CM: P 744 170 322

AC05-144482 File Copy
PM
19 Jan 1988
Orlando, FL

ORLANDO UTILITIES COMMISSION
500 SOUTH ORANGE AVENUE • P. O. BOX 3193 • ORLANDO, FLORIDA 32802 • 305/423-9100

Cert. Return Receipt Requested

January 18, 1988

Mr. C. H. Fancy, Deputy Chief
Bureau of Air Quality
Florida Department of
Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

DER
JAN 20, 1988
BAQM

Dear Mr. Fancy:

Enclosed is an original and a copy of our application for a permit to construct an air pollution source. The application is for a four unit combustion turbine addition to our Indian River Plant. The permit is requested for all four units with construction to commence right away for the first two units. The third and fourth units are currently scheduled to commence construction in November 1989 and November 1990.

Our permit plan for these units which you reviewed for us indicated that multi source modeling would be required for SO_2 since modeled impacts from the four units exceeded the significant impact level in the EPA guidelines. This assessment had been made assuming 0.8 percent sulfur fuel oil. OUC is willing to commit to a maximum of 0.3 percent sulfur fuel oil for these combustion turbines. At this level of emissions, no pollutants exceed the significant impact level and, hence, no multi source modeling is necessary. We trust that this will enable you to accelerate your review of our application as it greatly simplifies the modeling requirements.

The application fee of $1,000.00 is also enclosed.

Very truly yours,

JSCrall

J. S. Crall
Director
Environmental Division

JSC:ch
Enclosures

xc: W. H. Herrington
T. D. Slepow
S. M. Day

Copied: Brodeup Rowal, Max Linn } 1-26-88

ORLANDO UTILITIES COMMISSION P.O. BOX 3193 ORLANDO, FLORIDA 32802 No. 013982

INVOICE DATE	VENDOR INVOICE NUMBER	VOUCHER NUMBER		AMOUNT
	Application Fee		117512	1000.00

DISB #	VENDOR NO.	CHECK DATE	TOTAL	

Orlando Utilities Commission

ORLANDO, FLORIDA

"Where Electricity Powers Progress"

63-215
631

No. 013982

PAY TO THE ORDER OF: ORLANDO UTILITIES $1000 and 00 cts

NOT VALID AFTER 180 DAYS

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

DATE JAN. 18 88

1000.00

SUN BANK, N.A.
MAIN OFFICE:
ORLANDO, FLORIDA 32801

AUTHORIZED SIGNATURE

⑈013982⑈ ⑆063102152⑆ 1001140805⑈

ORLANDO
JAN 15 '88
FLA.

US POSTAGE
5.06

FROM

ORLANDO UTILITIES COMMISSION

P.O. BOX 3193 ORLANDO, FLORIDA 32802

Mr. C. H. Fancy, Deputy Chief
Bureau of Air Quality
Florida Department of
Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

DER
JAN 20
BAQM

Fold at line over top of envelope to the right of the return address

Receipt Requested

CERTIFIED
P 744 170 322
MAIL

Receipt # 117512
$1000.00
AC05-144482
Sub Code = 01
PSD-FL-130

Received ✓ for $3,000.00 on March 11, 1988 for Units 2-4

Unit #2 = AC05-146749
Unit #3 = AC05-146750
Unit #4 = AC05-146751
Receipted on 3-16-88

ORLANDO UTILITIES COMMISSION
INDIAN RIVER PLANT--GAS TURBINE ADDITIONS
FILE NO. 14137.22.0400

APPLICATION TO CONSTRUCT A MAJOR EMITTING FACILITY IN ACCORDANCE WITH PREVENTION OF SIGNIFICANT DETERIORATION REQUIREMENTS

Black & Veatch
Engineers-Architects

CONTENTS

CONTENTS (Continued)

LISTS OF TABLES

LIST OF FIGURES

ORLANDO UTILITIES COMMISSION
INDIAN RIVER COMBUSTION TURBINE FACILITY

APPLICATION TO CONSTRUCT

1.0 INTRODUCTION

Orlando Utilities Commission (OUC) currently has three operating oil and gas fueled boilers producing steam for the generation of electricity at the Indian River Plant located about 10 km south of Titusville. OUC plans to install up to four new simple cycle combustion turbines, each with an electrical generation capacity of about 35 megawatts (MW), at the Indian River Plant.

In the Air Quality Work Plan previously reviewed by Florida's Department of Environmental Regulation (FDER), it was mentioned that this application would be made for either of two different types of combustion turbines. However, at this time it appears that only one type of turbine will need to be modeled. Therefore, this application is based on the emission characteristics of only the GE Frame 6 combustion turbines.

This prevention of significant deterioration (PSD) permit application is for four combustion turbines. A completed air permit application form (DER Form 17-1.202(1)) is provided at the end of this section. The permit application form references other sections of this application. This application consists of the following sections.

- o 1.0 Introduction (with completed application form).
- o 2.0 Project Description.
- o 3.0 Pollutant Applicability.
- o 4.0 Best Available Control Technology (BACT) Analysis.
- o 5.0 Air Quality Assessment Methodology.
- o 6.0 Additional Impacts Analysis.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Combustion Turbine Facility [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Orlando Utilities Commission COUNTY: Brevard

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) 4 Unit Combustion Turbine Facility

SOURCE LOCATION: ~~Street~~ Indian River Plant City Titusville (10 km north of site)

UTM: East 521.5 km North 3151.6 km

Latitude 28 ° 29 ' 32 "N Longitude 80 ° 46 ' 59 "W

APPLICANT NAME AND TITLE: Orlando Utilities Commission

APPLICANT ADDRESS: 500 South Orange Avenue, Orlando, Florida 32802

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Orlando Utilities Commission

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: [signature]

William H. Herrington, Manager Electric Operations
Name and Title (Please Type)

Date: 1/5/88 Telephone No. 305-423-9140

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed D D Schultz

Donald D. Schultz
Name (Please Type)

Black & Veatch, Engineers-Architects
Company Name (Please Type)

P. O. Box 8405, Kansas City, Missouri 64114
Mailing Address (Please Type)

Florida Registration No. 30304 Date: November 20,1980 Telephone No. 913-339-2000

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See Section 2.0 of the Application to Construct

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction October 1988 Completion of Construction September 1989

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

The combustion turbine facility will be equipped with water injection to control NO_x emissions. However, a cost estimate for the water treatment and injection system is not available at this time.

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

None

E. Requested permitted equipment operating time: hrs/day____; days/wk____; wks/yr____;

if power plant, hrs/yr 8760; if seasonal, describe: __________

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? No
   - a. If yes, has "offset" been applied? N/A
   - b. If yes, has "Lowest Achievable Emission Rate" been applied? N/A
   - c. If yes, list non-attainment pollutants. N/A
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Yes
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

- a. If yes, for what pollutants? N/A
- b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
N/A				

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): N/A

2. Product Weight (lbs/hr): N/A

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
			(SEE SECTION 3.0 OF APPLICATION.)				

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
SEE SECTION 4.0 OF APPLICATION				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input at 59 F (MMBTU/hr)
	avg/hr	max./hr	
Natural Gas		0.49 mcf/hr	∿445
Distillate Fuel Oil		3,122 gal/hr	∿436

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis: (Typical No. 2 Fuel Oil)

Percent Sulfur: 0.2 (0.30 max) Percent Ash: ________

Density: 7.09 lbs/gal Typical Percent Nitrogen: ________

Heat Capacity: 19,696 BTU/lb 139,645 BTU/gal

Other Fuel Contaminants (which may cause air pollution): ________

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average None Maximum None

G. Indicate liquid or solid wastes generated and method of disposal.

No solid wastes or wastewaters will be generated.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack): for Fuel Oi

Stack Height: 36 ft. Stack Dimensions: 10 ft x 12 ft. (rectangular)

Gas Flow Rate: 697,015 ACFM _______ DSCFM Gas Exit Temperature: 1003 °F.

Water Vapor Content: ~8 % Velocity: 96.8 FPS

SECTION IV: INCINERATOR INFORMATION

N/A

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste ____________

Total Weight Incinerated (lbs/hr) ________ Design Capacity (lbs/hr) ________

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______

Manufacturer ____________

Date Constructed ________ Model No. ________

	Volume (ft)³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______ ft. Stack Diamter: ________ Stack Temp. ______

Gas Flow Rate: ________ ACFM ________ DSCFM* Velocity: ________ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ________

Brief description of operating characteristics of control devices: ____________________

____

____

____

____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

____

____

____

____

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[X] Yes [ ] No

Contaminant	Rate or Concentration
SO_2	152 ppmvd or 0.80 percent S in fuel
NO_x	75 ppmvd (plus heat rate adjustment)

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [X] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
SO_2	55 ppmvd (fuel oil)
NO_x	65/42 ppmvd (fuel oil/natural gas)
CO	10 ppmvd
VOC	5 ppmvd

D. Describe the existing control and treatment technology (if any). See Section 4.0 of the Application

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life: 6. Operating Costs:

7. Energy: 8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary). See Section 4.0 of Application.

1.

a. Control Device: b. Operating Principles:

c. Efficiency:[1] d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy:[2] h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device: b. Operating Principles:

c. Efficiency:[1] d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy:[2] h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1] Explain method of determining efficiency.
[2] Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: See Section 4.0 of Application

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data No pre-construction monitoring is required--see Section 5.0 of the Application.

1. ________ no. sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

Period of Monitoring ____/____/____ to ____/____/____
month day year month day year

Other data recorded ________________

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 01 / 01 / 81 to 12 / 31 / 85
month day year month day year

2. Surface data obtained from (location) Orlando, Florida

3. Upper air (mixing height) data obtained from (location) Tampa, Florida

4. Stability wind rose (STAR) data obtained from (location) N/A

C. Computer Models Used

1. PTPLU-2 (UNAMAP 6) Modified? If yes, attach description.

2. ISCST (UNAMAP 6) Modified? If yes, attach description.

3. ______ Modified? If yes, attach description.

4. ______ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP(and PM_{10})	1.26 g/s/unit (oil) 0.31 g/s/unit (natural gas)	grams/sec
SO^2	17.98 g/s/unit (oil) 3.20 g/s/unit (natural gas)	grams/sec

E. Emission Data Used in Modeling See Sections 5.0 and 6.0 of Application

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review. See Application

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources. See Section 4.0 of Application

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology. See Section 4.0 of Application

2.0 PROJECT DESCRIPTION

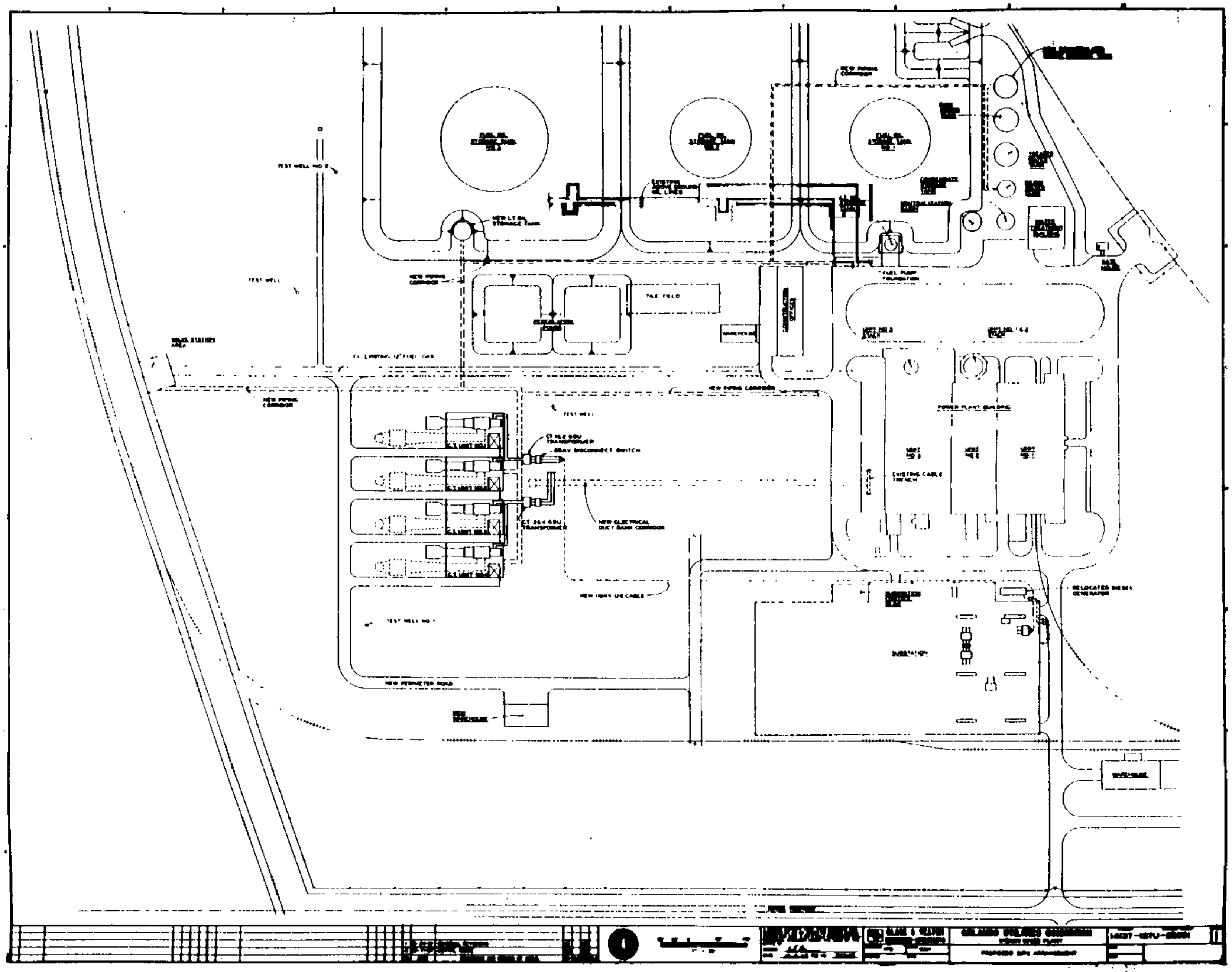
The project includes the installation of two 35 MW (approximate rating at site conditions) combustion turbine generators. The proposed site arrangement is shown in Figure 2-1. Provisions are being made for the installation of up to two additional combustion turbine generators in the future. This application is being made for all four units in phased construction for the final two units. For purposes of this PSD permit, construction on the third and fourth combustion turbines is currently scheduled to commence on November 1, 1989 and November 1, 1990. The project also includes the relocation of a 1 MW diesel generator from OUC's Lake Highland Plant to the Indian River Plant Site.

Included in the project is the installation of a new demineralized water storage tank, a new No. 2 fuel oil storage tank, and warehouse for storage of the combustion turbine generator spare parts. The existing demineralizer and fuel oil unloading system will be used on this project.

The combustion turbines are being designed for firing on either natural gas or No. 2 fuel oil. The combustion turbines are also designed with black start capability.

This project will result in full compliance with applicable air pollution laws and regulations.

010488
PSDIND



PROPOSED PLANT ARRANGEMENT
FIGURE 2-1

3.0 POLLUTANT APPLICABILITY

3.1 BACKGROUND

The Indian River area is currently designated attainment for all "criteria" pollutants. Table 3-1 lists those pollutants designated as criteria pollutants. Criteria pollutants are those for which EPA has established ambient air quality standards, i.e., particulates, sulfur dioxide, nitrogen oxides, carbon monoxide, ozone (VOC), and lead. Therefore, nonattainment review requirements will not be applicable to the project, but the project may be subject to the Prevention of Significant Deterioration (PSD) Program. The PSD Program is designated to protect the air quality in air sheds which currently are designated as attainment or unclassified for criteria pollutant.

New sources which have the potential to emit any criteria pollutant in excess of 100 tons per year (tpy) will be subject to PSD review. Since the project will have the potential to emit more than 100 tpy of a criteria pollutant, the project is subject to PSD review.

Once a source has been determined to be subject to PSD review, each regulated pollutant that is potentially emitted in excess of designated significance levels (given in Table 3-1) is subject to PSD review. The review process for those pollutants emitted in excess of the indicated significance levels includes a determination of Best Available Control Technology (BACT) and an air quality impact analysis.

3.2 ESTIMATED POTENTIAL EMISSIONS

Estimates of maximum potential emissions during natural gas or distillate oil firing for the four proposed combustion turbines are provided in Table 3-1. These estimates are based on all four combustion turbines operating at 100 percent capacity for the entire year. From this table, it is apparent that all criteria pollutants are estimated to be emitted in excess of the PSD significance levels.

Emissions of nitrogen oxides and sulfur dioxide are limited by Federal New Source performance Standards (NSPS) under Subpart GG of 40 CFR 60. However, the combustion turbines will be subject to Best Available Control Technology (BACT) for these pollutants. For the air quality assessment, it

TABLE 3-1. SUMMARY OF AIR EMISSIONS FROM GENERAL ELECTRIC FRAME 6 COMBUSTION TURBINES.

Pollutant	Fuel	Maximum Emissions Per Unit lb/h	Potential Annual Emissions* 1 Unit t/yr	Potential Annual Emissions* 4 Units t/yr	Significant Emission Rate t/yr
Carbon Monoxide	Gas	10.0	22	~~88~~ 177	100
	Oil	10.1	22	~~88~~ 177	100
Nitrogen Oxides (as NO_2)	Gas	75.1	164	658	40
	Oil	118.3	259	~~1,036~~ 2073	40
Sulfur Dioxide	Gas	25.4	56	223	40
	Oil	142.7	625	2,500	40
Total Particulate	Gas	2.5	5.5	22	25
	Oil	10.0	22	~~88~~ 175	25
PM_{10}	Gas	2.5	5.5	22	15
	Oil	10.0	22	~~88~~ 175	15
VOC	Gas	4.0	8.8	35	40
	Oil	4.0	8.8	~~35~~ 70	40

*Based on 8,760 hours of full load operation per year.

NOTE: The emissions are for operation at sea level and 59 F.

has been assumed that an emission rate for sulfur dioxide of 55 ppmvd (at 15 percent oxygen) will be determined to be BACT.

Nitrogen oxide emission estimates have been based on an assumed BACT outlet concentration of 42 ppmvd (at 15 percent oxygen) while burning natural gas and 65 ppmvd (at 15 percent oxygen) while burning distillate oil. These emissions will be controlled through the use of water injection and represent emission rates below NSPS.

All other pollutant emission rates were obtained from the turbine manufacturer.

4.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

Previous sections of this application concluded that the project's emissions of particulates, sulfur dioxide, NO_x, carbon monoxide, and volatile organic hydrocarbons were subject to the provisions of the PSD Program. Consequently, this discussion of the appropriate best available control technology (BACT) for the project addresses control technologies/ practices for these pollutants.

Under the federal Clean Air Act, BACT represents the maximum degree of pollutant reduction determined on a case-by-case basis after consideration of environmental, energy, and economic factors. However, BACT cannot be less stringent than the emission limits imposed through any applicable new source performance standards (NSPS).

4.1 PARTICULATE BACT

The emission of particulates from the combustion turbine facility will be controlled by ensuring as complete combustion of the fuel as possible. The NSPS for combustion turbines do not establish any emission limit for particulates. A review of the EPA's BACT/LAER Clearinghouse - A Compilation of Control Technology Determinations" (1985 edition) and its May 1986 supplement did not reveal any more stringent particulate control technologies being used on gas/oil fueled combustion turbines. Therefore, OUC proposes to implement measures to ensure as complete combustion of the fuel as possible as its BACT for particulates, especially those particulates smaller than 10 microns (PM_{10}).

4.2 SULFUR DIOXIDE (SO_2) BACT

The emission of sulfur dioxide (SO_2) from the combustion turbine will be controlled by limiting the sulfur content of the distillate fuel oil to 0.30 percent by weight and by limiting sulfur dioxide emissions to 55 ppmvd at 15 percent oxygen. This BACT is 63 percent more stringent than the requirements of the NSPS for combustion turbines. OUC can obtain fuel oil meeting the 0.30 percent sulfur limit at no additional cost over the oil used to comply with the NSPS limitation. The use of flue gas scrubbers is not practical for combustion turbines and has not been proposed as BACT for any combustion turbine project listed in the EPA BACT/LAER Compilation or its supplement.

4.3 NITROGEN OXIDES (NO_x) BACT

The combustion turbine NSPS imposes a 75 ppmvd (plus heat rate adjustment) emission limit at 15 percent oxygen for NO_x. Therefore, this represents the "upper bound" of NO_x BACT for the project. Compliance with the 75 ppmvd NO_x emission limit requires that water or steam be injected into the combustion chamber of the turbine to lower combustion temperatures and retard the formation of thermal NO_x from the nitrogen in the combustion air. The degree of reduction in NO_x formation is somewhat proportional to the amount of water injected into the turbine.

Since the combustion turbine NSPS was last revised in 1982, combustion turbines have improved their tolerance to the water necessary to control NO_x emissions below the new source level. However, there is still a point where the amount of water injected into the turbine seriously degrades its reliability and operational life. This generally occurs at NO_x emission levels of about 65 ppmvd (with no heat rate adjustment) on oil and 42 ppmvd on natural gas. Since these NO_x emission levels can be achieved with little additional costs and with little impact on reliability over those required to comply with the NSPS, OUC proposes 65/42 ppmvd at 15 percent oxygen as NO_x BACT for this project.

Use of the 65/42 ppmvd NO_x emission level as BACT is supported by the EPA BACT/LAER Compilation and its supplement since no combustion turbine project outside of California apparently will be limited to NO_x emissions below this level. (BACT listings from California in the EPA BACT/LAER Compilation are not included in this analysis because California uses a "LAER-based" approach to BACT determinations where costs are ignored.)

There are three possible NO_x control technologies used on fuel combustion projects which can achieve NO_x emissions less than the proposed BACT. However, two of these NO_x control technologies, multi-port fuel injection and Thermal DeNox, are not available for this project.

Multi-port fuel injection, although available for larger GE combustion turbines, has not yet been developed for Frame 6 turbines. Thermal DeNox is effective with higher flue gas temperatures (about 1600 F) found in coal combustion, but is ineffective at the lower flue gas temperatures (about 1000 F) found on combustion turbines. This is confirmed by the absence of any mention in the EPA BACT/LAER compilation of use of Thermal DeNOx on combustion turbines. Therefore, the only control technology capable of achieving NO_x emission rates less than the proposed BACT for this project is selective catalytic reduction (SCR).

However, SCR is ineffective at temperatures above 700 F. Cooling the flue gas from the combustion turbine to 700 F would require OUC to install steam coils to extract enough flue gas heat to produce thousands of pounds of steam. This steam must then be condensed and that waste heat dissipated by a cooling tower. The modeled NO_x impacts from the facility is already below significant impact levels. Balancing the economic, energy, and environmental aspects of the SCR technology, as required in a BACT analysis, indicates that the cost of all these facilities clearly outweighs any perceived benefits of the lower NO_x emissions. Consequently, NO_x BACT for this simple cycle combustion turbine facility is the use of water injection to achieve NO_x emission of 65 ppmvd at 15 percent oxygen on oil and 42 ppmvd on gas.

4.4 CARBON MONOXIDE (CO) BACT

The CO emissions from combustion turbines are minimized by ensuring as complete combustion as possible. Although water injection does tend to raise CO emission levels, the increase is not significant at the levels of water injection necessary to achieve NO_x emissions at the proposed BACT level. The proposed BACT emission rate for CO is 10 ppmvd at 15 percent oxygen. The EPA BACT/LAER Compilation and its supplement do not list any combustion turbine projects using more stringent control technologies to limit CO emissions.

4.5 VOLATILE ORGANIC HYDROCARBONS (VOC) BACT

VOC emissions from combustion turbines are also minimized by ensuring as complete combustion as possible. Although water injection does tend to raise VOC emission levels, the increase is not significant at the levels of water injection necessary to achieve NO_x emissions at the proposed BACT level. The proposed BACT emission rate for VOC is 5 ppmvd at 15 percent oxygen. The EPA BACT/LAER Compilation and its supplement do not list any combustion turbine projects using more stringent control technologies to limit VOC emissions.

5.0 AIR QUALITY ASSESSMENT METHODOLOGY

An analysis of combustion gas emissions was conducted to facilitate the assessment of the impacts of airborne pollutants on ground-level air quality levels, visibility, soils, and vegetation in the project vicinity. This section summarizes the overall air quality assessment methodology including the various modeling data requirements. The assessment methodology was based on EPA's Guideline on Air Quality Models (Revised) July 1986, the UNAMAP 6 dispersion models, and previous discussions with Florida's Department of Environmental Regulation (FDER).

5.1 APPLICABLE AIR QUALITY DISPERSION MODELS

EPA's PTPLU-2 and Industrial Source Complex Short-term (ISCST) air quality dispersion models were both used for this air quality assessment. PTPLU-2 was used to indicate the approximate distance at which maximum ground-level concentration can be expected to occur during varying meteorological conditions. This information was used in establishing receptor locations for the refined air quality assessment. Within the refined air quality assessment, ISCST predicted the maximum air quality impacts for determining whether ambient air monitoring and further air quality impact assessments were required.

The following information documents the typical EPA default modeling options that were included in the refined air quality assessment. The Indian River Plant location was considered to be rural for modeling purposes. For unstable through stable atmospheric conditions, the wind profile exponents were 0.07, 0.07, 0.10, 0.15, 0.35, and 0.55, respectively. Other ISCST modeling options implemented included stack-tip downwash, buoyancy induced dispersion, and concentration adjustments for calm periods.

5.2 METEOROLOGICAL DATA

Five years of surface and upper air meteorological data were used for the refined air quality analysis. These data were provided by the FDER and were processed into a compatible modeling format. The hourly surface data were recorded during 1981 through 1985 for nearby Orlando, Florida. The corresponding upper air data were obtained for Tampa, Florida for the same time period.

5.3 PROPOSED GAS TURBINE SOURCE PARAMETERS

Four identical GE Frame 6 combustion turbines are being proposed for OUC's Indian River Plant. Natural gas is considered to be the main fuel, but the turbines can also burn distillate oil. The stack parameters and emission rates for a typical unit are summarized in Table 5-1. To reduce air quality modeling computation, these four identical combustion turbines were modeled as one source with four times the individual unit pollutant emission rate. Also, air quality modeling was actually only performed for the SO_2 emissions. The SO_2 emissions were modeled using emission data based on 0.8 percent sulfur fuel oil. The SO_2 impacts from burning 0.30 percent sulfur fuel oil were determined by the ratio of 0.30/0.8 or 0.38. Predicted concentrations for the other pollutants were determined by the ratio of actual pollutant emission rate and SO_2 emission rate.

The proposed combustion turbines stacks will be located approximately 700 feet from the existing Unit 3 building. At this distance, the proposed units will be slightly greater than five times the lesser of the Unit 3 building height (137 feet) or projected building width (173 feet). This location should preclude the potential for aerodynamic building downwash in accordance with EPA's Guideline for Determination of Good Engineering Practice Stack Height.

5.4 APPLICABLE AIR QUALITY ANALYSES

Any air quality analysis which supports a PSD permit application should provide a determination of the ambient air monitoring requirements, identification of significant impact areas, and, if required, NAAQS comparison and PSD increment consumption.

For the various analyses, the short-term impacts were based on the highest, second-highest predicted concentrations since the entire five year period was modeled. Based on the difference in stack parameters and emission rates, oil firing will yield worst case pollutant impacts, and thus natural gas fired impacts were not analyzed.

TABLE 5-1. SUMMARY OF GAS TURBINE STACK MODELING PARAMETERS

GE--Frame 6--Distillate Oil 65 ppm NO_x

Height	=	36 ft
Diameter	=	10 ft by 12 ft (rectangular opening)
		[redacted]
Flow	=	697,015 acfm
Velocity	=	5,808 ft/min (96.8 fps)
Temperature	=	1003 F
SO_2	=	17.98 g/s/unit
NO_x	=	14.9 g/s/unit
CO	=	1.26 g/s/unit
VOC	=	0.50 g/s/unit
Particulate	=	1.26 g/s/unit

GE--Frame 6--Natural Gas 42 ppm NO_x

Height	=	36 ft
Diameter	=	10 ft by 12 ft (rectangular opening)
Flow	=	712,397 acfm
Velocity	=	5,937 fpm (98.9 fps)
Temperature	=	1002 F
SO_2	=	3.20 g/s/unit
NO_x	=	9.46 g/s/unit
CO	=	1.26 g/s/unit
VOC	=	0.50 g/s/unit
Particulate	=	0.31 g/s/unit

5.4.1 Determination of Ambient Air Quality Monitoring Requirements

EPA has established significant monitoring concentrations for use as criteria for determining if ambient air monitoring would be required as part of the permitting process. The maximum impact for the project are compared with these criteria for each applicable pollutant criteria. Ambient preconstruction air monitoring would only be required for those pollutants which exceed the applicable criteria.

The ISCST dispersion model and five years of meteorological data were used to determine the maximum ground-level impacts. PTPLU-2 screening modeling indicated that the maximum 1-hour concentration would occur about 1 kilometer from the source. Therefore, twenty model receptor rings were placed along the 36 standard radial directions. The ring distances used were 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, and 14.0 kilometers.

A summary of the maximum predicted ground-level concentrations for the proposed combustion turbines is presented in Table 5-2. The PSD significant monitoring criteria are also included in Table 5-2. The maximum 3- and 24-hour impacts from the General Electric (GE) units were predicted to occur approximately 10 kilometers south of the plant. The maximum annual concentration was predicted to occur 7.0 kilometers southwest of the plant. An 8-hour CO impact was not directly determined from the ISCST modeling. However, the 3-hour maximum concentration is well below the 8-hour CO monitoring criteria and thus implies that the project will be below the CO monitoring criteria concentration.

As shown Table 5-2, all predicted impacts are below the monitoring criteria. Since all impacts were below the criteria, preconstruction monitoring is not required for any pollutant.

5.4.2 Significant Impact Area Determination

Impact areas need to be established for each applicable pollutant for each averaging time for which a NAAQS exists. In accordance with PSD guidance, the various pollutant impact areas are defined as the circular area whose radius is equal to the greatest distance from the source at which a significant impact level is predicted to exist. If the dispersion

TABLE 5-2. PREDICTED MAXIMUM IMPACT FROM FOUR COMBUSTION TURBINES FIRING DISTILLATE OIL.

Pollutant	Averaging Period	Highest Second-Highest Concentration ug/m**3	Significant Monitoring Criteria ug/m**3	Receptor Location Distance km	Receptor Location Direction deg	Year
SO_2	24-hour	4.95	13	10.0	180	1982
NO_x	Annual	0.3	14	7.0	240	1984
Particulate	24-hour	0.3	10	10.0	180	1982
PM_{10}	24-hour	0.3	10	10.0	180	1982
CO	8-hour	1.3[a]	575	10.0	180	1982

[a]Note that the 8-hour CO based on 3-hour maximum concentration.

modeling demonstrates that a pollutant does not produce a significant impact, further air quality assessment of this pollutant is not required.

Table 5-3 compares the air quality significant impact levels with the maximum predicted concentrations. The table shows that no pollutant impacts exceed the significant impacts criteria. Therefore, no further ambient air quality assessment is required.

The Appendix contains the dispersion modeling printouts for the computer runs which produced these results.

TABLE 5-3. COMPARISON OF MAXIMUM IMPACTS AND SIGNIFICANT IMPACT CRITERIA.

Pollutant	Maximum Predicted Concentration ug/m**3	Significant Impact Criteria ug/m**3	Significant Impact
SO_2			
3-hour	20.3	25	~~Yes~~ No
24-hour	4.95	5	~~Yes~~ No
Annual	0.4 ✓	1	~~Yes~~ No
PM_{10}			
24-hour	~~0.3~~ .4	5	No
Annual	~~0.3~~ .03	1	No
NO_2			
Annual	0.3 ✓	1	No
CO			
8-hour	~~1.3~~[a] 1.4 Assume 3-hr conc.	500	No
1-hour	---[b]	2,000	No

[a]Note that the 8-hour CO concentration is based on a 3-hour impact.
[b]A 1-hour impact was not determined during modeling.

6.0 ADDITIONAL IMPACT ANALYSIS

6.1 VISIBILITY IMPAIRMENT

An analysis of possible adverse visibility impairment at the nearest PSD Class I area was carried out using the EPA's visibility screening methods. The nearest PSD Class I area is Chassahowitzha Wilderness Area along the west coast of Florida, at a distance of approximately 175 kilometers from the proposed combustion turbines. The results of the Level-1 screening shows that it is highly unlikely that such impairment might occur and no further analysis of potential visibility impacts was performed.

6.2 SOILS AND VEGETATION

The NAAQS have been established to protect public health and welfare from any adverse effects of air pollutants. The maximum impacts from all pollutants are below significance levels. Therefore, no adverse effects on soils and terrestrial vegetation are expected.

6.3 GROWTH

The addition of four Frame 6 combustion turbines to the Indian River Plant are not expected to induce any secondary growth in the surrounding area.

12/4/87

FPL 2 stacks identical parameters add em rates
OUC 300 ft 14 ft dia
Flow rate differs 23 ft/s 300 F
63 ft/s 340 F } combine
74 ft/s 340 F }

Cape Canaveral AFB ← need UTM's
Kennedy Space Center vel T ER
1 & 2 65 4 5 55 TPY each
3 50 5 missing 12 TPY
Add ER from 50 to 65 ft stack
#4 50 2.5 B 20
#5 53 TPY *