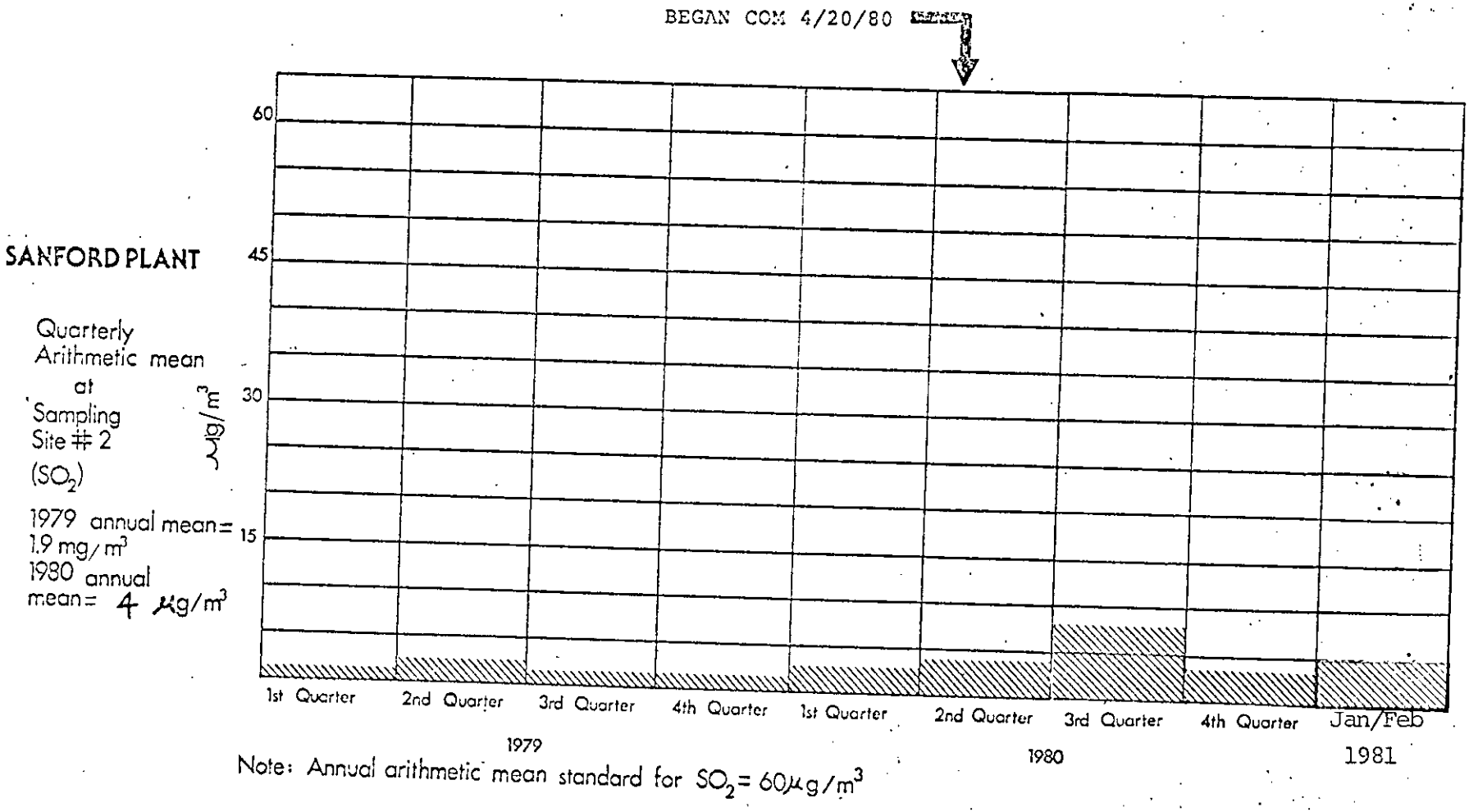


FIGURE II-6

Note: Annual arithmetic mean standard for SO_2= 60µg/m³



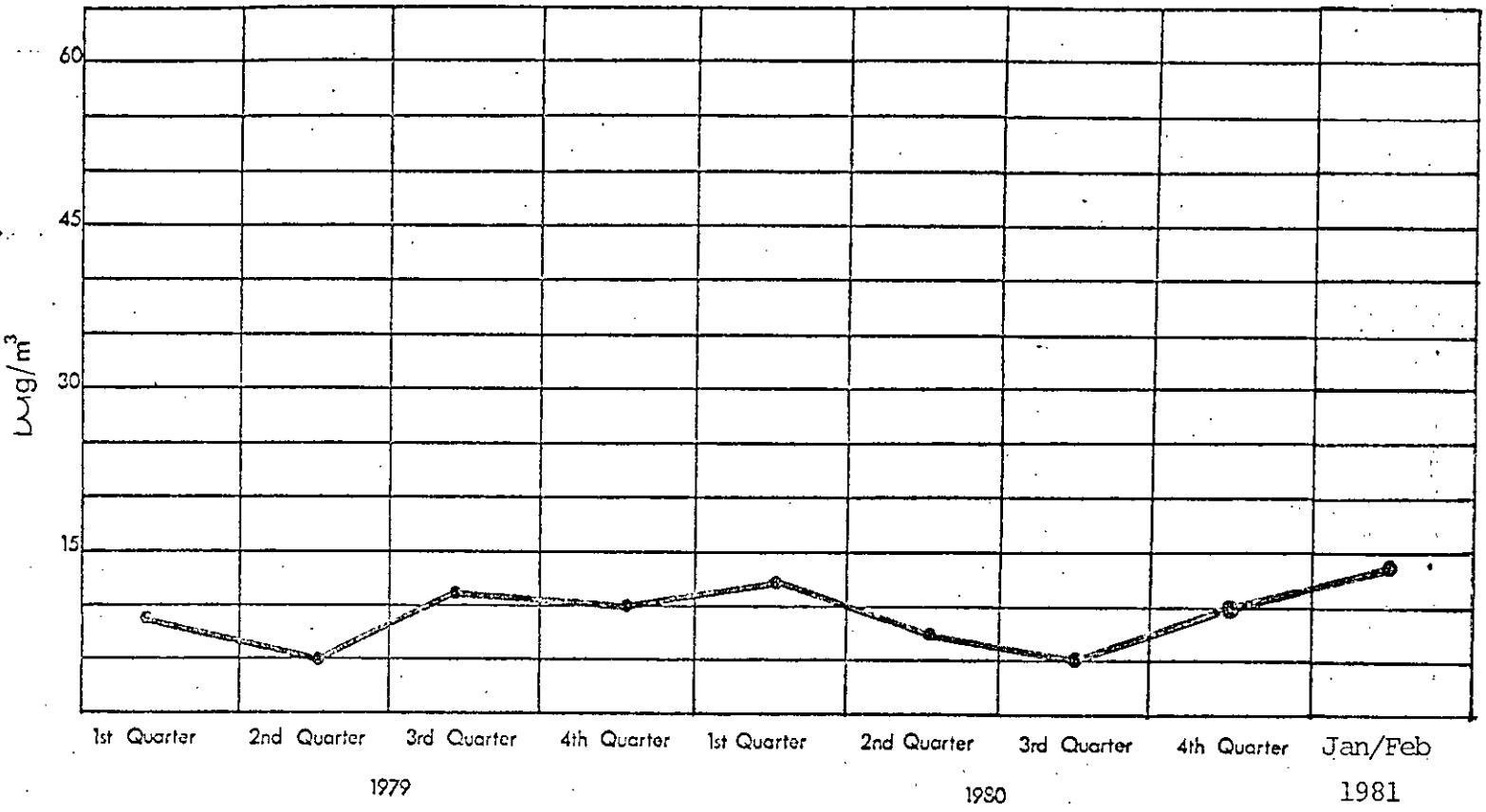
Note: Annual arithmetic mean standard for SO_2 = 60µg/m³

FIGURE II-7

BEGAN COM 4/20/80

SANFORD PLANT

Quarterly Maximums at Sampling Site #1 (SO_2)

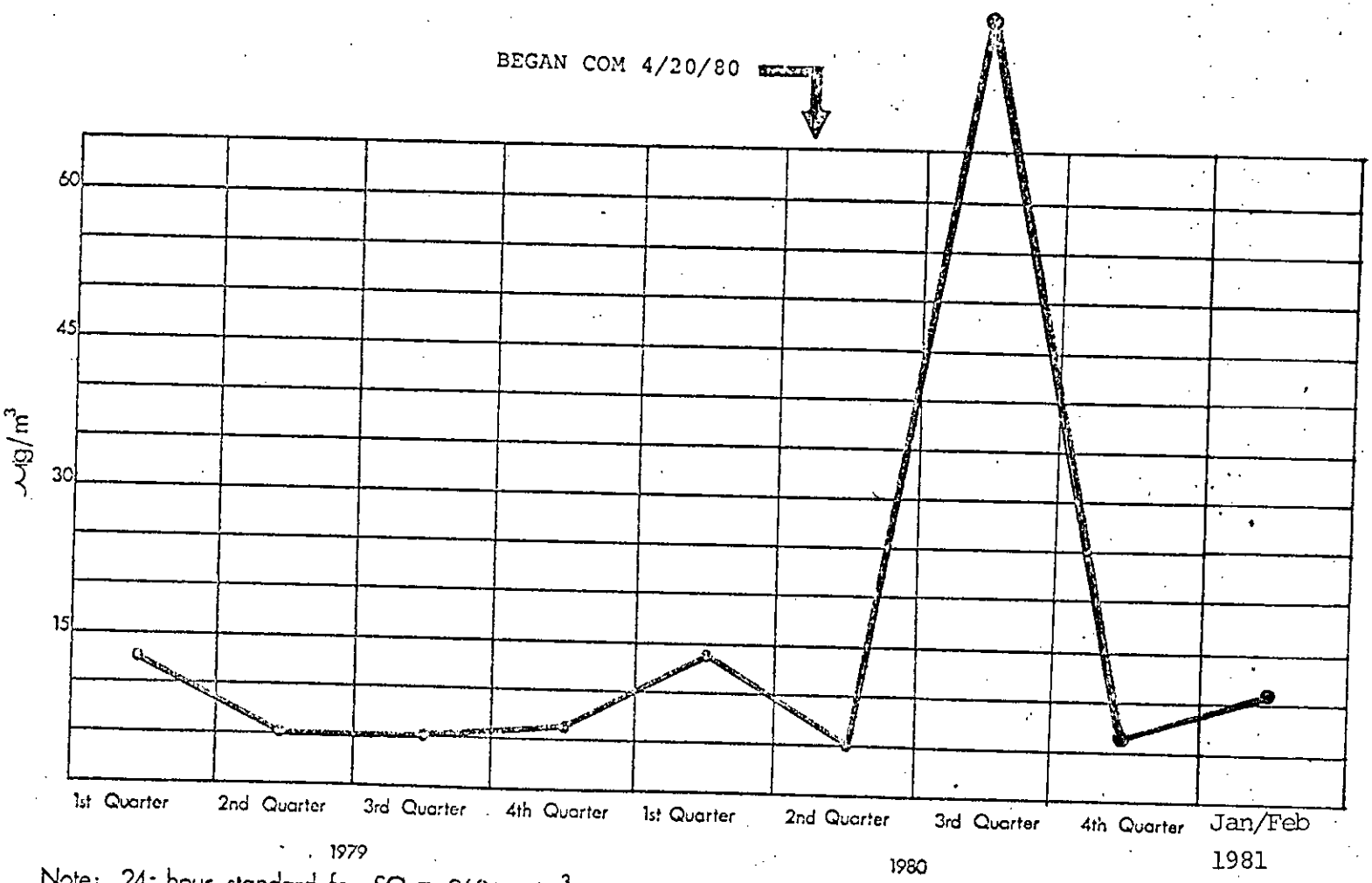


Note: 24-hour standard for SO_2 = 260μg/m³

FIGURE II-8

SANFORD PLANT

Quarterly Maximums at Sampling Site # 2 (SO_2)



Note: 24- hour standard for SO_2 = 260$\mu g/m^3$

THE SECOND HIGHEST OBSERVED VALUE FOR 3rd QUARTER 1980 WAS 5 $\mu g/m^3$

FIGURE II-9

SECTION III

PROPOSED COM EMISSION LIMITS

A. Proposed Sulfur Dioxide Emission Limits

The sulfur dioxide emission limitation applicable to Sanford Unit 4 when burning oil and coal set forth in Chapter 17-2, Florida Administrative Code, is 2.75 and 6.17 pounds per million BTU respectively. Rather than prorate these limits, FPL proposes to use a COM mixture that will still comply with the 2.75 pound per million BTU oil limit.

B. Proposed Particulate Emission Limits and Bubbles

The proposed rule to allow Sanford Unit 4 to continue burning COM for a 30 month period is in the form of an emission rate and a cap or bubble. There is a proposed particulate emission limiting rate for Sanford Unit 4 of 0.7 lbs/10^6 Btu (2,520 lbs/hour) and a plant emission cap of 2,920 lbs/hour. The bubble is equivalent to the emission allowed for Sanford Units 3, 4, and 5 under the particulate variance, i.e., 0.34 lb/10^6 Btu at maximum capacity (24 hour average).

These emission limiting standards can be best expressed by the equation:

$X + Y + Z = 2{,}920$ lbs/hour Equation 1

where X = Unit 3 emissions ≤ 0.34 lbs/10^6 Btu

Y = Unit 4 emissions ≤ 0.7 lbs/10^6 Btu

Z = Unit 5 emissions ≤ 0.34 lbs/10^6 Btu

Under the emissions bubble there is a variety of possible emission scenarios that would meet the proposed rule. One scenario could have Unit 4 at 2,520 lbs/hour (a 0.7 lb/10^6 Btu limit at maximum capacity). Unit 5 at 360 lbs/hour (a 0.1

lbs/10^6 Btu limit at maximum capacity) and Unit 3 at 40 lbs/hour (a 0.03 lbs/10^6 Btu limit at maximum capacity) to equal 2,920 lbs/hour. The overall plant emissions would equal 2,920 lbs/hour, i.e., the emission bubble.

Sanford Unit 4 often had emissions less than 0.7 lbs/10^6 Btu when burning COM. ~~An~~ emissions from Unit 4 of 0.67 lbs/10^6 Btu at maximum capacity would enable both Units 3 and 5 to emit at 0.1 lbs/10^6 Btu during maximum capacity periods.

FPL can meet the emissions restrictions on Units 3 and 5 by using certain combinations of: 1) natural gas in Unit 3, 2) high quality low asphaltene oil in Units 3 and 5, and/or 3) emission/load control in Unit 4.

The proposed rule also contains a provision to allow testing of coal and oil, and coal and water mixtures. Particulate emissions are limited by 5,150 lbs/hour and 6,850 lbs/hour respectively for both Sanford Unit 4 and the plant. A period of 90 full-power burn days is proposed for testing. This testing bubble would limit emissions at maximum capacity to 1.43 lbs/10^6 Btu from Unit 4 and 0.34 lbs/10^6 Btu from Units 3 and 5. With the exception of the duration of testing (90 versus 120 full-power burn days), the emission cap is identical to the inital COM variance.

The testing bubble can be expressed by the following equation:

$X_1 + Y_1 + Z_1 = 6{,}850$ lbs/hour Equation 2

where X_1 = Unit 3 emissions $\leq$ 0.34 lbs/10^6 Btu

Y_1 = Unit 4 emissions $\leq$ 5,150 lbs/hour; 1.43 lbs/10^6 Btu at maximum capacity

Z_1 = Unit 5 emissions $\leq$ 0.34 lbs/10^6 Btu

Emision restrictions can be achieved in a variety of methods so long as the emission caps as represented in both equations 1 and 2 are not exceeded.

C. Coal/Oil Mixture Fuel Specifications

The proposed COM fuel specifications are as follows:

	CLEAN COAL
Ash (by weight)	10% Maximum
Sulfur (ultimate analysis)	2% Maximum*
Moisture (by weight)	10% Maximum
Heating Value	12,500 BTU/lb Minimum

	NO. 6 FUEL OIL
Ash	.1% Maximum
Sulfur	2.5% Maximum
Asphaltenes	5.5% Maximum
Vanadium	200 PPM Maximum

*SO_2 emissions will not exceed 2.75 lbs/10^6 Btu. The actual sulfur percentage of the coal will depend upon the actual heating value of the coal. These specifications are independently variable.

SECTION IV

MAINTENANCE OF AMBIENT AIR QUALITY AIR STANDARDS AND PREVENTION OF SIGNIFICANT DETERIORATION

The proposed rule change has the potential of affecting the air quality in the vicinity of the Sanford Plant. However, the change in air quality would primarily be on the duration of impacts and not the magnitude. That is, the proposed emission bubbles for the Sanford Plant will not be greater in magnitude than the emission limitations previously approved by DER. The difference would occur in the durations of the impact of those emissions.

In order to evaluate the impact of emissions, an analysis of available air quality data and atmospheric dispersion model results were performed. These results were then compared to the Ambient Air Quality Standards (AAQS) and Prevention of Significant Deterioration Increments (PSD). The results of this analysis are presented in Table 1.

Since 1976, ambient air quality data for TSP and SO_2 have been collected in the vicinity of the Sanford Plant. These data have shown that there have been no substantial increases in TSP in 1980 even with COM firing at Unit 4. While there has been an increase in SO_2 concentrations, these increases are not attributable to COM firing. The air quality increase, approximately 24% of the AAQS for the 24 hour concentrations, is due to the increase in sulfur content allowed by DER in 1979. The maximum TSP and SO_2 concentrations are shown in column A of Table 1. During the 30 month period that the rule is in effect, the sampling stations will continue to be operated.

To analyze the impact of COM firing for 30 months and testing for 90 full-power burn days, EPA and DER approved atmospheric models were used. The results, after adding a suitable background[1], are presented in columns C through G of Table 1.

The estimated maximum impacts for both COM firing (column D) and testing (column F) are within the AAQS limitations. Also, these air quality estimates are no greater than previously allowed by DER approved rule and variances.

Differential air quality impacts are presented in columns E and G. These estimated air quality differences are within the TSP and SO_2 PSD increments. It is important to note that the differences are from baseline (1977) conditions, i.e., FPL Sanford Plant was burning 1% sulfur oil. In 1979 and 1980 FPL's oil averaged 1.4 and 2.0% suflur respectively. Therefore, the actual air quality difference from 1979/1980 would be approximately half of that listed in Table 1.

In addition, the air quality analysis for the testing period (90 full-power burn days) assumes that the allowable emission would occur over the entire 30 month period. The probability of this occurrence is unlikely.

---

[1]Background is the air quality concentration not attributable by point sources in the area. The estimated background (column C, Table 1) was derived solely from air quality data.

TABLE 1 - SUMMARY OF AIR QUALITY ANALYSIS

		Total Suspended Particulate		Sulfur Dioxide		
		24-Hour	Annual Geometric Mean	3-Hour	24-Hour	Annual Average
A.	Maximum Observed Air Quality 1979-1980	113	41	-	78	4
B.	Estimated Background	58	41	64	32	4
C.	Estimated Baseline (Includes background)	62	41	379	77	8
D.	Estimated Maximum Impact for Proposed Rule (non-testing)	70	42	832	141	14
E.	Estimated Maximum Air Quality Difference (non-testing)	13	1	460	70	6
F.	Estimated Maximum Impact During Testing	88	45	832	142	14
G.	Estimated Maximum Air Quality Difference Testing	29	3	460	70	6
	Ambient Air Quality Standards	150	60	1,300	260	60
	PSD Increments	37	19	512	91	20

SECTION V

COMPLIANCE PLAN

A. Compliance With Sulfur Limits

1. Compliance Methodology

The applicable SIP limitation for SO_2 emissions is 2.75 pounds per million BTU heat input enforceable at the top of the stack. For purposes of convenience, compliance determinations in the past have been based upon the assumption that all of the sulfur contained in the fuel is converted to SO_2 and is emitted from the stack. However, available information indicates that approximately three percent of the fuel sulfur content is not emitted, but ends up in the bottom ash of the facility. When credit for this SO_2 removal is given, a fuel resulting in 2.83 pounds per million BTU heat input emissions will meet the regulatory limit. Section III contains the general bid specifications for oil and coal that will be finalized to assure the use of a mixture which will not exceed this limitation.

2. Oil Sampling

The same compliance procedures which are now being used for our fuel oil would be continued. A composite sample of the fuel oil received is obtained as each tanker is unloaded into our fuel storage tanks in Jacksonville. A representative sample from this tank is then sent to FPL's Power Resources Lab for analysis to insure the sulfur content of each delivery. At the Sanford Plant, composite, "as-fired" oil samples are also analyzed, and a monthly report is prepared. (See Attachment V-1)

3. Coal Sampling

The same procedures that were followed during the COM test burn would be continued. A composite sample is taken on each train at the mine and then analyzed by the vendor. A copy of these analyses are forwarded to FPL's Fuel Resources Department. At the Sanford Plant, a composite sample is taken from random train deliveries, which is then analyzed by an independent lab. (See Attachment V-2) This insures that not only the sulfur content but also the ash and Btu makeup are consistent with the coal specifications.

Our experience has been that since the coal is a clean coal and goes through washing processes, quality control is very good. The vendor's analyses forwarded to FPL have been accurate. In our analyses done on on-site deliveries, if the coal is found to be out of specifications, sampling would be stepped up and done subsequent to blending to insure coal consistent with the specifications.

B. Compliance With Particulate Limits

1. Emission Tests Prior to Precipitator Operation (30 Months)

In burning COM, particulate emission tests will be conducted quarterly using "Method 17." This method is preferred due to easier implementation, and is expected to yield the same results as "Method 5" because of the larger percentage of ash in coal as opposed to oil.

2. Emission Tests For Special Fuels (90 Full-Power Burn Days)

For special (solid and/or liquid) fuel tests, particulate emission tests will be conducted during the initial burn and any time the ratio of the mixture of the

special fuel is increased significantly. Prediction of emissions and graphical evaluations will be conducted whenever possible, in a manner similar and equivalent to information provided on the mixture concentration changes on the COM burn. (See Attachments V-3 and V-4) In this manner, we will be assured that emissions limits will always be met. Types of fuel that are anticipated to be tested include, but are not limited to: coal/water slurry, coal/oil/water slurry, pulverized coal, and mixtures of COM between 50 and 100% pulverized coal.

3. Emission Tests After Precipitator Operation

Once the precipitator is installed and operating, particulate compliance testing would be conducted on a quarterly basis for the first year and annually thereafter.

C. Precipitator Compliance Schedule

Compliance schedule dates for procurement, installation, and operation are listed below:

7/ 1/81 - Specification development begins

10/ 1/81 - Vendor solicitation

1/ 1/82 - Vendor selection

4/ 1/82 - Construction commences

9/ 1/83 - Construction completed

9/ 1/83 - Precipitator start-up

12/ 1/83 - Unit #4 in compliance with existing oil particulate standard of 0.1 pounds per million BTU heat input.

A more detailed 30-month schedule for installation and operation, indicating the anticipated various phases of the precipitator construction, is attached (Attachment V-5).

ATTACHMENT V-1

FLORIDA POWER AND LIGHT COMPANY
POWER RESOURCES LABORATORY
9250 W FLAGLER STREET
PO BOX 529100
MIAMI, FLORIDA 33152

SANFORD PLANT
ANALYSIS OF FUEL OIL FIRED
FEBRUARY 1981

DATE SAMPLE RECEIVED AT LABORATORY	2/19/81
API GRAVITY	11.6
DENSITY,LB/GAL	8.235
DENSITY,LB/BBL	345.870
HEAT OF COMBUSTION, B/LB	18150
HEAT OF COMBUSTION, B/GAL	149500
HEAT OF COMBUSTION, KB/BBL	6270
WATER, % BY VOLUME	0.40
SEDIMENT, % BY WEIGHT	0.01
SULFUR, % BY WEIGHT	2.05
SULFUR DIOXIDE EQUIVALENT, LB/MB	2.26
ASH, % BY WEIGHT	0.07
PARTICULATE EQUIVALENT, LB/MB	0.04
VANADIUM IN ASH AS V2O5, % BY WEIGHT	14.
VANADIUM IN OIL AS V2O5, PPM	105.
VANADIUM IN OIL AS V, PPM	59.
VISCOSITY, SSF AT 122 F	243
ASPHALTENES, % BY WEIGHT	5.7

ANALYSIS CERTIFIED BY _____ FEBRUARY 24, 1981

ORIGINAL TO: O D SMITH
COPIES TO: L L WILLIAMS
B F GILBERT
A D SCHMIDT
C D HENDERSON

ATTACHMENT V-2

APR 14 1981

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

PLEASE ADDRESS ALL CORRESPONDENCE TO:
216 OXMOOR CIRCLE, BIRMINGHAM, AL 35209
OFFICE TEL. (205) 942-3120

Bechtel Power Corporation
Gaithersburg, Maryland

4-1-81

Kind of sample reported to us	Railcars P.O. No. 13900-CP-13-01
Sample taken at	---
Sample taken by	Florida Power & Light Co.
Date sampled	3-26-81
Date received	3-31-81

Sample identification by Florida Power & Light Co.

CRR 57709	54692
54576	54013
55848	54789
54089	54143

Analysis made in accordance with ASTM Specifications

Analysis Report No. 73-72608

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis	
% Moisture	3.02	XXXXX	
% Ash	7.12	7.34	
Btu/lb.	14032	14469	MAF 15615
% Sulfur	0.73	0.75	

FUSION TEMPERATURE OF ASH

	Reducing	Oxidizing
Initial Deformation	^{O}F	^{O}F
Softening (H=W)	^{O}F	^{O}F
Softening (H=½W)	^{O}F	^{O}F
Fluid	^{O}F	^{O}F

H=Cone Height
W=Cone Width

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

JOHN A. HOAGLAND, Manager, Southern Division

Charter Member

Original Copy Watermarked For Your Protection

ATTACHMENT V-3

FLORIDA POWER & LIGHT COMPANY

July 30, 1980

Mr. Tommie Gibbs
Chief, Air Facilities Branch
Air and Hazardous Materials Division
U. S. Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30308

RE: PSD-FL-047, FPL Sanford Com
(Coal/Oil Mixture) Test Project

Dear Mr. Gibbs:

Enclosed ia a summary of particulate test data obtained from burning 40% COM (40% coal/60% oil) at Sanford Plant Unit #4. The particulate data for pounds per hour and pounds per million BTU's have been graphed on additional enclosures. Using the 40% COM data, we have projected 50% COM particulate emissions. The graphs indicate we will be well below the established limits at 50% COM.

Our estimated date for burning 45% COM (45% coal/55% oil) is August 4, 1980. Particulate test data from this run will be used for a projection to assure that the next COM increment will not violate the established limits.

Complete compliance test results for 40% COM will be forwarded once we have received them.

Sincerely,

W. J. Barrow, Jr.
Assistant Manager
Environmental Affairs

WJBjr/RTKjr/kb

Enclosures

cc: Mr. Roger Pfaff, EPA, Atlanta
Mr. J. T. Wilburn, EPA, Atlanta
Mr. Steve Smallwood, DER, Tallahassee

DATA SUMMARY

COM. PROJECT - UNIT #4

RTK 7/30/80

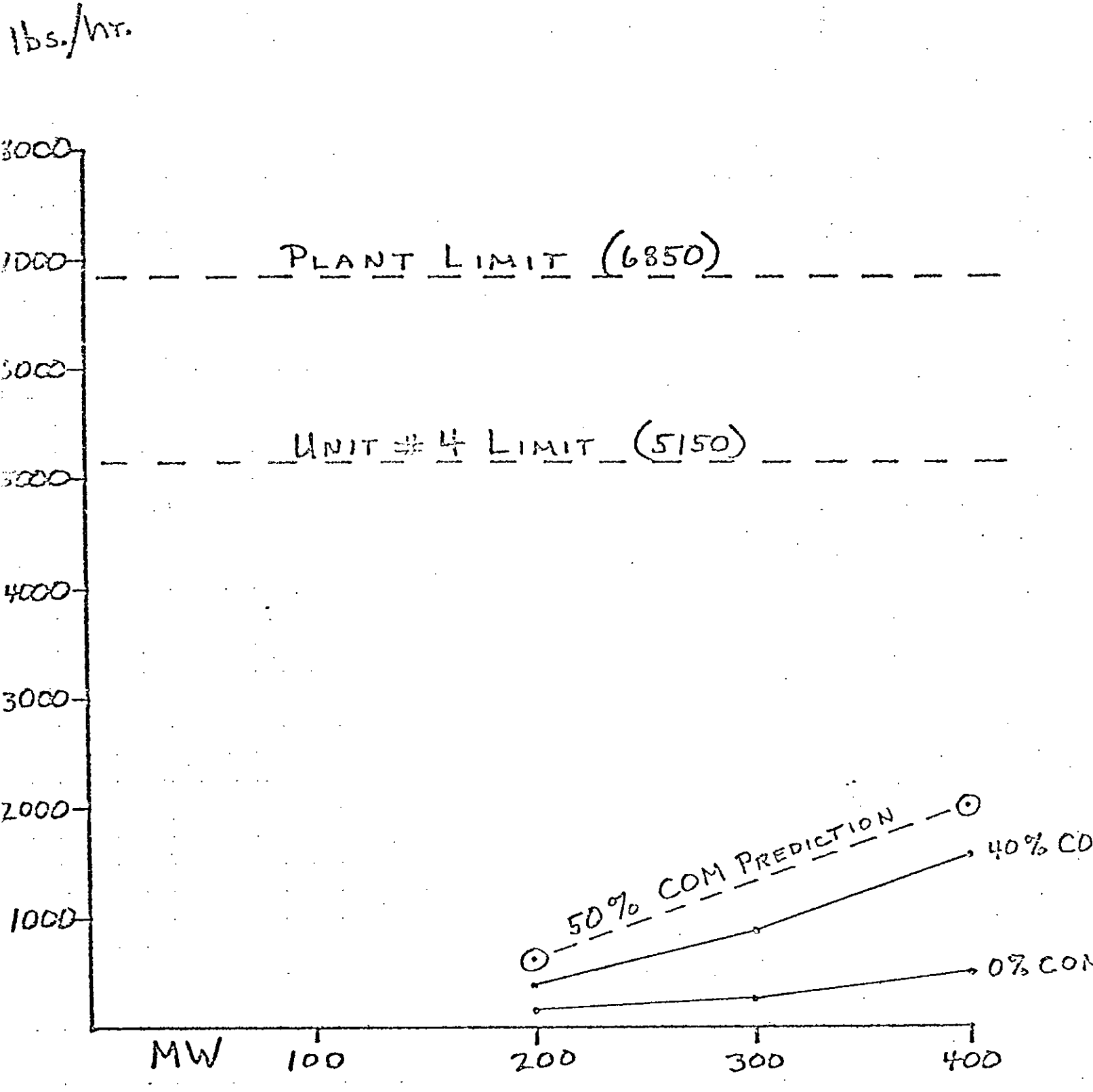
ITEM	400 MW			300 MW			200 MW			100 MW		
	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test
40% COM												
Date	7/21	7/21		7/19	7/19		7/22					
Opacity (Monitors)	44%	48%		39%	39%		37%					
Opacity (Visual)	43%	42%		47%	40%		37%					
lbs./hour	1,481	1,717		758	975		423					
lbs./mBTU	.396	.459		.273	.351		.195					
Date												
Opacity (Monitors)												
Opacity (Visual)												
lbs./hour												
lbs./mBTU												
Date												
Opacity (Monitors)												
Opacity (Visual)												
lbs./hour												
lbs./mBTU												

RIK
7/30/80

FPL SANFORD COM PROJECT

GRAPH #1 - LBS./HR. PROJECTIONS

(Based on latest 40% COM data)

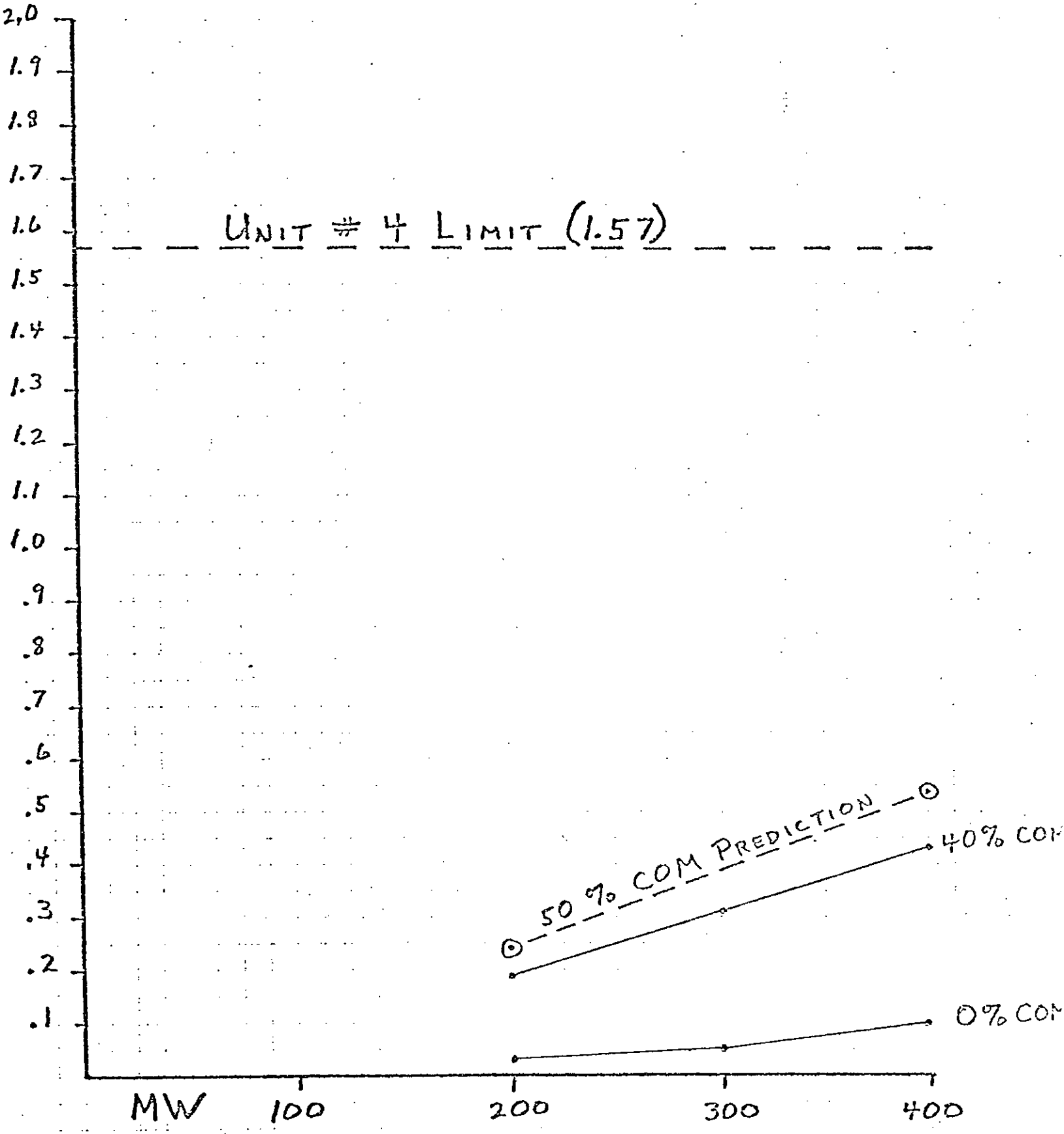


RTK
7/30/80

FPL SANFORD COM PROJECT

GRAPH # 2 - LBS./mBTU PROJECTIONS

(Based on latest 40% COM data)



P.O. BOX 529100, MIAMI, FL 33152

ATTACHMENT V-4

FLORIDA POWER & LIGHT COMPANY

August 18, 1980

Mr. Tommie Gibbs
Chief, Air Facilities Branch
Air and Hazardous Materials Division
U. S. Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30308

RE: PSD-FL-047, FPL Sanford COM
(Coal/Oil Mixture) Test Project

Dear Mr. Gibbs:

Enclosed is a summary of particulate test data obtained from burning 45% COM (45% coal/55% oil) at Sanford Plant Unit #4. The particulate data for pounds per hour and pounds per million BTU's have been graphed on additional enclosures. Using the 45% COM data, we have projected 50% COM particulate emissions. The graphs indicate we will be well below the established limits at 50% COM.

Our estimated date for burning 50% COM (50% coal/50% oil) is September 3, 1980.

Complete compliance test results for 45% COM will be forwarded in the near future.

Sincerely,

W. J. Barrow, Jr.
Assistant Manager
Environmental Affairs

WJBjr/RTKjr/kb

Enclosures

cc: Mr. Roger Pfaff, EPA, Atlanta
Mr. J. T. Wilburn, EPA, Atlanta
Mr. Steve Smallwood, DER, Tallahassee

DATA SUMMARY

COM PROJECT - UNIT #4

RTK 8/18/80

ITEM	400 MW			300 MW			200 MW			100 MW		
	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Test 1	Test 2	Test
45% COM												
Date	8/5	8/5		8/6	8/6		8/7					
Opacity (Monitors)	55%	55%		55%	50%		54%					
Opacity (Visual)	—	⊛ —		44%	55%		46%					
lbs./hour	1,952	1,761		1,289	1,117		716					
lbs./mBTU	.518	.467		.456	.395		.367					

⊛ Certified observers not available on this date.

Date												
Opacity (Monitors)												
Opacity (Visual)												
lbs./hour												
lbs./mBTU												

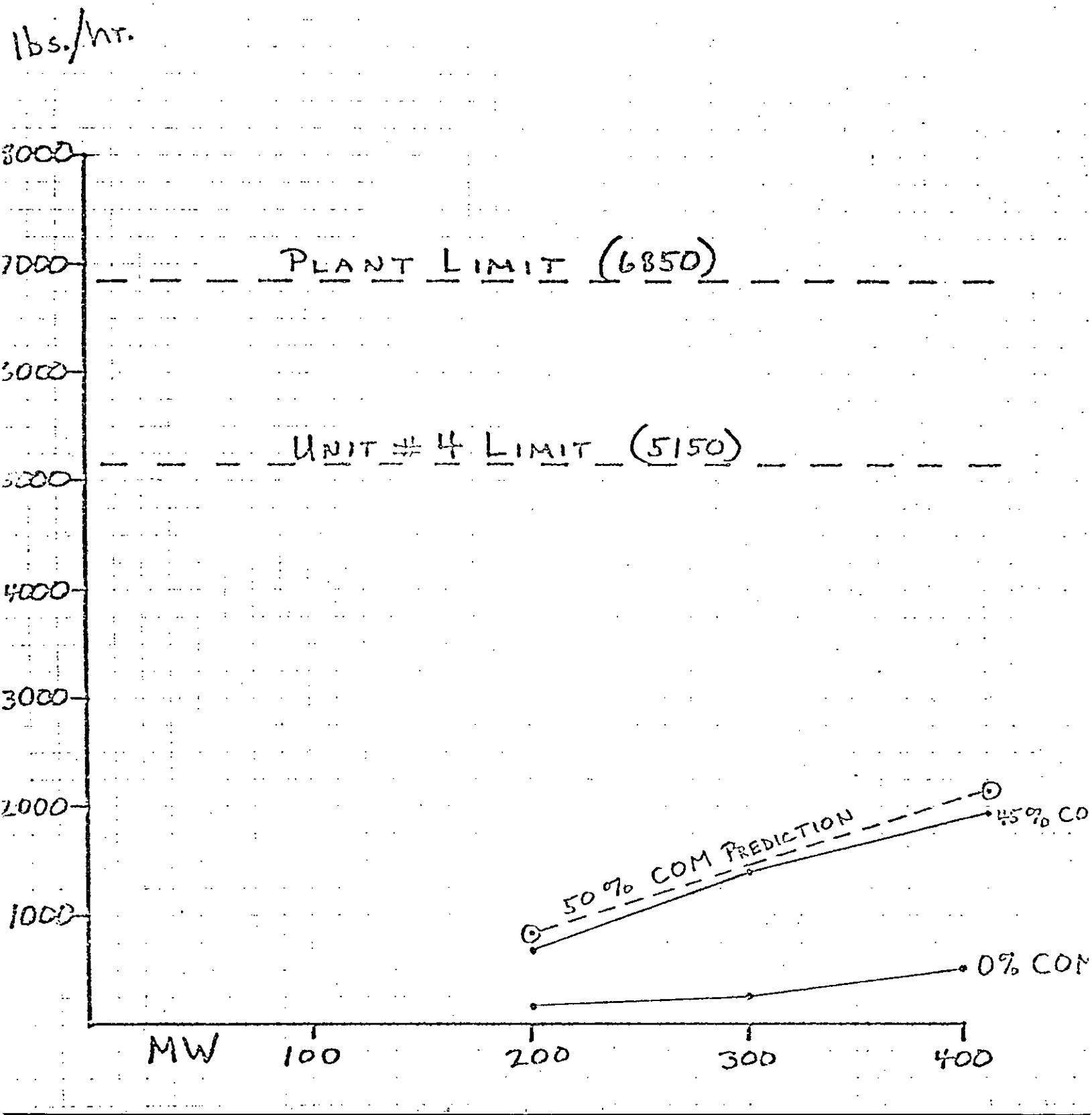
Date												
Opacity (Monitors)												
Opacity (Visual)												
lbs./hour												
lbs./mBTU												

FPL SANFORD COM PROJECT

RTK
8/18/80

GRAPH #1 - LBS./HR. PROJECTIONS

(Based on latest 45% COM data)

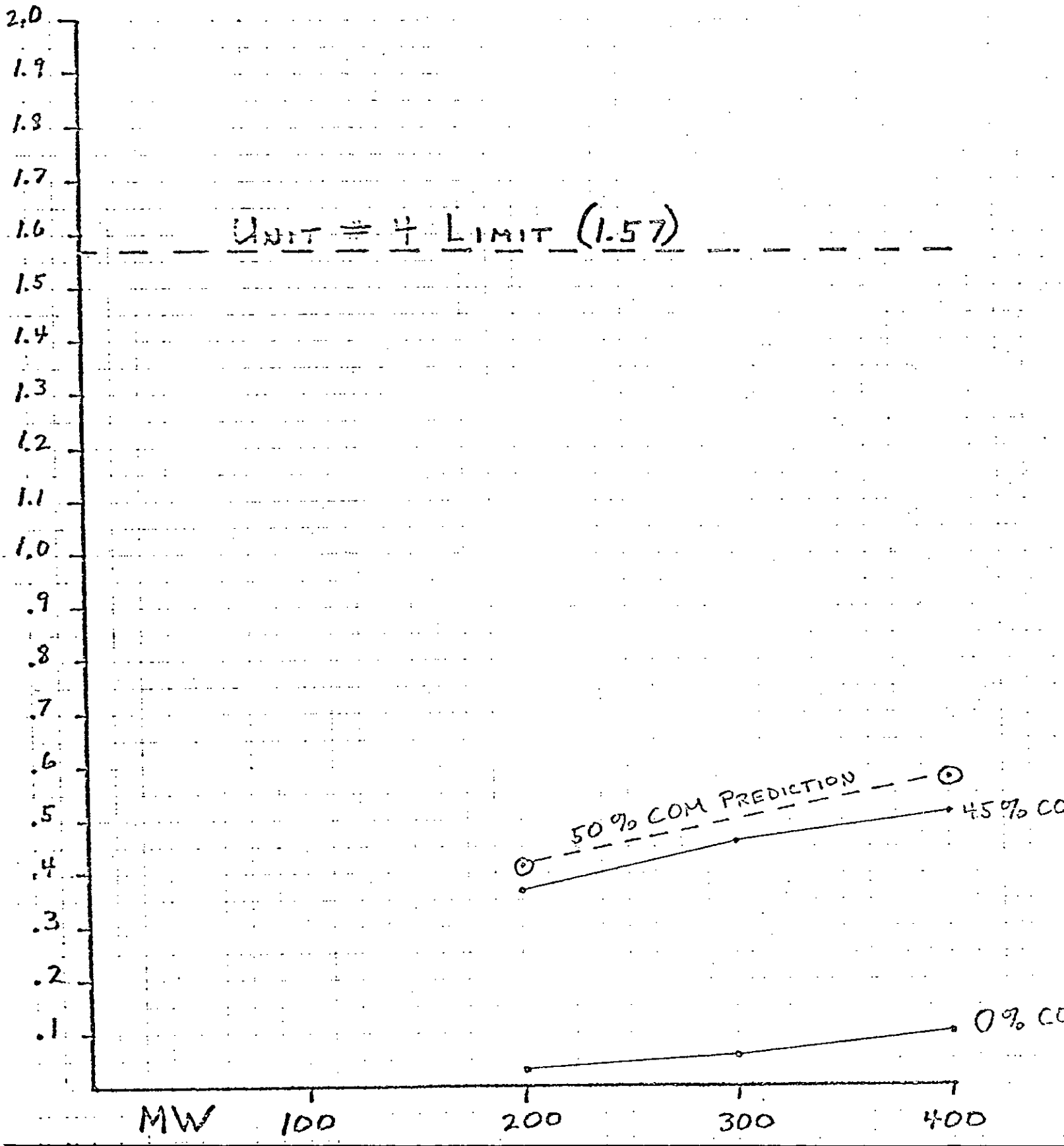


R|K
8/18/80

FPL SANFORD COM PROJECT

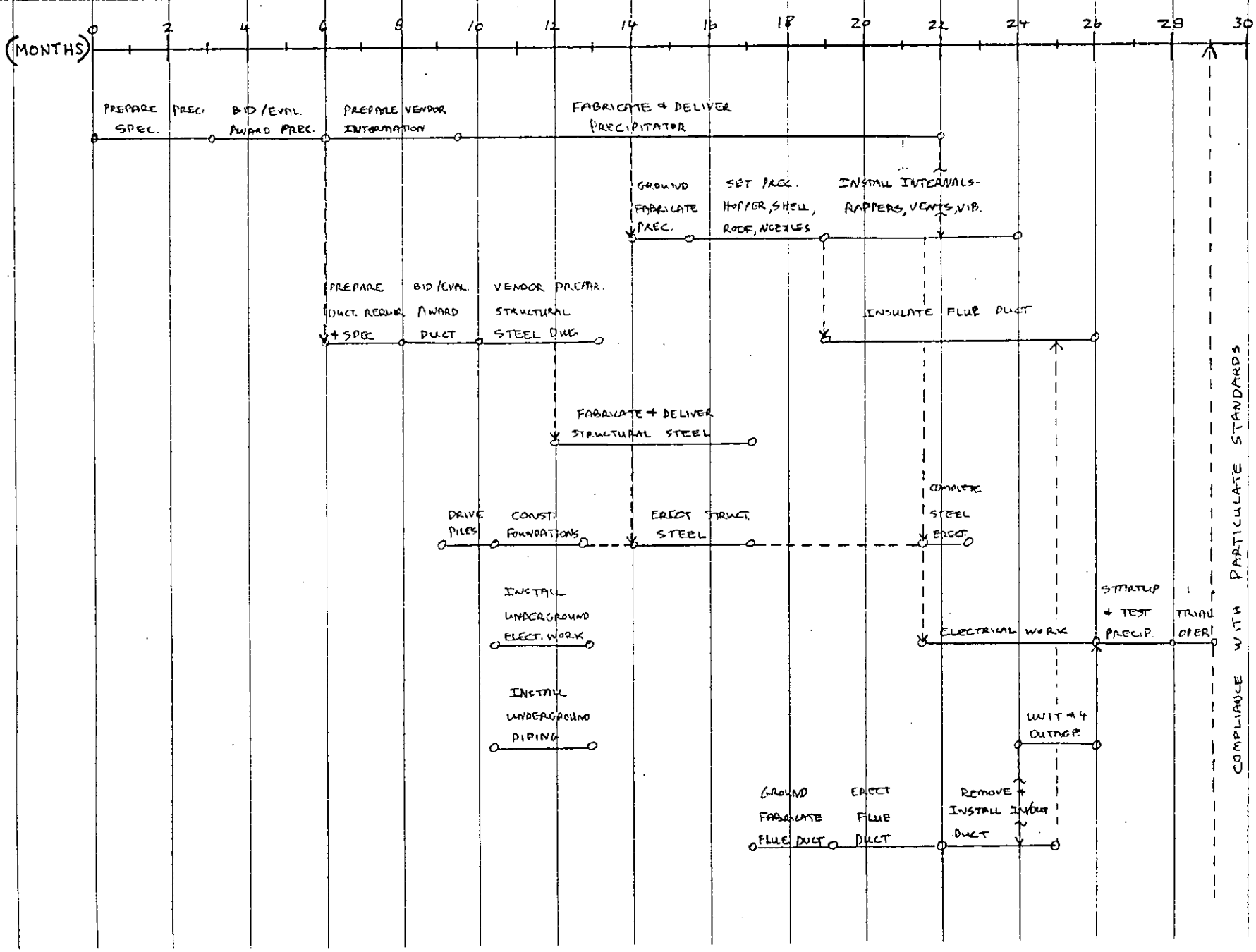
GRAPH # 2 - LBS./mBTU PROJECTIONS

(Based on latest 45% COM data)



SANFORD UNIT NO. 4 - PRECIPITATOR INSTALLATION

NSO 3/11/81



ATTACHMENT V-5

SECTION VI

ECONOMIC CONSIDERATIONS

In October, 1979, #6 fuel oil as used in the Sanford Plant was being purchased by FPL for $22.50 per barrel; and coal, on a delivered basis, for $55.50 per ton or $3.63/MMBtu and $2.04/MMBtu respectively. A COM mixture (assuming a 60/40 oil/coal ratio by weight) therefore had an approximate cost (excluding processing and additive costs) of $3.13/MMBtu, or a savings of $.50/MMBtu versus #6 oil.

In February, 1981, the cost of #6 oil delivered to the Sanford Plant had risen to $33.15/barrel; and coal, on a delivered basis, cost us $58.23/ton. At these prices, the cost of oil and coal on a MMBtu basis were $5.35 and $2.13 respectively. The resulting COM mixture cost $4.23 (excluding processing and additive costs) results in a savings of $1.12/MMBtu over #6 oil usage.

COM has proven itself as a usable and less expensive boiler fuel than #6 oil at Sanford Unit 4. However, the high capital cost of converting to COM may offset part or all of the fuel savings. Although conversion to 100% coal appears to be a more attractive alternative than conversion to COM, it will take several years to fully assess the feasibility of 100% coal use and to implement an actual conversion.

In the meantime, because FPL's investment in the Sanford COM mixing plant was fully amortized by April 20, 1981 (the date FPL's DER permit to burn COM expired), future use of COM in Sanford Unit 4 would result in major fuel cost savings for FPL and its customers.

Schedule VI-1 indicates the assumptions made, and Schedule VI-2 indicates the estimated fuels savings each year through 1990[1]. Offsetting these fuel savings to

some extent will be the annual operating and maintenance costs of approximately $10 million. Capital expenditures (in 1981 dollars) of approximately $29 million for an electrostatic precipitator and associated systems, and approximately $4 million for other plant improvements will be necessary for sustained burning of COM. Estimated construction personnel to affect these improvements will range from 150 to 175 at the peak of the construction process.

---

[1]It should be noted that these estimates conservatively assume the use of 40% COM. However, the Company will burn higher percentages if unit operation permits.

SCHEDULE VI-1

FORECASTED FUEL SUBSTITUTION SAVINGS
COM VS. #6 OIL
ASSUMPTIONS

At: 40% Coal
57.8% #6 Oil
2.0% Water
0.2% Additive

Annual COM Consumption		1,404,613,440	Lbs
COM Components:	Coal	280,923	Tons/Year
	#6 Oil	2,353,236	Bbls/Year
	Additive	2,809,226	Lbs/Year
Equivalent #6 Oil Usage Alone		3,602,903	Bbls/Year
Barrels of #6 Oil Saved		1,249,667	Bbls/Year

Forecasted Mid Year Prices:*

	COAL/TON	#6 OIL/BBL	ADDITIVE/LB
1981	$ 62.12	$ 33.15	$ 0.87
1982	70.01	37.81	0.94
1983	77.91	40.91	1.00
1984	88.91	45.06	1.110
1985	100.18	49.70	1.22
1986	112.88	54.37	1.34
1987	127.20	59.48	1.48
1988	143.33	65.07	1.63
1989	161.50	71.19	1.79
1990	182.40	77.88	1.96

* Coal assumed to escalate at 1%/month

Oil assumed to escalate at 10.77% 1981 - 1984
9.4% 1984 - 1990

(Forecasts furnished by FPL Fuel Resources Department 2/23/81)

SCHEDULE VI-2

FORECASTED FUEL SUBSTITUTION SAVINGS
COM VS. #6 OIL
($000)

1981	Coal	$ 17,451		1986	Coal	$ 31,710	
	Oil	78,010			Oil	127,945	
	Additive	2,444			Additive	3,764	
	Total COM	$ 97,905			Total COM	$ 163,419	
	#6 Oil Alone	$ 119,436			#6 Oil Alone	$ 195,890	
	SAVINGS		$ 21,531		SAVINGS		$ 32,471
1982	Coal	$ 19,667		1987	Coal	$ 35,733	
	Oil	88,976			Oil	139,970	
	Additive	2,632			Additive	4,158	
	Total COM	$ 111,275			Total COM	$ 179,861	
	#6 Oil Alone	$ 136,226			#6 Oil Alone	$ 214,301	
	SAVINGS		$ 24,951		SAVINGS		$ 34,440
1983	Coal	$ 21,887		1988	Coal	$ 40,265	
	Oil	96,271			Oil	153,125	
	Additive	2,809			Additive	4,298	
	Total COM	$ 120,967			Total COM	$ 197,688	
	#6 Oil Alone	$ 147,395			#6 Oil Alone	$ 234,441	
	SAVINGS		$ 26,428		SAVINGS		$ 36,753
1984	Coal	$ 24,977		1989	Coal	$ 45,369	
	Oil	106,037			Oil	167,527	
	Additive	3,118			Additive	5,029	
	Total COM	$ 134,132			Total COM	$ 217,925	
	#6 Oil Alone	$ 162,347			#6 Oil Alone	$ 256,491	
	SAVINGS		$ 28,215		SAVINGS		$ 38,566
1985	Coal	$ 28,143		1990	Coal	$ 51,240	
	Oil	116,956			Oil	183,270	
	Additive	3,427			Additive	5,506	
	Total COM	$ 148,526			Total COM	$ 240,016	
	#6 Oil Alone	$ 179,064			#6 Oil Alone	$ 280,594	
	SAVINGS		$ 30,538		SAVINGS		$ 40,578

1,249,667 Barrels of #6 Oil are saved annually

SECTION VII

FUTURE COAL CONVERSION

FPL is in the forefront of the world's technology for using coal in oil-fired power plants. This is an appropriate role for FPL, a company which uses more oil to generate electricity than any other U. S. utility. Current consumption of oil is over 40 million barrels annually. Even with new coal plants and conservation, growth in demand and unavilability of natural gas would raise FPL's annual oil consumption to approximately 55 million barrels by 1990.

World oil production could increase slightly for the next couple of years, but will then decline in the years ahead. Furthermore, many of the major refiners are modifying their facilities to convert more of the barrel to premium products such as transportation fuels, petrochemicals, and home heating oil. Several oil companies forecast a 50% decline in residual oil production over the next 10-15 years. They base this forecast on the assumption that residual oil users will be switching to coal and that the resulting decline in demand for residual oil when combined with the higher demand for transportation and heating fuels will cause producers to invest in "upgrading" facilities which will reduce residual oil production in order to meet rising demands for these other products. Once such facility investments are made, if residual demand is greater than anticipated, it would be necessary for resid users to pay higher prices to compete with the higher quality products the refiners could make with the same material.

FPL does not agree with the oil company forecasts. They believe that coal burning projects will be completed less rapidly and that utilities will have to substantially increase residual oil use during the 1980's to make up for declining gas supplies. This is certainly consistent with FPL's situation and seems more credible than the oil

company forecasts. If FPL's scenario is correct, the residual oil demand will actually increase between now and 1990. This demand would have to be met by increased imports of Caribbean residual oil and increased throughput of lower quality foreign crudes in U. S. refineries. The resultant residual oil production would be of a lower average quality than exists today (i.e., higher sulfur and asphaltenes).

This increased reliance on poorer quality imported crudes and residual oils introduces even greater risks of supply disruptions and environmentally unacceptable product quality than the oil company forecasts. Such problems already exist today and are likely to worsen each year.

Of equal concern is the price of residual oil. Today, FPL's 2.5% sulfur fuel oil costs over $5.00 per million BTU. Coal delivered to our plants would cost about $2.00 per million BTU. At today's prices, if FPL could substitute coal for all our oil, the fuel cost differential would be over 700 million dollars annually!

OPEC will seek to keep oil prices rising faster than the inflation rate. With the possibility that OPEC will be successful in achieving future price increases, the U. S. increasing its reliance on low quality crude imports, and refiners having the choice of installing equipment to convert residual oil into other products, the price of crude oil is expected to rise faster than the inflation rate. Even if crude prices dip (in constant dollars) during the '80's, as predicted by industry observers, constant dollar residual oil prices after 1990 are expected to be higher than current prices.

Coal will rise in price too. Higher mining costs are inevitable as older, cheaper-to-produce, reserves are depleted and new mines are opened. Transportation costs will escalate also, since new higher cost equipment and facilities will be needed to meet

increased demand. With the disparity between oil and coal prices forecasted to continue, coal producers and shipppers will want to seek higher prices which reflect the energy value of coal relative to oil and gas.

However, abundant U. S. coal resources and resultant supplier competition for the coal market should keep coal prices more in line with production costs, plus a reasonable return on investment. Investments in coal properties can produce a return only if the product is sold. Since coal is not supply-limited, and there are numerous transportation options available to FPL, the basic economics of supply and demand should prevail, despite the oil supply-limited price increases which OPEC may achieve. In other words, coal suppliers in the U. S. must compete with each other, not with OPEC oil. Accordingly, FPL projects that the post-1990 oil/coal price ratio will equal or exceed a 2 to 1 oil/coal cost per BTU differential.

Thus, we project that the long term market price of coal should rise less rapidly than the market price of residual oil on a cost per BTU basis and that the real-dollar cost difference could therefore widen from today's $3.00 per million BTU differential.

Given the outlook for potential supply disruptions, inadequate product quality, and relative price increases, it is necessary for FPL to seek cost-effective ways to reduce its dependence on oil beginning no later than 1985. One of the principal means to achieve such an objective is a program to displace oil in existing power plants by modifying them to burn some form of coal.

The first step in this process was the COM test burn at Sanford Unit 4. The next step is the conversion of an oil-fired unit to burn 100% coal to determine the construction, operation, and maintenance problems that will have to be addressed and overcome with straight coal.

Present plans contemplate the conversion of Sanford Unit #5 to coal. The installation of an electrostatic precipitator at Unit #5 would be completed prior to its switch from oil to coal. Therefore, the emission limitations applicable to existing oil-fired units will be met at Unit #5 before, during, and after conversion. Other than the addition of an electrostatic precipitator to control emissions of particulate matter, some adaptations of the existing boiler will be required, including new burners, an ash removal system, and additional heat transfer surfaces to maintain plant capacity. Additions to the plant site would include coal receiving, storage and handling systems, coal pulverizers and transport systems; some changes to electrical, instrumentation, and control systems would also be made.

The use of COM in Sanford Unit 4 and then potential conversion to 100% coal at Sanford Units 4 and 5 is the first step in a system-wide plan to potentially convert FPL's nine 400 megawatt units (and potentially its four 800 megawatt units) to the use of coal in some form. The three major unknowns which could determine the outcome of the plan are its technological feasibility, its financial feasibility, and regulatory constraints.

FPL's strategy is to select optimum conversion technologies, select and schedule plants for conversion, contract for and acquire coal supplies and transportation that will offer the highest probability of favorable costs while retaining the greatest flexibility to adjust conversion plans and fuel mix as the future evolves. This is the direction that FPL must take in order to reduce our dependence on foreign oil and provide reliable, reasonably priced electric supplies for our customers.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

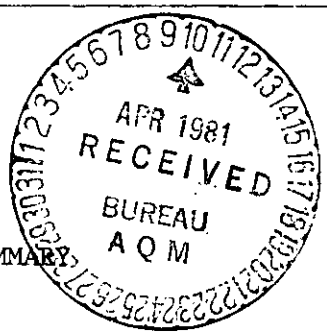
For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
From: _____	Date: _____	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due: _____	Date Due: _____	

TO: Steve Smallwood

FROM: David Harlos

DATE: April 10, 1981

SUBJECT: SANFORD, UNIT 4, COM TEST PROGRAM, STACK TESTING SUMMARY



Attached you will find four graphs summarizing the year long stack test series completed on FPL's unit 4 at Sanford. The data are present in terms of pounds of particulate emitted per million BTU's of heat input. The test series is relatively complete except for the lack of testing at 400 mw and 50/50 COM. The tests appear to be of good quality. The results are consistent with expected trends and no apparent outliers are encountered.

Figure one presents emission levels measured after the mechanical collectors (hereafter "outlet" emissions). Outlet emissions are consistently higher for higher loads and higher coal to oil ratios. The anomalous tests at 373 mw and 360 mw (runs E26A,B and 22A,B,C) indicate the need for more data at maximum load and 50/50 COM in order to predict maximum expected emission rates. The trend observed in Figure two for outlet data can be extrapolated to an emission rate of 0.6 LB/10^6 BTU, but the anomalous points on Figure one indicate some nonlinearity and so this extrapolation is probably conservative.

Uncontrolled boiler emissions are plotted as 'collector inlet' on Figures two and three. Inlet emissions decrease at higher loads. An examination of the particle size data shows a decrease in coarse particle size fractions at higher loads. The high loading of coarse particles at low loads is efficiently removed by the mechanical collectors, hence, the low outlet measurements at low load. Progressively higher boiler firing rates produce increasing amounts of finer particles which are captured with decreasing efficiency, so although inlet grain loading is slowing decreasing with higher loads, emission rates and grain loading increase at the stack outlet.

Opacity-grain loadings correlations are plotted in Figure four. Within fuel mix ratio, opacity correlates rather well with grain loading, indicating that emission factors might be developed if a stable fuel mix can be maintained.

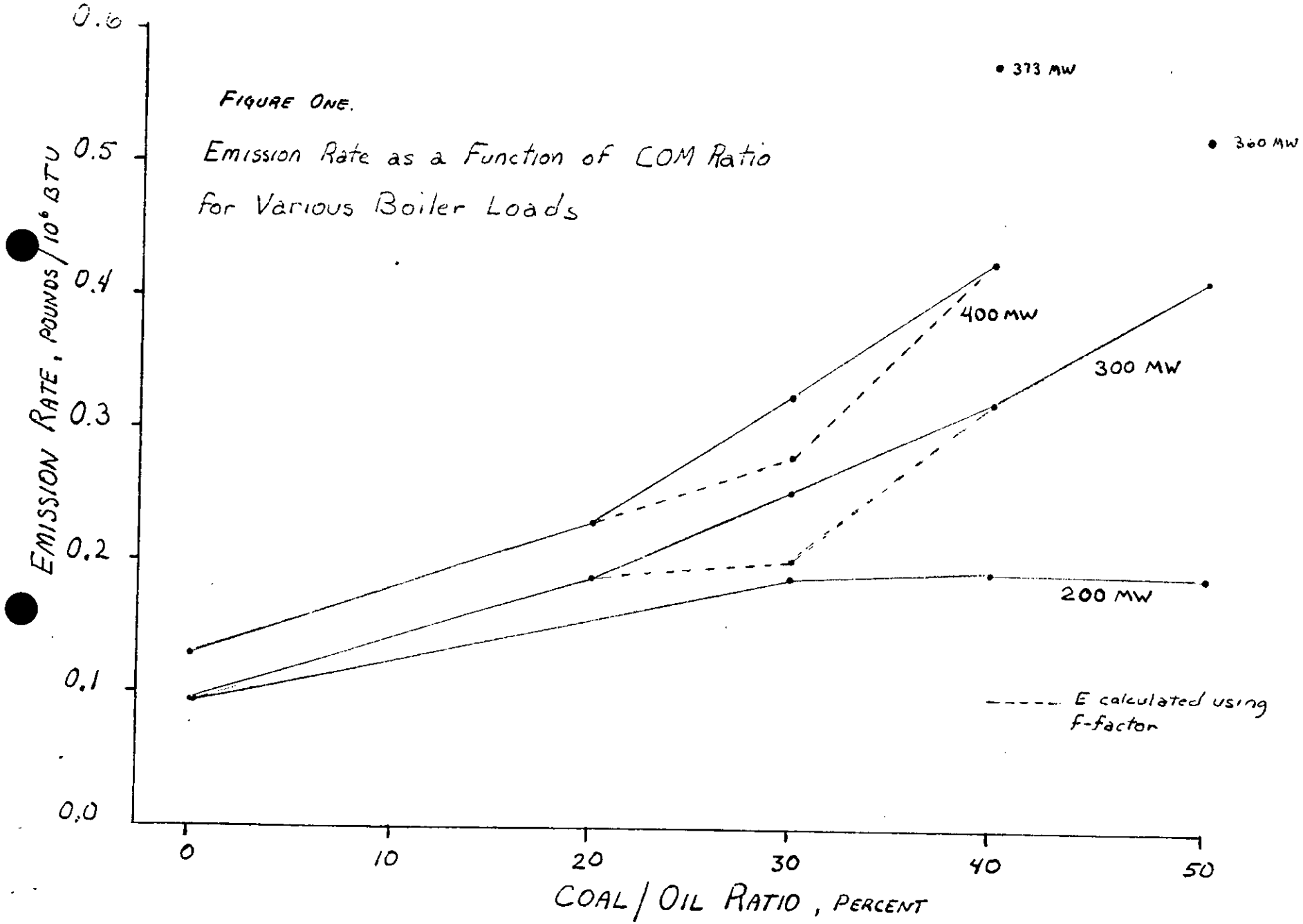
The conclusions and emission estimates obtainable from this study are very limited, since the coal used for the test burn was the best quality metallurgical grade coal available. It is not normally burned in power boilers and most probably is cleaner than the coal which might be used on a long term basis; nonetheless, the relative trends observed should apply to other grades of coal.

DH:kb

cc: Bill Blommel
Bob King
Chuck Collins

FIGURE ONE.

Emission Rate as a Function of COM Ratio for Various Boiler Loads



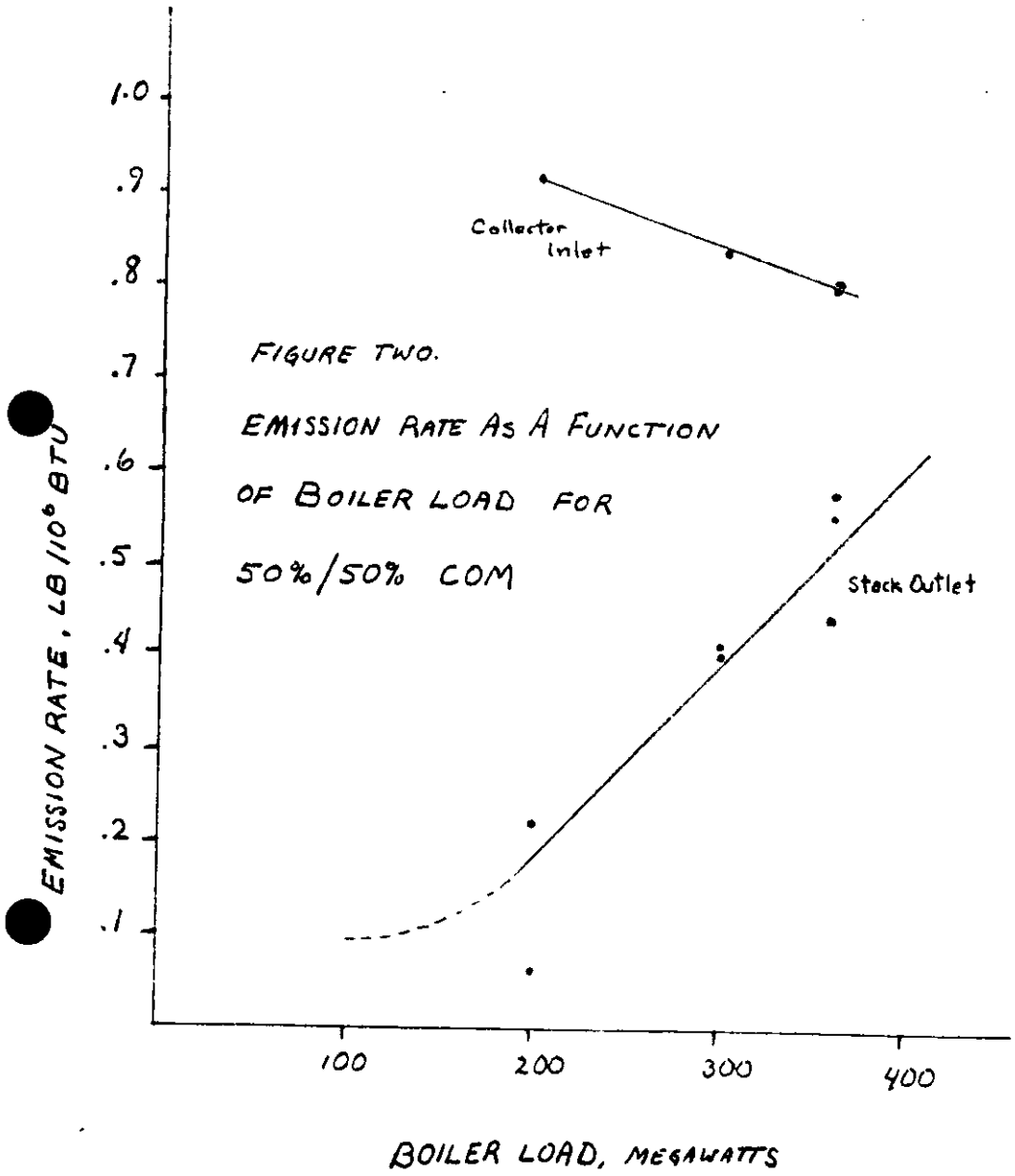


FIGURE TWO.

EMISSION RATE AS A FUNCTION OF BOILER LOAD FOR 50%/50% COM

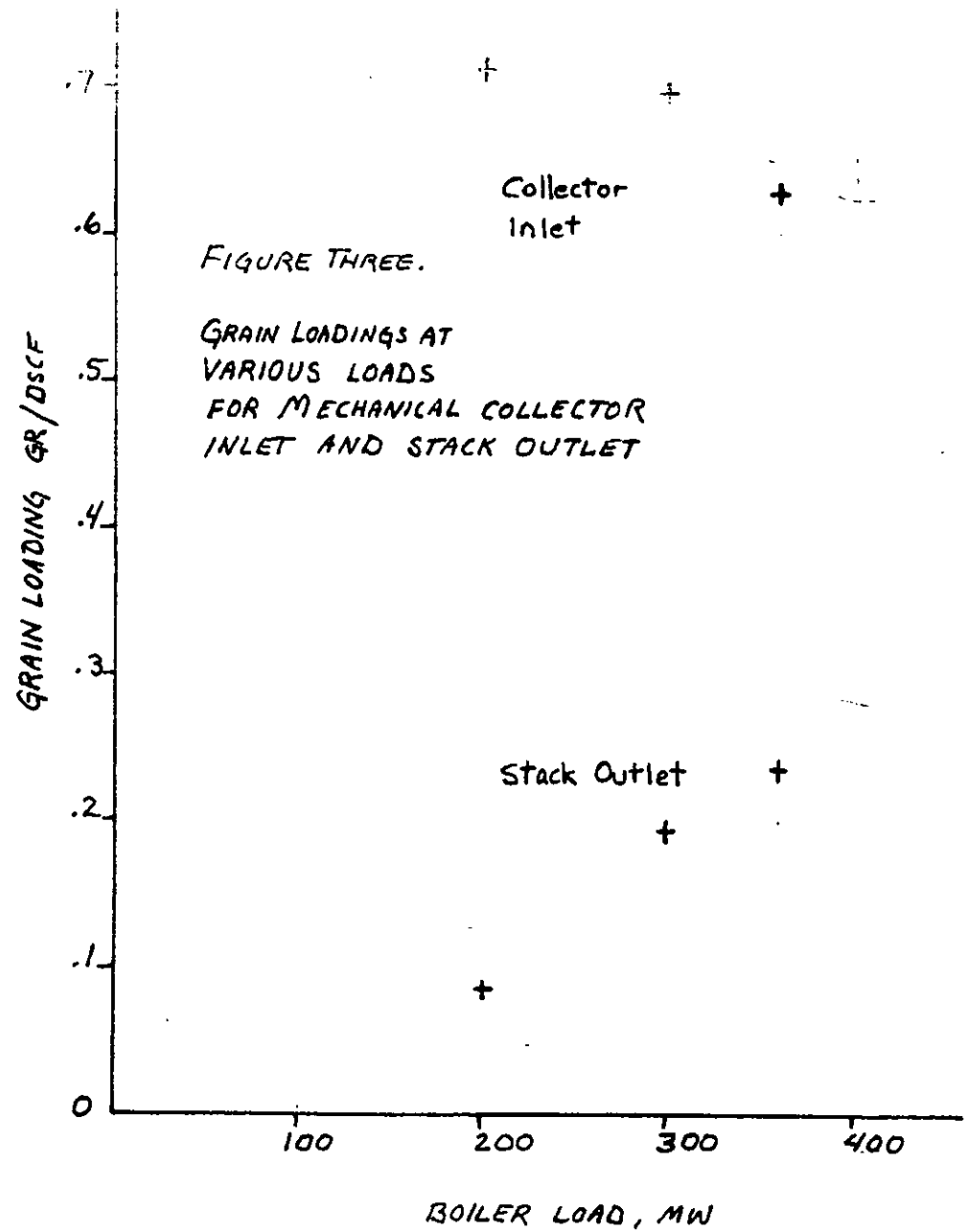


FIGURE THREE.

GRAIN LOADINGS AT
VARIOUS LOADS
FOR MECHANICAL COLLECTOR
INLET AND STACK OUTLET

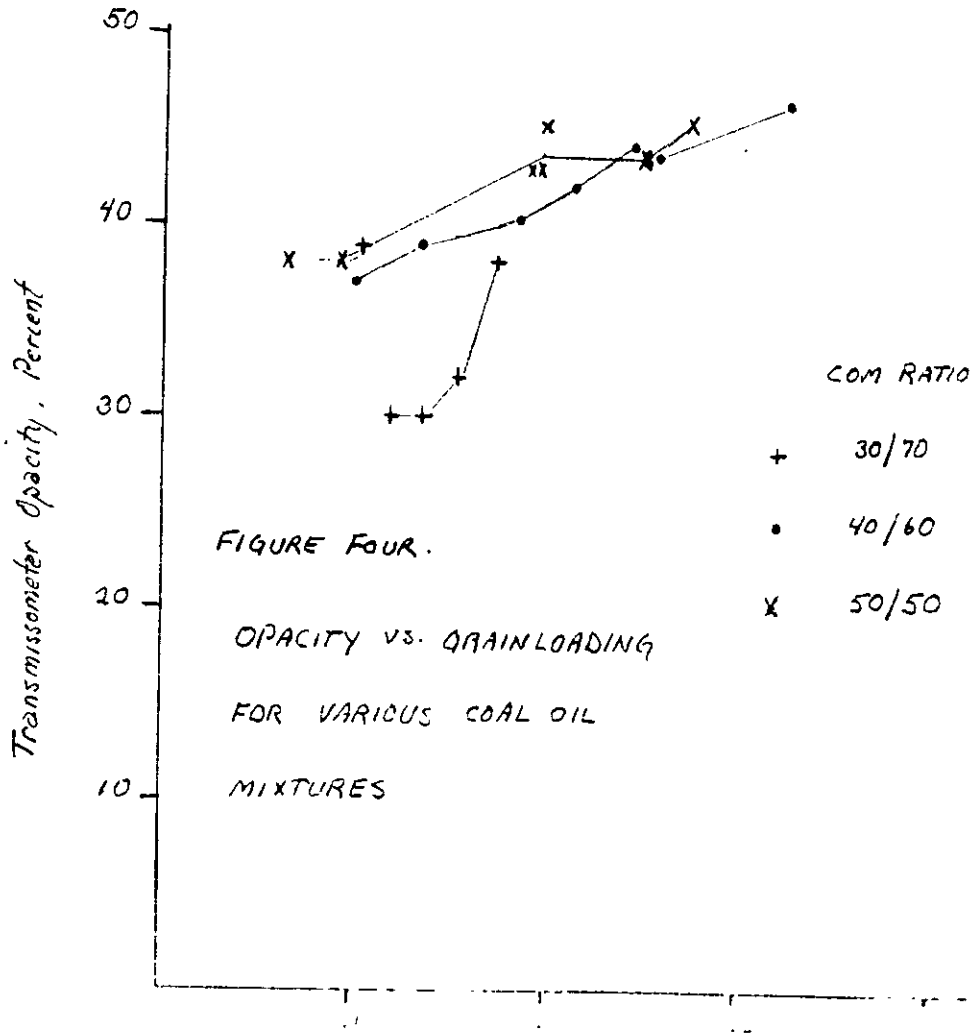


FIGURE FOUR.

OPACITY VS. GRAINLOADING FOR VARIOUS COAL OIL MIXTURES

FLORIDA POWER AND LIGHT, UNIT 4, COM DATA

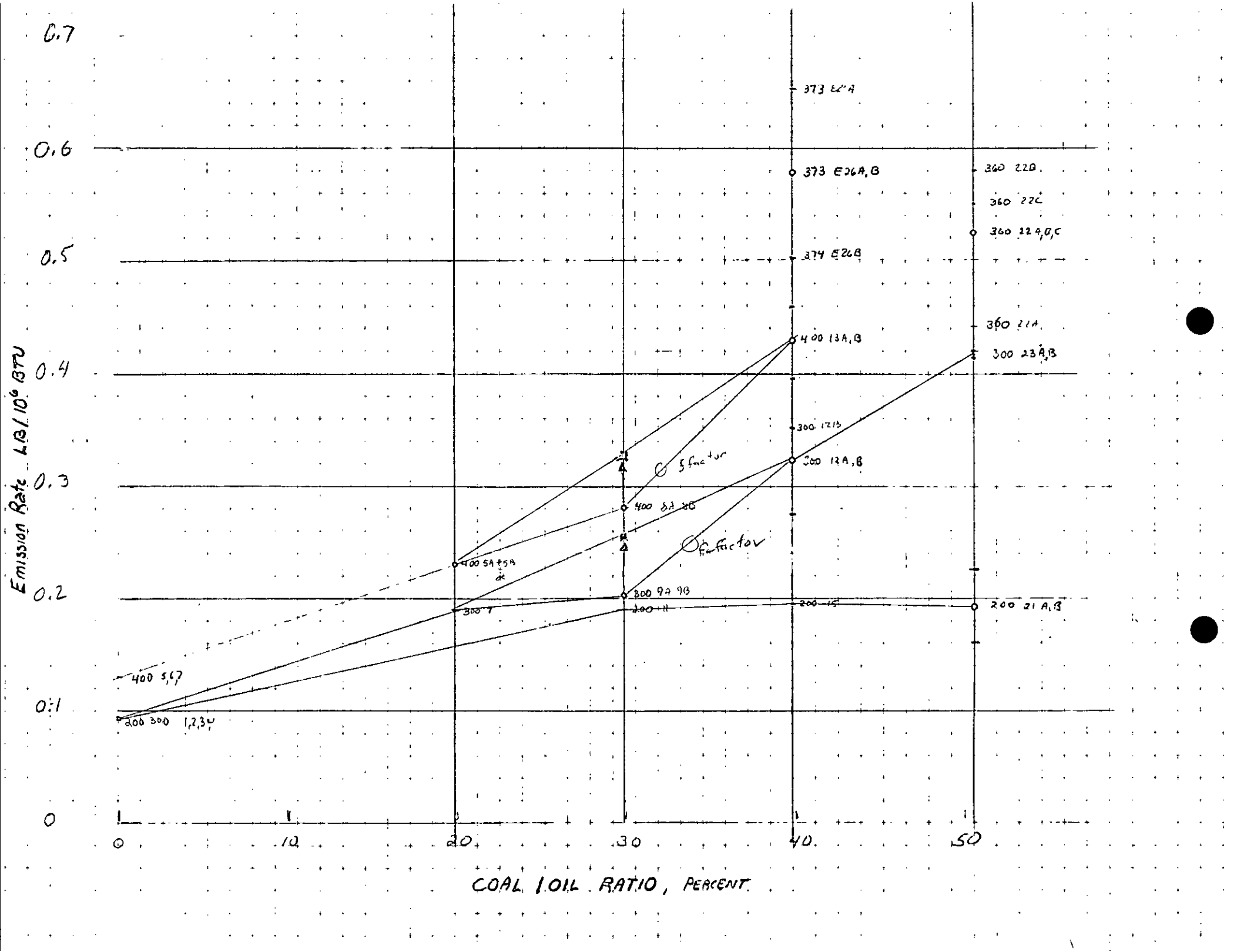
RUN	1	2	3	4	5	6	7	5A	5B	7	8A	8B	9A	9B	11	E26A	E26B
%MIX COAL/OIL	0/100							20/80			30/70					40/60	
LOAD MW	200	300	300	300	400	400	400	400	400	300	400	400	300	300	200	373	374
EMISSION+ lbs/10^6BTU	.090	.094	.093	.091	.141	.126	.135	.237	.232	.189	.252	.262	.2101	.2314	.189	.653*	.501*
											.327*		.263*		.243*		
ALLOWABLE GRAIN LOADING, GR/DSCF	0.10 (.0275)	0.10 (.051)	0.10 (.054)	0.10 (.054)	0.10 (.067)	0.10 (.073)	0.10 (.070)	0.14 (.138)	0.14 (.131)	0.14 (.109)	0.16 (.168)	0.16 (.154)	0.16 (.120)	0.16 (.128)	0.16 (.105)	.326	.256
OPACITY (MON)											38	32	30	30	39	46	43.5
DATE	4/16	4/17	4/17	4/17	4/18	4/18	4/18	5/7	5/7	5/8	5/28	5/28	5/29	5/29	5/30	1/27	1/27

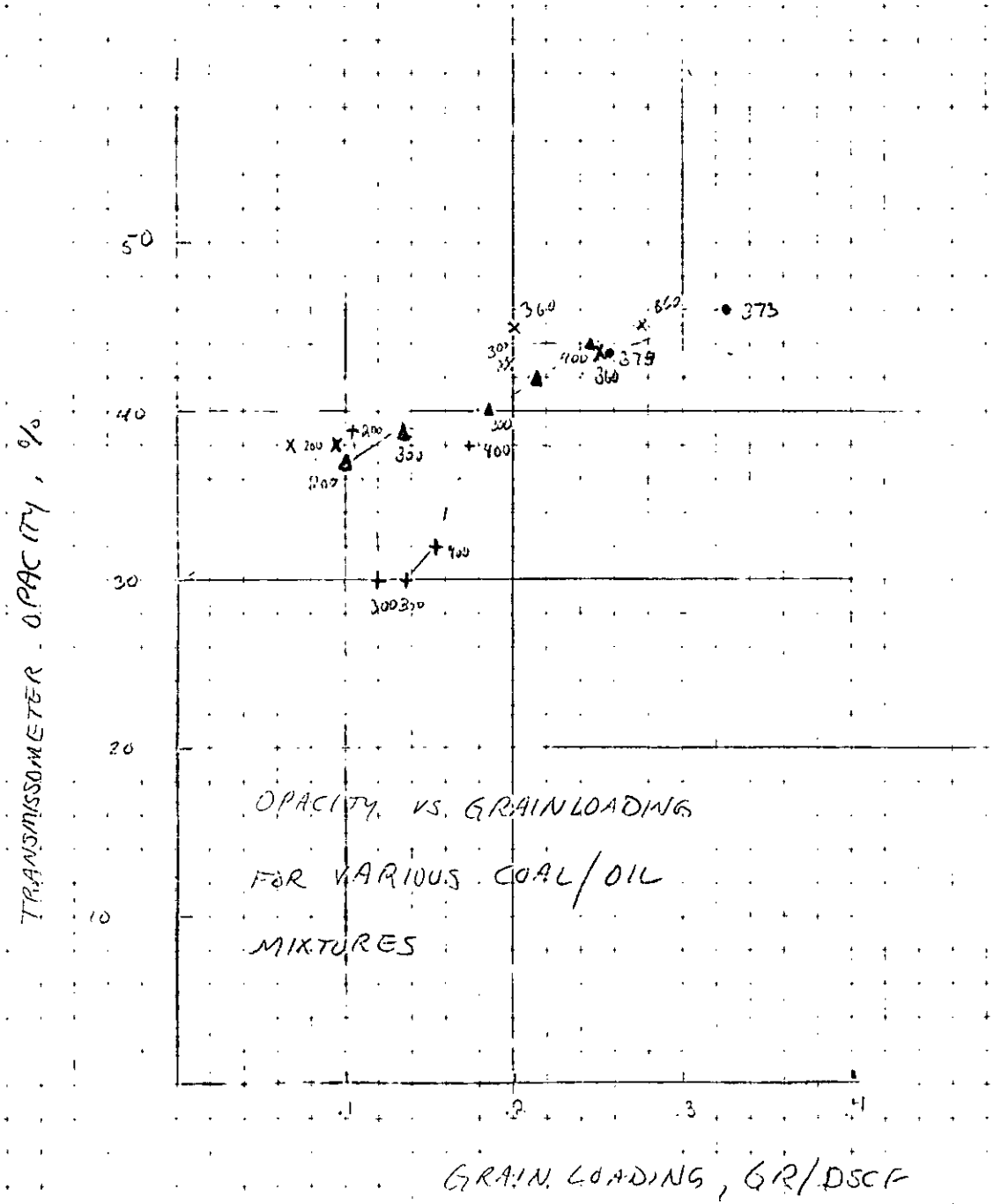
FPL CONT

RUN	12A STACK	12B STACK	13A STACK	13B STACK	15 STACK	21A	21B	22A	22B	22C	23A	23B
%MIX COAL/OIL	40/60					50/50						
LOAD MW	300	300	400	400	200	200	200	360	360	360	300	300
EMISSION^ lbs/10^6BTU	.273*	.351*	.459*	.396*	.195*	.224*	.160*	.1441*	.580*	.552*	.420*	.416*
GRAIN LOADING GR/DSCF ALLOWABLE	.137	.184	.2415	.213	.100	.096	.069	.1992	.07724	.2524	.1919	.1946
OPACITY (MON.)	39.0	40.0	44.0	42.0	37.0	38	38	45	45	43.5	42.5	42.5
TEST DATE	7/19	7/19	7/21	7/21	7/22	9/10	9/10	9/11	9/11	9/11	9/12	9/12

+ Calculated using f-factor

* supplied by FPL


0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Emission Rate LB/10⁶ BTU
373 E-4A
373 E-26A,B
374 E-26B
400 13A,B
300 12A,B
400 5A+5A
300 9A 9B
400 5,6,7
200 300 1,2,3,4
360 22B
360 22C
360 22A,B,C
360 21A
300 23A,B
300 12B
200 21A,B
5 factor
6 factor
0
10
20
30
40
50
COAL / OIL RATIO, PERCENT


TRANSMISSOMETER - OPACITY, %
50
40
30
20
10
.1
.2
.3
.4
GRAIN LOADING, GR/DSCF
OPACITY VS. GRAINLOADING
FOR VARIOUS COAL/OIL
MIXTURES
+ 30/70
▲ 40/60
▲ 40/60
x 50/50

INLET / OUTLET DATA UNIT 4 50/50 COM

Run	LB/BTU / LB/HR		Efficiency	LOAD	GR/DSCF	
	Inlet	Outlet			Inlet	Outlet
21 A	.958 / 1834	.224 / 428.7		200		.0958
	(.915)	.192	88.4%		(.7122)	(.0825)
21 B	.8714 / 1666	.160 / 305.9		200		.0692
22 A	.9671 / 3182	.6337 (800) / 2085	.441 / 1451	62.4	360	.7392 / 150 73 / (.6259)	.1992 / (.2355)
22 B	.9922 / 3264	.6189 (805) / 2036	.580 / 1908	61.2	360	—	.2734
22 C	—	—	.552 / 1767		360		.2524
23 A	1.01 / 2797		.420 / 1162			.7743	.1919
	(.8336)		.418	72.3	300	(.6981)	(.1932)
23 B	.6572 / 1820		.416 / 1152			.6069	.1946

Emission Calculations 0/100 CO/NO

Run 5

$$= \frac{534.0}{43.1464E7} (9190) \left(\frac{20.9}{20.9-4.0}\right)$$

$$= (1.2376E-5)(9190)(1.2367)$$

$E = .141$

Run 6

$$= \frac{436.4}{41.7927E6} (9190) \left(\frac{20.9}{20.9-5.0}\right)$$

$$= 1.0442E-5 \cdot (9190) \cdot 1.3145$$

$E = .126$

Run 7

$$= \frac{428.8}{42.667E6} (9190) \left(\frac{20.9}{20.9-3.9}\right)$$

$$= 1.0049E-5 \cdot 9190 \cdot 1.2294$$

$= .1135$

Emission Calculation 0/100 COM

Run 1

200 MEU

$$E = \frac{159.3}{234708E7}(9190)(1.4514)$$

$$= 6.7871E-6$$

$$= .090$$

Run 2

300

$$E = \frac{244}{33.275E7}(9190)\left(\frac{20.9}{20.9-5.3}\right)$$

$$1.3397$$

$$7.344E-6$$

$$E = .0941$$

Run 3

300

$$\frac{255.2}{32.9030E7}(9190)\frac{20.9}{20.9-4.9}$$

$$1.30625$$

$$E = .0931$$

Run 4

300

$$\frac{259.5}{33.7589E7}\quad \frac{20.9}{20.9-4.7}$$

$$E = .0906 \qquad 1.2901$$

Run 11.

$$E = \frac{384.8}{25.717920 E7} (9463) \left(\frac{20.9}{20.9-5.3}\right)$$

$$= 1.4962E-5 \quad (9463)(1.3397)$$

$$= .1897$$

Emission Calculations 30/70 COM

$$E = \frac{LB/HR}{DSCFH}(F_{composite})\left(\frac{20.9}{20.9 - O_2}\right)$$

Run 8A
400 MW

$$E = \frac{1101.1}{4.5793 \times 10^{7}}\left(.30(10100) + .7(9190)\right)\left(\frac{20.9}{20.9 - 5.0}\right)$$

$$E = 2.4045\ E\text{-}5\ (9463)\ (1.3145)$$

$$E = .2991$$

Run 8B
400 MW

$$E = \frac{1043.4}{\qquad}\qquad \frac{20.9}{20.9 - 4.3}$$

$$E = 2.2007\ E\text{-}5\ (9463)\qquad 1.2590$$

$$E = .2622$$

Run 9A
300 MW

$$E = \frac{629.9}{3.6828 \times 10^{7}}\ (9463)\left(\frac{20.9}{20.9 - 4\%}\right)$$

$$E = 1.7103 \times 10^{-5}\ \ (9463)\ (1.2981)$$

$$E = .2101$$

Run 9B
300 MW

$$E = \frac{726.1}{3.6799 \times 10^{7}}\left(\qquad\right)\left(\frac{20.9}{20.9 - 4.2}\right)$$

$$= 1.9731\ E\text{-}5\ (9463)(1.25149)$$

$$E = .2344$$

Run 5A

20/80 COM

$$E = C_s F \frac{20.9}{20.9 - O_2} = \frac{876.5 \text{ LB/HR}}{4.449 \times 10^7 \text{ DSCF/HR}} \left((809190 + (20)10100) \right) \frac{20.9}{20.9 - 4.6}$$

$$E = = \left(9372 \right) \left(1.2822 \right)$$

$$E = .2367 \text{ LB / MMBTU}$$

Run 5B $E = \frac{821.4}{4.3802 \times 10^{-7}} (9372) \left(\frac{20.9}{20.9 - 4.6} \right)$

$$E = 1.8752 \times 10^{-5} (9372)(1.2822)$$

$$E = 2.242 \text{ LB/MBTU}$$

$\bar{\mu}$ 5A, B = .2315 LB/MBTU

Run 7 $E = \frac{564.1}{3.6011 \times 10^{-7}} (9372) \left(\frac{20.9}{20.9 - 4.7} \right)$

$$E = 1.5664 \times 10^{-5} (9372) \; 1.2901$$

$$E = .1894$$

UNCONTROLLED PARTICULATE EMISSIONS FOR COAL OIL MIXTURE (COM) BURNED IN A 400 MW UTILITY BOILER (GRAINS/DSCF)

COAL/OIL RATIO	BOILER LOAD (MEGAWATTS) 200	300	360	400
0/100	.0475	.0531		.0767
20/80	—	.1096		.1346
30/70	.1047	.1289		.1612
40/60	—	.5846		.9129
50/50	.712	.6981	.625	—

From AT K Report ?

COM DATA, Particulate Outputs

	Florida Power Light, Unit #4 FFFSG								New Brunswick Electric Power ① Chatham, FFFSG			Ontario Research ② Boiler Burners	
Case # Run #	1	2	3	4	5	6	7	8	9	10	11	12	13
% Mix COAL/OIL	0/100			20/80		30/70			0/100	12/88		35/65	35/65
Load, Megawatts	200	300	400	300	400	200	300	400	10	10	10	2	2
Emissions Pounds / million BTU	.091	.092	.13	.19	.23	.19	.20	.28	.24	1.0	.99	.94	1.4
Allowable * Pounds / Million BTU	0.10			0.14		0.16			—	—		—	
Opacity						39	30	35	5-20	20-30	25-35		

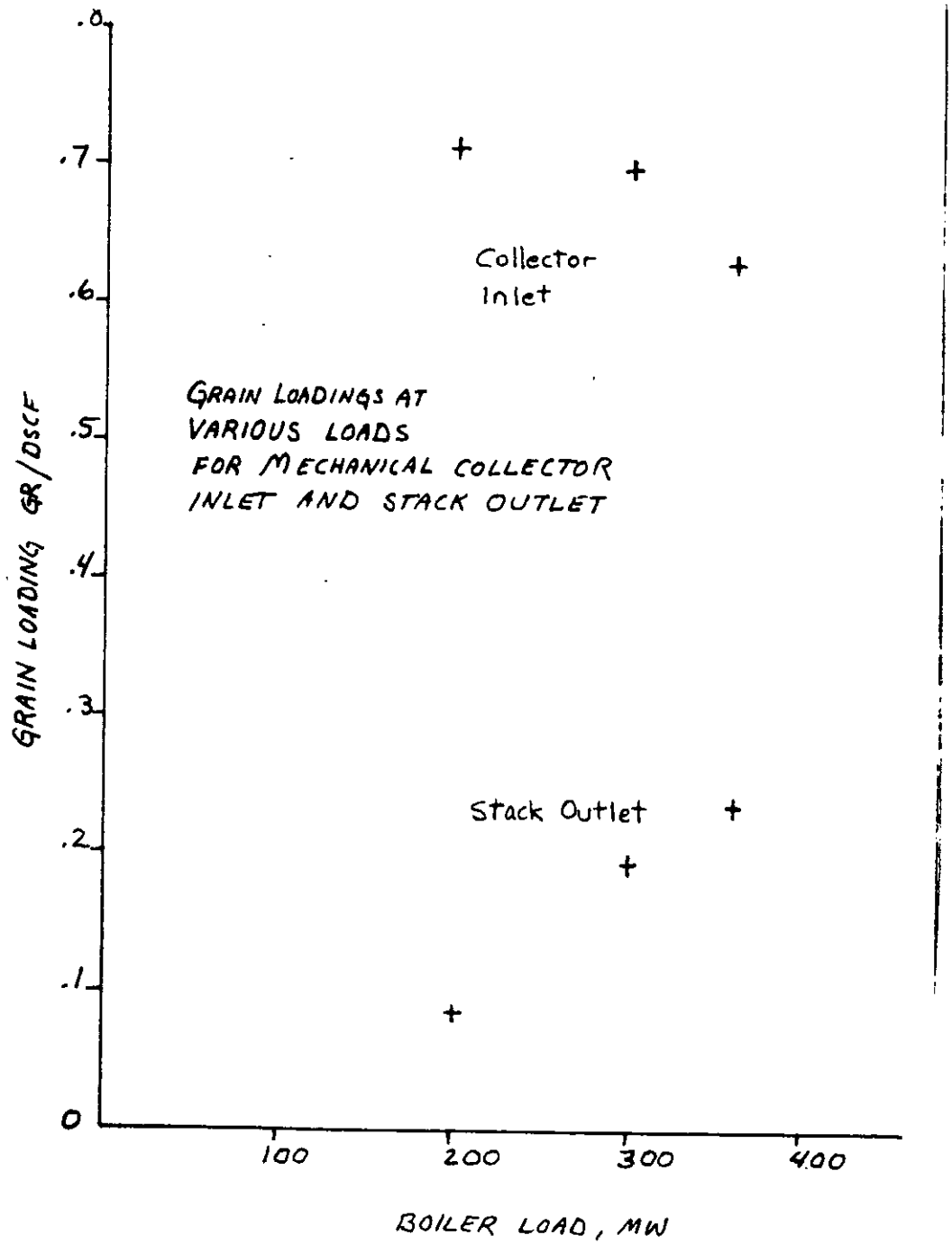
Test Date

① A small power boiler, Foster Wheeler Type SA., 38.8 lbs/sec steam, dual-fired, (coal, oil) with seperate burners. Fuel benification (agglomeration process) for 70% ash reduction, 50% sulfur. # cyclone Dust collector control device.

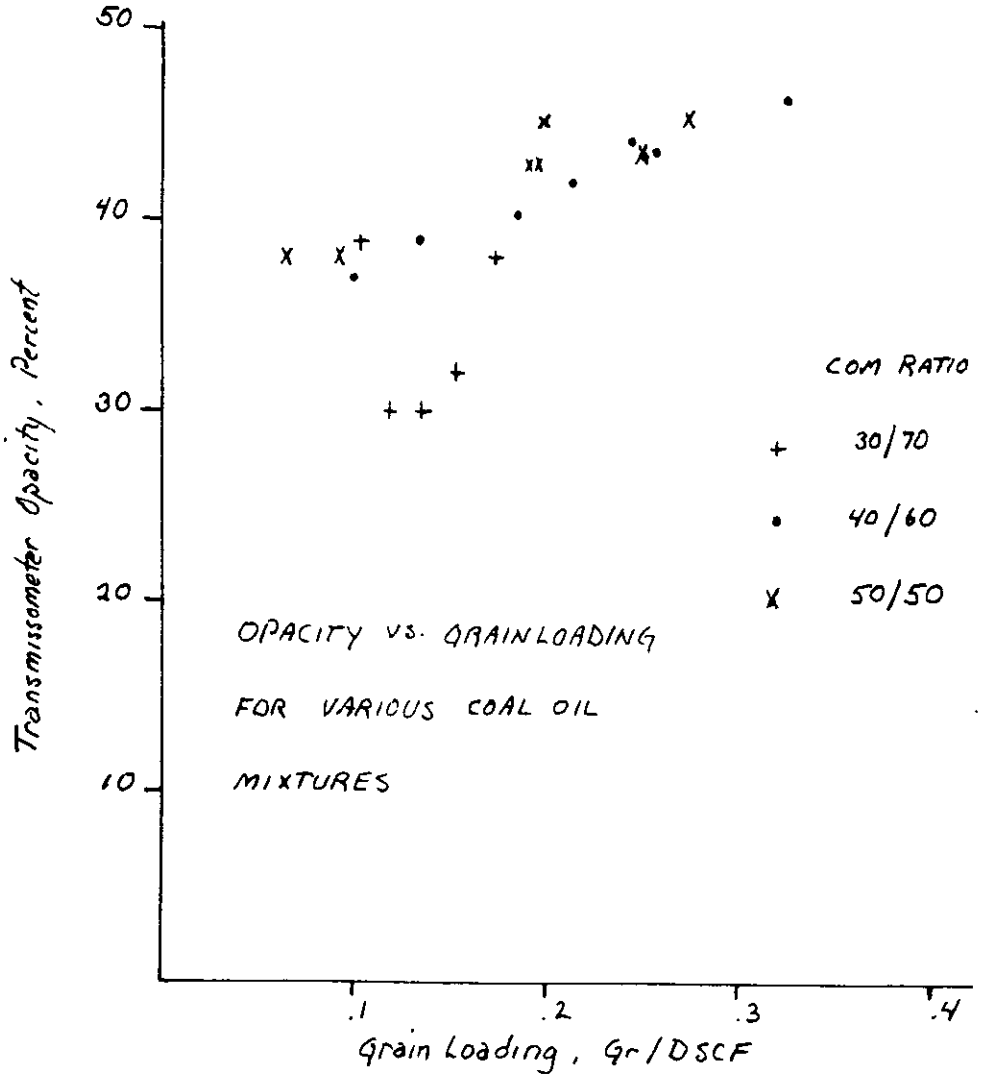
② Two types of boiler burners fired into a flame tube. Benification - dry grinding, flotation. agglomeration.

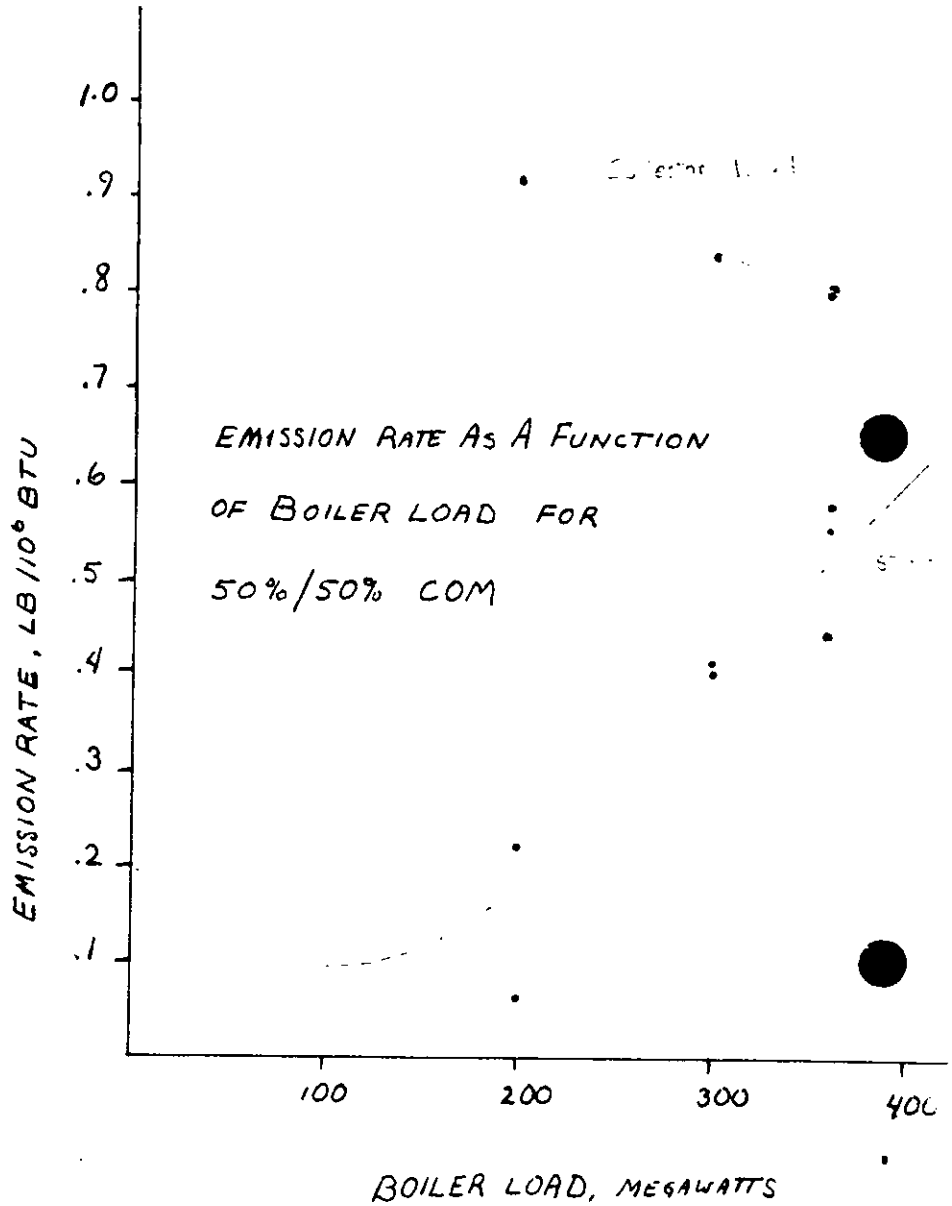
* Based present standards of: oil - 0.10 lb/MMBTU heat input
coal - 0.30 lb/MMBTU heat input

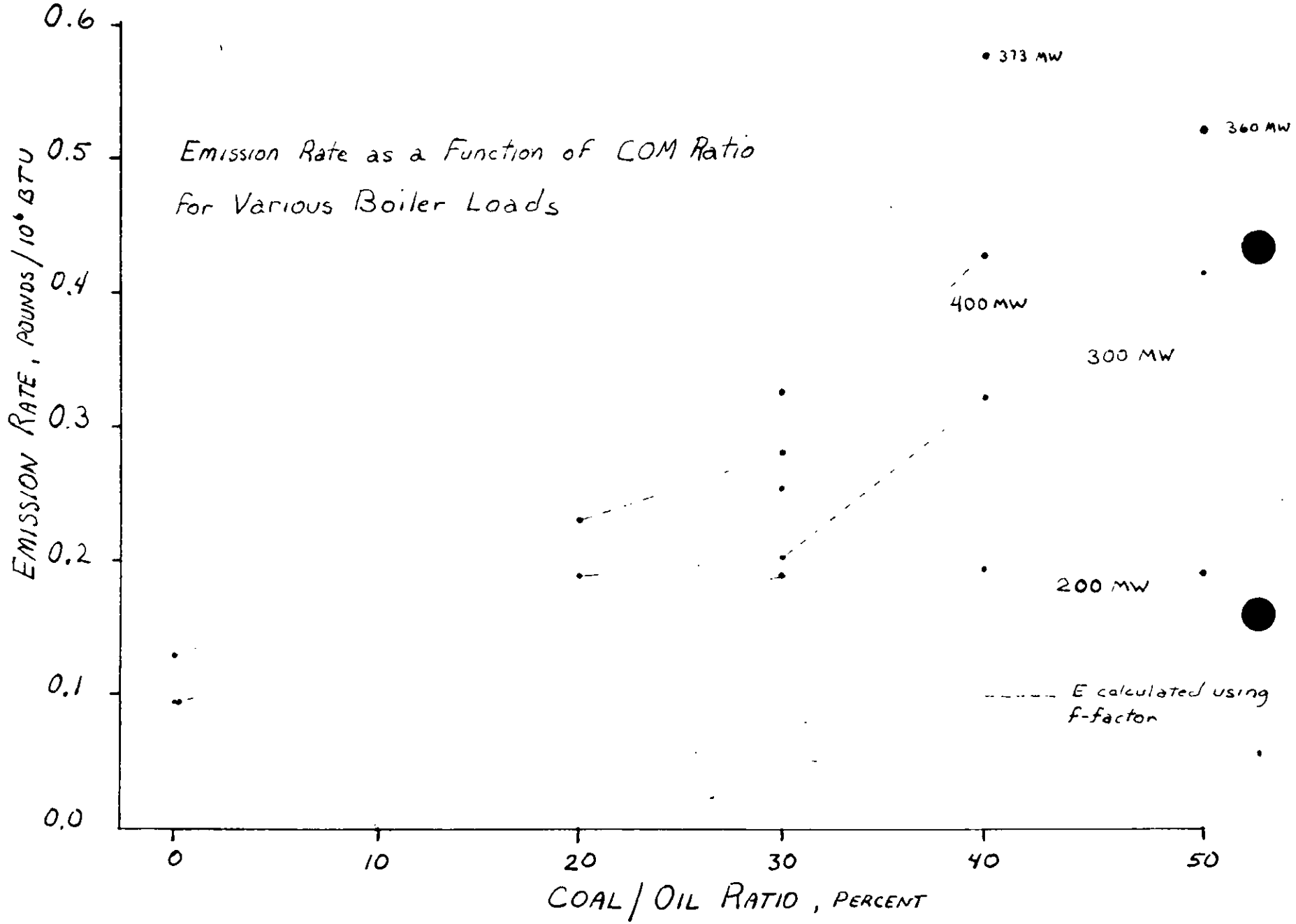
only OUTLET FIGURES

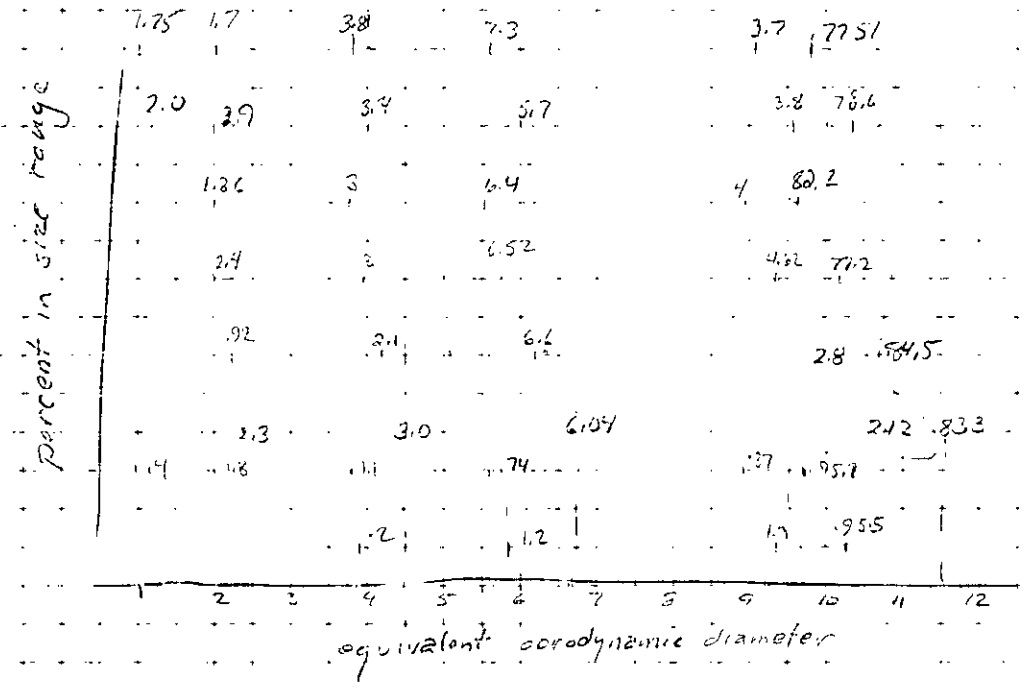


GRAIN LOADINGS AT VARIOUS LOADS FOR MECHANICAL COLLECTOR INLET AND STACK OUTLET


50
40
30
20
10
Transmissometer Opacity, Percent
.1
.2
.3
.4
Grain Loading, Gr/DSCF
COM RATIO
30/70
40/60
50/50
OPACITY VS. GRAIN LOADING
FOR VARIOUS COAL OIL
MIXTURES


1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
EMISSION RATE, LB/10⁶ BTU
100
200
300
400
BOILER LOAD, MEGAWATTS
EMISSION RATE AS A FUNCTION
OF BOILER LOAD FOR
50%/50% COM


Emission Rate as a Function of COM Ratio
for Various Boiler Loads
EMISSION RATE, POUNDS / 10⁶ BTU
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
10
20
30
40
50
COAL / OIL RATIO, PERCENT
373 MW
360 MW
400 MW
300 MW
200 MW
E calculated using f-factor



LOAD	TEST RUN #
360	22.1
360	22.2
360	22.3
360	22.4
300	23.1
300	23.2
200	21.1
200	21.2

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee

To: _____ Loctn.: _____
To: _____ Loctn.: _____
To: _____ Loctn.: _____
From: _____ Date: _____

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: _____ Date Due: _____

TO: Steve Smallwood

THROUGH: Bill Blommel

FROM: Rick Vail

DATE: February 19, 1981

SUBJECT: FP & L quarterly summary

According to all records the Bureau has, and data supplied by Mr. Bob Righter of FP & L; the following is a summary of the data you requested.

1) Riveria unit 3 was down due to mechanical problems

2) Sanford unit 3 was down due to mechanical problems

3) All other units show complete data

RV/BB/dt

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
From: _____	Date: _____	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due: _____	Date Due: _____	

TO: Steve Smallwood

THROUGH: Bill Blommel

FROM: Rick Vail

DATE: December 10, 1980

SUBJECT: FP&L Plants under Variance Stack Test Status

According to all records the Bureau has, and data supplied by Mr. Bob Allen of FP&L, the following is a summary of the data you requested.

1) No oil sample for both tests at the Ft. Myers Plant. The sample was assumed lost by Mr. Allen.

2) Manatee unit 2 shows no test during the quarter. This was due to numerous malfunctions with the unit.

3) Sanford unit 4 is now conducting a Coal-Oil Mixture burn.

4) Port Everglades unit 4 and Turkey Point unit (1) both have installed low excess air burners.

RV/mr

FPL PLANT	UNIT	QUARTERLY PERIOD (OCT-DEC) TESTED	EMISSION AVG lbs/10^6BTU	% SULFUR	% ASPHALTENES
Ft Myers	1	Oct 6	.133	2.3%	4.3%
Ft Myers	2	Oct 6	.116	2.3%	4.4%
Manatee	1	Oct 22	.10	1.03%	1.4%
Manatee	2	Nov 8	.06	0.96%	1.5%
Cape Canaveral	1	Dec 2	.125	2.5%	4.5%
Cape Canaveral	2	Dec 4	.110	2.4%	4.2%
Port Everglades	1	Oct 2	.058	1%	4.0%
Port Everglades	2	Oct 27	.068	1%	3.4%
Port Everglades	3* (LEAB)	Oct 2	.07	1%	3.8%
Port Everglades	4* (LEAB)	Oct 27	.052	1%	3.0%
Riveria	3* (LEAB)	Unit down due to mechanical problems			
Riveria	4	Nov 4	.110	0.92%	1.2%
Sanford	3	Unit down due to mechanical problems			
Sanford	4	COM			
Sanford	5	Nov 18	.111	2.2%	4.5%
Turkey Pt	1* (LEAB)	Dec 10	.061	1%	2.3%
Turkey Pt	2	Oct 9	.07	1%	-3.2%

*Low Excess Air Burners COM (coal oil mixture)

FP&L Quarterly Summary

FPL Plant	Unit	Quarterly Period (July-September) Tested	Emission Avg. lbs./10^6 BTU	% Sulfur	% Asphaltene
Ft. Myers	1	July 7-10	.09	No sample Assumed lost	No sample Assumed lost
Ft. Myers	2	July 9-11	.15	No sample Assumed lost	No sample Assumed lost
Manatee	1	September 15	.07	1.0%	1.3%
Manatee	2	No Test	No Test	No Test	No Test
Cape Canaveral	1	September 1	.135	2.2%	1.6%
Cape Canaveral	2	September 1	.108	2.2%	1.6%
Port Everglades	1	August 1-2	.055	.9%	2.3%
Port Everglades	2	August 1-2	.050	1.0%	3.0%
Port Everglades	3	August 11-12	.09	1.0%	2.8%
Port Everglades	4 (LEAB)*	August 20-21	.065	0.8%	3.4%
Riveria	3	September 22	.096	0.93%	1.9%
Riveria	4	August 20-21	.12	1.0%	1.4%
Sanford	3	July 18-19	.17	2.1%	1.7%
Sanford	4	Coal Oil Mix	(COM)	(COM)	(COM)
Sanford	5	August 5	.21	2.3%	1.9%
Turkey Point	1 (LEAB)*	September 3-4	.07	1.0%	4.0%
Turkey Point	2	July 23-24	.09	1.0%	1.9%

*LEAB = Low Excess Air Burners

12 day 24 July (10.1%)
of the 120-full burn day

Dave Hanes-

Some of my
old notes on
JONFORD COM
Note I keep
if useful or
file (13)

SS
2-12-81

Monday
4-8-80

ESP modules
collecting 99.9%

Lear-Seigler
Opacity Monitor

metals analysis on ash
Fly / bottom
have particle dist data on cyclone inlet
distribution flow (neg ΔP) at random point on inlet
outlet OK

3% O_2 - 15% EA
slagging at 20-30% load (2400°F+)
wall blower installed
2300°F at 40%
13-20% Carbon in fly ash
continue on 50%
burn design modification
bad erosion on stuf
burners at 40% prior to mod.
mod not in tip
prior to tip.
more bottom ash than anticipated

will call Haulas w/ them

Cyclone 62-72% eff
will be taking inequal
Oxstat
stack temp 250 - 330
(200 - 400 MW)

collected ash dry gray w/ tan tint

will be take 2 run along
simultaneous / Method 5 - acclimate ...

40% COM

	T1	T2	T1	T2	T1
	400 MW	400 MW	300	300	200 MW
Date	7-21	7-21	7-19	7-19	7-22
Opacity (CT)	44%	48%	39%	39%	37%
Opacity (mg)	43%	42%	47%	40%	37%
#/hr	1481	1717	758	975	423
#/MMBtu	0.396	.459	.273	.351	.195

Prediction

base on 40% COM data

50% COM	200 MW	531 #/hr
	400 MW	2000 #/hr

50% COM	200 MW	.245 #/MMBtu
	400 MW	.535 #/MMBtu

Plan to start monday

5-7 day