FEDERAL EXPRESS

[redacted] QUESTIONS? CALL 800-238-5355 TOLL FREE.

1196K   1028818486

AIRBILL PACKAGE TRACKING NUMBER **1028818486**

[redacted]

Date: 6/13/92

RECIPIENT'S COPY

From	
From (Your Name) Please Print	Kennard F. Kosky
Your Phone Number (Very Important)	(904) 331-9000
Company	KBN ENG & APPLIED SCIENCES
Department/Floor No.	
Street Address	1034 NW 57TH ST
City	GAINESVILLE
State	FL
ZIP Required	32605

To	
To (Recipient's Name) Please Print	ChairnFancy
Recipient's Phone Number (Very Important)	(904) 488-1344
Company	Bureau of Air Regulation Florida Dept of Environmental Regulation
Department/Floor No	
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes)	Twin Towers Office Bldg 2600 Blairstone Rd
City	Tallahassee
State	FL
ZIP Required	32399-2400

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.) 12018-0400 KFK/LCB

H IF HOLD FOR PICK-UP, Print FEDEX Address Here: Street Address / City / State / ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct No 3 [ ] Bill 3rd Party FedEx Acct No 4 [ ] Bill Credit Card 5 [ ] Cash/Check [redacted]

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)	Standard Overnight (Delivery by next business afternoon†)
11 [X] YOUR PACKAGING	51 [ ] YOUR PACKAGING
16 [ ] FEDEX LETTER *	56 [ ] FEDEX LETTER *
12 [ ] FEDEX PAK *	52 [ ] FEDEX PAK *
13 [ ] FEDEX BOX	53 [ ] FEDEX BOX
14 [ ] FEDEX TUBE	54 [ ] FEDEX TUBE
Economy Two-Day (Delivery by second business day†)	**Government Overnight** (Restricted to authorized users only)
30 [ ] ECONOMY	46 [ ] GOVT LETTER
	41 [ ] GOVT PACKAGE

Freight Service (for Extra Large or any package over 150 lbs.)

70 [ ] OVERNIGHT FREIGHT ** (Confirmed reservation required) 80 [ ] TWO-DAY FREIGHT **

† Delivery commitment may be later in some areas. *Declared Value Limit $100 **Call for delivery schedule

5 DELIVERY AND SPECIAL HANDLING (Check services required)

1 [ ] HOLD FOR PICK-UP (Fill in Box H)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge) (Not available to all locations)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ]
6 [ ] DRY ICE
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [X] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ] DESCRIPTION
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES | WEIGHT In Pounds Only | Total 1 | Total 34

[redacted]

DIM SHIPMENT (Chargeable Weight) [ ] ____ lbs
___ x ___ x ___ = ___

Received At: 1 [ ] Regular Stop 2 [X] On-Call Stop 3 [ ] Drop Box 4 [ ] BSC 5 [ ] Station

Emp No | Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg To Del [ ] Chg To Hold
Street Address
City State Zip
Received By: X
Date/Time Received FedEx Employee Number

7 Release Signature:
FedEx Emp No Date/Time

Federal Express Use	
Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

REVISION DATE 4/91
PART #137204 FXEM 6/91
FORMAT #082

082

Destec Energy Inc.
P.O. Box 4411
Houston, Texas 77210

DATE 06/03/92

CHECK NUMBER 63199

PAYMENT ADVICE

INVOICE NUMBER	INVOICE DATE	COMMENT	GROSS	DEDUCTIONS	AMOUNT PAID
MAY291992	050192		7,500.00	.00	7,500.00

DETACH BEFORE DEPOSITING

DESTEC ENERGY

Bank One, Texas, N.A.
Houston, Texas

CHECK NUMBER 00063199

DATE	AMOUNT
06/03/92	$*****7,500.00

PAY
SEVEN THOUSAND FIVE HUNDRED AND 00/100 **

Destec Energy Inc.

TO THE ORDER OF:

130956 FLORIDA DEPT OF ENVIRONMENTAL
REGULATION
2600 BLAIRSTONE RD
TALLAHASEE, FL 32399-2400

R Dennis Martin

⑈00063199⑈ ⑆111310140⑆ ⑈0580000198⑈

DESTEC ENGINEERING

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DER - MAIL ROOM

1992 JUN 15 AM 9:39

HOUSTON, TEXAS

June 12, 1992

RECEIVED

JUN 15 1992

Bureau of Air Regulation

Mr. Clair Fancy
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Central Florida Power Limited Partnership

Dear Clair:

Please find enclosed five copies of air construction permit application and prevention of significant deterioration analysis for a 206-MW cogeneration facility. A fee of $7,500 is enclosed to cover the appropriate permit fees for the facility. Disk and paper copies of the computer printouts of the air quality modeling results are included. The engineering calculations of the emission rates are presented in Appendix A. Also, a disk copy of these calculations has been included.

I will be contacting you in a few weeks to review the initial comments your staff my have. In the meantime, please call if you have any questions.

Sincerely,

Robert S. Chatham

Robert S. Chatham, P.E.
Senior Environmental Engineer

RSC/dmm

cc: Kennard F. Kosky, KBN
Barry Andrews, FDER
File (2)
M. Baig
C. Holladay
B. Thomas, SW Dist.
G. Harper, EPA
C. Shaver, NPS

12018C1/NKC1

#7500 pd.
6-15-92
Recpt.# 180772

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

AC 53-214903
PSD-FL-190

RECEIVED
JUN 15 1992
Bureau of
Air Regulation

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Cogeneration Power Plant [x] New[1] [ ] Existing[1]

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

COMPANY NAME: Central Florida Power Limited Partnership COUNTY: Polk

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) GT/HRSG Stack

SOURCE LOCATION: Street County Road 630 City 5 miles west of Ft. Meade

UTM: East 416.22 km Zone 17 North 3069.22 km

Latitude 27 ° 44 ' 46.7 "N Longitude 81 ° 51 ' 0.3 "W

APPLICANT NAME AND TITLE: Robert I. Taylor, Project Manager

APPLICANT ADDRESS: Suite 150, 2500 City West Blvd., Houston, Texas 77042

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Central Florida Power Limited Partnership

I certify that the statements made in this application for an air 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: R I Taylor

Robert I. Taylor, Project Manager
Name and Title (Please Type)

Date: 6/12/92 Telephone No. (713) 735-4330

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 judgement, that

[1]See Florida Administration 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 *Kennard F. Kosky*

Kennard F. Kosky
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

1034 N.W. 57th Street, Gainesville, FL 32605
Mailing Address (Please Type)

Florida Registration No. *14996* Date: *6/12/92* Telephone No. *(904) 331-9000*

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.

Construction and operation of cogeneration facility. The power plant consists of one combustion turbine and an associated duct-burner-fired heat recovery steam generator (HRSG). See Sections 1.0 and 2.0 in PSD Application.

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

Start of Construction *6/1/93* Completion of Construction *1/1/95*

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 cost of control is integral to the overall design of the project. Dry low-NO_x combustion technology and water injection will be used to reduce air pollutant emissions.

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

No previous DER permits.

E. Requested permitted equipment operating time: hrs/day *24*; days/wk *7*; wks/yr *52*;
If power plant, hrs/yr ____; 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? ____
   b. If yes, has "Lowest Achievable Emission Rate" been applied? ____
   c. If yes, list non-attainment pollutants. ____
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. *Yes*[a]
3. Does the State "Prevention of Significant Deterioration" (PSD) requirement apply to this source? If yes, see Sections VI and VII. *Yes*[b]
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? *Yes*[c]
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? ____
   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. *PSD permit application attached. Full responses can be found as follows:*

[a] *Section 4.0*
[b] *Section 3.0*
[c] *Section 4.0*

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		
	Not Applicable			

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

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

2. Product Weight (lbs/hr): ______

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary) ***See Tables 2-1 and 2-2 in PSD Application***

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/hr	T/yr	
Refer to Tables 2-1							***See Figure 2-1***
and 2-2 in PSD Application							***in PSD 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) ***See Section VI of application.***
[3]Calculated from operating rate and applicable standard.
[4]Emission, if source operated with~~out~~ control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4) *See Section 4.0 in PSD Application*

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

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Refer to Tables in			
Appendix A of PSD			
Application			

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

Fuel Analysis: *(Typical)*

Percent Sulfur: *Natural gas--1 grain/100 CF; Oil--0.05%* Percent Ash: *<0.01% WGT*

Density: *7.1* lbs/gal Typical Percent Nitrogen: *0.03% WGT*

Heat Capacity: *Gas--21,515; oil--18,550* BTU/lb *131,700* BTU/gal

Other Fuel Contaminants (which may cause air pollution): *See Appendix A in PSD Application*

F. If applicable, indicate the percent of fuel used for space heating. *Not applicable*

Annual Average *N.A.* Maximum *N.A.*

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

Liquid and solid wastes will be disposed of in an approved manner.

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

Stack Height: *180* ft. Stack Diameter: *18.0* ft.

Gas Flow Rate: *1,017,973* ACFM *749,253* DSCFM Gas Exit Temperature: *205* °F.

Water Vapor Content: *7.3* % Velocity: *66.7* FPS

See Table A-6 in Appendix A of PSD Application. Data for a GE turbine, natural gas at 27°F shown above (maximum emission case).

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type O (Plastics)	Type II (Rubbish)	Type III (Refuse)	Type IV (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 Diameter: ______ 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 devices: [ ] 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)]
   Not Applicable
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.
   See Tables in Appendix A in PSD Application.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   See Tables in Appendix A in PSD Application.
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.)
   See Sections 2.0 and 4.0 and Tables in Appendix A in PSD Application.
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).
   Manufacturers' guarantees form the basis of emission estimates (see Tables in Appendix A in PSD Application).
6. An 8 ½" 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.
   See Figure 2-1 in PSD Application.
7. An 8 ½" 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 (Examples: Copy of relevant portion of USGS topographic map).
   See Figure 1-1 in PSD Application.
8. An 8 ½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
   See Figure 2-2 in PSD Application.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
   Applicable fee is attached.
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. *Not Applicable*

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 *CT - Subpart GG; DB - Subpart Dc*

Contaminant	Rate or Concentration
CT: NO_x - oil firing	*100-107.9 ppmvd corrected to 15% O_2 & heat rate*
- natural gas firing	*101.9-104.9 ppmvd corrected to 15% O_2 & heat rate*
SO_2	*0.8% sulfur fuel*
DB: NO_x - natural gas firing	*No quantitative limits for natural gas firing.*

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

[X] Yes [ ] No

Contaminant	Rate or Concentration
See Section 4.0 in PSD Application	

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

Contaminant	Rate or Concentration
See Sections 2.0 and 4.0 in PSD Application	

D. Describe the existing control and treatment technology (if any). ***N.A.***

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 in PSD Application*

1.

a. Control Devices:

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 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:

F. Describe the control technology selected: *See Section 4.0 in PSD 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 *See Section 5.0 in PSD 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 ***See Section 6.1 in PSD application***

1. ______ Year(s) of data from ______/____/______ to ______/____/______
(month / day / year to month / day / year)

2. Surface data obtained from (location)________________

3. Upper air (mixing height) data obtained from (location) ________________

4. Stability wind rose (STAR) data obtained from (location) ________________

C. Computer Models Used ***See Section 6.1 in PSD Application***

1. ________________ Modified? If yes, attach description.

2. ________________ 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 ***See Section 6.1 in PSD Application***

Pollutant	Emission Rate
TSP	________________ grams/sec
SO^2	________________ grams/sec

E. Emission Data Used in Modeling ***See Section 6.0 in PSD 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 PSD 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 in PSD 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 in PSD Application***

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1.0 INTRODUCTION

Central Florida Power Limited Partnership is proposing to construct and operate a nominal 206-megawatt (MW) cogeneration facility at the U.S. Agri-Chemicals Complex near Fort Meade, Florida. The facility is referred to as the Central Florida Cogeneration Plant. The Central Florida Cogeneration Plant is a combined cycle cogeneration power plant located on County Road 630 approximately 5 miles west of Fort Meade (see Figure 1-1). Destec Engineering, Inc. is under contract to the limited partnership to perform engineering services for the project, including air permitting. KBN Engineering and Applied Sciences, Inc. (KBN) has been contracted by Destec Engineering to provide air permitting services and perform air quality impact assessments for the project.

The plant will consist of one advanced technology heavy-duty industrial gas turbine (GT) electric generating unit, with a duct burner-fired heat recovery steam generator (HRSG) and one steam turbine generator. The GT will have a nominal electrical output of about 147 MW to the transmission system at average ambient conditions. The primary fuel for the GT is natural gas; distillate fuel oil will be used as the backup fuel. The GT uses advanced dry low NO_x combustors to limit nitrogen oxide (NO_x) emissions. Exhaust gas from the GT will be routed to a duct burner-fired HRSG. The natural gas-fired duct burner is expected to have a maximum heat input of about 100 million British thermal units per hour (MMBtu/hr). The steam from the HRSG will power a steam turbine to generate electrical power of no greater than 74 MW. Low-pressure steam will be exported to the U.S. Agri-Chemicals complex for process uses.

Because the proposed plant will be located in an attainment area for all criteria pollutants, the plant's emissions are subject to new source review requirements under the Prevention of Significant Deterioration (PSD) regulations. The PSD review includes control technology review, source impact analysis, air quality analysis (monitoring), and additional impact analyses.

06-12-92

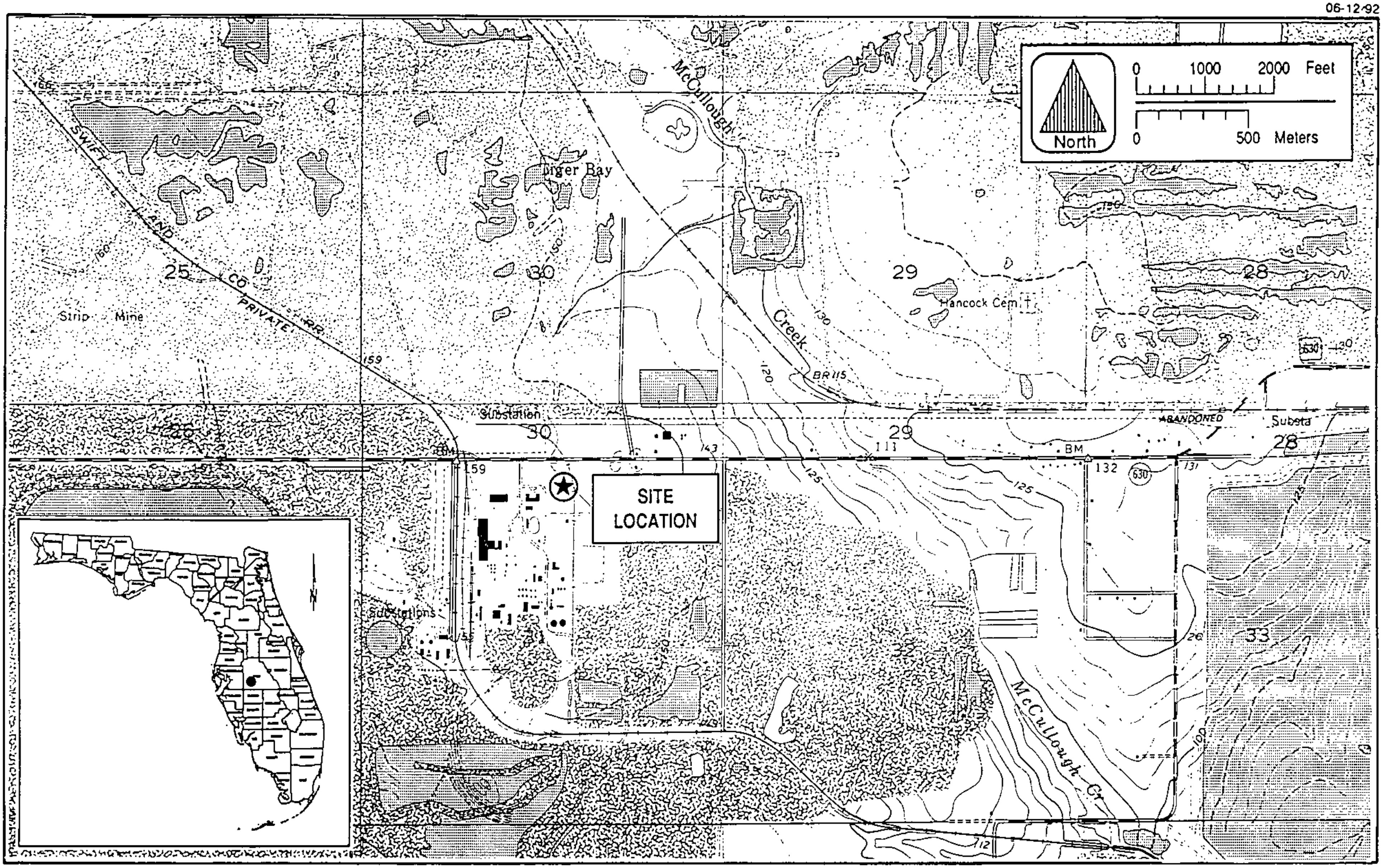


Figure 1-1 CENTRAL FLORIDA LIMITED PROJECT LOCATION MAP

SOURCE: USGS, 1986,1987; KBN, 1992.

KBN

The proposed plant will be a major new source because emissions of at least one regulated pollutant exceeds 250 tons per year (TPY). PSD review is required for these emissions and for any pollutant for which the net increase in emissions exceeds the PSD significant emission rates. The potential emissions from the proposed project will exceed the PSD significant emission rates for nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter (PM), particulate matter with an aerodynamic diameter of 10 micrometers (PM10), volatile organic compounds (VOC), beryllium (Be), and arsenic (As). Therefore, the project is subject to PSD review for these pollutants.

This report is presented in seven sections.

- Section 2.0 -- A general description of the proposed operation.
- Section 3.0 -- The air quality review requirements and applicability of the project to the PSD and nonattainment regulations.
- Section 4.0 -- The control technology review for the project applicable under the U.S. Environmental Protection Agency's (EPA's) current (draft) top-down approach.
- Section 5.0 -- A discussion of the need for air quality monitoring data to satisfy the PSD preconstruction monitoring requirements.
- Section 6.0 -- The air source impact analysis approach.
- Section 7.0 -- The results of the air quality analyses and additional impact analyses associated with the project's impacts on vegetation, soils, and associated growth.

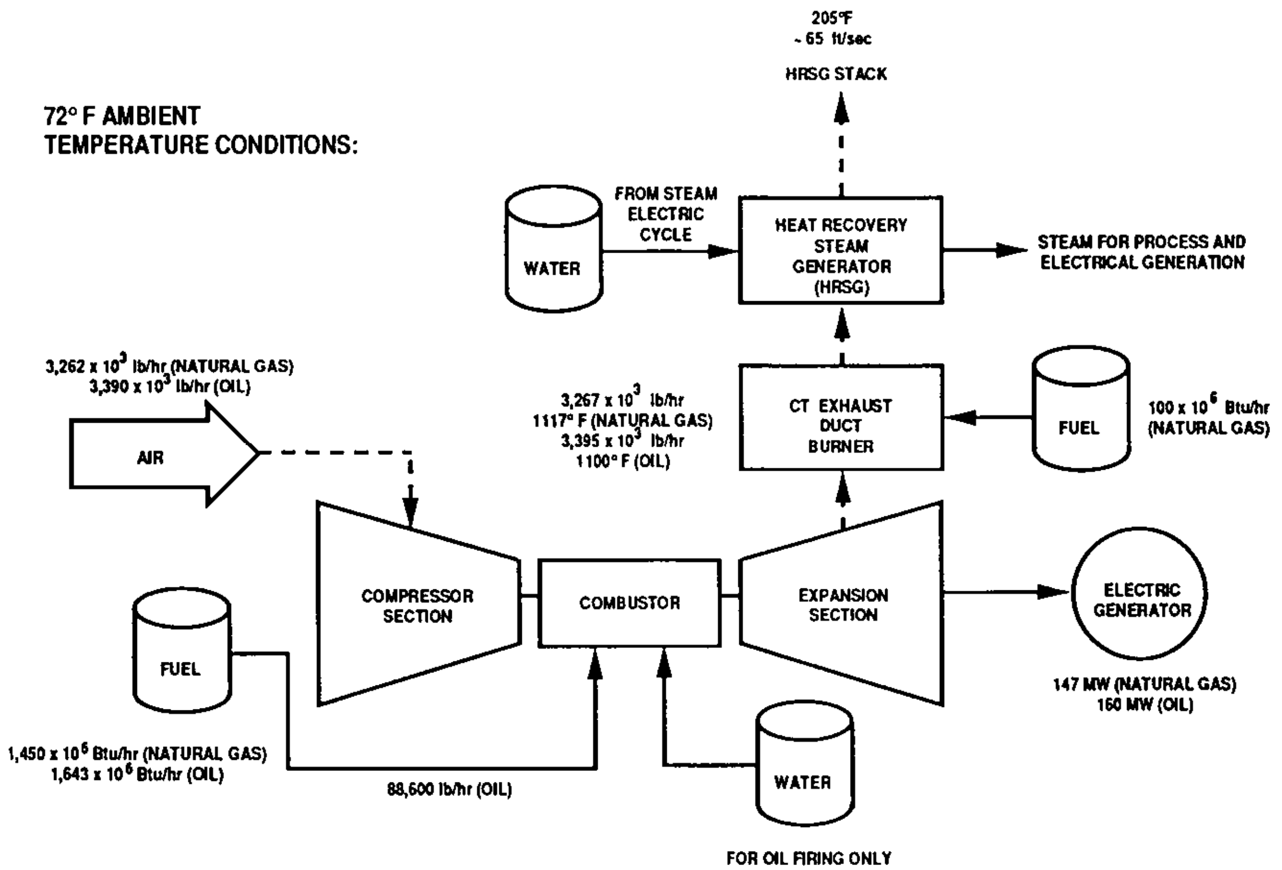
2.0 PROJECT DESCRIPTION

The Central Florida Cogeneration Plant will consist of one GT electrical generating unit, equipped with a duct burner-fired HRSG. The GT will be an advanced technology heavy-duty industrial gas turbine that will use advanced dry low-NO_x combustors to control NO_x emissions. The GT combustion gases will exhaust through the HRSG and into a single stack. There will be no bypass for simple cycle operation. A flow diagram is presented in Figure 2-1. Stack, operating, and emission data for the proposed combustion turbine are presented in Table 2-1. Emission data for the duct burner are presented in Table 2-2. Detailed information on the combustion calculations for the fuels to be fired in the GT and duct burner is presented in Appendix A. A plot plan of the facility is presented in Figure 2-2.

The GT/HRSG unit will be fired primarily with natural gas; distillate fuel oil will be used as the backup fuel for the GT. The annual distillate oil usage is anticipated to be no greater than 300 hours per year. The distillate oil will have an annual average sulfur content of 0.05 percent. The duct burner will be fired with natural gas only and is assumed to operate for 8,760 hours in a year.

The GT will have a nominal electrical output of about 147 MW and a maximum heat input of about 1,607 MMBtu/hr at average ambient conditions. The natural gas-fired duct burner will have a maximum heat input of 100 MMBtu/hr. The steam from the HRSG will power a steam turbine electrical generator with maximum output of about 74 MW. Low-pressure steam (approximately 40,000 lb/hr) will be exported to the U.S. Agri-Chemicals complex for process uses. Electrical power will be sold to the electric utility grid.

At this time, two types of advanced GTs are being considered for this project: General Electric (GE) PG7221 (FA) and Westinghouse 501F. Operating and emission data are available for these turbines for operating



NOTE: SEE APPENDIX A FOR DESIGN INFORMATION AND STACK PARAMETERS FOR EACH FUEL.

Figure 2-1 SIMPLIFIED FLOW DIAGRAM OF PROPOSED CENTRAL FLORIDA COGENERATION POWER PLANT

Table 2-1. Stack, Operating, and Emission Data for the Proposed Combustion Turbine

Parameter	Fuel Type[a]			
	Natural Gas		Fuel Oil	
Stack Data (ft)				
Height	180		180	
Diameter	18		18	
Operating Data (72°F)[b]				
Temperature (°F)	205		205	
Velocity (ft/sec)	61.1		63.8	
Maximum Hourly Emission Data (lb/hr)/Fuel Type (27°F)[c]				
SO_2	4.86	(GE)	99.7	(GE)
PM	9.0	(GE)	40.4	(W)
NO_x	169.0	(W)	326.2	(GE)
CO	48.8	(GE)	163.5	(W)
VOC	8.0	(W)	18.9	(W)
Pb	Neg.		0.0165	(GE)
Sulfuric Acid Mist	0.63	(GE)	1.22	(GE)
F	Neg.		0.0602	(GE)
Be	Neg.		0.00462	(GE)
Hg	Neg.		0.00555	(GE)
As	Neg.		0.00777	(GE)
Annual Potential Emission Data (TPY)/Fuel Type (72°F)[c]				
SO_2	18.5	(GE)	13.3	(GE)
PM	38.1	(GE)	5.9	(W)
NO_x	614.8	(GE)	43.5	(GE)
CO	186.0	(GE)	23.6	(W)
VOC	29.8	(W)	2.7	(W)
Pb	Neg.		0.00219	(GE)
Sulfuric Acid Mist	2.38	(GE)	1.63	(GE)
F	Neg.		0.0080	(GE)
Be	Neg.		0.000616	(GE)
Hg	Neg.		0.000739	(GE)
As	Neg.		0.00104	(GE)

Note: GE = General Electric.
Neg. = negligible emissions for applicable pollutant.
W = Westinghouse.

[a] Refer to Appendix A for detailed information on each fuel. Annual emission data are based on the turbine firing fuel oil and natural gas for 300 and 8,460 hours, respectively. Tables A-1 through A-10 provide information on the GE machine while Tables A-19 through A-28 provide information on the Westinghouse machine.

[b] Does not account for additional exhaust flow from duct burner.

[c] Other regulated pollutants are assumed to have negligible emissions. These pollutants include reduced sulfur compounds, hydrogen sulfide, asbestos, vinyl chloride, and radionuclides.

Table 2-2. Emission Data for the Proposed Duct Natural Gas-Fired Burner

	Emissions[a] (Natural Gas Firing Only)
Maximum Hourly Emissions (lb/hr)[c]:	
SO_2	0.30
PM	1.00
NO_x	10.0
CO	10.0
VOC	2.90
Pb	Neg.
Sulfuric Acid Mist	0.0388
F	Neg.
Be	Neg.
Hg	Neg.
As	Neg.
Maximum Annual Emissions (TPY)[c]:	
SO_2	1.32
PM	4.38
NO_x	43.8
CO	43.8
VOC	12.7
Pb	Neg.
Sulfuric Acid Mist	0.170
F	Neg.
Be	Neg.
Hg	Neg.
As	Neg.

Note: Neg. = negligible emissions for applicable pollutant.

[a] Based on the duct burner operating for 8,760 hours at 100 MM Btu per hour and the following emission factors:
PM = 0.01 lb/MM Btu; SO_2 = 1 grain/100 cf of natural gas;
NO_x = 0.10 lb/MM Btu; CO = 0.10 lb/MM Btu; VOC = 0.029 lb/MM Btu, and H_2SO_4 = 8% of SO_2

Tables A-11A through A-14A present duct burner emissions.

[c] Other regulated pollutants are assumed to have negligible or no emissions.

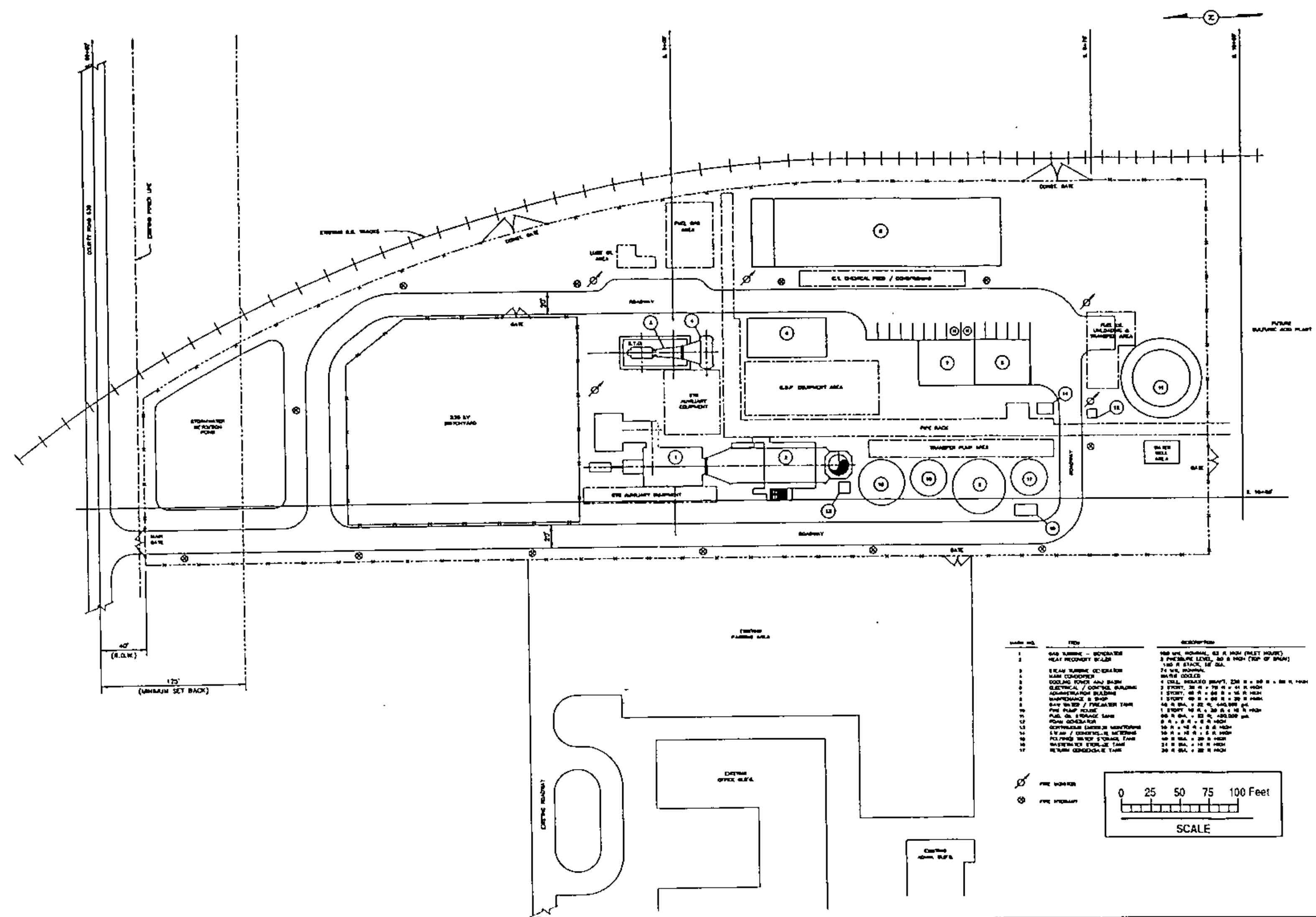


Figure 2-2 PLOT PLAN

loads of 100 and 70 percent and ambient temperatures ranging from 27 to 97 degrees Fahrenheit (°F).

Maximum hourly emissions occur for the lowest ambient temperature of 27°F when the GT is firing fuel oil. The hourly emission data for a given pollutant in Table 2-1 are based on the higher emission rate from either the GE or Westinghouse GT. The annual emissions are based on an ambient temperature of 72°F with GT firing fuel oil and natural gas for 300 and 8,460 hours, respectively. Similar to the maximum hourly emissions, the annual emissions are based on the higher emission rate from either type of GT.

3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the federal and state air regulatory requirements and their applicability to the proposed project. These regulations must be satisfied before the proposed facility (combined cycle gas turbine) can begin operation. The specific applicability of the proposed facility's maximum potential emissions and predicted impacts to air regulatory requirements for PSD, nonattainment, and hazardous pollutant reviews is presented in Section 3.1. General discussions concerning the AAQS, PSD review requirements, and nonattainment rules are presented in Sections 3.2 through 3.4.

3.1 SOURCE APPLICABILITY

3.1.1 AREA CLASSIFICATION

The project site is located in Polk County, which has been designated by EPA and FDER as an attainment area for all criteria pollutants. Polk County and surrounding counties are designated as PSD Class II areas for SO_2, PM(TSP), and NO_x. The site is located approximately 120 km from the closest part of the Chassahowitzka National Wilderness Area, a PSD Class I area.

3.1.2 PSD REVIEW

3.1.2.1 Pollutant Applicability

As presented in Table 3-1, the proposed project is considered to be a major new source because emissions of any regulated pollutant will exceed 250 TPY; therefore, PSD review is required for any pollutant for which the net increase in emissions exceeds the PSD significant emission rates. As shown, potential emissions from the proposed project will exceed the PSD significant emission rates for PM(TSP), PM(PM10), NO_2, CO, VOC, Be, and inorganic As. Therefore, the project is subject to PSD review for these pollutants.

3.1.2.2 Ambient Monitoring

Based on the net increase in emissions from the proposed project, presented in Table 3-1, a PSD preconstruction ambient monitoring analysis is required for PM(TSP), PM(PM10), NO_2, CO, VOC (O_3), Be, and As. However, if the

Table 3-1. Net Increase in Emissions Due To the Central Florida Cogeneration Facility Compared to the PSD Significant Emission Rates

Pollutant	Emissions (TPY) Potential Emissions From Proposed Facility[a]	Significant Emission Rate	PSD Review
Sulfur Dioxide[b]	33.1	40	No
Particulate Matter (TSP)	45.0 (GE)	25	Yes
Particulate Matter (PM10)	45.0 (GE)	15	Yes
Nitrogen Dioxide	702.1 (GE)	40	Yes
Carbon Monoxide	243.1 (GE)	100	Yes
Volatile Organic Compounds	45.3 (W)	40	Yes
Lead	0.00219 (GE)	0.6	No
Sulfuric Acid Mist	4.2 (GE)	7	No
Total Fluorides	0.00802 (GE)	3	No
Total Reduced Sulfur	NEG	10	No
Reduced Sulfur Compounds	NEG	10	No
Hydrogen Sulfide	NEG	10	No
Asbestos	NEG	0.007	No
Beryllium	0.000616 (GE)	0.0004	Yes
Mercury	0.000739 (GE)	0.1	No
Vinyl Chloride	NEG	1	No
Benzene	NEG	0	No
Radionuclides	NEG	0	No
Inorganic Arsenic	0.00104 (GE)	0	Yes

Note: GE = General Electric.
NEG = Negligible.
W = Westinghouse.

All calculations based on 72°F base load condition.

[a] Maximum annual emissions based on the gas turbine firing distillate oil and natural gas for 300 and 8,460 hours, respectively, and duct burner firing natural gas for 8,760 hours. Tables A-15 through A-18 present emissions for the GE machine while Tables A-33 through A-36 present emissions for the Westinghouse machine.

[b] Based on a maximum sulfur content specification of 0.05 percent in fuel oil.

predicted impact of a pollutant is less than the de minimis monitoring concentration, then an exemption from the preconstruction ambient monitoring requirement is provided for in the FDER regulations [FDER Rule 17-2.500(3)(e)]. In addition, if an acceptable ambient monitoring method for the pollutant has not been established by EPA, monitoring is not required.

Maximum predicted modeling impacts as a result of the net increase associated with the proposed project are presented in Table 3-2 for pollutants requiring PSD review. The methodology used to predict maximum impacts and the impact analysis results are presented in Sections 6.0 and 7.0. As shown in Table 3-2, the maximum net increase in impact is below the respective de minimis monitoring concentration for all pollutants.

3.1.2.3 GEP Stack Height Impact Analysis

The GEP stack height regulations allow any stack to be at least 65 m high. The stack for the proposed turbine will be 180 feet (ft) (54.9 m). This stack height does not exceed the GEP stack height. The potential for downwash of the unit's emissions caused by nearby structures is discussed in Section 6.0, Air Quality Modeling Approach.

3.1.3 NONATTAINMENT REVIEW

The project site is located in Polk County, which is classified as an attainment area for all criteria pollutants. The plant is located approximately 20 km from Hillsborough County, a nonattainment area for ozone (O_3), and more than 50 km from any other nonattainment area. Therefore, nonattainment requirements are not applicable.

3.1.4 HAZARDOUS POLLUTANT REVIEW

The FDER has promulgated guidelines (FDER, 1991) to determine whether any emission of a hazardous or toxic pollutant can pose a possible health risk to the public. Each regulated pollutant for which an ambient standard does not exist and each nonregulated hazardous pollutant is to be compared to the applicable no-threat level (NTL). If the maximum predicted concentration for any hazardous pollutant is less than the corresponding NTL for each applicable averaging time, that emission is considered

Table 3-2. Predicted Net Increase in Impacts Due To the Proposed Central Florida Cogeneration Facility Compared to PSD De Minimis Monitoring Concentrations

Pollutant	Concentration ($\mu g/m^3$) Predicted Net Increase in Impacts	De Minimis Monitoring Concentration
Particulate Matter (TSP)	2.12	10, 24-hour
Particulate Matter (PM10)	2.12	10, 24-hour
Nitrogen Dioxide	0.29	14, annual
Carbon Monoxide	20.8	575, 8-hour
Volatile Organic Compounds	45.3 TPY	100 TPY
Beryllium	0.00021	0.001, 24-hour
Inorganic Arsenic	NA	NM

Note: NA = Not applicable.
NM = No acceptable ambient measurement method has been developed and, therefore, de minimis levels have not been established by EPA.
TPY = tons per year.

not to pose a significant health risk. The NTLs for pollutants applicable to the proposed project are presented in Table 3-3. Emissions for these pollutants are presented in Appendix A. As discussed in Section 7.0, the proposed project's impacts are predicted to be less than the applicable NTL and, therefore, are not expected to pose a health risk to the public.

3.2 NATIONAL AND STATE AAQS

The existing applicable national and Florida AAQS are presented in Table 3-4. Primary national AAQS were promulgated to protect the public health, and secondary national AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

3.3 PSD REQUIREMENTS

3.3.1 GENERAL REQUIREMENTS

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a preconstruction permit issued. Florida's State Implementation Plan (SIP), which contains PSD regulations, has been approved by EPA, and therefore PSD approval authority has been granted to the Florida Department of Environmental Regulation (FDER).

A "major facility" is defined as any one of 28 named source categories that has the potential to emit 100 TPY or more, or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Under PSD regulations, 40 CFR 52.21, this proposed project is a "new source". PSD significant emission rates applicable to the project are shown in Table 3-5.

Table 3-3. Summary of Florida No-Threat Levels for Toxic Air Pollutants Applicable to the Proposed Facility Analysis

Pollutant	No-Threat Level (μg/m³)		
	8-Hour	24-Hour	Annual
Antimony	5	1.2	0.3
Arsenic	2	0.48	0.00023
Barium	5	1.2	50
Beryllium	0.02	0.0048	0.00042
Cadmium	0.5	0.12	0.00056
Chlorine	15	3.6	NE
Chromium	5	1.2	1,000
Cobalt	0.5	0.12	NE
Copper	1	0.24	NE
Fluoride	2	0.48	50
Formaldehyde	4.5	1.08	0.077
Lead	1.5	0.36	0.09
Manganese	50	12	NE
Mercury	0.5	0.12	0.3
Nickel	0.5	0.12	0.0042
Polycyclic Organic Matter	NE	NE	NE
Selenium	2	0.48	NE
Sulfuric Acid Mist	10	2.38	NE
Vanadium	0.5	0.12	20
Zinc[a]	50	12	NE

Note: NE = none established.

[a] As zinc oxide.

Table 3-4. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels ($\mu g/m^3$)

Pollutant	Averaging Time	AAQS[a] National Primary Standard	AAQS[a] National Secondary Standard	AAQS[a] State of Florida	PSD Increments[a] Class I	PSD Increments[a] Class II	Significant Impact Levels[b]
Particulate Matter (TSP)	Annual Geometric Mean	NA	NA	NA	5	19	1
	24-Hour Maximum	NA	NA	NA	10	37	5
Particulate Matter (PM10)	Annual Arithmetic Mean	50	50	50	4[c]	17[c]	1
	24-Hour Maximum	150	150	150	8[c]	30[c]	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum	365	NA	260	5	91	5
	3-Hour Maximum	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone	1-Hour Maximum[d]	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

[a]Short-term maximum concentrations are not to be exceeded more than once per year.
[b]Maximum concentrations are not to be exceeded.
[c]Proposed October 5, 1989.
[d]Achieved when the expected number of days per year with concentrations above the standard is fewer than 1.

Note: Particulate matter (TSP) = total suspended particulate matter.
Particulate matter (PM10) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.

NA = Not applicable, i.e., no standard exists.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.
40 CFR 50.
40 CFR 52.21.
Chapter 17-2.400, F.A.C.

Table 3-5. PSD Significant Emission Rates and De Minimis Monitoring Concentrations Applicable to the Project

Pollutant	Regulated Under	Significant Emission Rate (TPY)	De Minimis Monitoring Concentration[a] ($\mu g/m^3$)
Particulate Matter (TSP)	NAAQS, NSPS	25	10, 24-hour
Particulate Matter (PM10)	NAAQS	15	10, 24-hour
Nitrogen Oxides	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY[b]
Beryllium	NESHAP	0.0004	0.001, 24-hour
Inorganic Arsenic	NESHAP	[c]	NM

[a] Short-term concentrations are not be exceeded.
[b] No de minimis concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.
[c] Any emission rate of these pollutants.

Note: Ambient monitoring requirements for any pollutant may be exempted if the impact of the increase in emissions is below de minimis monitoring concentrations.

NAAQS = National Ambient Air Quality Standards.
NM = No ambient measurement method.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.
TPY = tons per year.
$\mu g/m^3$ = micrograms per cubic meter.

Sources: 40 CFR 52.21.
Chapter 17-2, F.A.C.

PSD review is used to determine whether significant air quality deterioration will result from the new facility. Federal PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. The State of Florida has adopted PSD regulations that are essentially identical to federal regulations [Chapter 17-2.510, Florida Administrative Code (F.A.C.)]. Major facilities are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis,
4. Source information, and
5. Additional impact analyses.

In addition to these analyses, a new facility also must be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements are presented in the following sections.

3.3.2 INCREMENTS/CLASSIFICATIONS

The proposed project is located in Polk County which is a PSD Class II area for SO_2, PM(TSP), and NO_x. All surrounding counties are also designated as PSD Class II areas. The project site is located approximately 120 km from the nearest PSD Class I area, the Chassahowitzka National Wilderness Area.

3.3.3 CONTROL TECHNOLOGY REVIEW

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that Best Available Control Technology (BACT) be applied to control emissions from the source [Chapter 17-2.500(5)(c), F.A.C]. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the new facility exceeds the significant emission rate (see Table 3-1). The proposed project will be equipped with the most advanced dry low NO_x combustor design currently offered by GE or Westinghouse.

3.3.4 AIR QUALITY MONITORING REQUIREMENTS

In accordance with requirements of 40 CFR 52.21(m) and Chapter 17-2.500(f), F.A.C, any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility. For a new major facility, the affected pollutants are those that the facility potentially would emit in significant amounts (see Table 3-1).

Ambient air monitoring for a period of up to 1 year generally is appropriate to satisfy the PSD monitoring requirements. A minimum of 4 months of data is required. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA, 1987a).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that FDER may exempt a proposed major stationary facility from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility would cause, in any area, air quality impacts less than the de minimis levels presented in Table 3-5 [Chapter 17-2.500(3)(e), F.A.C.]. The proposed project's impacts will be less than the de minimis levels.

3.3.5 SOURCE IMPACT ANALYSIS

A source impact analysis must be performed for a proposed major source subject to PSD review for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-1). The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated EPA models normally must be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the EPA publication Guideline on Air Quality Models (Revised). The source impact analysis for criteria pollutants to address compliance with AAQS and PSD Class II increments may be limited to the new source if the net increase in impacts as a result of the new source is below significance levels, as presented in Table 3-4.

Various lengths of record for meteorological data can be used for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" (HSH) refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor normally must be used for comparison to air quality standards.

3.3.6 ADDITIONAL IMPACT ANALYSES

In addition to air quality impact analyses, federal and State of Florida PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21; Chapter 17-2.500(5)(e), F.A.C.]. These analyses are to be conducted primarily for PSD Class I areas. Impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 3-5).

3.3.7 GOOD ENGINEERING PRACTICE STACK HEIGHT

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (EPA, 1985a). Identical regulations have been adopted by FDER [Chapter 17-2.270, F.A.C.]. GEP stack height is defined as the highest of:

1. 65 meters (m), or
2. A height established by applying the formula:

$$Hg = H + 1.5L$$

where: Hg = GEP stack height,

H = Height of the structure or nearby structure, and

L = Lesser dimension (height or projected width) of nearby structure(s), or

3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 kilometer (km). Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

3.4 NONATTAINMENT RULES

Based on the current nonattainment provisions (Chapter 17-2.510, F.A.C.), all major new facilities located in a nonattainment area must undergo nonattainment review. The nonattainment provisions do not apply since the proposed project is located in an attainment area for all pollutants.

4.0 CONTROL TECHNOLOGY REVIEW

4.1 APPLICABILITY

The PSD regulations require new major stationary sources to under go a control technology review for each pollutant that may potentially emit above significant amounts. The control technology review requirements of the PSD regulations are applicable to emissions of PM/PM10, NO_x, CO, VOC, Be, and inorganic As (see Section 3.0). The emissions of these pollutants are:

Pollutant	Emissions (TPY)
NO_x	702.1
CO	243.1
VOC	45.3
PM/PM10	35.2
Beryllium	0.00062
Inorganic Arsenic	0.00104

This section presents the applicable NSPS and the proposed BACT for these pollutants. The approach to the BACT analysis is based on the regulatory definitions of BACT, as well as EPA's current policy guidelines requiring the top-down approach. A BACT determination requires an analysis of the economic, environmental, and energy impacts of the proposed and alternative control technologies [see 40 CFR 52.21(b)(12), Chapter 17-2.100(25), F.A.C., and Chapter 17-2.500(5)(c), F.A.C.]. The analysis must, by definition, be specific to the project (i.e., case-by-case).

4.2 NEW SOURCE PERFORMANCE STANDARDS

The applicable NSPS for gas turbines are codified in 40 CFR 60, Subpart GG and summarized in Appendix B. The applicable NSPS emission limit for NO_x is 75 ppmvd corrected for heat rate and 15 percent oxygen. For the GTs being considered for the project, the NSPS emission limit with the NSPS heat rate correction would range from 100 to 107.9 ppm on oil and from 101.9 to 104.9 ppm on gas (corrected to 15 percent oxygen at a fuel-bound nitrogen content of 0.015 percent). The applicable NSPS for the duct burner will be 40 CFR 60, Subpart Dc since the maximum heat input is $100x10^6$ Btu/hr. For natural gas firing, there are no quantifiable emission limitations for duct burners. More information on the NSPS is presented in Appendix B. The proposed emission limits for the project will be much lower than the NSPS.

4.3 BEST AVAILABLE CONTROL TECHNOLOGY

In recent permitting actions, FDER has established BACT for heavy-duty industrial gas turbines. These decisions have included the use of advanced dry low-NO_x combustors for limiting NO_x and CO emissions and clean fuels (natural gas and distillate oil). The proposed project will have two modes of operation for which a BACT analysis has been performed. The results of the analysis have concluded the following controls as BACT for the project.

1. GT--Natural Gas Fired. CFPLP is proposing to utilize state-of-the-art dry low-NO_x combustion technology which will achieve gas turbine exhaust NO_x levels of no greater than 25 parts per million or less on a dry basis (ppmvd) corrected to 15 percent O_2 and ISO conditions. CO emissions will be limited to 15 ppmvd.
2. GT--Fuel Oil Fired. CFPLP is proposing to utilize water injection to achieve gas turbine exhaust NO_x levels of no greater than 42 ppmvd corrected to 15 percent O_2 and ISO conditions. CO emissions will be limited to 50 ppmvd.

   It is possible that the advanced combustors may be able to achieve significantly lower NO_x levels. However, at this time, the ultimate levels achievable are not known due to the ongoing status of the technology development.
3. Duct Burner--Natural Gas Fired (Only). The propose NO_x/CO control technology for the duct burner is modern burner design, such that NO_x emission rates will not exceed 0.1 $lb/10^6$Btu (HHV) heat input and CO emission rates will not exceed 0.1 $lb/10^6$Btu. These proposed limits for natural gas firing are consistent with FDER's past and current BACT decisions for duct burners.

4.3.1 NITROGEN OXIDES

The BACT analysis was performed for the following alternatives:

1. Advanced dry low-NO_x combustors at an emission rate of 25 ppmvd corrected to 15 percent O_2 when firing gas and 42 ppmvd (corrected) when firing oil.
2. SCR and advanced dry low-NO_x combustors at an emission rate of approximately 9 ppmvd corrected to 15 percent O_2 when firing natural gas and 15 ppmvd when firing oil.

Appendix B presents a discussion of NO_x control technologies and their feasibility for the project.

As discussed in Section 2.1, the GT will be fired primarily with natural gas. Distillate oil will be used as backup fuel not to exceed 300 hours per year. The NO_x removed using SCR would be 28 TPY when firing oil and 428 TPY when firing natural gas; the later includes emissions from the duct burner.

4.3.1.1 Proposed BACT and Rationale

The proposed BACT for the project is advanced dry low-NO_x combustion technology. The proposed NO_x emissions level using this technology is 25 ppmvd (corrected to 15 percent oxygen and ISO conditions) when firing natural gas. This control technology is proposed for the following reasons:

1. SCR was rejected based on technical, economic, environmental, and energy grounds. The estimated incremental cost of SCR is about $7,400 per ton of NO_x removed. These costs are in the range for other projects that have rejected SCR as unreasonable. This is even more apparent if additional pollutant emissions due to SCR are considered. The cost effectiveness is over $10,000 per ton of pollutant removed when the net emissions of all pollutants (exclusive of CO_2) are considered.
2. Additional environmental impacts would result from SCR operation, including emissions of ammonia; from secondary generations (to

replace the lost generation); and from the generation of hazardous waste (i.e., spent catalyst replacement).

3. The energy impacts of SCR will reduce potential electrical power generation by more than 7 million kWh per year.
4. The proposed BACT (i.e, dry low-NO_x combustion) provides the most cost effective control alternative, is pollution preventing and results in low environmental impacts (less than the significant impact levels). Dry low-NO_x combustion at the proposed emissions levels has been adopted previously in BACT determinations. Indeed, compared to conventional GTs, the proposed BACT will result in 10 percent less NO_x emission from the same amount of generation. In addition, GT manufacturers have been willing to guarantee this level of NO_x emissions.
5. The proposed emission limit for duct firing (i.e., 0.1 lb/10^6 Btu) is BACT given the emission limits established on other projects.

The analyses of economic, environmental, and energy impacts follow.

4.3.1.2 <u>Impacts Analysis</u>

<u>Economic</u>--The total capital costs for SCR are $7,996,800. The total annualized cost of applying SCR with dry low-NO_x combustion is $3,364,400. Appendix B contains the detailed cost estimates for the capital and annualized costs. The incremental cost effectiveness of adding SCR to the dry low-NO_x combustors and water injection (for oil firing) is estimated to be $7,370/ton of NO_x removed.

<u>Environmental</u>--The maximum predicted impacts of the dry low-NO_x technology are all considerably below the PSD increment for NO_x of 25 $\mu g/m^3$, annual average, and the AAQS for NO_x, 100 $\mu g/m^3$. Indeed, the maximum annual impact is 0.29 $\mu g/m^3$, which is 70 percent less than the significant impact level. While additional controls beyond dry low-NO_x combustors (i.e., SCR and SCR with water injection) would reduce predicted impacts, the effect will not be significant and much less than 1 percent of the PSD increment and the AAQS for the project.

The use of dry low-NO_x combustor technology is truly "pollution prevention". In contrast, use of SCR on the proposed project will cause emissions of ammonia and ammonium salts, such as ammonium sulfate and bisulfate. Ammonia emissions associated with SCR are expected to be up to 10 ppm based on reported experience; previous permit conditions have specified this level. Thus, the total, by volume, pollutant emissions using SCR would be about 80 percent of the proposed BACT level of 25 ppmvd. Indeed, ammonia emissions could be as high as 96 TPY. Potential emissions of ammonium sulfate and bisulfate will increase emissions of PM10; up to 71.1 TPY could be emitted.

The electrical energy required to run the SCR system and the back pressure from the turbine will reduce the available power from the project. This power, which would otherwise be available to the electrical system, will have to be replaced by other less efficient units. The replacement power will cause air pollutant emissions that would not have occurred without SCR. These "secondary" emissions, coupled with potential emissions of ammonia and ammonium salts, are presented in Table 4-1. This table shows the emissions balance for the project with and without SCR. As shown, the net reduction in emissions with SCR will be 233 TPY. In addition, emissions of carbon dioxide were included in Table 4-1 since this gas is under study as required in the 1990 Clean Air Act Amendments. As noted from this table, the emissions including CO_2 would be greater with SCR than that proposed using dry low-NO_x combustion technology.

The replacement of the SCR catalyst will create additional economic and environmental impacts since certain catalysts contain materials that are listed as hazardous chemical wastes under Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261).

The use of ammonia is necessary for the reduction of NO_x emissions by means of a catalytic reaction. This process will require the construction and maintenance of storage vessels of anhydrous or aqueous ammonia for use in

Table 4-1. **Maximum Potential Emission Differentials TPY With and Without Selective Catalytic Reduction**

Pollutants	Project With SCR Primary	Project With SCR Secondary[a]	Project With SCR Total	Project Without SCR CT/DB	Difference[b]
Particulate	71 [c]	3.57	75	0	75
Sulfur Dioxide	0	39.27	39	0	39
Nitrogen Oxides	246 [d]	19.63	265	702	(437)
Carbon Monoxide	0	1.18	1	0	1
Volatile Organic Compounds	0	0.18	0	0	0
Ammonia	96 [e]	0.00	96	0	96
Total	413	63.83	476	702	(226)
Carbon Dioxide[f]	--	6,130	6,130	--	6,130

Note: Btu/kWh = British thermal units per kilowatt-hour.
CT = combustion turbine.
DB = duct burner.
MW = megawatt.
% = percent.
SCR = selective catalytic reduction.
TPY = tons per year.

[a] Lost energy of 0.50 MW from heat rate penalty and electrical for 8,760 hours per year operation (0.5% of 147 MW plus 0.080 MW). Assumes Florida Power Corp. baseloaded oil-fired unit would replace lost energy. EPA emission factors used for 1% sulfur fuel oil and an assumed heat rate of 10,000 Btu/kWh. Emission factors use were ($lb/10^6$ Btu): PM = 0.1; SO_2 = 1.1; NO_x = 0.55, CO = 0.033 and VOC = 0.005. Example calculation for PM - 0.815 MW x 10,000 Btu/kwh x 1,000 kw/MW x 8,760 hr/yr x 0.1 lb pm/10^6 Btu ÷ 2,000 lb/ton = 3.57 TPY.

[b] Difference = Total with SCR minus project without SCR.

[c] Assume sulfur reacts with ammonia; 34.4 TPY SO_2 x 132 (MW of ammonia salt) ÷ 64 (MW of H_2SO_4).

[d] 9 ppm NO_x emissions on gas and 15 ppm NO_x emissions on oil; assumes 4% capacity factor on oil, the maximum proposed.

[e] 10 ppm ammonia slip (ideal gas law): 3,600,000 lb/hr x 10 ppm NH_3 x 17 ÷ 28 ÷ 10^6 x 4.38.

[f] Reflects differential emissions due to lost energy efficiency with SCR (i.e., 0.815 MW CO_2 calculated based on 85.7% carbon in fuel oil and 18,300 Btu/lb).

the reaction. Ammonia has a number of potential health effects, and the construction of ammonia storage facilities triggers the application of at least three major standards: Clean Air Act (section 112), OSHA 29 CFR 1910.1000, and OSHA 29 CFR 1910.119.

Ammonia is a colorless gas with a sharp, pungent odor which can be identified at about 5 ppm. It is lighter than air and very soluble in water. Other chemical and physical properties include:

Molecular weight - 17.03
Density (gas) - 0.5967, (liquid) 0.67
Boiling point - (-33.35°C)
Freezing point - (-77.7°C)
Vapor pressure(liquid) - 8.5 atmospheres at 20°C
Solubility - very soluble in water, alcohol, and ether
Flammable limits in air - LEL 15 percent, UEL 28 percent

Elevated temperatures may contribute to instability and cause containers to burst. Ammonia is incompatible with strong oxidizers, calcium, hypochlorite bleaches, gold, mercury, halogens, and silver. Liquid ammonia will corrode some forms of plastic, rubber, and coatings.

The toxicology of ammonia is well understood from a variety of animal and human studies. Ammonia is a severe irritant of the eyes, especially the cornea, the respiratory tract, and the skin. It is detectable at about 5 ppm and causes respiratory irritation in humans above 25 ppm. The irritating effects of ammonia are less noticeable with chronic exposure. There is at least one reference in the literature that indicates exposure to ammonia and amines increases the incidence of cancer.

The eyes are generally the organ of most concern in an acute exposure. As a strong alkali, ammonia can cause severe burns of the cornea and the effects are often delayed. Even burns that at the time of injury appear to be mild can go on to opacification, vascularization, and ulceration or perforation. Of all the alkali compounds that cause eye damage, ammonia penetrates the cornea the most rapidly, resulting in potentially severe damage to the cornea.

Because ammonia is very soluble in water, it is irritating to the upper respiratory tract. Inhalation of the gas will cause throat and nose irritation and dyspnea as aqueous ammonia is formed. Liquid anhydrous ammonia will cause first and second degree burns on contact with the skin. Standards applicable to ammonia are listed below:

OSHA--35 ppm as a 15-minute short-term exposure limit (STEL), 29 CFR 1910.1000.

ACGIH/NIOSH--25 ppm as an 8-hour TWA, 35 ppm as a 15-minute STEL.

NIOSH has also established an immediately dangerous to life or health (IDLH) recommendation of 500 ppm. The U.S. Navy has established a limit of 25 ppm for continuous exposure to personnel in submarines.

Employee exposure to ammonia should be measured on a regular basis to assure compliance with the applicable standards and verify that the protective equipment chosen is effective. Monitoring should follow the procedures outlined in the NIOSH Manual of Analytical Methods, Number 6701. Air-purifying respirators may be used if concentrations do not exceed 250 ppm. If concentrations exceed 250 ppm, a supplied air system must be used to provide maximum protection. The use of any respirator requires the implementation of a respiratory protection program in compliance with 29 CFR 1910.134.

Protective clothing should be provided to employees if there is any chance of skin or eye contact with solutions of more than 10 percent ammonia. Protective clothing includes goggles or face shields for face and eye protection and impervious clothing. Facilities should be provided for quick drenching of the skin and eyes of employees exposed to ammonia.

The utilization of ammonia will require the installation of one or more pressure vessels (anhydrous ammonia) or atmospheric tanks (aqueous ammonia). OSHA, in 29 CFR 1910.119, requires a stringent process safety review if 10,000 pounds of anhydrous ammonia or 15,000 pounds of aqueous ammonia (> 44 percent ammonia by weight) is stored in one location at the site. Compliance with the standard requires the preparation of a process safety analysis that is updated every 5 years. Other major requirements include: written operating procedures, employee training, pre-startup review, mechanical integrity checks, hot work permit system, incident investigation (releases), emergency action plan, and a compliance audit every 3 years.

Section 112 of the 1990 Clean Air Act Amendments proposes to regulate a number of highly toxic substances. Anhydrous and aqueous ammonia are both listed as compounds that may cause a threat to the public if released to the atmosphere. Regulated facilities must prepare a risk management plan which shall include a hazard assessment to predict the effect of any release. Other requirements include the development of worst-case release scenarios, training, monitoring, and actions to be taken in the event of a spill.

Energy--Significant energy penalties occur with SCR. With SCR, the output of the GT may be reduced by about 0.50 percent over that of advanced low-NO_x combustors. This penalty is the result of the SCR pressure drop, which would be about 4 inches of water and would amount to about 6,438,600 kilowatt hours (kWh) in potential lost generation per year. The energy required by the SCR equipment would be about 700,800 kilowatt hours per year (kWh/yr). Taken together, the lost generation and energy requirements of SCR could supply the electrical needs of about 600 residential customers. To replace this lost energy, an additional 7×10^{10} British thermal units per year (Btu/yr) or about 70 million cubic feet per year (ft^3/yr) of natural gas would be required.

Technology Comparison--CFPLP will use an advanced heavy-duty industrial gas turbine with advanced dry low-NO_x combustors. This type of machine advances the state-of-the-art for GTs by being more efficient and less polluting than previous GTs. Integral to the machine's design is dry low-NO_x combustors that prevent the formation of air pollutants within the combustion process, thereby eliminating the need for add-on controls that can have detrimental effects to the environment. An analogy of this technology is a more efficient automotive engine that gives better mileage and reduces pollutant formation without the need of a catalytic converter.

An advanced machine is unique from an engineering perspective in two ways. First, advanced machine is larger and has higher firing (i.e., combustion) temperatures than conventional turbines. This results in a larger, more thermally efficient machine. For example, the electrical generating capability of the GE advanced machine is about 147 megawatts (MW), compared to conventional machines, which range from about 70 MW to 120 MW. The higher firing temperature [i.e., 2,350 degrees Fahrenheit (°F)] results in about 10 percent more electrical energy produced for the same amount of fossil fuel used in conventional machines, which have firing temperatures of about 2,000°F. This has the added advantage of producing lower air pollutant emissions (e.g., NO_x, PM, and CO) for each MW generated. While the increased firing temperature increases the thermal NO_x generated, this NO_x increase is controlled through combustor design.

The second unique attribute of the advanced machine is the use of dry low-NO_x combustors that will reduce NO_x emissions to 25 ppmvd corrected to 15 percent oxygen when firing natural gas. Thermal NO_x formation is inhibited by using staged combustion techniques where the natural gas and combustion air are premixed prior to ignition. This level of control has never before been achieved in an advanced GT and will result in emissions of less than 0.1 $lb/10^6$ Btu, which is more than two times lower than emissions from conventional steam generators.

Since the purpose of the project is to produce electrical energy, and combustion turbine technology is rapidly advancing, it is appropriate to compare the proposed emissions on an equivalent generation basis to that of a conventional GT. The heat rate of the advanced GT will be about 9,900 Btu/kWh or better. In contrast, the heat rate for the conventional GT is about 11,000 Btu/kWh. The NO_x emission rate of the advanced GT, relative to the heat rate and NO_x emission rate of a conventional GT at 25 ppmvd corrected, is as follows:

Advanced GT - 22.5 ppmvd corrected to 15 percent O_2
Conventional GT - 25 ppmvd corrected to 15 percent O_2

Therefore, the NO_x emissions for an advanced GT will be 10 percent less than a conventional GT for the same amount of generation.

Also, the amount of NO_x control achieved by the dry low-NO_x combustor on an advanced GT is considerably higher than that achieved by a conventional machine as Table 4-2 illustrates. Since the advanced machine has higher firing temperatures, the NO_x emissions without the use of dry low-NO_x combustion technology are much higher. This results is an overall greater NO_x reduction on these machines.

4.3.2 CARBON MONOXIDE

Emissions of carbon monoxide (CO) are dependent upon the combustion design, which is a result of the manufacturer's operating specifications, including the air-to-fuel ratio, staging of combustion, and the amount of water injected (i.e., for oil firing). The GTs proposed for the project have designs to optimize combustion efficiency and minimize CO as well as NO_x emissions.

For the project, the following alternatives were evaluated as BACT:

1. Combustion controls at 15 ppmvd; maximum annual CO emissions are 243 TPY (see Section 2.0), and
2. Oxidation catalyst at 10 ppmvd; maximum annual CO emissions are 172 TPY assuming 96.6 percent operation on gas and 3.4 percent operation on oil.

Table 4-2. NO_x Emissions Comparison of Conventional and Advanced Combustion Turbines

	Fuel	Units	NO_x Emissions Conventional	NO_x Emissions Advanced
Emissions Without Dry Low-NO_x Technology	Gas	ppmvd	150	179
	Oil	ppmvd	245	276
Emissions With Dry Low-NO_x Technology	Gas	ppmvd	25	25
	Oil	ppmvd	42	42
Reduction with Dry Low-NO_x Technology	Gas	ppmvd	125	154
		%	83	86
	Oil	ppmvd	203	234
		%	83	85

Installations with an oxidation catalyst and combustion controls generally have controlled CO levels of 10 ppm as LAER and BACT.

4.3.2.1 Proposed BACT and Rationale

Combustion design is proposed as BACT as a result of the technical and economic consequences of using catalytic oxidation on GTs. The proposed BACT emission rates for CO would not exceed 15 ppmvd when firing natural gas and 50 ppmvd when firing distillate oil. Catalytic oxidation is considered unreasonable for the following reasons:

1. Catalytic oxidation will not produce measurable reduction in the air quality impacts; and
2. The economic impacts are significant (i.e., an annualized cost of about one million dollars, with a cost effectiveness of over $10,000/ton of CO removed).

Combustion design is proposed as BACT as a result of the technical and economic consequences of using catalytic oxidation on GTs. Catalytic oxidation is considered unreasonable since it will not lower CO emissions substantially and will not produce a measurable reduction in the air quality impacts. Indeed, recent BACT decisions for similar advanced combustion turbines have set limits in the 30 ppmvd range and higher. Even the Northeast State for Coordinated Air Use Management (NESCAUM) has recognized a BACT level of 50 ppmvd for CO emissions. The cost of an oxidation catalyst would be significant and not cost-effective given the maximum proposed emission limit of 15 ppmvd for the GT when firing gas and 50 ppmvd when firing distillate oil.

For the duct burner, the proposed BACT limit of 0.1 $lb/10^6$ Btu is lower than that adopted by FDER as BACT for similar projects (i.e., Lake and Pasco Cogeneration projects).

4.3.2.2 Impact Analysis

Economic--The estimated annualized cost of a CO oxidation catalyst is $1,045,936, resulting in a cost effectiveness of over $10,000/ton of CO removed. The cost effectiveness is based on 96.6 percent operation on gas and 3.4 percent operation on oil, with the maximum emissions controlled to 10 ppmvd. No costs are associated with combustion techniques since they are inherent in the design.

Environmental--The air quality impacts of both oxidation catalyst control and combustion design control techniques are below the significant impact levels for CO. Therefore, no significant environmental benefit would be realized by the installation of a CO catalyst. Indeed, secondary emissions as a result of an oxidation catalyst will be about 29 TPY.

Energy--An energy penalty would result from the pressure drop across the catalyst bed. A pressure drop of about 2 inches water gauge would be expected. At a catalyst back pressure of about 2 inches, an energy penalty of about 2,575,400 kWh/yr would result at 100 percent load. This energy penalty is sufficient to supply the electrical needs of about 200 residential customers for a year. To replace this lost energy, about 2.6×10^{10} Btu/yr or about 26 million ft^3/yr of natural gas would be required.

4.3.3 VOLATILE ORGANIC COMPOUNDS

VOCs will be emitted by the GT and are a result of incomplete combustion. The proposed BACT for VOC emissions will be the use of combustion technology and the use of clean fuels so that emissions will not exceed 4.1 ppmvd when firing natural gas and 10.5 ppmvd when firing distillate oil. These emission levels are similar to the BACT emission levels established for other similar sources. Combustion controls and the use of clean fuels have been overwhelmingly approved as BACT for GTs. The proposed VOC emission limits for the GT are in the range approved for other similar sources. The environmental effect of reduced emissions would not be significant.

4.3.4 PM/PM10 AND OTHER REGULATED AND NONREGULATED POLLUTANT EMISSIONS

The emission of particulates from the GT is a result of incomplete combustion and trace elements in the fuel. Beryllium and inorganic arsenic would be included in the PM/PM10 emissions. The design of the GT ensures that particulate emissions will be minimized by combustion controls and the use of clean fuels. A review of EPA's BACT/LAER Clearinghouse Documents did not reveal any post-combustion particulate control technologies being used on gas- or oil-fired GTs.

The maximum particulate emissions from the GT will be lower in concentration than that normally specified for fabric filter designs (i.e., the grain loading associated with the maximum particulate emissions [about 40 pounds per hour (lb/hr) when firing natural gas]) is less than 0.01 grain per standard cubic foot (gr/scf), which is a typical design specification for a baghouse. This further demonstrates that no further particulate controls are necessary for the proposed project.

Therefore, there are no technically feasible methods for controlling the emissions of these pollutants from GTs, other than the inherent quality of the fuel. Clean fuels, natural gas and distillate oil represent BACT for these pollutants.

For the nonregulated pollutants, none of the control technologies evaluated for other pollutants (i.e., SCR) would reduce such emissions; thus, natural gas and distillate oil represent BACT because of their inherent low contaminant content.

5.0 AIR QUALITY MONITORING DATA

5.1 PSD PRECONSTRUCTION MONITORING

The CAA requires that an air quality analysis be conducted for each pollutant subject to regulation under the act before a major stationary source is constructed. This analysis may be performed by the use of modeling and/or by monitoring the air quality. Preconstruction monitoring data generally are not required if the ambient air quality concentration before construction is less than the de minimis impact monitoring concentrations. Also, if the maximum predicted impact of the source is less than the de minimis impact monitoring concentrations, the source generally would be exempt from preconstruction monitoring.

For noncriteria pollutants, EPA recommends that an analysis based on air quality modeling generally should be used instead of monitoring data.

5.2 PROJECT MONITORING APPLICABILITY

As determined by the source applicability analysis described in Section 3.1, an ambient monitoring analysis is required by PSD regulations for PM(TSP), PM(PM10), NO_2, CO, VOC (O_3), Be, and As emissions. The maximum concentrations predicted for the proposed project compared to the PSD de minimis monitoring concentrations are presented in Table 5-1. Arsenic may be exempt from monitoring requirements because no acceptable monitoring technique has been established for that pollutant. However, since the maximum predicted impacts from the proposed facility are less than de minimis levels for all pollutants, preconstruction monitoring is not required for this project.

6.0 AIR QUALITY MODELING APPROACH

6.1 ANALYSIS APPROACH AND ASSUMPTIONS

6.1.1 GENERAL MODELING APPROACH

The general modeling approach for the proposed project follows EPA and FDER modeling guidelines. The highest predicted concentrations are compared with PSD significant impact levels, de minimis air quality levels, and Florida NTLs for toxic air pollutants. If the predicted impact from a facility exceeds the significant impact level for a particular pollutant, current policies stipulate that the highest annual average and highest, second-highest short-term (i.e., 24 hours or less) concentrations be compared with AAQS and PSD increments when 5 years of meteorological data are used.

To develop the maximum short-term concentrations for the facility, the general modeling approach was divided into screening and refined phases to reduce the computation time required to perform the modeling analysis. The basic difference between the two phases is the receptor grid used when predicting concentrations.

Concentrations for the screening phase were predicted using a coarse receptor grid and a 5-year meteorological record. After a final list of maximum short-term concentrations was developed, the refined phase of the analysis was conducted by predicting concentrations for a refined receptor grid centered on the receptor at which the highest concentration from the screening phase was produced. The air dispersion model then was executed for the entire year during which highest concentrations were predicted. More detailed descriptions of the emission inventory and receptor grids used in the screening and refined phases of the analysis are presented in the following sections.

6.1.2 MODEL SELECTION

The selection of the appropriate air dispersion model was based on its ability to simulate impacts in areas surrounding the plant site. Within

50 km of the site, the terrain can be described as simple (i.e., flat to gently rolling). As defined in the EPA modeling guidelines, simple terrain is considered to be an area where the terrain features are all lower in elevation than the top of the stack(s) under evaluation. Therefore, a simple terrain model was selected to predict maximum ground-level concentrations.

The Industrial Source Complex (ISC) dispersion model (EPA, 1992a) was selected to evaluate the pollutant emissions from the proposed unit and other modeled sources. This model is contained in EPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6 (EPA, 1992b). The ISC model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights.

In this analysis, the ISCST2 model, Version 92062, was used to calculate both short-term and annual average concentrations because FDER and EPA have recommended this model for specific applications for an elevated emission source, such as that proposed for this project. Major features of the ISCST2 model are presented in Table 6-1.

The ISC model has rural and urban options that affect the wind speed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground-level concentrations. The criteria used to determine when the rural or urban mode is appropriate are based on land use near the proposed plant's surroundings (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3-km radius circle centered on the proposed source, the urban option should be selected. Otherwise, the rural option is more appropriate.

In this analysis, the EPA regulatory options were used to address maximum impacts. Based on a review of the land use around the facility, the rural mode was selected because of the lack of residential, industrial, and commercial development within 3 km of the plant site.

Table 6-1. Major Features of the ISCST2 Model

ISCST2 Model Features
• Polar or Cartesian coordinate systems for receptor locations
• Rural or one of three urban options that affect wind speed profile exponent, dispersion rates, and mixing height calculations
• Plume rise as a result of momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1972, and 1975)
• Procedures suggested by Huber and Snyder (1976); Huber (1977); Schulmann and Hanna (1986); and Schulmann and Scire (1980) for evaluating building wake effects
• Procedures suggested by Briggs (1974) for evaluating stack-tip downwash
• Separation of multiple-point sources
• Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations
• Capability of simulating point, line, volume, and area sources
• Capability to calculate dry deposition
• Variation with height of wind speed (wind speed-profile exponent law)
• Concentration estimates for 1-hour to annual average
• Terrain-adjustment procedures for elevated terrain, including a terrain truncation algorithm
• Receptors located above local terrain (i.e., "flagpole" receptors)
• Consideration of time-dependent exponential decay of pollutants
• The method of Pasquill (1976) to account for buoyancy-induced dispersion
• A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)
• Procedure for calm-wind processing
• Wind speeds less than 1 m/s are set to 1 m/s.

Source: EPA, 1992a.

6.2 METEOROLOGICAL DATA

Meteorological data used in the ISCST2 model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the National Weather Service (NWS) station at Tampa International Airport. The 5-year period of meteorological data, 1982 through 1986, is the data set recommended by FDER for emission sources in Polk County undergoing regulatory review.

The NWS station in Tampa, located approximately 70 km to the west-northwest of the site, was selected for use in the study because it is the closest primary weather station to the study area considered to have meteorological data representative of the project site. This station has surrounding topographical features similar to the project site and the most readily available and complete database.

Mixing heights were calculated from the radiosonde data at Tampa using the Holzworth approach (Holzworth, 1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by EPA (Holzworth, 1972). The hourly surface data and mixing heights were used to develop a sequential series of hourly meteorological data (i.e., wind direction, wind speed, temperature, stability, and mixing heights). These calculations were performed using the EPA RAMMET meteorological preprocessor program.

6.3 EMISSION INVENTORY

Stack operating parameters and emission rates for the proposed facility used in the modeling analysis are presented in Tables 6-2 and 6-3. The GT operating data are presented for both the GE and the Westinghouse turbines at 100 and 70 percent loads and 27 and 97°F ambient temperatures. For a given combination of operating load and ambient temperature, the lower exit velocities from the two types of turbines were selected to be modeled in order to maximize impacts. The exit gas velocities developed for burning natural gas were used because they were lower than those for fuel oil.

Table 6-2. Stack, Operating, and Emission Data Considered in the Air Quality Impact Modeling for the Proposed Facility

	General Electric Turbine				Westinghouse Turbine			
	100% Load		70% Load		100% Load		70% Load	
Parameter	27°F	97°F	27°F	97°F	27°F	97°F	27°F	97°F
Stack Data (ft)								
Height	180	180	180	180	180	180	180	180
Diameter	18	18	18	18	18	18	18	18
Operating Data								
Temperature (°F)	205	205	200	200	205	205	200	200
Velocity (ft/sec)	66.7[b]	57.8[b]	50.7[b]	45.8[b]	68.3	59.1	52.0	47.6

		General Electric Turbine[a]				Westinghouse Turbine[a]			
		100% Load		70% Load		100% Load		70% Load	
Parameter	Units	27°F	97°F	27°F	97°F	27°F	97°F	27°F	97°F
PM	lb/hr	18.0	18.0	18.0	18.0	41.4[c]	37.7[c]	35.2[c]	30.2[c]
	TPY	45.0[c]	45.0[c]	45.0[c]	45.0[c]	37.5	33.6	30.2	27.8
NO_2	TPY	777.5[c]	655.2[c]	623.3[c]	528.4[c]	802.5[c]	644.0	629.8[c]	509.4
CO	lb/hr	108.4	93.2	84.3	75.6	174.0[c]	157.0[c]	152.0[c]	131.0[c]

Note: Appendix A presents emissions and stack parameter information used to develop this table. 100 percent load refers to base load condition in the appendix tables.

[a] Short-term rates are based on burning distillate oil in the gas turbine and natural gas in the duct burner. Annual emission rates are based on burning distillate oil and natural gas for 300 and 8,460 hours, respectively, in the gas turbine and natural gas for 8,760 hours in the duct burner.

[b] Lower exit velocity of two turbine types burning natural gas for given operating load and ambient temperature; used in the modeling to produce maximum impacts for given operating load-ambient temperature combination. Does not include additional exhaust from duct burner.

[c] Higher emission rate of two turbine types for given operating load and ambient temperature; used in the modeling to produce maximum impacts.

Table 6-3. Emission Data for Other Regulated and Non-Regulated Pollutants Considered in the Air Quality Impact Modeling for the Proposed Facility

Parameter	Maximum Emission Rate (lb/hr)[a]			
	100% Load		70% Load	
	27°F	97°F	27°F	97°F
Antimony	4.04×10^{-2}	3.32×10^{-2}	3.23×10^{-2}	2.64×10^{-2}
Arsenic	7.77×10^{-3}	6.37×10^{-3}	6.20×10^{-3}	5.08×10^{-3}
Barium	3.61×10^{-2}	2.96×10^{-2}	2.88×10^{-2}	2.36×10^{-2}
Beryllium	4.62×10^{-3}	3.79×10^{-3}	3.69×10^{-3}	3.02×10^{-3}
Cadmium	1.94×10^{-2}	1.59×10^{-2}	1.55×10^{-2}	1.27×10^{-2}
Chlorine	4.99×10^{-2}	4.09×10^{-2}	3.98×10^{-2}	3.26×10^{-2}
Chromium	8.79×10^{-2}	7.21×10^{-2}	7.01×10^{-2}	5.75×10^{-2}
Cobalt	1.68×10^{-2}	1.38×10^{-2}	1.34×10^{-2}	1.10×10^{-2}
Copper	5.18×10^{-1}	4.25×10^{-1}	4.13×10^{-1}	3.39×10^{-1}
Fluoride	6.02×10^{-2}	4.94×10^{-2}	4.80×10^{-2}	3.94×10^{-2}
Formaldehyde	7.58×10^{-1}	6.23×10^{-1}	6.07×10^{-1}	4.99×10^{-1}
Lead	1.65×10^{-2}	1.35×10^{-2}	1.31×10^{-2}	1.08×10^{-2}
Manganese	2.59×10^{-2}	2.12×10^{-2}	2.07×10^{-2}	1.69×10^{-2}
Mercury	5.55×10^{-3}	4.55×10^{-3}	4.43×10^{-3}	3.63×10^{-3}
Nickel	3.14×10^{-1}	2.58×10^{-1}	2.51×10^{-1}	2.06×10^{-1}
Polycyclic Organic Matter	1.91×10^{-3}	1.61×10^{-3}	1.55×10^{-3}	1.31×10^{-3}
Selenium	4.33×10^{-2}	3.55×10^{-2}	3.46×10^{-2}	2.83×10^{-2}
Sulfuric Acid Mist	1.23×10^{1}	1.01×10^{1}	9.79×10^{0}	8.03×10^{0}
Vanadium	1.29×10^{-1}	1.05×10^{-1}	1.03×10^{-1}	8.41×10^{-2}
Zinc	1.26×10^{0}	1.04×10^{0}	1.01×10^{0}	8.26×10^{-1}

[a] Based on the General Electric turbine burning distillate oil, which produces the higher emission rates between the turbine types selected for this facility. Also includes emissions from the 100 MMBtu/hr duct burner.

The exit velocities are based on the exhaust from the turbine only and do not include the additional exhaust and, therefore, additional flow, from the duct burner. Also, the higher emission rate was selected for the specific operating load-ambient temperature combination to produce a conservative estimate of ambient impacts.

Modeling of the proposed facility demonstrated that the facility's maximum predicted PM, NO_2, and CO impacts are below the significant impact levels (see Section 7.1). Therefore, further modeling for these pollutants with background sources to determine impacts for comparison to AAQS and PSD Class II and I increments is not required.

6.4 RECEPTOR LOCATIONS

As discussed in Section 6.1.1, the general modeling approach considered screening and refined phases to address compliance with AAQS and PSD increments. For the screening phase, concentrations were predicted for 391 total receptors located in a radial grid centered at the proposed GT stack location (see Figure 6-1). These receptors were classified into two main groups:

1. 36 plant property receptors placed at the nearest plant boundary along 36 radials spaced at 10-degree increments. These receptors are presented in Table 6-4.
2. 355 general grid receptors located at distances of 100; 300; 500; 700; 1,000; 1,500; 2,000; 3,000; 4,000; and 5,000 m along 36 radials with each radial spaced at 10-degree increments.

After the screening modeling was completed, refined modeling was conducted using a receptor grid centered on the receptor that had the highest concentration from the screening analysis. The receptors were located at intervals of 100 m between the distances considered in the screening phase, along 9 radials spaced at 2-degree increments, centered on the radial along which the maximum concentration was produced. For example, if the maximum concentration was produced along the 90-degree radial at a distance of

06-11-92

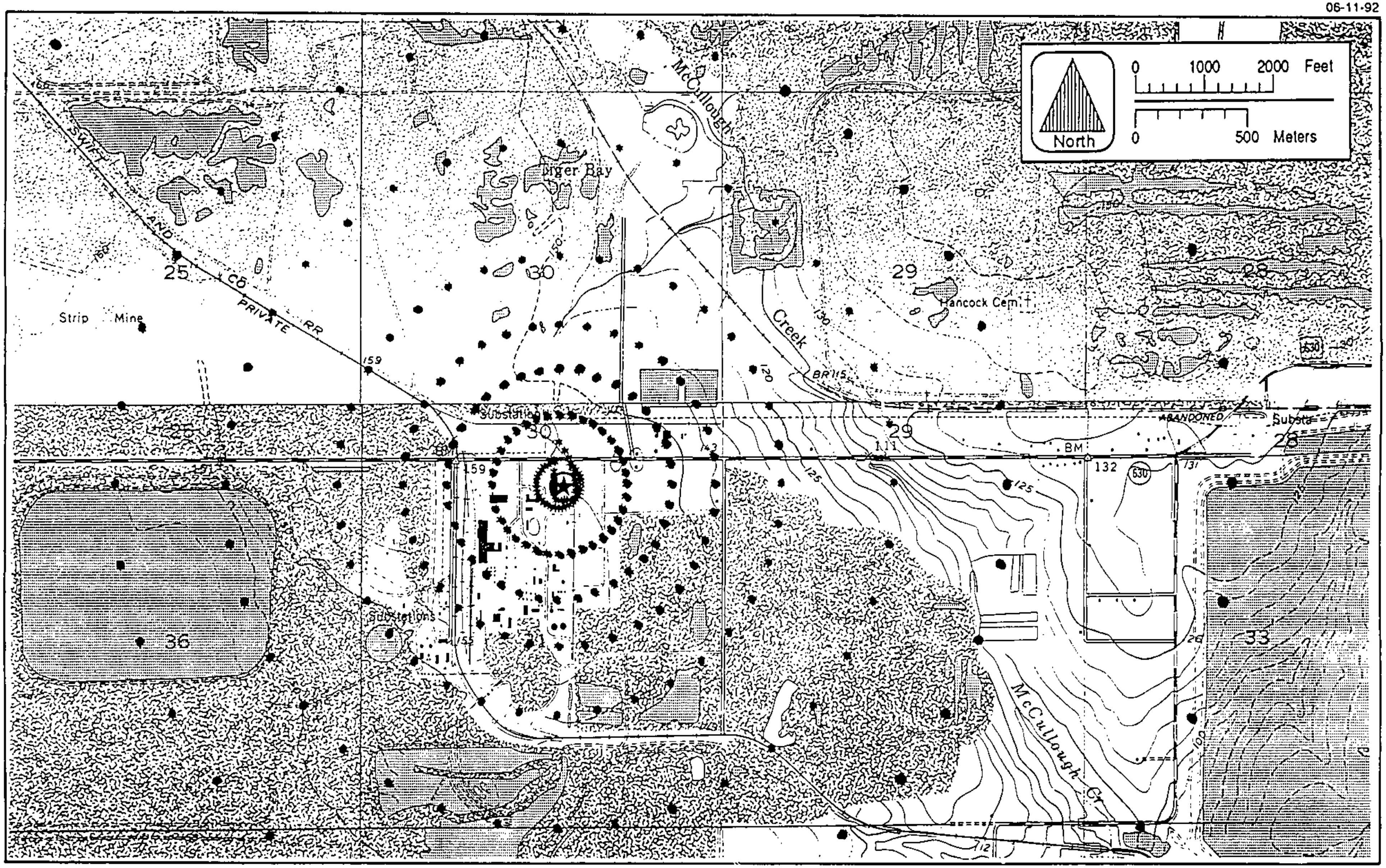


Figure 6-1 RECEPTOR LOCATIONS USED IN THE AIR QUALITY IMPACT ANALYSIS NEAR THE PROPOSED FACILITY

SOURCES: USGS, 1986, 1987; KBN, 1992.

KBN

Table 6-4. Plant Property Receptors Used in the Screening Modeling Analysis

Receptor Location		Receptor Location	
Direction (degrees)	Distance (meters)	Direction (degrees)	Distance (meters)
10	149	190	69
20	125	200	57
30	108	210	42
40	95	220	34
50	86	230	29
60	81	240	27
70	77	250	25
80	76	260	24
90	76	270	24
100	77	280	24
110	79	290	25
120	85	300	27
130	94	310	30
140	84	320	35
150	76	330	43
160	71	340	59
170	69	350	100
180	69	360	184

Note: Direction and distance are relative to the proposed GT stack.

1.0 km, the refined receptor grid would consist of receptors at the following locations:

Directions (degrees)	Distance (km)
82, 84, 86, 88, 90, 92, 94, 96, 98	0.8, 0.9, 1.0, 1.1, 1.2, 1.3, and 1.4 per direction

To ensure that a valid maximum concentration was calculated, concentrations were predicted using the refined grid for the entire year that produced the highest concentration from the screening receptor grid.

Refined modeling analysis was not performed for the annual averaging period because the spatial distribution of annual average concentrations are not expected to vary significantly from those produced from the screening analysis.

The maximum PSD increment consumption at the Chassahowitzka Wilderness Area was determined for the proposed facility alone at 13 discrete receptors located along the boundary of the Class I area (see Table 6-5). The highest predicted concentrations for the proposed facility for the 5 years of meteorological data were compared with the proposed PSD Class I significance values for PM and NO_2 (see Section 7.1.2).

6.5 BUILDING DOWNWASH EFFECTS

Based on the building dimensions associated with buildings and structures planned at the plant, the stack for the proposed GT will be less than GEP. Therefore, the potential for building downwash to occur was considered in the modeling analysis.

The procedures used for addressing the effects of building downwash are those recommended in the ISC Dispersion Model User's Guide. The building height, length, and width are input to the model, which uses these parameters to modify the dispersion parameters. For short stacks (i.e., physical stack height is less than H_b + 0.5 l_b, where H_b is the building

Table 6-5. Receptor Locations at the Chassahowitzka PSD Class I Area Used to Address the Proposed Facility's Impacts

Receptor Location UTM Coordinates (km)	
East	North
340.3	3165.7
340.3	3167.7
340.3	3169.8
340.7	3171.9
342.0	3174.0
343.0	3176.2
343.7	3178.3
342.4	3180.6
341.1	3183.4
339.0	3183.4
336.5	3183.4
334.0	3183.4
331.5	3183.4

height and l_b is the lesser of the building height or projected width), the Schulman and Scire (1980) method is used. The features of the Schulman and Scire method are as follows:

1. Reduced plume rise as a result of initial plume dilution, and
2. Enhanced plume spread as a linear function of the effective plume height.

For cases where the physical stack is greater than $H_b + 0.5\ l_b$ but less than GEP, the Huber-Snyder (1976) method is used. For both methods, the ISCST2 model uses direction-specific building dimensions for H_b and l_b for 36 radial directions, with each direction representing a 10-degree sector.

The building dimensions considered in the modeling analysis are presented in Table 6-6. The height of the GT stack is greater than $H_b + 0.5\ l_b$ but less than GEP. Therefore, the Huber-Snyder method was used for downwash calculations in the modeling analysis.

Table 6-6. Building Dimensions Used in the ISCST2 Modeling Analysis to Address Potential Building Downwash Effects for the Proposed Turbine's Stack

Direction (Degree)	Direction-Specific Building Data (m)	
	Height	Projected Width
10	27.43	15.28
20	27.43	18.44
30	27.43	21.03
40	27.43	23.00
50	27.43	24.26
60	27.43	24.78
70	27.43	24.80
80	27.43	24.49
90	27.43	23.58
100	27.43	24.55
110	27.43	24.80
120	27.43	24.76
130	27.43	24.16
140	27.43	22.83
150	27.43	20.80
160	27.43	18.14
170	27.43	14.93
180	NA	NA
190	27.43	15.28
200	27.43	18.44
210	27.43	21.03
220	27.43	23.00
230	27.43	24.26
240	27.43	24.78
250	27.43	24.80
260	27.43	24.49
270	27.43	23.58
280	27.43	24.55
290	27.43	24.80
300	27.43	24.76
310	27.43	24.16
320	27.43	22.83
330	27.43	20.80
340	27.43	18.14
350	27.43	14.93
360	NA	NA

Note: Based on the height, length, and width for heat recovery steam generator building of 27.43, 22.82, and 9.7 m, respectively.

NA = not applicable.

Table 7-2. Summary of Screening and Refined Air Modeling Impacts of Regulated Pollutants for the Central Florida Cogeneration Project (Page 1 of 2)

Operating Load (Percent)	Ambient Temperature (°F)	Pollutant	Averaging Period	Emission Rate Value	Emission Rate Units	Highest Predicted Concentration (μg/m³)	Significance Level (μg/m³)
SCREENING IMPACTS							
100	27	PM	24-Hour	41.4	lb/hr	0.63	5
			Annual	45.0	TPY	0.015	1
		NO_2	Annual	802.5	TPY	0.26	1
		CO	1-Hour	174.0	lb/hr	25.8	2000
			8-Hour	174.0	lb/hr	6.38	500
		Be	24-Hour	0.00462	lb/hr	0.000070	NA
100	97	PM	24-Hour	37.7	lb/hr	0.88	5
			Annual	45.0	TPY	0.017	1
		NO_2	Annual	655.2	TPY	0.25	1
		CO	1-Hour	157.0	lb/hr	29.8	2000
			8-Hour	157.0	lb/hr	10.5	500
		Be	24-Hour	0.00379	lb/hr	0.000089	NA
70	27	PM	24-Hour	35.2	lb/hr	1.59	5
			Annual	45.0	TPY	0.020	1
		NO_2	Annual	629.8	TPY	0.29	1
		CO	1-Hour	152.0	lb/hr	34.3	2000
			8-Hour	152.0	lb/hr	19.5	500
		Be	24-Hour	0.00369	lb/hr	0.00017	NA
70	97	PM	24-Hour	30.2	lb/hr	1.94	5
			Annual	45.0	TPY	0.022	1
		NO_2	Annual	528.4	TPY	0.26	1
		CO	1-Hour	131.0	lb/hr	33.0	2000
			8-Hour	131.0	lb/hr	19.4	500
		Be	24-Hour	0.00302	lb/hr	0.00019	NA

7.0 AIR QUALITY MODELING RESULTS

7.1 PROPOSED FACILITY ONLY

7.1.1 SIGNIFICANT IMPACT LEVELS

A summary of the maximum screening concentrations as a result of the proposed facility using a generic emission rate (i.e., 10 g/s) and operating at 100 percent and 70 percent load conditions and 27°F and 97°F ambient temperatures is presented in Table 7-1. Predicted screening and refinement impacts based on the maximum emission rates for each pollutant are presented in Table 7-2. The results are presented for all regulated pollutants to be considered in the modeling analysis. The modeling was performed based on the lowest exit velocity and highest emission rate of the two turbine types for each load and temperature (see Table 6-2). This approach ensures that the maximum impacts from the proposed facility will be obtained. Refinements were performed for the operating scenario producing the worst-case impacts (i.e., 70 percent load, 27 and 97°F ambient temperatures). Generic screening impacts for each year and averaging period are presented in Appendix C.

PM/PM10 Concentrations

The maximum predicted 24-hour and annual average PM(TSP) concentrations due to the proposed facility are 2.12 and 0.022 $\mu g/m^3$, respectively. Maximum PM10 impacts are assumed to be identical to the PM(TSP) impacts. Since these maximum concentrations are below the 24-hour and annual significance levels of 5 and 1 $\mu g/m^3$ and 24-hour de minimis level of 10 $\mu g/m^3$ for these pollutants, no further modeling analysis is necessary.

NO_2 Concentrations

The maximum predicted annual NO_2 concentration due to the proposed facility is 0.29 $\mu g/m^3$. Because this level of impact is below the annual significance level of 1 $\mu g/m^3$ and annual de minimis level of 14 $\mu g/m^3$, no further modeling analysis was performed.

Table 7-1. Summary of Generic Screening Air Modeling Impacts for the Central Florida Cogeneration Project

					Location and Time Period of Maximum Concentration					
					Receptor Location		Time Period			
Operating Load (Percent)	Ambient Temperature (°F)	Exit Velocity (ft/s)	Averaging Period	Generic Concentration (μg/m³)[a]	Direction (degrees)	Distance (meters)	Year	Month	Day	Hour Ending
SCREENING IMPACTS										
100	27	66.7	1-hour	11.8	100	300	84	3	29	8
			3-hour	6.49	120	300	82	1	14	15
			8-hour	2.91	250	2000	84	6	12	16
			24-hour	1.21	90	2000	86	8	18	24
			Annual	0.11	90	2000	86	--	--	--
100	97	57.8	1-hour	15.1	220	300	84	8	17	4
			3-hour	8.20	120	300	82	1	14	15
			8-hour	5.33	120	300	84	3	29	16
			24-hour	1.86	130	300	84	2	28	24
			Annual	0.13	90	2000	86	--	--	--
70	27	50.7	1-hour	17.9	220	300	84	8	17	4
			3-hour	14.0	120	300	84	3	29	12
			8-hour	10.2	120	300	84	3	29	16
			24-hour	3.58	120	300	84	3	29	24
			Annual	0.16	90	2000	86	--	--	--
70	97	45.8	1-hour	20.0	220	300	84	8	17	4
			3-hour	16.1	120	300	84	3	29	12
			8-hour	11.7	120	300	84	3	29	16
			24-hour	5.09	130	300	84	2	28	24
			Annual	0.17	90	2000	86	--	--	--

Note: Highest concentrations reported for all averaging periods.

[a] Based on modeling at a generic emission rate of 10.0 grams per second.

Table 7-2. Summary of Screening and Refined Air Modeling Impacts of Regulated Pollutants for the Central Florida Cogeneration Project (Page 2 of 2)

Operating Load (Percent)	Ambient Temperature (°F)	Pollutant	Averaging Period	Emission Rate Value	Emission Rate Units	Highest Predicted Concentration (µg/m³)	Significance Level (µg/m³)
REFINED IMPACTS[a]							
70	97	PM	24-Hour	30.2	lb/hr	2.12	5
			Annual	45.0	TPY	0.022	1
70	27	NO_2	Annual	629.8	TPY	0.29	1
70	27	CO	1-Hour	152.0	lb/hr	45.8	2000
			8-Hour	152.0	lb/hr	20.8	500
70	97	Be	24-Hour	0.00302	lb/hr	0.00021	NA

Note: Highest concentrations reported for all averaging periods.
NA = not applicable.

[a] Based on the refined modeling results using an emission rate of 10 g/s:

1-hour, 27.7 µg/m³
3-hour, 16.6 µg/m³
8-hour, 12.6 µg/m³
24-hour, 5.58 µg/m³
Annual, 0.173 µg/m³

CO Concentration

The maximum predicted 1- and 8-hour average CO concentrations due to the proposed facility are 45.8 and 20.8 $\mu g/m^3$, respectively. Because the maximum predicted impacts due to the proposed facility are less than the 1- and 8-hour significance levels of 2,000 and 500 $\mu g/m^3$ and the 8-hour de minimis level of 575 $\mu g/m^3$, additional modeling is not required for this pollutant.

Be Concentration

The maximum 24-hour Be concentration due to the proposed facility is predicted to be 0.00021 $\mu g/m^3$. No significance level has been established for Be, but a de minimis monitoring concentration has been set at 0.001 $\mu g/m^3$, 24-hour average. Since the predicted impacts due to the proposed facility only are well below the de minimis, no further PSD modeling analysis was conducted. Beryllium was addressed as a toxic air pollutant for comparison to the Florida NTLs (refer to Section 7.1.3).

As Concentration

No significance levels have been established for As. There is also no ambient measurement method established for As and, thus, no de minimis monitoring concentration. Therefore, no further PSD modeling analysis was conducted. Arsenic was addressed as a toxic air pollutant for comparison to the Florida NTLs (refer to Section 7.1.3).

7.1.2 PSD CLASS I SIGNIFICANCE ANALYSIS

Maximum PM and NO_2 concentrations predicted at the PSD Class I area of the Chassahowitzka National Wildlife Area using a generic emission rate of 10 g/s are presented in Table 7-3. Detailed generic impacts for each year and averaging period are presented in Appendix C.

Predicted PM and NO_2 impacts using maximum emission rates for comparison to the National Park Service (NPS) recommended Class I significance values are presented in Table 7-4. Impacts are presented using the lowest exit velocity and highest emission rate for the two turbine types for each load and temperature (see Table 6-2). As shown, the maximum predicted PM

Table 7-3. Summary of Maximum Predicted Generic Concentrations Due to the Proposed Project at the Chassahowitzka NWA

Operating Load (Percent)	Ambient Temperature (°F)	Exit Velocity (ft/s)	Averaging Period	Generic Concentration (μg/m3)[a]	Location and Time Period of Maximum Concentration: Receptor Location: UTM East (meters)	UTM North (meters)	Time Period: Year	Month	Day	Hour Ending
100	27	66.7	24-hour	0.088	340700	3171900	86	12	10	24
			Annual	0.0059	340300	3165700	82	--	--	--
100	97	57.8	24-hour	0.090	340700	3171900	86	12	10	24
			Annual	0.0060	340300	3165700	82	--	--	--
70	27	50.7	24-hour	0.092	340700	3171900	86	12	10	24
			Annual	0.0063	340300	3165700	82	--	--	--
70	97	45.8	24-hour	0.094	340700	3171900	86	12	10	24
			Annual	0.0064	340300	3165700	82	--	--	--

[a] Based on modeling at a generic emission rate of 10.0 grams per second.

Table 7-4. Summary of Maximum Predicted PM and NO_2 Concentrations Due to the Proposed Project at the Chassahowitzka NWA

Operating Load (Percent)	Ambient Temperature (°F)	Pollutant	Averaging Period	Emission Rate Value	Emission Rate Units	Highest Predicted Concentration ($\mu g/m^3$)	NPS Recommended Significance Level ($\mu g/m^3$)
100	27	PM	24-Hour	41.4	lb/hr	0.046	0.33
			Annual	45.0	TPY	0.0008	0.1
		NO_2	Annual	802.5	TPY	0.014	0.025
100	97	PM	24-Hour	37.7	lb/hr	0.043	0.33
			Annual	45.0	TPY	0.0008	0.1
		NO_2	Annual	655.2	TPY	0.011	0.025
70	27	PM	24-Hour	35.2	lb/hr	0.041	0.33
			Annual	45.0	TPY	0.0008	0.1
		NO_2	Annual	629.8	TPY	0.011	0.025
70	97	PM	24-Hour	30.2	lb/hr	0.036	0.33
			Annual	45.0	TPY	0.0008	0.1
		NO_2	Annual	528.4	TPY	0.010	0.025

Note: Highest concentrations reported for all averaging periods.

24-hour and annual impacts are 0.046 and 0.0008 $\mu g/m^3$, respectively. These impacts are well below the NPS significance values of 0.33 and 0.10 $\mu g/m^3$.

The maximum predicted annual NO_2 concentration is 0.014 $\mu g/m^3$ which is below the NPS significance value of 0.025 $\mu g/m^3$.

As the results indicate, the proposed facility's impacts are below the NPS recommended Class I significance values for all averaging periods and modeled pollutants. Therefore, no further Class I modeling analysis was conducted.

7.1.3 TOXIC POLLUTANT ANALYSIS

The maximum impacts of regulated and nonregulated hazardous pollutants that will be emitted in significant amounts by the proposed facility are presented in Table 7-5. These impacts are based on the refined 24-hour impacts modeled for the 70 percent load, 97°F case and the refined 1-hour and annual impacts for the 70 percent load (27°F case), since these cases produced the highest impacts for the respective averaging periods (see Table 7-2).

The maximum 8-hour, 24-hour, and annual concentrations are compared in Table 7-5 to the Florida NTLs. As shown, the predicted impacts are below the NTLs for all pollutants and averaging times. Therefore, the emissions from the proposed facility are not expected to pose a health risk to the public.

7.2 ADDITIONAL IMPACT ANALYSES

7.2.1 IMPACTS UPON VEGETATION

The response of vegetation to atmospheric pollutants is influenced by the concentration of the pollutant, duration of the exposure and the frequency of exposures. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants, they will be from the short-term

Table 7-5. Summary of Maximum Concentrations Due to the Proposed Facility For the Air Toxic Modeling Analysis (Page 1 of 2)

Pollutant	Averaging Period	Maximum Concentration (μg/m3)[a]	Florida No Threat Level (μg/m)
Antimony	8-hour	0.0042	5
	24-hour	0.0019	1.2
	Annual	0.000058	0.3
Arsenic	8-hour	0.00081	2
	24-hour	0.00036	0.48
	Annual	0.000011	0.00023
Barium	8-hour	0.0037	5
	24-hour	0.0017	1.2
	Annual	0.000052	50
Beryllium	8-hour	0.00048	0.02
	24-hour	0.00021	0.0048
	Annual	0.000007	0.00042
Cadmium	8-hour	0.0020	0.5
	24-hour	0.00089	0.12
	Annual	0.000028	0.00056
Chlorine	8-hour	0.0052	15
	24-hour	0.0023	3.6
	Annual	0.000071	NE
Chromium	8-hour	0.0091	5
	24-hour	0.0040	1.2
	Annual	0.00013	1000
Cobalt	8-hour	0.0017	0.5
	24-hour	0.00077	0.12
	Annual	0.000024	NE
Copper	8-hour	0.054	1
	24-hour	0.024	0.24
	Annual	0.00074	NE
Fluoride	8-hour	0.0063	2
	24-hour	0.0028	0.48
	Annual	0.000086	50
Formaldehyde	8-hour	0.079	4.5
	24-hour	0.035	1.08
	Annual	0.0011	0.077

Table 7-5. Summary of Maximum Concentrations Due to the Proposed Facility For the Air Toxic Modeling Analysis (Page 2 of 2)

Pollutant	Averaging Period	Maximum Concentration (μg/m3)[a]	Florida No Threat Level (μg/m)
Lead	8-hour	0.0017	1.5
	24-hour	0.00076	0.36
	Annual	0.000024	0.09
Manganese	8-hour	0.0027	50
	24-hour	0.0012	12
	Annual	0.000037	NE
Mercury	8-hour	0.00058	0.5
	24-hour	0.00026	0.12
	Annual	0.000008	0.3
Nickel	8-hour	0.033	0.5
	24-hour	0.014	0.12
	Annual	0.00045	0.0042
Polycyclic Organic Matter	8-hour	0.00021	NE
	24-hour	0.000092	NE
	Annual	0.000003	NE
Selenium	8-hour	0.0045	2
	24-hour	0.0020	0.48
	Annual	0.000062	NE
Sulfuric Acid Mist[b]	8-hour	1.3	10
	24-hour	0.56	2.38
	Annual	0.018	NE
Vanadium	8-hour	0.013	0.5
	24-hour	0.0059	0.12
	Annual	0.00018	20
Zinc[c]	8-hour	0.13	50
	24-hour	0.058	12
	Annual	0.0018	NE

Note: NE = none established.

[a] 24-hour concentrations reported are the maximum refined impacts for the 70 percent load, 97°F case; 1-hour and annual concentrations from the refined impacts for the 70 percent load, 27°F case.

[b] Not in current FDER NTL list. NTL in table is based on dividing the time-weighted average by 100 and 420 for the 8-hour and 24-hour NTL, respectively.

[c] As zinc oxide.

higher doses. A dose is the product of the concentration of the pollutant and the duration of the exposure. The impact of the proposed facility on regional vegetation was assessed by comparing pollutant doses that are predicted from modeling with threshold doses reported from the scientific literature which could adversely affect plant species typical of those present in the region.

Predicted impacts of all regulated pollutants are less than the significant impact levels (see Table 7-4). As a result, no impacts are expected to occur to vegetation as a result of the proposed emissions of these pollutants.

7.2.2 IMPACTS TO SOILS

SO_2 that reaches the soil by deposition from the air is converted by physical and biotic processes to sulfates. (Particulates have no affect on soils at the levels predicted.) The effects can be beneficial to plants if sulfates in native soils are less than plant requirements for optimum growth. However, sulfates can also increase acidity of unbuffered soils, causing adverse effects due to changes in nutrient availability and cycling. The predicted concentrations of SO_2 from stack emissions are not expected to have a significant adverse effect on soils in the vicinity because:

1. The predicted concentrations are low; and
2. Fertilizer and gypsum is generally applied to lands being used for crops, pasture, and citrus.

Therefore, the facility is not expected to have a significant adverse impact on regional vegetation or soils.

7.2.3 IMPACTS DUE TO ADDITIONAL GROWTH

A limited number of additional personnel may be added to the current plant personnel complement. These additional personnel are expected to have an insignificant effect on the residential, commercial, and industrial growth in Polk County.

7.2.4 IMPACTS TO VISIBILITY

The Central Florida Cogeneration Plant is located approximately 120 km from the Chassahowitzka Wilderness Area, a PSD Class I area. Impacts to visibility were estimated using the VISCREEN computer model. Impacts were calculated for particulates and nitrogen oxides (as nitrogen dioxide). Worst-case particulate emissions for the Westinghouse turbine at base load and 27°F ambient temperature and nitrogen dioxide emissions for the GE turbine at base load and 27°F ambient temperature were used in order to maximize impacts at the Class I area. The results of the screening analysis are presented in Table 7-6. Based on these results, the proposed facility is not expected to significantly impair visibility in the Chassahowitzka Wilderness Area.

Table 7-6. Visibility Analysis for the Central Florida Cogeneration Facility on the PSD Class I Area

Visual Effects Screening Analysis for
Source: CENTRAL FLORIDA COGENERATION FACILITY
Class I Area: CHASSAHOWITZKA NWA

*** Level-1 Screening ***

Input Emissions for

Particulates	41.40	lb/hr
NOx (as NO2)	336.20	lb/hr
Primary NO2	.00	lb/hr
Soot	.00	lb/hr
Primary SO4	.00	lb/hr

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	120.00 km
Min. Source-Class I Distance:	120.00 km
Max. Source-Class I Distance:	152.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	120.0	84.	2.00	.023	.05	.000
SKY	140.	84.	120.0	84.	2.00	.006	.05	-.000
TERRAIN	10.	84.	120.0	84.	2.00	.001	.05	.000
TERRAIN	140.	84.	120.0	84.	2.00	.000	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	75.	116.2	94.	2.00	.024	.05	.000
SKY	140.	75.	116.2	94.	2.00	.006	.05	-.000
TERRAIN	10.	60.	109.7	109.	2.00	.001	.05	.000
TERRAIN	140.	60.	109.7	109.	2.00	.000	.05	.000

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