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

July 27, 1990

Ms. Judy Corces
Florida Power Corporation
3201 34th Street
St. Petersburg, Florida 33711

Dear Ms. Corces:

Re: PSD Preconstruction Monitoring Requirement for Debary Site

We have reviewed your proposal to use Site No. 0930-001-F02 at Debary to satisfy the PSD preconstruction monitoring requirements for SO_2 for your project to add 450 MW of turbines at your Debary facility. We have determined that data collected at this site is acceptable for satisfying these requirements.

If you have any questions, please call Cleve Holladay at (904)488-1344.

Sincerely,

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

CHF/plm

c: Robert C. McCann, KBN

Florida Power
CORPORATION

May 24, 1990

Mr. Clair H. Fancy, Chief
Bureau of Air Regulation
Division of Air Resources Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Dear Mr. Fancy:

Florida Power Corporation (FPC) is planning the addition of 600 megawatts (MW) of simple cycle combustion turbines at the Northeast Substation site in Pinellas County.

Enclosed is a letter from KBN Engineering and Applied Sciences, Inc. (KBN) to FPC outlining existing ambient and sulfur dioxide (SO_2) emission inventory data available in the vicinity of Northeast Substation. The existing air quality monitoring data should be appropriate to satisfy the PSD preconstruction monitoring requirements for this project. Therefore, FPC requests that FDER review the enclosed information and determine if the existing monitoring data will be acceptable to the FDER as preconstruction monitoring for the air construction permit.

OK

Thank you for your consideration of this matter.

We have reviewed

Sincerely,

The existing monitoring data at

Judy N. Corces

as discussed in your May 24 letter is acceptable for satisfying the PSD preconstruction monitoring requirements for this project.

Judy N. Corces, P.E.
Environmental & Licensing Affairs

JNC/sss:Fancy.ltr

Seems OK to me

KBN

May 21, 1990
89055

Ms. Judy Corces
Florida Power Corporation
3201 34th Street South
St. Petersburg, Florida 33711

Re: Northeast Substation, Existing Ambient and Emission Inventory Data

Dear Judy:

This letter presents the results of a preliminary evaluation of ambient and sulfur dioxide (SO_2) emission inventory data available in the vicinity of the Northeast Substation. Reviews were made for ambient data collected in Pinellas County and emission sources within 50 km from the site. The evaluation assumed that the proposed siting of up to 600 megawatts of simple cycle combustion turbines (CTs) at the Northeast Substation will require, under Prevention of Significant Deterioration (PSD) regulations, air impact analyses of other sources and submittal of preconstruction monitoring data for SO_2 only. The impacts from other pollutants are expected to be less than the significant impact levels and, therefore, detailed modeling for those pollutants would not be required. ✓

There are currently nine monitoring stations in Pinellas County that collect ambient concentrations. A summary of these stations, including the pollutants monitored and relative locative to the substation, is presented in Table 1. Of these monitors, four monitors collect SO_2 concentrations and are located approximately 3.3 to 36 km from the substation. A summary of the SO_2 concentrations measured at these stations during the last three years is presented in Table 2. For all of these stations, the ambient concentrations are below the Florida ambient air quality standards (AAQS). The nearest monitoring station to the substation is located in North Pinellas and is approximately 3.3 km from the site. From 1987 through 1989, the site has collected more than 90 percent of available data and meets quality assurance standards. Because of its location relative to the substation, the monitoring data collected at the site are proposed for use to satisfy the PSD preconstruction monitoring requirements. OK

A summary of the SO_2 emission sources within 50 km of the substation is given in Table 3. As shown, the site is located in an area that has several sources with emissions greater than

KBN ENGINEERING AND APPLIED SCIENCES, INC.
1034 Northwest 57th Street Gainesville, Florida 32605 904/331-9000 FAX: 904/332-4189

1,000 TPY located within 10 km of the site. The majority of the emissions occur at sources located between 20 to 30 km from the site. The emissions from these sources are expected to be measured at the monitoring data collected in Pinellas County.

Based on the available monitoring data collected near the substation and locations of the existing emission sources relative to the substation, it is recommended that that the existing monitoring data meets the requirements of PSD preconstruction monitoring and can be used in lieu of collecting ambient data at the site.

Please call me to discuss this evaluation or if you have any questions about the data.

Sincerely yours,

Robert C. McCann

Robert C. McCann
Principle Scientist

Table 1. Summary of Monitoring Sites in the Vicinity of FPC's Northeast Substation

Site No.	County	Address	Pollutant Measured	UTM Coordinates (km) East	UTM Coordinates (km) North	Relative Location Northeast Substation Distance (km)	Relative Location Northeast Substation Direction (degrees)
3620-002-G05	Pinellas	Pinellas Park, 11500 43rd Ave., N. Pinellas	SO2	333.45	3083.45	3.3	294
3980-023-G02	Pinellas	St. Petersburg, Derby Lane, 10100 San Mar.	SO2,PM	340.17	3082.98	3.8	77
4380-001-G02	Pinellas	Tarpon Springs, 303A Anclote Rd.,	SO2,PM	325.82	3116.44	36.0	343
4380-002-G03	Pinellas	Tarpon Springs, Brooker Creek Pk.	SO2,NO2,O3, CO,PM10,Pb	332.88	3108.17	26.3	352
3980-018-G01	Pinellas	St. Petersburg, Azalea Park, 7200 22nd Ave. N.	NO2,O3,CO, PM	328.56	3074.50	11.0	226
0620-004-G01	Pinellas	Clearwater, St. Petersburg Jr. Col.	O3,PM	329.23	3095.00	14.8	331
2260-002-G01	Pinellas	Largo, Pinellas County Sheriff Dept.	O3,PM	332.88	3108.17	26.3	352
3980-024-G01	Pinellas	St. Petersburg, 2301 66th St. N.	O3,Pb	329.75	3075.26	9.6	225
2260-004-G02	Pinellas	Largo, 1301 Ulmerton Rd.	PM,PM10	325.32	3086.73	12.1	292

Note: The substation's east and north UTM coordinates are 336.5 and 3082.1 km, respectively.

Table 2. Summary of SO2 Monitoring Data in the Vicinity of FPC's Northeast Substation

Site No.	County/ City	Monitoring Objective	Spatial Scale	Year	Observations		Concentration (ug/m3)				
							3-Hour Average		24-Hour Average		
					Number	% Capture	Highest	Second Highest	Highest	Second Highest	Annual Average
3620-002-G05	Pinellas/ N. Pinellas	Source	Neighborhood	1987	8541 ✓	97.5	367 ✓	281 ✓	83 ✓	76 ✓	12 ✓
				1988	8307 ✓	94.6	345 ✓	241 ✓	87 ✓	74 ✓	11 12
				1989 ✓	8103 ✓	92.5	231 ✓	224 ✓	84 ✓	73 ✓	13 ✓
			19	1990	2096		201	182	49	48	12
3980-023-G02	Pinellas/ St. Petersburg	Pop Exp.	Neighborhood	1987	8629 ✓	98.5	587 ✓	433 ✓	130 ✓	129 ✓	18 ✓
				1988	8595 ✓	97.8	412 ✓	373 ✓	137 ✓	105 ✓	17 ✓ 18
				1989 ✓	8552 ✓	97.6	465 ✓	427 ✓	123 ✓	115 ✓	20 ✓
			19	1990	2138		368	355	92	87	20
4380-001-G02	Pinellas/ Tarpon Spr.	Source	Middle	1987	8466 ✓	96.6	197 ✓	150 ✓	48 ✓	33 ✓	5 ✓
				1988	8579 ✓	97.7	169 ✓	119 ✓	38 ✓	34 ✓	6 ✓
				1989 ✓	8596 ✓	98.1	157 ✓	134 ✓	42 ✓	27 ✓	6 ✓
			19	1990	2135		82	69	22	18	5
4380-002-G03	Pinellas/ Tarpon Spr.	Max. Conc.	Neighborhood	1987	8593 ✓	98.1	232 ✓	193 ✓	50 ✓	48 ✓	9 ✓
				1988	8559 ✓	97.4	244 ✓	199 ✓	69 ✓	49 ✓	10 ✓
				1989 ✓	8447 ✓	96.4	328 ✓	174 ✓	68 ✓	58 ✓	13 ✓
			19	1990	2110		148	111	56	32	9

Table 3. SO2 Sources Within 50 km of the FPC -Northeast Substation

Distance Category	APIS Facility Identification Number	Facility	County	UTM Coordinates (km) East	UTM Coordinates (km) North	Relative Location to FPC -Northeast Substation X (km)	Relative Location to FPC -Northeast Substation Y (km)	Relative Location to FPC -Northeast Substation Distance (km)	Relative Location to FPC -Northeast Substation Direction (degrees)	Maximum Allowable SO2 Emissions (TPY)
0-10 km	40PNL520117	Pinellas Co. Res. Rec.	Pinellas	335.2	3084.1	-1.1	2.0	2.3	331	2,300
-------	40PNL520011	FPC -Bartow	Pinellas	342.4	3082.7	6.1	0.6	6.1	0	54,960
10-20 km	40HIL290028	Gold Bond Building	Hillsborough	347.3	3082.7	11.0	0.6	11.0	87	310
--------	40PNL520013	FPC -Bayboro	Pinellas	338.8	3071.3	2.5	-10.8	11.1	167	6,876
	40HIL290099	Sulphuric Acid Trading	Hillsborough	349.0	3081.5	12.7	-0.6	12.7	93	156
	40PNL520012	FPC -Higgins	Pinellas	336.5	3098.4	0.2	16.3	16.3	1	11,195
20-30 km	40HIL290029	Nitram	Hillsborough	315.0	3089.0	-21.3	6.9	22.4	288	108
--------	40HIL290082	Sulfur Terminal	Hillsborough	358.0	3090.0	21.7	7.9	23.1	70	103
	40HIL290018	Lafarge Corp.	Hillsborough	357.9	3090.7	21.6	8.6	23.2	68	20,293
	40HIL290018	General Portland	Hillsborough	358.0	3090.6	21.7	8.5	23.3	69	12,132
	40HIL290038	TECO -Hookers Point	Hillsborough	358.0	3091.0	21.7	8.9	23.5	68	13,474
	40HIL290083	AMOCO Oil	Hillsborough	357.8	3092.0	21.5	9.9	23.7	65	166
	40HIL290040	TECO -Gannon	Hillsborough	360.0	3087.5	23.7	5.4	24.3	77	126,940
	40HIL290024	IMC -Port Sutton	Hillsborough	360.1	3087.5	23.8	5.4	24.4	77	1,443
	40HIL290005	Central Phosphate	Hillsborough	358.9	3092.8	22.6	10.7	25.0	65	8,834
	40HIL290127	McKay Bay Res. Rec.	Hillsborough	360.0	3091.9	23.7	9.8	25.6	68	745
		Columbus Company	Hillsborough	361.9	3077.8	25.6	-4.3	26.0	100	167
	40HIL290050	Pacific Chloride	Hillsborough	361.8	3088.3	25.5	6.2	26.2	76	702
	40HIL290039	TECO -Big Bend	Hillsborough	361.9	3075.0	25.6	-7.1	26.6	106	364,554
	40HIL290008	Gardinier	Hillsborough	362.9	3082.2	26.6	0.1	26.6	90	5,471
	40MAN410002	Royster Phosphate	Manatee	348.5	3057.3	12.2	-24.8	27.6	154	1,122
	40HIL290057	Gulf Coast Lead	Hillsborough	363.9	3093.8	27.6	11.7	30.0	67	1,641
30-40 km	40HIL290223	Couch Construction	Hillsborough	364.3	3098.1	28.0	16.0	32.2	60	115
--------	40HIL290261	Hillsborough Co. Res. Rec.	Hillsborough	368.2	3092.7	31.9	10.6	33.6	72	1,029
	40TPA510017	FPC -Anclote	Pasco	324.4	3118.7	-11.9	36.6	38.5	0	116,840
40-50 km	40MAN410010	FPL -Manatee	Manatee	367.3	3054.2	31.0	-27.9	41.7	132	75,680
--------	40MAN410007	Tropicana	Manatee	346.8	3040.9	10.5	-41.2	42.5	166	437
> 50 km	40HIL290101	IMC -Fort Lonesome	Hillsborough	389.5	3067.9	53.2	-14.2	55.1	105	1,547
-------	40HIL290076	Delta Asphalt	Hillsborough	393.8	3096.3	57.5	14.2	59.2	76	167
	40HIL290075	Consolidated Minerals	Hillsborough	393.8	3096.3	57.5	14.2	59.2	76	3,302
	40HIL290075	AMAX	Hillsborough	393.8	3096.3	57.5	14.2	59.2	76	3,313
	40TPA530052	CF Industries	Polk	408.0	3082.4	71.7	0.3	71.7	90	1,700
	40TPA510002	Lykes Pasco Packing	Pasco	383.5	3139.2	47.2	57.1	74.1	40	715
	40TPA270021	Florida Crushed Stone	Hernando	360.0	3162.5	23.7	80.4	83.8	16	4,556
	40TPA270015	Asphalt Pavers	Hernando	361.4	3168.4	25.1	86.3	89.9	16	198

* Based on UTM coordinates for the FPC -Northeast Substation of 336.3 km East and 3082.1 km North.

Seems OK to me

Florida Power
CORPORATION

May 10, 1990

RECEIVED
MAY 15 1990
DER - BAQM

Mr. Clair H. Fancy, Chief
Bureau of Air Regulation
Division of Air Resources Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Dear Mr. Fancy,

As discussed at the March 27th meeting between Florida Department of Environmental Regulation (FDER) and Florida Power Corporation (FPC), FPC is planning the addition of 450 megawatts (MW) of simple cycle combustion turbines at the DeBary site. Enclosed is the "Preliminary Air Quality Impact Assessment for Evaluating the Site Location of 450 MW of Simple Cycle Combustion Turbines at the FPC DeBary Facility" report, prepared by KBN Engineering and Applied Sciences, Inc. (KBN) for FPC.

Section 4.0 of the enclosed report, Existing Monitoring Data, shows that existing air quality monitoring data should be appropriate to satisfy the PSD preconstruction monitoring requirements for this project. Therefore, FPC requests that FDER review the enclosed report and determine if the existing monitoring data will be acceptable to the FDER as preconstruction monitoring for the air construction permit.

Thank you for your consideration of this matter.

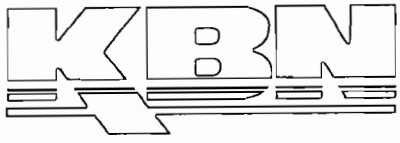
Sincerely,

Judy N. Corces

Judy N. Corces

PYB/sss
PYB:#1:Fancy.ltr

Encl.



KBN ENGINEERING AND
APPLIED SCIENCES, INC.

PRELIMINARY
AIR QUALITY IMPACT ASSESSMENT
FOR EVALUATING THE
SITE LOCATION OF
450 MW OF SIMPLE CYCLE
COMBUSTION TURBINES
AT THE FPC DEBARY FACILITY

PREPARED FOR:

Florida Power Corporation
3201 34th Street South
St. Petersburg, Florida 33711

PREPARED BY:

KBN Engineering and Applied Sciences, Inc.
1034 NW 57th Street
Gainesville, Florida 32605

MAY 1990
89055B2/DB450

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1.0 INTRODUCTION

KBN Engineering and Applied Sciences, Inc. (KBN) has been contracted by Florida Power Corporation (FPC) to provide environmental services for evaluating the suitability of locating up to 450 megawatts (MW) of simple cycle combustion turbines (CTs) at the DeBary facility. Simple cycle CTs have a nominal generating capacity of 75 to 95 MW; therefore, depending on the manufacturer selected, five to six CTs will be needed to generate 450 MW. The preliminary analyses were undertaken to determine compliance with prevention of significant deterioration (PSD) increments and preconstruction de minimis monitoring levels for the proposed plant only.

A full PSD review will be performed at a later date to determine whether significant air quality deterioration will result from the proposed facility and other PSD increment consuming sources and to determine compliance with ambient air quality standards (AAQS). The PSD review will also include control technology review, source impact analysis, air quality analysis (monitoring), and additional impact analyses.

The applicable PSD increments, de minimis monitoring levels, and significance levels are presented in Table 1-1. The PSD increments are specified as certain increases above an air quality baseline concentration that would constitute significant deterioration. If a proposed source's impacts are less than the de minimis monitoring levels, then the preconstruction monitoring requirement does not have to be met. Otherwise, monitoring data collected at or near the project site are required based on the use of existing air quality data or the collection of on-site data. If a proposed source's impacts are less than the significance levels, then the source's impacts are assumed to be insignificant and further impact assessments are not required to demonstrate compliance with ambient standards.

This report addresses only the source impact analysis requirement for sulfur dioxide (SO_2) concentrations within the PSD regulations. This

Table 1-1. Allowable PSD Increments, De Minimis Monitoring Levels, and Significance Levels

Pollutant	Averaging Time	PSD Class II Increments ($\mu g/m^3$)	De Minimis Monitoring Levels ($\mu g/m^3$)	Significant Impact Levels ($\mu g/m^3$)
Particulate Matter (TSP)	Annual geometric mean	19	19	1
	24-Hour maximum[a]	37	37	5
Particulate Matter (PM10)	Annual arithmetic mean	17[c]	NA	1
	24-Hour maximum[b]	30[c]	10	5
Sulfur Dioxide	Annual arithmetic mean	20	NA	1
	24-Hour maximum[a]	91	13	5
	3-Hour maximum[a]	512		25
Carbon Monoxide	8-Hour maximum[a]	NA	575	500
	1-Hour maximum[a]	NA	NA	2,000
Nitrogen Dioxide	Annual arithmetic mean	25[d]	14	1
Lead	Calendar quarter	NA	0.1	NA

Note: NA = not applicable, i.e., no standard exists.
PM10 = particulate matter with aerodynamic diameter less than or equal to 10 micrometers (μm).
TSP = total suspended particulate matter.
$\mu g/m^3$ = micrograms per cubic meter.

[a]Maximum concentration not to be exceeded more than once per year.
[b]Achieved when the expected number of exceedances per year is less than 1.
[c]Proposed PSD increments.
[d]The State of Florida has not yet adopted the PSD increments for NO_2 concentrations.

Source: 40 CFR 52.21.

pollutant is assumed to be more critical in evaluating compliance with PSD and AAQS.

The remainder of this report is presented in three sections. The air quality analysis approach is presented in Section 2.0. A description of the proposed project sources is presented in Section 2.1. This section includes descriptions of the design stack, operating, and emission data for the proposed CTs. The general modeling approach is presented in Section 2.2. The meteorological data and receptor grids are described in Sections 2.3 and 2.4, respectively. The results of the air quality analyses are summarized in Section 3.0. A summary of existing ambient and emission data within 50 km of the site is given in Section 4.0. The data in this section indicate that existing air quality monitoring data are appropriate for use in satisfying the PSD preconstruction monitoring requirements for this project.

2.0 AIR QUALITY ANALYSIS APPROACH

2.1 DESCRIPTION OF PROJECT SOURCES

The design stack, operating, and emission data for the proposed CTs firing fuel oil are provided in Tables 2-1 and 2-2. These data have been developed from manufacturers' data for four types of simple cycle CTs for a range of operating conditions (i.e., 40°F and 95°F) and supplied by FPC. The operating and emission data for oil firing were used to assess impacts because emissions with this fuel were higher than those for natural gas. Because a manufacturer has not been selected, modeling was performed for two of the possible CTs which could potentially produce the highest impacts. Case 2 was selected because it had the lowest flow rate among the CTs under consideration. Case 4 was selected because it had the highest potential emissions among the four cases. For these cases, modeling was performed using the higher emissions at 40°F conditions coupled with the lower gas flow rates at 95°F conditions. These two cases will result in either the lowest plume rise or maximum emissions and, therefore, produce conservative estimates of maximum concentrations. The stack and operating parameters for the two cases modeled are given in Table 2-3.

Building data were also available to assess the potential for building downwash effects to occur. The building data used in the analyses are based on a building height, length, and width of 50, 100, and 52 ft, respectively. The modeling analyses used a building height and maximum projected width of 50 and 113 ft, respectively.

2.2 GENERAL MODELING METHODOLOGY

The modeling approach followed EPA and FDER modeling guidelines (EPA, 1987) for determining compliance with AAQS and PSD increments. In general, when model predictions are used to determine compliance with AAQS and PSD increments, current policies stipulate that the highest annual average and highest, second-highest short-term (i.e., 24 hours or less) concentrations be compared to the applicable standard when 5 years of meteorological data

Table 2-1. Design Information and Stack Parameters for the Simple Cycle Combustion Turbines at the FPC DeBary Facility

Data	Case 1		Case 2		Case 3		Case 4	
	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F
General:								
Power (kW)	92,488.0	77,986.0	92,067.0	75,761.0	115,940.0	95,191.0	118,018.0	96,085.0
Heat Rate (Btu/kWh)	12,491.0	12,850.0	11,629.0	12,015.0	11,494.0	12,233.0	11,408.0	11,969.0
Heat Input (MMBtu/hr)	1,155.3	1,002.1	1,070.6	910.3	1,332.6	1,164.5	1,346.3	1,150.0
Fuel Oil (lb/hr)	58,439.0	50,714.0	54,183.0	46,065.0	67,439.0	58,931.0	68,132.0	58,200.0
Fuel:								
Heat Content--Oil(HHV)	19,768.8	19,760.2	19,759.8	19,760.5	19,760.3	19,759.9	19,760.9	19,760.2
Percent Sulfur	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CT Exhaust:								
Volume Flow (acfm)	1,699,826	1,510,154	1,525,434	1,385,909	1,857,998	1,737,025	1,881,709	1,716,410
Volume Flow (scfm)	638,342	556,040	564,421	499,836	672,855	614,711	695,758	620,729
Mass Flow (lb/hr)	2,812,602	2,424,000	2,515,022	2,207,000	2,980,386	2,697,000	3,095,915	2,735,000
Temperature (°F)	946	974	967	1,004	998	1,032	968	1,000
Moisture (% vol)	10.22	12.99	7.52	9.69	9.26	11.55	7.97	10.35
Moisture (% mass)	6.5	8.35	4.73	6.15	5.86	7.38	5.02	6.58
Oxygen (% vol)	13.10	12.54	13.39	13.17	12.76	12.55	13.17	12.94
Oxygen (% mass)	14.81	14.33	14.97	14.86	14.35	14.25	14.75	14.63
Molecular Weight	28.3	28	28.62	28.36	28.45	28.18	28.58	28.3
Water Injected (lb/hr)	107,615	96,357	54,183	38,234	86,523	77,671	68,132	58,200
Stack:								
Volume Flow (acfm)	1,699,826	1,510,154	1,525,434	1,385,909	1,857,998	1,737,025	1,881,709	1,716,410
Temperature (°F)	946	974	967	1,004	998	1,032	968	1,000
Diameter (ft)	15.0	15.0	20.9	20.9	18.5	18.5	25.1	25.1
Velocity (ft/sec)	160.3	142.4	74.3	67.5	115.2	107.7	63.5	57.9
Velocity (ft/min)	9619	8546	4460	4052	6912	6462	3809	3475

Note: For Case 2, effective diameter given based on rectangular vent with length and width of 19 and 18 ft, respectively.
For Case 4, effective diameter given based on rectangular vent with length and width of 38 and 13 ft, respectively.

acfm = actual cubic feet per minute.
Btu/kWh = British thermal units per kilowatt hour.
°F = degrees fahrenheit.
ft = feet.
ft/min = feet per minute.
ft/sec = feet per second.
HHV = high heating value.
kW = kilowatt hour.
lb/hr = pounds per hour.
% mass = percent mass.
MMBtu = million British thermal units.
% vol = percent volume.

Table 2-2. Maximum Criteria Pollutant Emissions for One Simple Cycle CT at the DeBary Facility

Pollutant	Case 1		Case 2		Case 3		Case 4	
	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F	No.2 Oil at 40°F	No.2 Oil at 95°F
Particulate:								
Basis								
lb/hr	45.5	41.0	42.1	37.0	50.0	45.1	49.1	43.1
TPY	199.4	179.4	184.4	162.2	219.1	197.4	214.9	188.8
Sulfur Dioxide:								
Basis	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur	0.5 % Sulfur
lb/hr	584.39	507.14	541.83	460.65	674.39	589.31	681.32	582.00
TPY	2,559.6	2,221.3	2,373.2	2,017.6	2,953.8	2,581.2	2,984.2	2,549.2
Nitrogen Oxides:								
Basis	42 ppm[a]	42 ppm[a]	42 ppm[a]	42 ppm[a]	42 ppm[a]	42 ppm[a]	42 ppm[a]	42 ppm[a]
lb/hr	184.4	160.1	170.9	145.4	212.9	186.0	215.0	183.5
TPY	807.7	701.1	748.6	636.8	932.5	814.9	941.6	803.9
ppm	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Carbon Monoxide:								
Basis	30 ppm[b]	30 ppm[b]	30 ppm[b]	30 ppm[b]	30 ppm[b]	30 ppm[b]	30 ppm[b]	30 ppm[b]
lb/hr	75.0	63.3	68.3	59.0	79.8	71.1	83.7	72.8
TPY	328.3	277.1	299.0	258.6	349.7	311.4	366.8	318.8
ppm	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
VOCs:								
Basis	6 ppm[b]	6 ppm[b]	6 ppm[b]	6 ppm[b]	6 ppm[b]	6 ppm[b]	6 ppm[b]	6 ppm[b]
lb/hr	6.42	5.42	5.85	5.06	6.84	6.09	7.18	6.24
TPY	28.1	23.8	25.6	22.2	30.0	26.7	31.4	27.3
ppm	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead:								
Basis	EPA(1988)	EPA(1988)	EPA(1988)	EPA(1988)	EPA(1988)	EPA(1988)	EPA(1988)	EPA(1988)
lb/hr	1.03×10^{-2}	8.92×10^{-3}	9.53×10^{-3}	8.10×10^{-3}	1.19×10^{-2}	1.04×10^{-2}	1.20×10^{-2}	1.02×10^{-2}
TPY	4.50×10^{-2}	3.91×10^{-2}	4.17×10^{-2}	3.55×10^{-2}	5.19×10^{-2}	4.54×10^{-2}	5.25×10^{-2}	4.48×10^{-2}

[a]Corrected to 15 percent O_2 dry conditions.
[b]Corrected to dry conditions.

Note: EPA = U.S. Environmental Protection Agency.
lb/hr = pounds per hour.
ppm = parts per million.
TPY = tons per year.

Table 2-3. Stack, Operating, and Emission Data for the Simple Cycle CTs Used in the Air Dispersion Modeling

Parameter	Values	
	Case 2	Case 4
Stack Data		
Height, ft	75	75
Diameter, ft	20.87[a]	25.07[b]
Operating Data		
Output (MW) for 1 Unit--		
at 40°F	92.067	118.018
at 95°F	75.76	96.085
Number of Units		
Needed for 450 MW--		
Number at 95°F	6	5
Output (MW)	454.56	480.43
Data for 95°F Conditions--		
Temperature, °F	1,004	1,000
Flow rate, acfm	1,385,996	1,716,410
Velocity, ft/sec	67.5	57.9
Emission Data (40°F Conditions)		
SO_2, total for proposed source, lb/hr	3,251	3,407

[a]Effective diameter based on area of rectangular vent with length and width of 19 and 18 ft, respectively.
[b]Effective diameter based on area of rectangular vent with length and width of 38 and 13 ft, respectively.

Note: acfm = actual cubic feet per minute.
°F = degrees Fahrenheit.
ft = feet.
ft/sec = feet per second.
lb/hr = pounds per hour.
MW = megawatts.

are used. The highest, second-highest concentration is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor.

The Industrial Source Complex (ISC) dispersion model (EPA, 1988a) was used as the recommended model to evaluate the pollutant emissions from the proposed plant and existing FPC facilities. EPA regulatory options were used to address maximum impacts. Based on a review of the land use around the site, the rural mode was selected for all analyses based on the limited degree of residential, industrial, and commercial development within 3 km of each site.

2.3 METEOROLOGICAL DATA

Meteorological data used in the ISCST model to determine air quality impacts consisted of a concurrent 5-year period from 1982 through 1986 of hourly surface weather observations and twice-daily upper-air soundings from the National Weather Service (NWS) stations located nearest the site. For this project, surface and upper-air data collected at the NWS stations at Orlando International Airport and Ruskin, respectively, were used. These stations also have the most readily available and complete databases which are considered representative of the plant site. To provide a meteorological database suitable for modeling, these surface and upper-air data were preprocessed by using RAMMET, an EPA UNAMAP meteorological processing program (EPA, 1988b).

2.4 RECEPTOR LOCATIONS

Receptors were located along 36 radials spaced at 10-degree increments outward from the facility, with the proposed CTs at the center of a grid. Along each radial, receptors were located at distances ranging from the fenced plant property of approximately 100 meters (m) and distances of 250, 400, 700, 1,000, 1,500, 2,000, 2,500, and 3,000 m. For directions of 340 degrees clockwise through 100 degrees, receptors at 100 m are on plant property and were not considered in the analysis. These receptor locations were selected to include the area of maximum impacts due to the proposed and existing sources. Impacts are required to be determined at receptors that are considered representative of ambient air. Ambient air is defined as those areas where the general public has access. In general, EPA and FDER consider areas outside of fenced property as ambient air.

3.0 AIR QUALITY MODELING RESULTS

3.1 PROPOSED COMBUSTION TURBINES ONLY

A summary of the maximum SO_2 concentrations due to the proposed simple cycle CTs for the two modeled cases is presented in Table 3-1. The results are summarized from the maximum concentrations predicted using 5 years of meteorological data from the NWS station in Orlando for Cases 2 and 4. A summary of the maximum SO_2, NO_2, CO, PM, and lead concentrations due to the proposed CTs is presented in Table 3-2. These results are based on scaling the maximum SO_2 concentrations given in Table 3-1 by the ratio of pollutant emissions to the modeled SO_2 emissions. Based on these results, the maximum concentrations predicted for the proposed turbines are less than the significance levels for NO_2, CO, and PM and de minimis levels for NO_2, CO, PM, and lead. As such, additional impact analyses are not required to be addressed for these pollutants (i.e., modeling of impacts due to other sources to determine compliance with ambient standards). For SO_2 concentrations, the proposed turbines' impacts are greater than the significance levels and additional ambient impact analyses would be required. These impact analyses are to determine if the proposed sources' impacts are greater than the de minimis monitoring level, PSD Class II increments, and AAQS. As shown in Table 3-2, the maximum impacts from the proposed turbines are less than the PSD Class II increments and consume approximately 42, 63, and 7.5 percent of the 3-, 24-hour, and annual increments, respectively, for Case 2 and 52, 59, and 7.0 percent of the respective increments for Case 4. For both cases, the proposed sources' impacts are greater than the de minimis monitoring levels which could require that preconstruction monitoring be performed. Under PSD regulations, codified in 40 CFR 52.21(i)(8) and Chapter ~~17-2.510~~ 17-2.500, F.A.C., up to 1 year of continuous air monitoring could be required. However, ambient air quality data from existing monitoring stations may be acceptable to the FDER in order to satisfy this PSD review requirement. A discussion on the use of existing monitoring data is given in Section 4.0.

Table 3-1. Summary of Maximum SO_2 Impacts Due to the Proposed Simple Cycle CTs for Two Cases

Averaging Period/ Year	Maximum SO_2 Concentration ($\mu g/m^3$) Case 2[a]	Case 4[b]
3-Hour		
1982	179	171
1983	214	265 H
1984	178	219
1985	156	162
1986	99	82
24-Hour		
1982	45.2	37.1
1983	57.2 H	50.8
1984	33.0	40.2
1985	55.4	53.3
1986	12.3	10.3
Annual		
1982	0.93	0.93
1983	1.5 H	1.4
1984	0.94	0.78
1985	1.2	1.1
1986	0.53	0.25

[a]Based on 6 units with total emissions of 3,251 lb/hr.
[b]Based on 5 units with total emissions of 3,407 lb/hr.

Note: lb/hr = pounds per hour.
$\mu g/m^3$ = micrograms per cubic meter.

Table 3-2. Summary of Maximum Impacts Due to the Proposed FPC Combustion Turbine Units

Pollutant/ Averaging Time	Maximum Predicted Concentration ($\mu g/m^3$) Case 2	Case 4	Air Quality Requirements ($\mu g/m^3$) Significance Level[a]	De minimis Monitoring[b]	PSD Class II Increment
Sulfur Dioxide (SO_2)					
3-Hour	214 42% I	265 52% I	25 Yes	--	512
24-Hour	57.2 63% I	53.3 59% I	5 Yes	13 Yes	91
Annual[c]	1.5 7.5% I	1.4 7%	1 Yes	--	20
Nitrogen Dioxide (NO_2)					
Annual[c]	0.47	0.44	1 No	14 No	25
Carbon Monoxide (CO)					
8-Hour[e]	27.0	32.6	2,000 No	575 No	NA
Particulate Matter (PM)					
24-Hour	4.4	3.8	5	10 No	37(30)[d]
Annual[c]	0.12	0.10	1	--	19(17)[d]
Lead					
Calendar Quarter[f]	0.001	0.0009	NA	0.1 No	NA

Note: NA = Not applicable.

EPA/DER guidance

[a]If impacts for a proposed source are less than the significance levels, further modeling to demonstrate compliance with AAQS and PSD increments is not necessary.
[b]If impacts to a proposed source are less than the de minimis monitoring level, the source is exempted from preconstruction monitoring. 17-2.500(4)(f)
[c]Based on maximum short-term emissions occurring for every hour in the year.
[d]The current PSD increments are established for total suspended particulates (TSP). The proposed increments, in parentheses, are for PM10.
[e]Based on 3-hour concentration from Table 3-1.
[f]Based on 24-hour concentration from Table 3-1.

4.0 EXISTING MONITORING DATA

4.1 METEOROLOGICAL OBSERVATIONS

Surface meteorological data from the NWS station in Orlando were used to address ambient impacts from the proposed sources. This station is located approximately 50 km to the south of the project site. The meteorological data collected at this site are considered to be representative of the project site's meteorological conditions. The annual and seasonal wind frequency distributions from the NWS station in Orlando from 1982 through 1986 are shown in Figures 4-1 and 4-2, respectively.

4.2 AMBIENT MONITORING DATA

There are currently four monitoring stations that collect SO_2 concentrations and are approximately 2.8 to 51 km from the project site. The monitoring stations and their locations relative to the project site are identified in Table 4-1. A summary of the SO_2 concentrations measured at these stations is given in Table 4-2. For all these monitoring stations, the ambient concentrations are well below the AAQS. It should be noted that two stations in Orange County may not meet all quality assurance standards and, therefore, may not be acceptable for meeting PSD preconstruction monitoring requirements. The nearest monitoring station to the project site is located in DeBary and is approximately 2.8 km to the southeast. From 1986 through January 1989, the site has collected more than 90 percent of available data and meets quality assurance standards. Because of its locations relative to the project site, the monitoring data collected at this site are proposed for use to satisfy the PSD preconstruction monitoring requirements. Seems OK to me

4.3 EXISTING SO_2 EMISSION SOURCES

A summary of SO_2 emission sources within 50 km of the project site is given in Table 4-3. As shown, the site is located in an area that has only several sources with emissions greater than 1,000 TPY located at approximately 7 km from the project site. The emissions from these sources are expected to be measured at the monitoring site in DeBary.

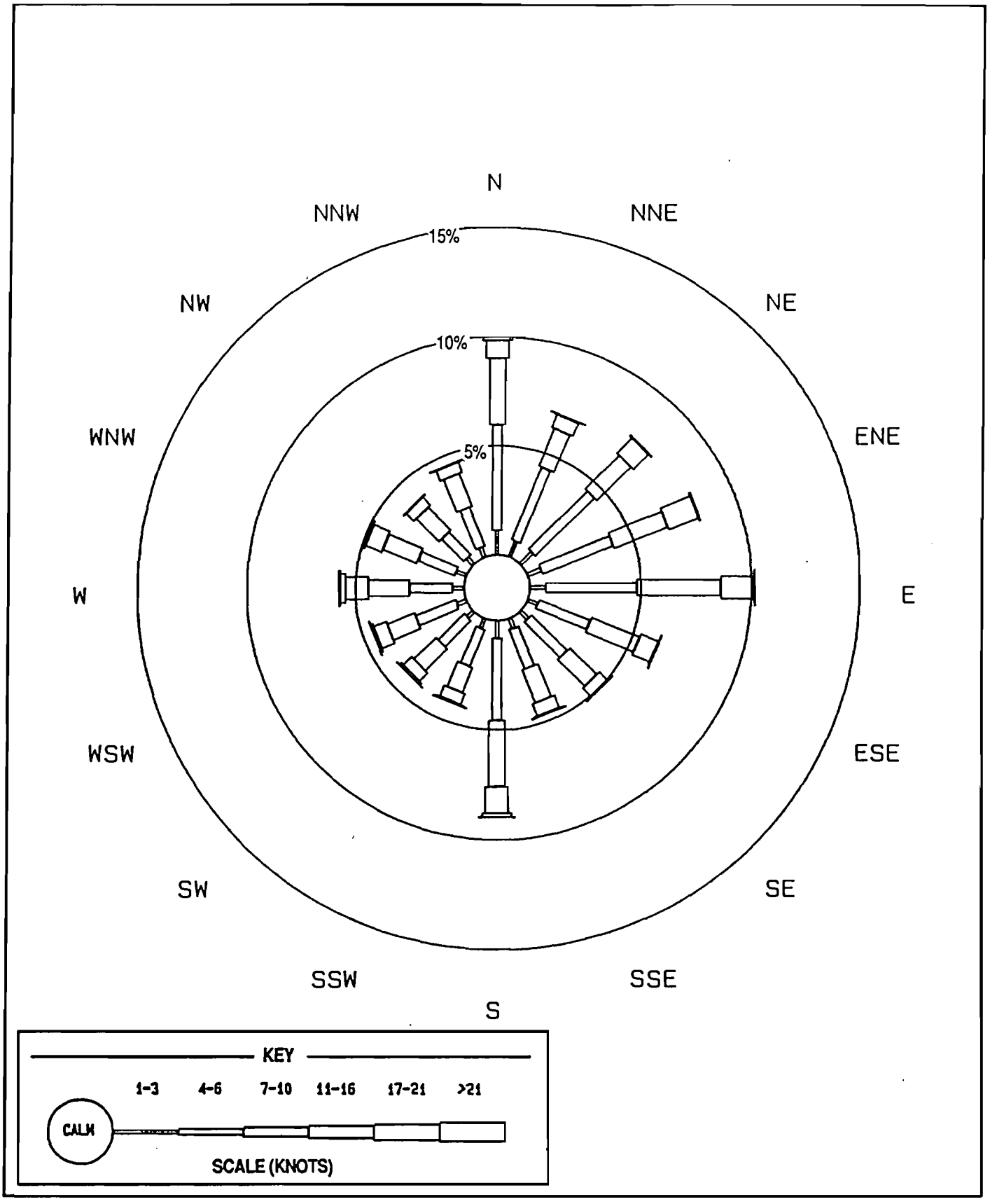

Figure 4-1 ANNUAL AVERAGE WIND FREQUENCY DISTRIBUTION (1982-1986) MEASURED AT THE NATIONAL WEATHER SERVICE STATION AT THE ORLANDO INTERNATIONAL AIRPORT

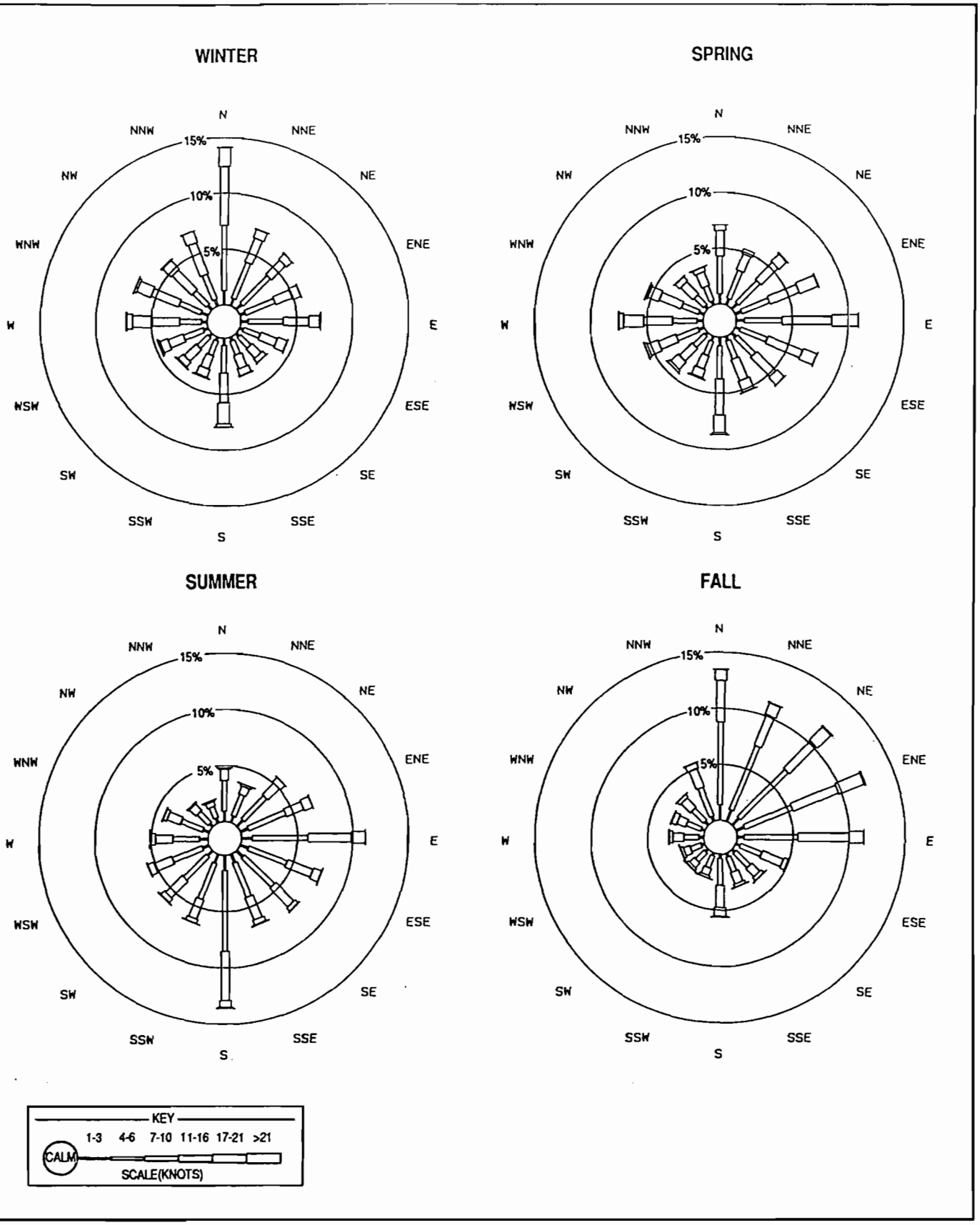

Figure 4-2 SEASONAL AVERAGE WIND FREQUENCY DISTRIBUTION (1982-1986) MEASURED AT THE NATIONAL WEATHER SERVICE STATION AT THE ORLANDO INTERNATIONAL AIRPORT

4.4 RECOMMENDATION

Based on the available monitoring data collected near the project site and the lack of emission sources within 5 km of the site, it is recommended that the existing monitoring data can be used to satisfy the preconstruction monitoring requirements under PSD regulations. The existing air quality data show that the ambient measurements are well below the AAQS.

Table 4-1. Summary of SO_2 Monitoring Sites in the Vicinity of the FPC--DeBary Facility

Site No.	County	Address	UTM Coordinates (km) East	UTM Coordinates (km) North	Location Relative to the De Bary Facility Distance (km)	Location Relative to the De Bary Facility Direction (degrees)
093-001-F	Volusia	38 S. Shell Road, DeBary	469.4	3,195.2	2.8	138
4900-002-G	Orange	Morse BLVD, Winter Park	464.5	3,162.5	34.9	185
3240-002-J[a]	Orange	N.E. Corner of Section 13, Orlando	484.0	3,152.0	48.2	160
3240-006-J[a]	Orange	12100 Young Pine Road, Orlando	483.8	3,148.7	51.3	161

[a]May not meet all quality assurance standards.

Table 4-2. Summary of Monitoring Data in the Vicinity of the FPC--DeBary Facility

Site No.	County	Monitoring Objective	Spatial Scale	Year	Observations		Concentration ($\mu g/m^3$)				
							3-Hour Average		24-Hour Average		
					Number	% Capture	Highest	Second Highest	Highest	Second Highest	Annual Average
093-001-F	Volusia	High Conc.	Neighborhood	1986	8,386	95.7	76	75	24	23	4
				1987	8,249	94.2	66	61	40	39	5
				1988	8,425	95.9	100	90	28	25	4
				1989[a]	707	95.0	46	40	12	12	5
4900-002-G	Orange	High Conc.	Neighborhood	1986	7,816	89.2	71	61	35	26	4
				1987	7,496	85.6	68	44	26	23	5
				1988	8,600	98.2	66	58	30	26	6
				1989[b]	6,442	98.3	55	38	16	14	5
3240-002-J[e]	Orange	-	-	1986[c]	2,145	97.1	87	80	39	25	14
				1987	6,321	72.2	45	37	37	37	14
				1988[b]	6,408	97.8	207	135	54	31	13
3240-006-J[e]	Orange	-	-	1986[d]	6,796	92.5	37	37	20	17	13
				1987	6,345	72.4	58	55	21	20	13
				1988[b]	6,382	97.4	51	41	22	21	13

[a]Only January data available.
[b]Only January - September data available.
[c]Only October - December data available.
[d]Only March - December data available.
[e]May not meet all quality assurance standards.

Note: -- =
ug/m^3 = micrograms per cubic meter.

Table 4-3. SO_2 Sources Within 50 km of the FPC--DeBary Plant

Distance Category	APIS Facility Identification Number	Facility	County	UTM Coordinates (km) East	UTM Coordinates (km) North	Relative Location to FPC--DeBary Facility[a] X (km)	Y (km)	Distance (km)	Direction (degrees)	Maximum Allowable SO_2 Emissions (TPY)
0-10 km	30ORL640064	Martin Asphalt	Volusia	467.9	3193.1	0.4	-4.2	4.2	175	536
-------	30ORL640028	FPL--Sanford	Volusia	468.3	3190.4	0.8	-6.9	6.9	173	104,346
	30ORL640020	FPC--Turner	Volusia	473.4	3193.3	5.9	-4.0	7.1	124	29,287
	30ORL590033	C A Meyer Paving and Constr.	Seminole	469.5	3189.0	2.0	-8.3	8.5	166	80
10-20 km	30ORL640053	Keller Kitchen Cabinets	Volusia	465.2	3210.3	-2.3	13.0	13.2	350	2
--------	30ORL640002	Brunswick Corp.	Volusia	475.5	3214.5	8.0	17.2	19.0	25	1
20-30 km	30ORL590014	David "M" Co.	Seminole	470.2	3177.2	2.7	-20.1	20.3	172	13
--------	30ORL590019	Macasphalt	Seminole	470.2	3175.8	2.7	-21.5	21.7	173	22
	30ORL590007	L D Plante	Seminole	474.5	3176.2	7.0	-21.1	22.2	162	34
	30ORL590002	Central Florida Drum	Seminole	474.7	3173.4	7.2	-23.9	25.0	163	4
	30ORL590022	Florida Hospital	Seminole	463.7	3170.9	-3.8	-26.4	26.7	188	6
	30ORL590006	Coca Cola	Seminole	459.4	3170.5	-8.1	-26.8	28.0	197	2
30-40 km	30ORG480068	Zellwood Farms	Orange	440.8	3180.0	-26.7	-17.3	31.8	237	101
--------	30ORG480006	Coca Cola/Foods Division	Orange	445.9	3173.6	-21.6	-23.7	32.1	222	13
	30ORG480156	Rogers Group, Inc.	Orange	455.8	3167.1	-11.7	-30.2	32.4	201	164
	30ORG480062	Orlando City Sludge Dryer	Orange	478.2	3166.5	10.7	-30.8	32.6	161	22
	30ORG350005	Golden Gem Growers	Lake	434.1	3196.0	-33.4	-1.3	33.4	268	3
	30ORG480055	Steel Drum Service of Florida	Orange	439.9	3178.2	-27.6	-19.1	33.6	235	12
	30ORG480088	Ralston Purina Co.	Orange	451.1	3167.7	-16.4	-29.6	33.8	209	54
	30ORG350004	Florida Food Products	Lake	431.5	3194.1	-36.0	-3.2	36.1	265	97
	30ORG480087	Naval Training Center	Orange	467.1	3160.6	-0.4	-36.7	36.7	181	9
	30ORG480063	Florida Hospital	Orange	463.8	3160.7	-3.7	-36.6	36.8	186	36
	30ORL640037	Port Orange City Incinerator	Volusia	498.0	3222.1	30.5	24.8	39.3	51	8
	30ORL640043	Martin Asphalt Co.	Volusia	496.7	3224.5	29.2	27.2	39.8	47	50
40-50 km	30ORG480014	FPC--Rio Pinar	Orange	475.2	3156.8	7.7	-40.5	41.2	169	109
--------	30ORL640077	Para Excavating, Inc.	Volusia	508.4	3206.9	40.9	8.6	42.0	77	16
	30ORG480097	National Linen Service	Orange	462.2	3155.6	-5.3	-41.7	42.0	187	355
	30ORL640004	New Smyrna Beach Power Plant	Volusia	507.7	3209.8	40.2	12.5	42.1	73	12
	30ORG480067	Orlando Regional Medical Center	Orange	463.1	3155.3	-4.4	-42.0	42.2	186	10
	30ORL640003	New Smyrna Beach Utilities	Volusia	505.9	3215.0	38.4	17.7	42.3	65	3,826
	30ORG480066	West Orange Memorial Hospital	Orange	443.1	3160.5	-24.4	-36.8	44.2	214	1
	30ORG480138	AT&T Technologies, Inc.	Orange	459.3	3153.6	-8.2	-43.7	44.5	191	64
	30ORG480053	Winter Garden Citrus Corp.	Orange	443.8	3159.6	-23.7	-37.7	44.5	212	145
	30ORG480048	American Asphalt Inc.	Orange	444.8	3158.2	-22.7	-39.1	45.2	210	53
	30ORG480014	Orlando City Incinerator	Orange	456.3	3152.7	-11.2	-44.6	46.0	194	16
	30ORG480137	OUC--Stanton Energy Center	Orange	483.5	3150.6	16.0	-46.7	49.4	161	21,738
	30ORG480095	FMC Corp/Airline Equip. Div.	Orange	459.8	3148.2	-7.7	-49.1	49.7	189	11

Note: km = kilometers.
TPY = tons per year.

[a]The UTM coordinates of the FPL--DeBary Plant are 467.5 km east and 3197.3 km north.

REFERENCES

U.S. Environmental Protection Agency, 1987. Guideline on Air Quality Models (Revised). (Includes Supplement A). EPA Report No. EPA 450/2-78-027R.

U.S. Environmental Protection Agency, 1988a. Industrial Source Complex (ISC) Dispersion Model User's Guide (Second Edition, Revised). EPA Report No. EPA 450/4-88-002a.

U.S. Environmental Protection Agency, 1988b. EPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6, Change 7, July 27, 1988. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

Information related to Item 1 of FDER's January 30, 1991

The emissions calculations of all regulated and non-regulated pollutants were calculated using both manufacturer's data and EPA emission factors. The design information and emissions are presented in Tables A-1 through A-20 of Appendix A in the permit application. These tables were generated using a computerized spreadsheet (i.e., Lotus 1-2-3). Attached are Tables A-1 through A-5 which have been annotated to show the columns (i.e., A ,B, C and D) and rows (i.e., 1, 2, 3, ...) in the spreadsheet. Attachment A presents a printout of all the calculations made in the spreadsheet along with the basis for the calculation. The calculations, as well as text comments, are listed alpha-numerically in ascending order. For example, in Table A-1 column D row 12 is listed as A:D12 on the calculation page and the data input is 82740; as noted, this data was provided by General Electric (GE). Attachment B presents a copy of the relevant EPA emission factors.

Table A-1. Design Information and Stack Parameters for Florida Power Corporation DeBary CT Project (CT Performance Data For Fuel Oil at Peak Load[a])

Data A	GE PG 7111EA No.2 Oil at 20°F B	GE PG 7111EA No.2 Oil at 59°F C	GE PG 7111EA No.2 Oil at 90°F D	
General				
Power (kW)	104,890.0	92,890.0	82,740.0	12
Heat Rate (Btu/kWh)	10,910.0	11,080.0	11,260.0	13
Heat Input (10^6 Btu/hr)	1,144.3	1,029.2	931.7	14
Fuel Oil (lb/hr)	61,690.0	55,483.6	50,223.8	15
Fuel				
Heat Content--Oil(LHV)	18,550.0	18,550.0	18,550.0	18
Percent Sulfur	0.5	0.5	0.5	19
CT Exhaust				
Volume Flow (acfm)	1,662,283	1,551,317	1,455,469	22
Volume Flow (scfm)	594,638	544,974	503,926	23
Mass Flow (lb/hr)	2,633,000	2,408,000	2,218,000	24
Temperature (°F)	1,016	1,043	1,065	25
Moisture (% vol)	9.16	9.60	10.66	26
Moisture (% mass)	5.80	6.09	6.79	27
Oxygen (% vol)	12.29	12.33	12.25	28
Oxygen (% mass)	13.83	13.90	13.87	29
Molecular Weight	28.44	28.38	28.27	30
Water Injected (lb/hr)	64,190	55,510	43,130	31
Diameter (ft)	13.8	13.8	13.8	32
Velocity (ft/sec)	184.4	172.1	161.5	33

Note: Data from GE combustion turbine performance and emission guarantees.

[a]Represents maximum fuel usage, electrical output, and emission condition; base load values are slightly lower than those presented herein.

Table A-2. Maximum Criteria Pollutant Emissions for Florida Power Corporation DeBary CT Project (Fuel Oil at Peak Load)

Pollutant A	GE PG 7111EA No.2 Oil at 20°F B	GE PG 7111EA No.2 Oil at 59°F C	GE PG 7111EA No.2 Oil at 90°F D	
Particulate				
Basis	15 lb/hr	15 lb/hr	15 lb/hr	55
lb/hr	15.0	15.0	15.0	56
TPY	65.7	65.7	65.7	57
Sulfur Dioxide				
Basis	0.5% Sulfur	0.5% Sulfur	0.5% Sulfur	60
lb/hr	616.90	554.84	502.24	61
TPY	2,702.0	2,430.2	2,199.8	62
Nitrogen Oxides				
Basis (Thermal NO_x)	42 ppm[a]	42 ppm[a]	42 ppm[a]	65
lb/hr	202.9	182.4	164.9	66
TPY	888.8	799.0	722.2	67
ppm[b]	42.0	42.0	42.0	68
Carbon Monoxide				
Basis	25 ppm[c]	25 ppm[c]	25 ppm[c]	71
lb/hr	58.9	53.7	49.1	72
TPY	257.8	235.2	214.9	73
ppm	25.0	25.0	25.0	74
VOCs				
Basis	5.0 lb/hr	5.0 lb/hr	4.5 lb/hr	77
lb/hr	5.00	5.00	4.50	78
TPY	21.9	21.9	19.7	79
Lead				
Basis	EPA(1988)	EPA(1988)	EPA(1988)	82
lb/hr	1.02×10^{-2}	9.16×10^{-3}	8.29×10^{-3}	83
TPY	4.46×10^{-2}	4.01×10^{-2}	3.63×10^{-2}	84

[a] Corrected to 15% O_2 dry conditions; GE guarantee.
[b] Does not include an allowance of fuel-bound nitrogen of 0.015 percent or greater.
[c] Corrected to dry conditions; GE guarantee.

Table A-3. Maximum Other Regulated Pollutant Emissions for Florida Power Corporation DeBary CT Project (Fuel Oil at Peak Load)

Pollutant A	GE PG 7111EA No.2 Oil at 20°F B	GE PG 7111EA No.2 Oil at 59°F C	GE PG 7111EA No.2 Oil at 90°F D	
Arsenic				
lb/hr	4.81×10^{-3}	4.32×10^{-3}	3.91×10^{-3}	103
TPY	2.11×10^{-2}	1.89×10^{-2}	1.71×10^{-2}	104
Beryllium				
lb/hr	2.86×10^{-3}	2.57×10^{-3}	2.33×10^{-3}	106
TPY	1.25×10^{-2}	1.13×10^{-2}	1.02×10^{-2}	107
Mercury				
lb/hr	3.43×10^{-3}	3.09×10^{-3}	2.79×10^{-3}	109
TPY	1.50×10^{-2}	1.35×10^{-2}	1.22×10^{-2}	110
Fluorine				
lb/hr	3.72×10^{-2}	3.34×10^{-2}	3.03×10^{-2}	112
TPY	1.63×10^{-1}	1.47×10^{-1}	1.33×10^{-1}	113
Sulfuric acid				
lb/hr	76.8	69.1	62.5	115
TPY	336.5	302.6	273.9	116

Sources: EPA, 1988; EPA, 1980.

Table A-4. Maximum Nonregulated Pollutant Emissions for Florida Power Corporation DeBary CT Project (Fuel Oil at Peak Load)

Pollutant A	Gas Turbine No.2 Oil at 40°F B	Gas Turbine No.2 Oil at 59°F C	Gas Turbine No.2 Oil at 90°F D	
Manganese				
lb/hr	7.37×10^{-3}	6.63×10^{-3}	6.00×10^{-3}	133
TPY	3.23×10^{-2}	2.90×10^{-2}	2.63×10^{-2}	134
Nickel				
lb/hr	1.95×10^{-1}	1.75×10^{-1}	1.58×10^{-1}	136
TPY	8.52×10^{-1}	7.66×10^{-1}	6.94×10^{-1}	137
Cadmium				
lb/hr	1.20×10^{-2}	1.08×10^{-2}	9.78×10^{-3}	139
TPY	5.26×10^{-2}	4.73×10^{-2}	4.28×10^{-2}	140
Chromium				
lb/hr	5.44×10^{-2}	4.89×10^{-2}	4.43×10^{-2}	142
TPY	2.38×10^{-1}	2.14×10^{-1}	1.94×10^{-1}	143
Copper				
lb/hr	3.20×10^{-1}	2.88×10^{-1}	2.61×10^{-1}	145
TPY	1.40	1.26	1.14	146
Vanadium				
lb/hr	7.98×10^{-2}	7.18×10^{-2}	6.50×10^{-2}	148
TPY	3.49×10^{-1}	3.14×10^{-1}	2.85×10^{-1}	149
Selenium				
lb/hr	2.69×10^{-2}	2.42×10^{-2}	2.19×10^{-2}	151
TPY	1.18×10^{-1}	1.06×10^{-1}	9.58×10^{-2}	152
Polycyclic Organic Matter				
lb/hr	3.19×10^{-4}	2.87×10^{-4}	2.60×10^{-4}	154
TPY	1.40×10^{-3}	1.26×10^{-3}	1.14×10^{-3}	155
Formaldehyde				
lb/hr	4.63×10^{-1}	4.17×10^{-1}	3.77×10^{-1}	157
TPY	2.03	1.83	1.65	158

Source: EPA, 1988.

Table A-5. Maximum Emissions for Additional Nonregulated Pollutants for Florida Power Corporation DeBary CT Project (Fuel Oil at Peak Load)

Pollutant A	Gas Turbine No.2 Oil at 40°F B	Gas Turbine No.2 Oil at 59°F C	Gas Turbine No.2 Oil at 90°F D	
Antimony				
lb/hr	2.50×10^{-2}	2.25×10^{-2}	2.04×10^{-2}	170
TPY	1.09×10^{-1}	9.85×10^{-2}	8.91×10^{-2}	171
Barium				
lb/hr	2.23×10^{-2}	2.01×10^{-2}	1.82×10^{-2}	173
TPY	9.78×10^{-2}	8.80×10^{-2}	7.97×10^{-2}	174
Colbalt				
lb/hr	1.04×10^{-2}	9.33×10^{-3}	8.44×10^{-3}	176
TPY	4.54×10^{-2}	4.09×10^{-2}	3.70×10^{-2}	177
Zinc				
lb/hr	7.82×10^{-1}	7.03×10^{-1}	6.37×10^{-1}	179
TPY	3.42	3.08	2.79	180
Chlorine[a]				
lb/hr	3.08×10^{-2}	2.77×10^{-2}	2.51×10^{-2}	182
TPY	1.35×10^{-1}	1.22×10^{-1}	1.10×10^{-1}	183

[a]Assumes 0.5 ppm in fuel oil.

Source: EPA, 1979.

ATTACHMENT A

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A:A1: [W24] 'Table A-1.  Design Information and Stack Parameters for Florida Power Corporation
A:A2: [W24] '            Corporation -De Bary CT Project  (CT Performance Data For
A:A3: [W24] '            Fuel Oil at 100% Load)
A:A4: [W24] \_
A:B4: [W15] \_
A:C4: [W15] \_
A:D4: [W15] \_
A:B6: [W15] ^GE PG 7111EA
A:C6: [W15] ^GE PG 7111EA
A:D6: [W15] ^GE PG 7111EA
A:B7: [W15] ^No.2 Oil
A:C7: [W15] ^No.2 Oil
A:D7: [W15] ^No.2 Oil
A:A8: [W24] ^Data
A:B8: [W15] ^@ 20oF
A:C8: [W15] ^@ 59oF
A:D8: [W15] ^@ 90oF
A:A9: [W24] \_
A:B9: [W15] \_
A:C9: [W15] \_
A:D9: [W15] \_
A:A11: [W24] ^General:
A:A12: [W24] 'Power (kW)
A:B12: (,1) [W15] 104890 . . . . . From GE
A:C12: (,1) [W15] 92890
A:D12: (,1) [W15] 82740
A:A13: [W24] 'Heat Rate (Btu/kwh)
A:B13: (,1) [W15] 10910 . . . . . From GE
A:C13: (,1) [W15] 11080
A:D13: (,1) [W15] 11260
A:A14: [W24] 'Heat Input (mmBtu/hr)
A:B14: (,1) [W15] (B12*B13/1000000) . . . . . Power * Heat Rate
A:C14: (,1) [W15] (C12*C13/1000000)
A:D14: (,1) [W15] (D12*D13/1000000)
A:A15: [W24] 'Fuel Oil (lb/hr)
A:B15: (,1) [W15] +B14*10^6/(B18) . . . . . Heat Input ÷ Heat Content
A:C15: (,1) [W15] +C14*10^6/(C18)
A:D15: (,1) [W15] +D14*10^6/(D18)
A:A17: [W24] ^Fuel:
A:A18: [W24] 'Heat Content -Oil(LHV)
A:B18: (,1) [W15] 18550 . . . . . Fuel Oil Specification
A:C18: (,1) [W15] 18550
A:D18: (,1) [W15] 18550
A:A19: [W24] '% Sulfur
A:B19: (,1) [W15] 0.5 . . . . . Maximum % Sulfur
A:C19: (,1) [W15] 0.5
A:D19: (,1) [W15] 0.5
A:A21: [W24] ^CT Exhaust:
A:A22: [W24] 'Volume Flow (acfm)
A:B22: (,0) [W15] (B24*1545*(460+B25)/(B30*2116.8*60)) . . . . . See Note A
A:C22: (,0) [W15] (C24*1545*(460+C25)/(C30*2116.8*60))
A:D22: (,0) [W15] (D24*1545*(460+D25)/(D30*2116.8*60))
A:A23: [W24] 'Volume Flow (scfm)
A:B23: (,0) [W15] (B24*1545*(460+68)/(B30*2116.8*60)) . . . . . See Note A
A:C23: (,0) [W15] (C24*1545*(460+68)/(C30*2116.8*60))
A:D23: (,0) [W15] (D24*1545*(460+68)/(D30*2116.8*60))
A:A24: [W24] 'Mass Flow (lb/hr)
A:B24: (,0) [W15] 2633000 . . . . . From GE
A:C24: (,0) [W15] 2408000
A:D24: (,0) [W15] 2218000
A:A25: [W24] 'Temperature (oF)
A:B25: (,0) [W15] 1016 . . . . . From GE
A:C25: (,0) [W15] 1043
A:D25: (,0) [W15] 1065
A:A26: [W24] 'Moisture (% vol)
A:B26: (F2) [W15] ((B27*B24/100*1545/18*(B25+460)/2116.8/60)/B22)*100 . . . . . See Note B
A:C26: (F2) [W15] ((C27*C24/100*1545/18*(C25+460)/2116.8/60)/C22)*100
A:D26: (F2) [W15] ((D27*D24/100*1545/18*(D25+460)/2116.8/60)/D22)*100
A:A27: [W24] 'Moisture (% mass)
A:B27: (F2) [W15] 5.8 . . . . . From GE
A:C27: (F2) [W15] 6.09
A:D27: (F2) [W15] 6.79
A:A28: [W24] 'Oxygen (% vol)
A:B28: (F2) [W15] ((B29*B24/100*1545/32*(B25+460)/2116.8/60)/B22)*100 . . . . . See Note C
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A:C28: (F2) [W15] ((C29*C24/100*1545/32*(C25+460)/2116.8/60)/C22)*100
A:D28: (F2) [W15] ((D29*D24/100*1545/32*(D25+460)/2116.8/60)/D22)*100
A:A29: [W24] 'Oxygen (% mass)
A:B29: (F2) [W15] 13.83 . . . . . From GE
A:C29: (F2) [W15] 13.9
A:D29: (F2) [W15] 13.87
A:A30: [W24] 'Molecular Weight
A:B30: [W15] 28.44 . . . . . From GE
A:C30: [W15] 28.38
A:D30: [W15] 28.27
A:A31: [W24] 'Water Injected (lb/hr)
A:B31: (,0) [W15] 64190 . . . . . From GE
A:C31: (,0) [W15] 55510
A:D31: (,0) [W15] 43130
A:A32: [W24] 'Diameter (ft)
A:B32: (,1) [W15] 13.83 . . . . . From GE
A:C32: (,1) [W15] 13.83
A:D32: (,1) [W15] 13.83
A:A33: [W24] 'Velocity (ft/sec)
A:B33: (,1) [W15] (B22/60/(B32^2*3.14159/4)) . . . . . Volume + Flow
A:C33: (,1) [W15] (C22/60/(C32^2*3.14159/4))
A:D33: (,1) [W15] (D22/60/(D32^2*3.14159/4))
A:A35: [W24] \_
A:B35: [W15] \_
A:C35: [W15] \_
A:D35: [W15] \_
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A:A45: [W24] 'Table A-2.  Maximum Criteria Pollutant Emissions for Florida Power
A:A46: [W24] '            Corporation -De Bary CT Project (Fuel Oil at 100% Load)
A:A47: [W24] \_
A:B47: [W15] \_
A:C47: [W15] \_
A:D47: [W15] \_
A:B49: [W15] ^GE PG 7111EA
A:C49: [W15] ^GE PG 7111EA
A:D49: [W15] ^GE PG 7111EA
A:B50: [W15] ^No.2 Oil
A:C50: [W15] ^No.2 Oil
A:D50: [W15] ^No.2 Oil
A:A51: [W24] ^Pollutant
A:B51: [W15] ^@ 20oF
A:C51: [W15] ^@ 59oF
A:D51: [W15] ^@ 90oF
A:A52: [W24] \_
A:B52: [W15] \_
A:C52: [W15] \_
A:D52: [W15] \_
A:A54: [W24] 'Particulate:
A:A55: [W24] '  Basis
A:B55: (,1) [W15] "15 lb/hr . . . . . From GE
A:C55: (,1) [W15] "15 lb/hr
A:D55: (,1) [W15] "15 lb/hr
A:A56: [W24] '  lb/hr
A:B56: (,1) [W15] 15
A:C56: (,1) [W15] 15
A:D56: (,1) [W15] 15
A:A57: [W24] '  TPY
A:B57: (,1) [W15] (B56*8760/2000) . . . . . Emissions * 8760 Hours/Year ÷ 2000 lb/ton
A:C57: (,1) [W15] (C56*8760/2000)
A:D57: (,1) [W15] (D56*8760/2000)
A:A59: [W24] 'Sulfur Dioxide:
A:A60: [W24] '  Basis
A:B60: (,1) [W15] "0.5 % Sulfur
A:C60: (,1) [W15] "0.5 % Sulfur
A:D60: (,1) [W15] "0.5 % Sulfur
A:A61: [W24] '  lb/hr
A:B61: (F2) [W15] (B15*0.005*2) . . . . . Fuel Used * Sulfur Content * 2 lb SO2/lb S
A:C61: (F2) [W15] (C15*0.005*2)
A:D61: (F2) [W15] (D15*0.005*2)
A:A62: [W24] '  TPY
A:B62: (,1) [W15] (B61*8760/2000)
A:C62: (,1) [W15] (C61*8760/2000)
A:D62: (,1) [W15] (D61*8760/2000)
A:A64: [W24] 'Nitrogen Oxides:
A:A65: [W24] '  Basis (Thermal NOx)
A:B65: (,1) [W15] "42 ppm* . . . . . From GE
A:C65: (,1) [W15] "42 ppm*
A:D65: (,1) [W15] "42 ppm*
A:A66: [W24] '  lb/hr
A:B66: (,1) [W15] (B68/5.9*(20.9*(1-$B$26/100)-$B$28)*$B$22*2116.8*46*60/(1545*(460+$B$25)*1000000)) . . . . . See Note D
A:C66: (,1) [W15] (C68/5.9*(20.9*(1-C26/100)-C28)*C22*2116.8*46*60/(1545*(460+C25)*1000000))
A:D66: (,1) [W15] (D68/5.9*(20.9*(1-D26/100)-D28)*D22*2116.8*46*60/(1545*(460+D25)*1000000))
A:A67: [W24] '  TPY
A:B67: (,1) [W15] (B66*8760/2000)
A:C67: (,1) [W15] (C66*8760/2000)
A:D67: (,1) [W15] (D66*8760/2000)
A:A68: [W24] '  ppm
A:B68: (,1) [W15] 42
A:C68: (,1) [W15] 42
A:D68: (,1) [W15] 42
A:A70: [W24] 'Carbon Monoxide:
A:A71: [W24] '  Basis
A:B71: (,1) [W15] "25 ppm+ . . . . . From GE
A:C71: (,1) [W15] "25 ppm+
A:D71: (,1) [W15] "25 ppm+
A:A72: [W24] '  lb/hr
A:B72: (,1) [W15] (B74*(1-B26/100)*B22*2116.8*28*60/(1545*(460+B25)*1000000)) . . . . . See Note E
A:C72: (,1) [W15] (C74*(1-C26/100)*C22*2116.8*28*60/(1545*(460+C25)*1000000))
A:D72: (,1) [W15] (D74*(1-D26/100)*D22*2116.8*28*60/(1545*(460+D25)*1000000))
A:A73: [W24] '  TPY
A:B73: (,1) [W15] (B72*8760/2000)
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A:C73: (,1) [W15] (C72*8760/2000)
A:D73: (,1) [W15] (D72*8760/2000)
A:A74: [W24] '  ppm
A:B74: (,1) [W15] 25  . . . . . From GE
A:C74: (,1) [W15] 25
A:D74: (,1) [W15] 25
A:A76: [W24] 'VOC's:
A:A77: [W24] '  Basis
A:B77: (,1) [W15] "5.0 lb/hr
A:C77: (,1) [W15] "5.0 lb/hr
A:D77: (,1) [W15] "4.5 lb/hr
A:A78: [W24] '  lb/hr
A:B78: (F2) [W15] 5
A:C78: (F2) [W15] 5
A:D78: (F2) [W15] 4.5
A:A79: [W24] '  TPY
A:B79: (,1) [W15] (B78*8760/2000)
A:C79: (,1) [W15] (C78*8760/2000)
A:D79: (,1) [W15] (D78*8760/2000)
A:A81: [W24] 'Lead:
A:A82: [W24] '  Basis
A:B82: [W15] "EPA(1988)
A:C82: [W15] "EPA(1988)
A:D82: [W15] "EPA(1988)
A:A83: [W24] '  lb/hr
A:B83: (S2) [W15] (B14*8.9/1000000) . . . . . From EPA 1988, Attached; See Page 4-156, attached; Heat Input * Emission Factor
A:C83: (S2) [W15] (C14*8.9/1000000)
A:D83: (S2) [W15] (D14*8.9/1000000)
A:A84: [W24] '  TPY
A:B84: (S2) [W15] (B83*8760/2000)
A:C84: (S2) [W15] (C83*8760/2000)
A:D84: (S2) [W15] (D83*8760/2000)
A:A85: [W24] \_
A:B85: [W15] \_
A:C85: [W15] \_
A:D85: [W15] \_
A:A87: [W24] '* corrected to 15% O2 dry conditions
A:A88: [W24] '+ corrected to dry conditions
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A:A93: [W24] 'Table A-3.  Maximum Other Regulated Pollutant Emissions for Florida
A:A94: [W24] '            Power Corporation -De Bary CT Project (Fuel Oil at 100%
A:A95: [W24] '            Load)
A:A96: [W24] \_
A:B96: [W15] \_
A:C96: [W15] \_
A:D96: [W15] \_
A:A98: [W24] ^Pollutant
A:B98: [W15] ^GE PG 7111EA
A:C98: [W15] ^GE PG 7111EA
A:D98: [W15] ^GE PG 7111EA
A:B99: [W15] ^No.2 Oil
A:C99: [W15] ^No.2 Oil
A:D99: [W15] ^No.2 Oil
A:B100: [W15] ^@ 20oF
A:C100: [W15] ^@ 59oF
A:D100: [W15] ^@ 90oF
A:A101: [W24] \_
A:B101: [W15] \_
A:C101: [W15] \_
A:D101: [W15] \_
A:A103: [W24] '  As (lb/hr)
A:B103: (S2) [W15] (B14*4.2/1000000)  . . . . . From EPA 1988; See Page 4-158, Attached; Heat Input * Emission Factor
A:C103: (S2) [W15] (C14*4.2/1000000)
A:D103: (S2) [W15] (D14*4.2/1000000)
A:A104: [W24] '     (TPY)
A:B104: (S2) [W15] (B103*8760/2000)
A:C104: (S2) [W15] (C103*8760/2000)
A:D104: (S2) [W15] (D103*8760/2000)
A:A106: [W24] '  Be (lb/hr)
A:B106: (S2) [W15] (B14*2.5/1000000)  . . . . . From EPA 1988; See Page 4-159, Attached
A:C106: (S2) [W15] (C14*2.5/1000000)
A:D106: (S2) [W15] (D14*2.5/1000000)
A:A107: [W24] '     (TPY)
A:B107: (S2) [W15] (B106*8760/2000)
A:C107: (S2) [W15] (C106*8760/2000)
A:D107: (S2) [W15] (D106*8760/2000)
A:A109: [W24] '  Hg (lb/hr)
A:B109: (S2) [W15] (B14*3/1000000)  . . . . . From EPA 1988; See Page 4-157, Attached
A:C109: (S2) [W15] (C14*3/1000000)
A:D109: (S2) [W15] (D14*3/1000000)
A:A110: [W24] '     (TPY)
A:B110: (S2) [W15] (B109*8760/2000)
A:C110: (S2) [W15] (C109*8760/2000)
A:D110: (S2) [W15] (D109*8760/2000)
A:A112: [W24] '  F (lb/hr)
A:B112: (S2) [W15] (B14*32.5/1000000) . . . . . From EPA 1981, Attached; 2.324 pg/J * 14 pg/J = 32.5 lb/10^6 Btu
A:C112: (S2) [W15] (C14*32.5/1000000)
A:D112: (S2) [W15] (D14*32.5/1000000)
A:A113: [W24] '    (TPY)
A:B113: (S2) [W15] (B112*8760/2000)
A:C113: (S2) [W15] (C112*8760/2000)
A:D113: (S2) [W15] (D112*8760/2000)
A:A115: [W24] '  H2SO4 (lb/hr)
A:B115: (F1) [W15] (B15*0.005*3.06*0.08139) . . . . . Fuel * % S * MW_H2SO4/MW_S * 0.0814 (% H2SO4 Formed)
A:C115: (F1) [W15] (C15*0.005*3.06*0.08139)
A:D115: (F1) [W15] (D15*0.005*3.06*0.08139)
A:A116: [W24] '    (TPY)
A:B116: (F1) [W15] (B115*8760/2000)
A:C116: (F1) [W15] (C115*8760/2000)
A:D116: (F1) [W15] (D115*8760/2000)
A:A118: [W24] \_
A:B118: [W15] \_
A:C118: [W15] \_
A:D118: [W15] \_
A:A120: [W24] 'Sources: EPA, 1988; EPA, 1980
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A:A123: [W24] 'Table A-4.  Maximum Non-Regulated Pollutant Emissions for Florida
A:A124: [W24] '            Power Corporation -De Bary CT Project (Fuel Oil at 100%
A:A125: [W24] '            Load)
A:A126: [W24] \_
A:B126: [W15] \_
A:C126: [W15] \_
A:D126: [W15] \_
A:A128: [W24] ^Pollutant
A:B128: [W15] ^Gas Turbine
A:C128: [W15] ^Gas Turbine
A:D128: [W15] ^Gas Turbine
A:B129: [W15] ^No.2 Oil
A:C129: [W15] ^No.2 Oil
A:D129: [W15] ^No.2 Oil
A:B130: [W15] ^@ 40oF
A:C130: [W15] ^@ 59oF
A:D130: [W15] ^@ 90oF
A:A131: [W24] \_
A:B131: [W15] \_
A:C131: [W15] \_
A:D131: [W15] \_
A:A133: [W24] '  Manganese (lb/hr)
A:B133: (S2) [W15] (B14*6.44/1000000) . . . . . From EPA 1988; See Page 4-156
A:C133: (S2) [W15] (C14*6.44/1000000)
A:D133: (S2) [W15] (D14*6.44/1000000)
A:A134: [W24] '     (TPY)
A:B134: (S2) [W15] (B133*8760/2000)
A:C134: (S2) [W15] (C133*8760/2000)
A:D134: (S2) [W15] (D133*8760/2000)
A:A136: [W24] '  Nickel (lb/hr)
A:B136: (S2) [W15] (B14*170/1000000)  . . . . . From EPA 1988; See Page 4-158, Attached
A:C136: (S2) [W15] (C14*170/1000000)
A:D136: (S2) [W15] (D14*170/1000000)
A:A137: [W24] '     (TPY)
A:B137: (S2) [W15] (B136*8760/2000)
A:C137: (S2) [W15] (C136*8760/2000)
A:D137: (S2) [W15] (D136*8760/2000)
A:A139: [W24] '  Cadmium (lb/hr)
A:B139: (S2) [W15] (B14*10.5/1000000) . . . . . From EPA 1988; See Page 4-159, Attached
A:C139: (S2) [W15] (C14*10.5/1000000)
A:D139: (S2) [W15] (D14*10.5/1000000)
A:A140: [W24] '     (TPY)
A:B140: (S2) [W15] (B139*8760/2000)
A:C140: (S2) [W15] (C139*8760/2000)
A:D140: (S2) [W15] (D139*8760/2000)
A:A142: [W24] '  Chromium (lb/hr)
A:B142: (S2) [W15] (B14*47.5/1000000) . . . . . From EPA 1988; See Page 4-160, Attached
A:C142: (S2) [W15] (C14*47.5/1000000)
A:D142: (S2) [W15] (D14*47.5/1000000)
A:A143: [W24] '    (TPY)
A:B143: (S2) [W15] (B142*8760/2000)
A:C143: (S2) [W15] (C142*8760/2000)
A:D143: (S2) [W15] (D142*8760/2000)
A:A145: [W24] '  Copper (lb/hr)
A:B145: (S2) [W15] (B14*280/1000000)  . . . . . From EPA 1988; See Page 4-161, Attached
A:C145: (S2) [W15] (C14*280/1000000)
A:D145: (S2) [W15] (D14*280/1000000)
A:A146: [W24] '    (TPY)
A:B146: (S2) [W15] (B145*8760/2000)
A:C146: (S2) [W15] (C145*8760/2000)
A:D146: (S2) [W15] (D145*8760/2000)
A:A148: [W24] '  Vanadium (lb/hr)
A:B148: (S2) [W15] (B14*30*2.324/1000000) . . . . . From EPA 1988; See Page 4-162, Atached; 2.324 pg/J = 1 lb/10^6 Btu
A:C148: (S2) [W15] (C14*30*2.324/1000000)
A:D148: (S2) [W15] (D14*30*2.324/1000000)
A:A149: [W24] '     (TPY)
A:B149: (S2) [W15] (B148*8760/2000)
A:C149: (S2) [W15] (C148*8760/2000)
A:D149: (S2) [W15] (D148*8760/2000)
A:A151: [W24] '  Selenium (lb/hr)
A:B151: (S2) [W15] (B14*10.1*2.324/1000000) . . . . . From EPA 1988; See Page 4-162
A:C151: (S2) [W15] (C14*10.1*2.324/1000000)
A:D151: (S2) [W15] (D14*10.1*2.324/1000000)
A:A152: [W24] '    (TPY)
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A:B152: (S2) [W15] (B151*8760/2000)
A:C152: (S2) [W15] (C151*8760/2000)
A:D152: (S2) [W15] (D151*8760/2000)
A:A154: [W24] '  POM (lb/hr)
A:B154: (S2) [W15] ($B$14*0.12*2.324/1000000) . . . . . From EPA 1988; See Page 4-161, Attached
A:C154: (S2) [W15] ($C$14*0.12*2.324/1000000)
A:D154: (S2) [W15] ($D$14*0.12*2.324/1000000)
A:A155: [W24] '    (TPY)
A:B155: (S2) [W15] (B154*8760/2000)
A:C155: (S2) [W15] (C154*8760/2000)
A:D155: (S2) [W15] (D154*8760/2000)
A:A157: [W24] '  Formaldehyde (lb/hr)
A:B157: (S2) [W15] ($B$14*405/1000000)  . . . . . From EPA 1988; See Page 4-156, Attached
A:C157: (S2) [W15] ($C$14*405/1000000)
A:D157: (S2) [W15] ($D$14*405/1000000)
A:A158: [W24] '    (TPY)
A:B158: (S2) [W15] (B157*8760/2000)
A:C158: (S2) [W15] (C157*8760/2000)
A:D158: (S2) [W15] (D157*8760/2000)
A:A159: [W24] \_
A:B159: [W15] \_
A:C159: [W15] \_
A:D159: [W15] \_
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A:A160: [W24] 'Table A-5.  Maximum Emissions for Additional Non-Regulated Pollutant
A:A161: [W24] '            for Florida Power Corporation  -De Bary CT Project (Fuel
A:A162: [W24] '            Oil at 100% Load)
A:A163: [W24] \_
A:B163: [W15] \_
A:C163: [W15] \_
A:D163: [W15] \_
A:A165: [W24] ^Pollutant
A:B165: [W15] ^Gas Turbine
A:C165: [W15] ^Gas Turbine
A:D165: [W15] ^Gas Turbine
A:B166: [W15] ^No.2 Oil
A:C166: [W15] ^No.2 Oil
A:D166: [W15] ^No.2 Oil
A:B167: [W15] ^@ 40oF
A:C167: [W15] ^@ 59oF
A:D167: [W15] ^@ 90oF
A:A168: [W24] \_
A:B168: [W15] \_
A:C168: [W15] \_
A:D168: [W15] \_
A:A170: [W24] '  Antimony (lb/hr)
A:B170: (S2) [W15] ($B$14*9.4*2.324/1000000)  . . . . . From EPA 1979; See Page 137, Attached
A:C170: (S2) [W15] ($C$14*9.4*2.324/1000000)
A:D170: (S2) [W15] ($D$14*9.4*2.324/1000000)
A:A171: [W24] '    (TPY)
A:B171: (S2) [W15] (B170*8760/2000)
A:C171: (S2) [W15] (C170*8760/2000)
A:D171: (S2) [W15] (D170*8760/2000)
A:A173: [W24] '  Barium (lb/hr)
A:B173: (S2) [W15] ($B$14*8.4*2.324/1000000)  . . . . . From EPA 1979; See Page 137, Attached
A:C173: (S2) [W15] ($C$14*8.4*2.324/1000000)
A:D173: (S2) [W15] ($D$14*8.4*2.324/1000000)
A:A174: [W24] '    (TPY)
A:B174: (S2) [W15] (B173*8760/2000)
A:C174: (S2) [W15] (C173*8760/2000)
A:D174: (S2) [W15] (D173*8760/2000)
A:A176: [W24] '  Colbalt (lb/hr)
A:B176: (S2) [W15] ($B$14*3.9*2.324/1000000)  . . . . . From EPA 1979; See Page 137, Attached
A:C176: (S2) [W15] ($C$14*3.9*2.324/1000000)
A:D176: (S2) [W15] ($D$14*3.9*2.324/1000000)
A:A177: [W24] '    (TPY)
A:B177: (S2) [W15] (B176*8760/2000)
A:C177: (S2) [W15] (C176*8760/2000)
A:D177: (S2) [W15] (D176*8760/2000)
A:A179: [W24] '  Zinc (lb/hr)
A:B179: (S2) [W15] ($B$14*294*2.324/1000000)  . . . . . From EPA 1979; See Page 137, Attached
A:C179: (S2) [W15] ($C$14*294*2.324/1000000)
A:D179: (S2) [W15] ($D$14*294*2.324/1000000)
A:A180: [W24] '    (TPY)
A:B180: (S2) [W15] (B179*8760/2000)
A:C180: (S2) [W15] (C179*8760/2000)
A:D180: (S2) [W15] (D179*8760/2000)
A:A182: [W24] '  Chlorine (lb/hr) +
A:B182: (S2) [W15] (B15*0.5/1000000)
A:C182: (S2) [W15] (C15*0.5/1000000)
A:D182: (S2) [W15] (D15*0.5/1000000)
A:A183: [W24] '    (TPY)
A:B183: (S2) [W15] (B182*8760/2000)
A:C183: (S2) [W15] (C182*8760/2000)
A:D183: (S2) [W15] (D182*8760/2000)
A:A184: [W24] \_
A:B184: [W15] \_
A:C184: [W15] \_
A:D184: [W15] \_
A:A186: [W24] 'Source: EPA, 1979
A:A187: [W24] '  + Assumes 0.5 ppm in fuel oil.
A:A189: [W24] ^Notes:
A:A190: [W24] '1. Emission calculation based on manufacturer guarentee or estimate.
A:A191: [W24] '2. Emission calculation based on AP-42 Table 1.4-1.
A:A192: [W24] '3. Emission calculation based on NSPS.
A:A193: [W24] '4. Emission calculation based on proposed BACT.
A:A194: [W24] '5. Emission calculation for Hg based on EPA (1980), Table 4-3.
A:A195: [W24] '6. Emission calculations for As, F, Hg, and Pb are based on EPA (1981b),
A:A196: [W24] '   Table 61; for Be EPA (1981a), Table 46; and for H2SO4 AP-42, Table 1.3-1.
```

NOTE A

Volume is calculated based on ideal gas law:

$PV = mRT/M$

where:
- P = pressure = 2116.8 lb/ft^2
- m = mass flow of gas (lb/hr)
- R = universal gas constant = 1545
- M = molecular weight of gas
- T = temperature (K)

Example: V = mRT/(MP) @ 90°F, peak load
= 2,218,000 * 1,545 * (460 + 1,065) / 28.27 / 2,116.8 / 60
= 1,455,469 ft^3/min

NOTE B

% moisture as volume is calculated from % mass using ideal gas law:

$$V_{H2O} = m_{H2O}RT/(M_{H2O}P)$$

$$\%H_2O \text{ by volume} = V_{H2O} / V_{TOTAL}$$

Example calculation @ 90°F peak load

V_{H2O} = (6.79/100 * 2,218,000) * 1,545 * (460 + 1,065) / 18 / 2,116.8 / 60
= 155,212 ft^3/min

$\%H_2O$ by volume = V_{H2O} / V_{TOTAL} = 155,212 / 1,455,469
= 0.1066 = 10.66%

NOTE C

$\%O_2$ by volume calculated the same way as $\%H_2O$ by volume, except % mass of O_2 and the molecular weight of O_2 are used in calculation.

NOTE D

NO_x is calculated by correcting to 15% O_2 dry conditions using ideal gas law and moisture and O_2 conditions.

Oxygen correction:

$$V_{NOx\ (15\%)} = \frac{V_{NOx\ Dry} * 5.9}{20.9 - \%O_{2\ Dry}}$$

$$V_{NOx\ Dry} = V_{NOx\ (15\%)} (20.9 - \%O_{2\ Dry}) / 5.9$$

$$\%O_{2\ Dry} = \%O_{2\ Act} / (1 - \%H_2O) \ ; \ \%O_{2\ Act} = \%O_{2\ Dry} (1 - \%H_2O)$$

$$V_{NOx\ Act} = V_{NOx\ Dry} (1 - \%H_2O)$$

Substituting:

$$V_{NOx\ Act} = V_{NOx\ 15\%} (20.9 - \%O_{2\ Dry}) (1 - \%H_2O) / 5.9$$

$$= V_{NOx\ (15\%)} [20.9 - (\%O_{2\ Act} / (1 - \%H_2O))] (1 - \%H_2O) / 5.9$$

$$= V_{NOx\ (15\%)} [20.9 (1 - \%H_2O) - \%O_2) / 5.9$$

$$m_{NOx} = \frac{PVM_{NOx}}{RT} = V_{NOx\ (15\%)} [20.9 (1 - \%H_2O) - \%O_2) * P * M_{NOx} / (RT * 5.9)$$

Example calculation at 90°F peak load

$$m_{NOx} = 42 * 1{,}455{,}469 [20.9 (1 - 0.1066) - 12.25] * 2{,}116.8 * 46 * 60 * 1/10^6 / [(460 + 1{,}065) * 1{,}545 * 5.9]$$

$$= 164.9 \text{ lb/hr}$$

NOTE E

Same as D except only moisture correction is used:

$$V_{CO\ Act} = V_{CO\ Dry} (1 - \%H_2O)$$

$$m_{CO} = PV_{CO\ Act}M_{CO} / RT$$
$$= PV_{CO\ Dry} (1 - \%H_2O) M_{CO} / RT$$

Example @ 90°F peak load

$$m_{CO} = 25 * 1{,}455{,}469 * (1 - 0.1066) * 2{,}116.8 * 28 * 60 / [1{,}545 * (460 + 1{,}065) * 10^6]$$

$$= 49.1 \text{ lb/hr}$$

ATTACHMENT B

EMISSION FACTORS

EPA-450/2-88-006
October 1988

Toxic Air Pollutant Emission Factors—A Compilation For Selected Air Toxic Compounds And Sources

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October 1988

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Nonylphenol production	2869	General	301	Phenol	108952	8.0 x 10E-4 lb/lb used	From engineering estimates	13
Nonylphenol production	2869	Fugitive	301	Phenol	108952	1.9 x 10E-4 lb/lb used	From engineering estimates	13
Nonylphenol production	2869	Storage	407084	Phenol	108952	1.0 x 10E-5 lb/lb used	From engineering estimates	13
Normal superphosphate production	2574	Curing building	30102806	Fluoride	16984488	3.8 lb/ton P205	Uncontrolled	97
Normal superphosphate production	2874	Mixer and den	30102805	Fluoride	16984488	0.2 lb/ton P205	Wet scrubber (97%)	97
Oil and coal combustion	49	Stack - particulate	102	Polychlorinated dibenzo-p-dioxins		68 ng/g	No penta homologue included, one location, TCDD detection = 20 ng/g	119
Oil and coal combustion	49	Stack - particulate	102	Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	1746016	Not detectable	One location, detection limit = 10 ng/g	119
Oil combustion		Oil-fired boiler or furnace, util/commerc/industr/residential	1	Formaldehyde	50000	405 lb/10E12 Btu	Uncontrolled, based on emissions testing	36
Oil combustion		Industrial, commercial, and residential boilers	1	Lead	7439921	8.9 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement, assumed use distillate oil	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Manganese	7439965	26 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Manganese	7439965	11.96 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Manganese	7439965	5.72 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Manganese	7439965	2.86 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residential	1	Manganese	7439965	14 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti	1	Manganese	7439965	6.44 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering	36

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
		al					judgement	
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Manganese	7439965	3.08 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Manganese	7439965	1.54 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	3.2 lb/10E12 Btu	Uncontrolled, based on engineering judgement	36
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	3.2 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	36
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	2.4 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	36
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	0.83 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	36
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	3.0 lb/10E12 Btu	Uncontrolled, based on engineering judgement	36
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	3.0 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	36
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	2.25 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	36
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residenti al	1	Mercury	7439976	0.78 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	1260 lb/10E12 Btu	Uncontrolled, based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti	1	Nickel	7440020	642.6 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	36

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
		al						
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	352.8 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	50.4 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	170 lb/10E12 Btu	Uncontrolled, based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	86.7 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	47.6 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Nickel	7440020	6.8 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	19 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	4.2 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	2.06 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	0.50 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	0.42 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti	1	Arsenic	7440382	9.31 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering	36

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
		al					judgement	
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	2.28 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Arsenic	7440382	1.90 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	4.2 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	2.5 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	1.58 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	0.35 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	0.15 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	2.65 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	0.59 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Beryllium	7440417	0.25 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	15.7 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti	1	Cadmium	7440439	10.5 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
		al						
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	7.45 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Distillete oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	1.58 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	0.63 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	46.86 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	9.90 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Cadmium	7440439	3.96 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti al	1	Chromium	7440473	21 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Chromium	7440473	47.5 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Chromium	7440473	27.8 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Chromium	7440473	13.92 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residenti al	1	Chromium	7440473	3.84 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residenti	1	Chromium	7440473	12.18 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering	36

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
		al					judgement	
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Chromium	7440473	6.09 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Chromium	7440473	1.68 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	278 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	280 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	165.2 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	42 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Distillate oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	25.2 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	165.2 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	42.0 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Oil combustion		Residual oil-fired boilers, util/commerc/industr/residential	1	Copper	7440508	25.2 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Oil combustion		Utility boilers	101004	Lead	7439921	28 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement, assumed use residual oil	36
Oil combustion		Distillate watertube boilers	10300501	POM		<0.12 pg/J heat input	Uncontrolled	114

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Scotch marine boilers, distillate oil	10300501	PON		17.7 pg/J	Uncontrolled	114
Oil combustion		Cast iron sectional boilers, distillate oil	10300501	PON		<14.9 pg/J	Uncontrolled, home heating application	114
Oil combustion		Hot air furnace, distillate oil	10300501	PON		<0.14 pg/J	Uncontrolled, same reference also lists <15.4 for same boiler/fuel type	114
Oil combustion	49	Boiler flue gas	1	Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	1746016	Not detectable	Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<4.2-<7.9 ng/m3	119
Oil combustion	49	Flue gas	1	Tetrachlorodibenzofuran, 2,3,7,8-	51207319	Not detectable	Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<0.67-<1.3ng/m3	119
Oil combustion, commercial		Residual oil-fired tangential furnaces	103004	Vanadium	7440622	3660 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, commercial		Residual oil-fired wall furnaces	103004	Vanadium	7440622	3660 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, commercial		Tangential furnace, residual oil	103004	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, commercial		Wall furnace, residual oil	103004	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, commercial		Scotch marine boilers, residual oil	10300401	PON		0.95 pg/J heat input	Uncontrolled, represents benzo(a)pyrene only	114
Oil combustion, commercial		Distillate oil-fired tangential furnaces	103005	Vanadium	7440622	30.0 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, commercial		Distillate oil-fired wall furnaces	103005	Vanadium	7440622	30.0 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, commercial		Tangential furnace, distillate oil	103005	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion, commercial		Wall furnace, distillate oil	103005	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, industrial		Tangential furnaces	102	Vanadium	7440622	260 pg/J	Controlled by scrubber, based on reported emissions and engineering judgement	54
Oil combustion, industrial		Tangentiel furnaces	102	Vanadium	7440622	1300 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, industrial		Wall furnaces	102	Vanadium	7440622	260 pg/J	Controlled by scrubber, based on reported emissions and engineering judgement	54
Oil combustion, industrial		Wall furnaces	102	Vanadium	7440622	1300 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, industrial		Tangential furnace	102	Selenium	7782492	2.0 pg/J	Controlled by scrubber, based on reported emissions data and engineering judgement	54
Oil combustion, industrial		Tangential furnace	102	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, industrial		Wall furnace	102	Selenium	7782492	2.0 pg/J	Controlled by scrubber, based on reported emissions data and engineering judgement	54
Oil combustion, industrial		Wall furnace	102	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, industrial		Steam atomized watertube, residual oil	10200401	POM		2.3 pg/J heat input	Uncontrolled, represents mostly particulate POM	114
Oil combustion, industrial		Watertube, residual oil	10200401	POM		0.63 pg/J heat input	Uncontrolled, represents both gaseous and particulate POM	114
Oil combustion, residential		Distillate oil-fired boilers		Vanadium	7440622	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, residential		Distillate oil-fired furnaces		Selenium	7782492	2.9 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion, utility		Wall-fired, residual oil	10100401	POM		3.9 pg/J heat input	Uncontrolled, ave. of 4 values ranging from 0.45-12.3 pg/J, represents gaseous & particulate POM	114
Oil combustion, utility		Face-fired, residual oil	10100401	POM		0.37 pg/J heat input	Uncontrolled, represents both gaseous and particulate POM	114
Oil combustion, utility		Tangential-fired, residual oil	10100404	POM		2.5 pg/J heat input	Cyclone controls, represents both gaseous and particulate POM	114
Oil combustion, utility	4911	Residual oil-fired tangential furnaces	101004	Vanadium	7440622	303 pg/J	Controlled by ESP, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired tangential furnaces	101004	Vanadium	7440622	1516 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired wall furnaces	101004	Vanadium	7440622	303 pg/J	Controlled by ESP, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired wall furnaces	101004	Vanadium	7440622	1516 pg/J	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Tangential, residual oil	101004	Selenium	7782492	2.0 pg/J	Controlled by ESP, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Tangential, residual oil	101004	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Wall furnace, residual oil	101004	Selenium	7782492	2.0 pg/J	Controlled by ESP, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Wall furnace, residual oil	101004	Selenium	7782492	10.1 pg/J	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil shale retorting	1311	Modified in situ retort		POM		3.3 g/hr	Based on offgas concentration and flow rate	114
Oil shale retorting	2911	Entire process		Mercury	7439976	2.2 x 10E-4 lbs/barrel oil produced	Includes Hg compound form, assumes fac. using 13,000 tons/day raw shale to prod. 12,000 bbl/day oil	40

PB81-225559

Emissions Assessment of Conventional Stationary Combustion Systems: Volume V: Industrial Combustion Sources

TRW, Inc.
Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

1981

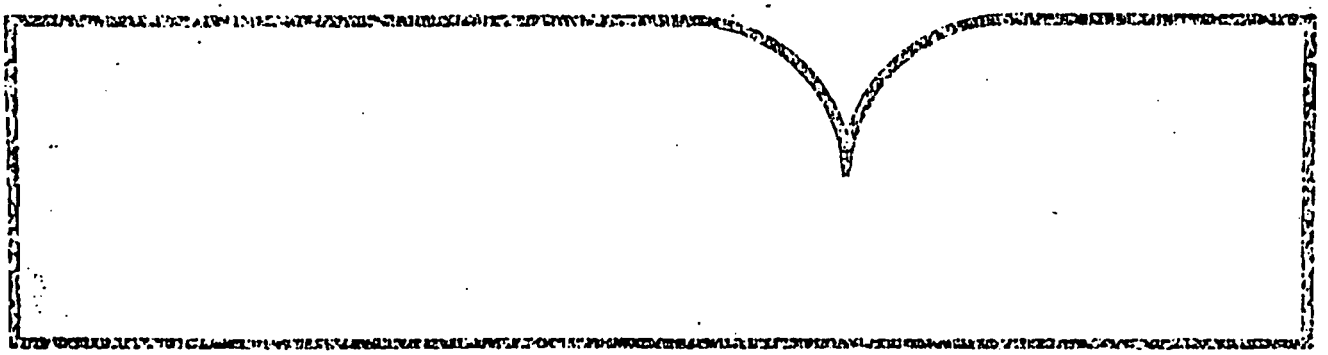

TABLE 61. COMPARISON OF EXISTING TRACE ELEMENT EMISSION FACTOR DATA WITH RESULTS OF CURRENT STUDY OF OIL-FIRED INDUSTRIAL COMBUSTION SOURCES, pg/J

	Distillate oil-fired boilers			Residual oil-fired boilers			
		Existing data			Existing data		
Element	Current study	Ref. 42	Ref. 43	Current study	Ref. 42	Ref. 21	Ref. 28
Aluminum (Al)	178	15	250	177	156	87	132
Arsenic (As)	3.5	1.3	1.5	1.2	9.1	18	12
Barium (Ba)	1.2	8.4	16	3.3	9.5	29	31
Calcium (Ca)	75	845	450	229	780	320	1428
Cadmium (Cd)	1.3	2.5	11	0.66	0.2	52	6.9
Cobalt (Co)	3.8	2.3	1.0	11	23	50	10
Chromium (Cr)	24	36	29	29	50	30	21
Copper (Cu)	37	205	160	10	93	64	350
Fluorine (F)	—	14	—	—	1.0	2.7	149
Iron (Fe)	383	545	140	83	379	411	453
Mercury (Hg)	—	1.7	1.2	—	1.9	0.9	1.5
Potassium (K)	85	60	230	261	213	777	392
Lithium (Li)	0.5	1.5	1.2	1.1	1.0	1.4	1.7
Magnesium (Mg)	42	40	210	24	111	297	2384
Nickel (Ni)	255	112	290	728	804	964	433
Lead (Pb)	24	48	42	2	7	80	34
Antimony (Sb)	—	1.7	5.7	—	21	10	25
Silicon (Si)	735	173	—	8655	1610	400	595
Vanadium (V)	195	30	2.9	366	250	3656	714
Zinc (Zn)	42	40	110	33	46	29	66

Ave. 50.9

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-296 390

Emission Assessment of Conventional Stationary Combustion Systems; Volume II Internal Combustion Sources

TRW, Inc, Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab, Research Triangle Park, NC

Feb 1979

TABLE 52. COMPARISON OF TRACE ELEMENT EMISSION FACTORS FOR DISTILLATE OIL-FUELED GAS TURBINES AND DISTILLATE OIL ENGINES

Trace Element	Mean Emission Factor, pg/J	
	Distillate Oil Fueled Gas Turbine	Distillate Oil Reciprocating Engine
Aluminum	64	66
Antimony	9.4	12
Arsenic	2.1	2.2
Barium	8.4	14
Beryllium	0.14	0.03
Boron	28	11
Bromine	1.8	4.0
Cadmium	1.8	3.1
Calcium	330	237
Chromium	20	26
Cobalt	3.9	5.7
Copper	578	453
Iron	256	325
Lead	25	26
Magnesium	100	44
Manganese	145	16
Mercury	0.39	0.13
Molybdenum	3.6	12.5
Nickel	526	564
Phosphorus	127	97
Potassium	185	179
Selenium	2.3	2.1
Silicon	575	301
Sodium	590	1625
Tin	35	9.1
Vanadium	1.9	0.95
Zinc	294	178

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor — Carol M. Browner, Secretary

January 30, 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. W. W. Vierday
Florida Power Corporation
3201 Thirty-fourth Street South
P. O. Box 14042
St. Petersburg, Florida 33733

Re: Six Simple-cycle Combustion Peaking Units at DeBary Facility
AC 64-191015, PSD-FL-167

Dear Mr. Vierday:

We have reviewed your December 31, 1990 application concerning the above referenced permit application and find it to be incomplete. You will need to show all calculations, state and justify all assumptions, identify the sources of any emission factors, and provide copies of references where the emission factors or other information were obtained from sources other than AP-42. In responding to those questions that request information concerning air pollutant emissions, please provide the emissions for each fuel that the affected sources are authorized to burn. Processing of your application will resume upon receipt of the following information:

1. Explain and demonstrate how the actual emissions of each pollutant listed in Table 500-2 of Rule 17-2.500 Florida Administrative Code (F.A.C.) were calculated in units of the applicable emission limiting standard (lbs/hr and tons/year) for each source at the DeBary facility.

2. What is the anticipated schedule for using natural gas at the DeBary facility for the proposed new combustion turbines and other existing units?

3. What is the intended use for the facility - base load, cycling, peaking, etc?

4. Why was combined cycle not used, particularly, for such a large facility expansion?

5. Please provide a map showing the facility location, county, municipalities, adjacent facilities, etc.

6. Please provide a copy of the air quality dispersion modeling inputs and results in both paper and diskette formats.

If you have any questions or wish to meet with us, please write to me at the address above or call Barry Andrews at (904)488-1344.

Sincerely,

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

CHF/PL/plm

c: J. Turner