Florida Power Corporation

Tiger Bay Cogeneration Facility

POWER PLANT SITE CERTIFICATION APPLICATION

September 1997

Best Available Copy

Florida Power
CORPORATION

RECEIVED
OCT 07 1997
BUREAU OF
AIR REGULATION

September 15, 1997

Mr. Hamilton S. Oven
Siting Coordination Administrator
Florida Department of Environmental Protection
2720 Blair Stone Rd.
Tallahassee, FL 32399

RE: Florida Power Corporation
Tiger Bay Facility Power Plant Site Certification Application

Dear Mr. Oven:

Florida Power Corporation (FPC) is applying for a site certification under the Florida Power Plant Siting Act (PPSA) for its Tiger Bay facility. Although Tiger Bay is an existing facility, the application is necessary in order for FPC to use the approximately 10 to 15 MW of additional steam capacity available. Because of the very minor increase in capacity, and the fact that no additional impacts to the environment will occur from the use of this capacity, FPC requests an expedited review as previously discussed.

Enclosed are fourteen copies of the application and a check in the amount of $75,000. Please contact Mr. Mike Kennedy at (813) 866-4344 or Ms. Jennifer Tillman at (813) 866-5022 if you have any questions regarding this submittal.

Sincerely,

W. Jeffrey Pardue, C.E.P.
Director

Enclosure

Best Available Copy

Memorandum

Florida Department of
Environmental Protection

TO: Clair Fancy (4)
Mike Hickey (4)
Geofrey Mansfield (3)
David Bickner (1)

FROM: Steve Palmer
Siting Coordination Office

DATE: October 6, 1997

SUBJECT: FPC Tiger Bay Electrical Power Plant Site Certification Application
PA 97-37; Module 8047

Attached is a copy of the FPC Tiger Bay SCA. This is an existing combustion turbine facility with heat recovery steam generation capability that has recently been purchased by FPC. The previous owners only produced 74.9 MW of steam electric power to avoid having to engage the siting process. Excess steam was wasted to maintain this level of production. FPC proposes to use all the available steam to produce electricity.

Because this facility is already permitted and no addition fuel consumption or site modifications are proposed, we are setting an accelerated review schedule. Please review this application for sufficiency and return your comments to me by November 5, 1997. If sufficiency questions can be timely resolved, reports will be due to the Siting Office on November 19,1997.

Attachment --

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FLORIDA POWER CORPORATION

SITE CERTIFICATION APPLICATION

Tiger Bay Cogeneration Facility

Florida Power CORPORATION

September 1997

CERTIFICATE OF SERVICE

I hereby certify that true copies of this Application for Power Plant Certification have been furnished to the following by U.S. mail on this 16TH day of September, 1997.

W. Jeffrey Pardue, C.E.P.

Hamilton S. Oven, Jr., P.E.
Office of Site Coordination
Department of Environmental Protection
2600 Blair Stone Road, Mail Stop 48
Tallahassee, FL 32399-2400

Mr. Paul Darst
Department of Community Affairs
2740 Centerview Drive
Tallahassee, FL 32399-2100

Mr. Michael K. Balser, P.G.
Southwest Florida Water Management District
170 Century Blvd.
Bartow, FL 33830

Mr. Brian Sodt
Central Florida Regional Planning Council
555 East Church Street
Bartow, FL 33830

Mr. Merle Bishop
Polk County, Florida
P.O. Box 60
Bartow, FL 33830

Mr. Douglas Bailey
Florida Game and Fresh Water Fish Commission
Bryant Building
620 South Meridian Street
Tallahassee, FL 32399-1600

Mr. Robert Trappe
Florida Public Service Commission
Capital Circle Office Center
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

U.S. Agri-Chemicals
3225 State Road 630 West
Fort Meade, FL 33841

APPLICANT INFORMATION

Applicant's Official Name **Florida Power Corporation**

Address **P.O. Box 14042, St. Petersburg, FL 33733**

Address of Official Headquarters **Same**

Business Entity (corporation, partnership, co-operative) **Corporation**

Names, owners, etc. **Florida Power Corporation**

Name and Title of Chief Executive Officer **Mr. Joseph H. Richardson**
President and Chief Executive Officer

Name, Address, and Phone Number of Official Representative responsible for obtaining certification **Mr. W. Jeffrey Pardue, CEP**
Florida Power Corporation
P.O. Box 14042, MAC H2G, St. Petersburg, FL 33733
(813) 866-4387

Site Location (county) **Polk**

Nearest Incorporated City **Fort Meade**

Latitude and Longitude **Latitude 27° 44' 52" Longitude 81° 50' 59"**

UTM's Northerly **3069.40**

Easterly **416.00**

Section, Township, Range **31, T31S, R25E**

Location of any directly associated transmission facilities (counties) **Polk, Hillsborough**

Name Plate Generating Capacity **85.5 MW Steam Capacity; 184 MW Combustion Turbine Capacity**

Capacity of Proposed Additions and Ultimate Site Capacity (where applicable)

Remarks: (Additional information that will help identify the applicant)

The Tiger Bay facility already exists and this application is for approval to operate 10 - 15 MWs of additional available steam capacity.

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INTRODUCTION

Florida Power Corporation (FPC) is an investor-owned electric utility that provides service to over 1.2 million customers in Florida. FPC acquired the Tiger Bay Cogeneration Facility on July 15, 1997 from Tiger Bay Limited Partnership (TBLP). Operation of the facility originally commenced on January 1, 1995, consisting of a combustion turbine and a separate steam turbine. The steam turbine was operationally limited to 74.9 megawatts (MW), so the construction and operation of the plant were not subject to the Power Plant Site Certification (PPSA) requirements.

FPC believes that the steam turbine is capable of producing approximately 85.5 MW simply by changing control set points and operating the system at a 5% increased pressure level. Since the capacity of the steam turbine will be increased to greater than 75 MW, the facility will become subject to the PPSA.

Use of the increased capacity will be obtained without increased fuel consumption or water use, and with no change in impact to the environment. Therefore, FPC is requesting an expedited PPSA approval for this increase in capacity.

Since Tiger Bay is an existing facility and has been in operation for approximately two years, the necessary environmental permits and approvals have already been obtained. This application relies heavily on existing permits and approvals, as well as information contained in the PPSA application for FPC's Hines facility, which is under construction a very short distance from Tiger Bay.

CHAPTER 1

NEED FOR POWER AND THE PROPOSED FACILITY

Section/Title

1.1 NEED SUMMARY

The existing steam turbine at the Tiger Bay Cogeneration Facility is limited by permit to 74.9 megawatts (MW). This unit has the capability to generate an additional 10 to 12 MW of steam electric capacity without increasing fuel use and without any additional impacts to the environment. As such, the proposed use of the additional capacity will help conserve resources by generating additional electricity with no negative impact to Florida's natural resources. Attachment 1-1 contains Florida Power Corporation's (FPC) petition to the Florida Public Service Commission for a need determination regarding the additional capacity.

1.2 PSC ORDER ON NEED

The need petition was filed on August 18, 1997. FPC anticipates that the final need determination will be made by the end of 1997.

CHAPTER 2

SITE AND VICINITY CHARACTERIZATION

Section/Title

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

The FPC Tiger Bay Cogeneration Facility is located in southwest Polk County, Florida, approximately 3.0 miles west of Fort Meade. The site is bounded on the north by State Road 630, and along the east, west and south borders by U.S. Agri-Chemical (USAC) / Ft. Meade Chemical Complex.

The facility was previously owned by the Tiger Bay Limited Partnership (formerly known as Central Florida Power Limited Partnership). This facility was acquired by Florida power Corporation on July 15, 1997.

The facility is located on a 6.2-acre tract on the U.S. Agri-Chemicals complex. The Tiger Bay Facility leases this land from USAC.

2.2 SOCIO-POLITICAL ENVIRONMENT

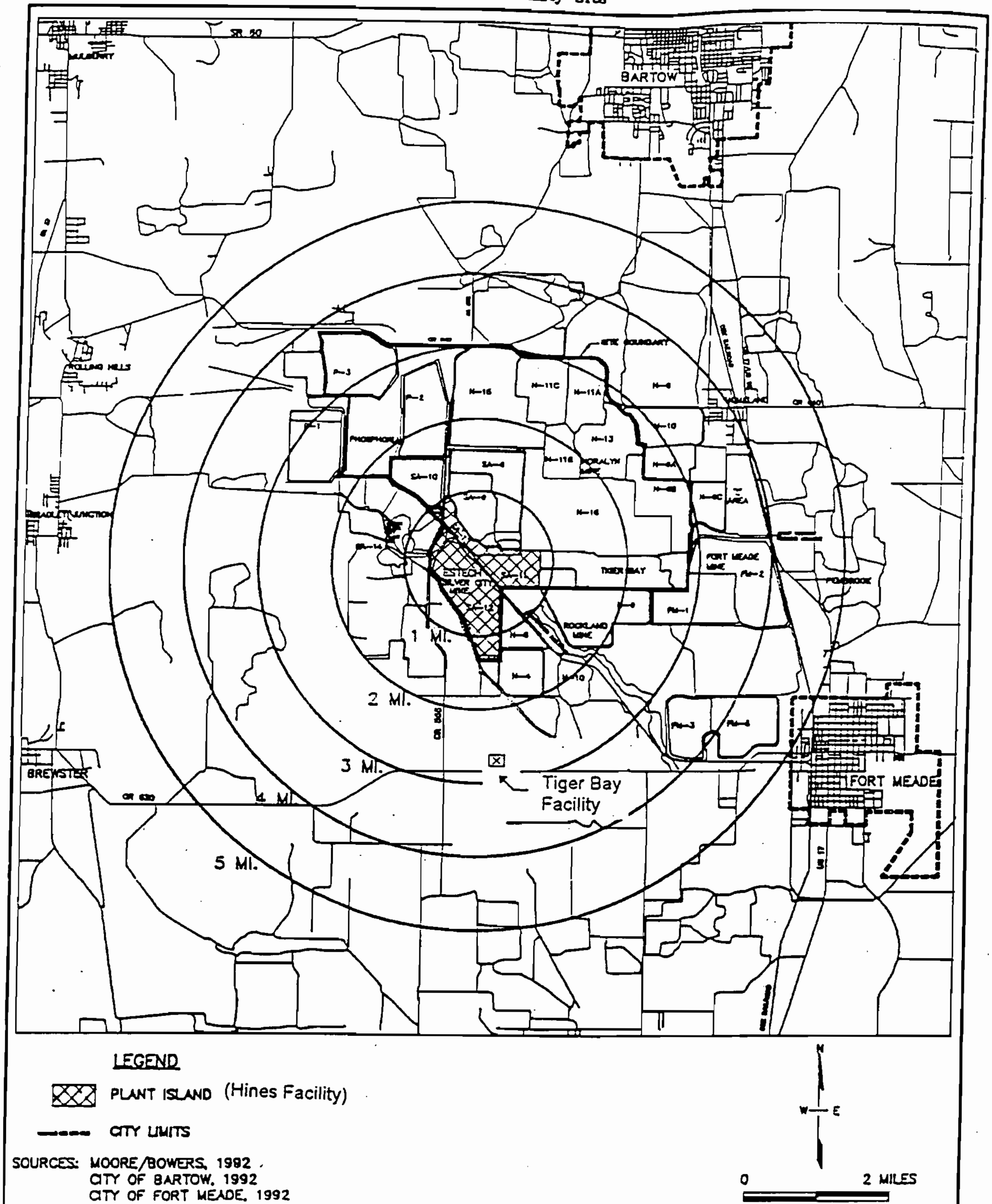
2.2.1 Government Jurisdictions

The facility is located in the unincorporated area in southwest Polk County approximately 3 miles west of the city of Fort Meade. As Figure 2-1 indicates, Fort Meade is the only governmental jurisdiction within a five mile radius of the facility.

The following areas are not found within 5 miles of the facility:

- National Parks
- National Forests
- National Seashores
- National Wildlife Refuges
- National Wilderness Areas
- National Memorials and Monuments
- National Marine and Estuarine Sanctuaries
- Roadless Area Review and Evaluation Areas
- National Wild and Scenic Rivers
- Critical Habitat of Endangered Species
- State Parks
- State Forests
- Areas of Critical Concern
- Conservation and Recreation Lands
- State Archaeological Landmarks or Landmark Zones
- Save Our Rivers Lands
- State Aquatic Preserves
- Outstanding Florida Waters
- Scenic and Wild Rivers
- Indian Reservations
- Military Lands
- Major private land-holdings for environmental protection

Polk County owns two parks that are located within a 5 mile radius of the facility (Fig. 2-2). The IMC Peace River Park, a regional park consisting of 640 acres of reclaimed phosphate land, is located approximately 3 miles northeast of the facility, near the community of Homeland. The County also owns and maintains the Homeland Historic and Pioneer Park, a 3-acre neighborhood park located southwest of the intersection of CR 640 and SR 17.



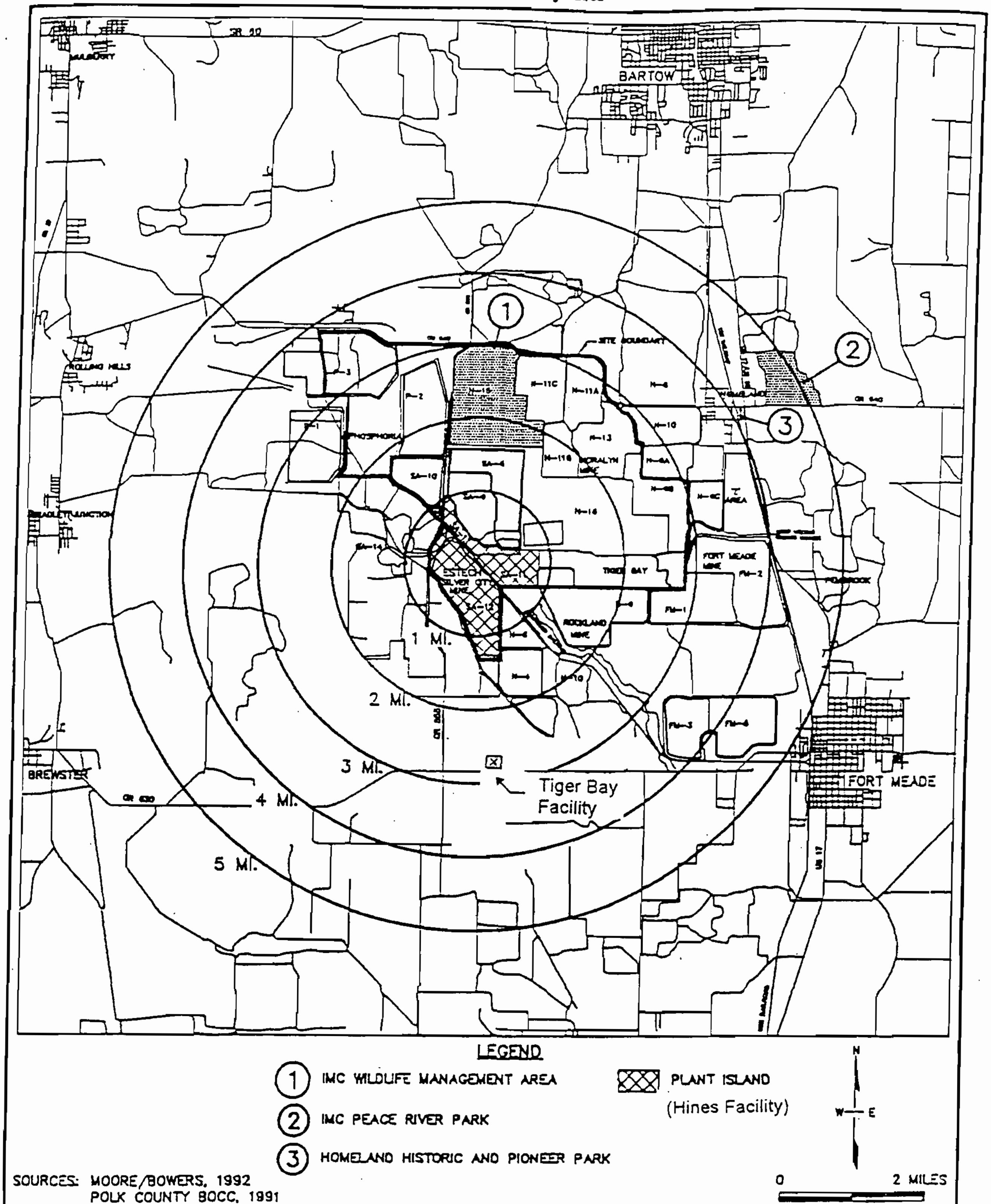
Florida Power CORPORATION

Polk County Site

FIGURE 2 - 1

GOVERNMENTAL JURISDICTIONS WITHIN FIVE MILES OF THE PLANT ISLAND

Best Available Copy



Florida Power CORPORATION

Polk County Site

FIGURE 2 - 2

PARKS AND RECREATION AREAS WITHIN FIVE MILES OF THE PLANT ISLAND

2.2.2 Zoning and Land Use Plans

This site is located within an existing industrial complex which is zoned PM- Phosphate Mining. The facility received the following development approvals from Polk County prior to construction:

1. **Non-Certified Electric Power Generating Facility Site Approval: SA-92-01** (approved November 17, 1992)

2. **Conditional Use Permit: CUP-92-17** (approved November 17, 1992)

3. **Commercial Site Plan** (approved on November 23, 1992)

Both the Non-Certified Electric Power Generating Facility Site Approval (SA-92-01) and the Conditional Use Permit (CUP-92-17) were approved under the April 9, 1991, version of the Polk County Comprehensive Plan. The Commercial Site Plan review was approved under the November 19, 1992, version of the Comprehensive Plan. Attachments 2-1 and 2-2 are copies of these approvals. Attachment 2-3 is a letter from the Polk County Board of Commissioners listing the approval dates of these permits.

There will not be any changes to these approvals based on this application.

2.2.3 Demography and Ongoing Land Use Plan

Two municipalities, Bartow and Fort Meade, are located within 5 miles of the Tiger Bay facility. The city of Bartow, with a population of 14,716 according to the 1990 census, is the county seat and the third largest city in Polk County. The city of Fort Meade had a 1990 population of 4,976.

Attachment 2-4 illustrates the rate of population growth from 1960 to 1990 in Florida and in Polk County. Polk County's comprehensive plan lists population data for the unincorporated area and the total county dating back to 1950. The plan projects total population in Polk County to reach 546,700 in the year 2000, followed by an increase to 599,400 in 2005, and to 648,400 in the year 2010.

The area surrounding the Tiger Bay facility has been dominated by phosphate mining operations. Most of the area within a 5-mile radius of the plant consists of land being actively mined, unreclaimed mining land, and lands in various stages of reclamation. Other land uses found within a 5-mile radius include pastureland, citrus groves, as well as limited residential, commercial, and industrial uses. Attachment 2-5 is a copy of the Impact Assessment Statement of the facility that was prepared for Polk County. Map number C-3, which is on page 35 of the document, shows the land uses in the vicinity of Tiger Bay.

The land use in the southwestern portion of Polk County is in transition. The phosphate industry has completed mining many of the phosphate deposits in Polk County. The county's comprehensive plan includes an objective of diversifying the county's economy by recruiting non-traditional industries and working with the phosphate industry to determine the feasibility of using phosphate lands for uses that enhance the county's economic base. Future land use is shown on Map C-1 of Attachment 2-5.

2.2.4 Easements, Title, Agency Works

This section is not applicable to the request in this application.

2.2.5 Regional Scenic, Cultural and Natural Landmarks

This section is not applicable to the request in this application.

2.2.6 Archaeological and Historic Sites

See Attachment 2-8 for a summary of the archeological resources in the plant area.

2.2.7 Socioeconomics and Public Services

This section is not applicable to the request in this application; however, a complete discussion is included in the PPSA application for the FPC Polk County Project (Hines facility).

2.3 BIO-PHYSICAL ENVIRONMENT

2.3.1 Geohydrology

This section is not applicable to the request in this application.

2.3.2 Subsurface Hydrology

This section is not applicable to the request in this application.

2.3.3 Site Water Budget and Area Uses

The water use of the Tiger Bay facility will not change as a result of the proposed increase in steam capacity. As previously discussed, the additional steam is already being generated. Under FPC's proposal, the steam will be utilized to generate electricity in the steam turbine rather than being vented to the atmosphere.

Attachment 2-6 is a copy of the Water Use Permit issued to the facility by the Southwest Florida Water Management District (SWFWMD) identifying plant water use.

2.3.4 Surficial Hydrology

Attachment 2-7 is a copy of the NPDES General Permit. The proposed use of additional steam capacity will not change this aspect of the plant's operation.

2.3.5 Vegetation / Land Use

This section is not applicable to the request in this application.

2.3.6 Ecology

Attachment 2-8 is a copy of an Ecological/Archaeological/Historical Resource Assessment of the Tiger Bay Cogeneration Facility Site that was prepared for DESTEC Energy prior to construction of the facility.

2.3.7 Meteorology and Ambient Air Quality

The meteorology of the area is discussed in Attachment 2-9. This attachment, which is an excerpt from FPC's Hines facility PPSA application, also describes the general ambient air quality of southwestern Polk County.

2.3.8 Noise

Attachment 2-10, which is a noise survey report prepared by KBN Engineering and Applied Sciences, discusses the ambient noise levels of the general area surrounding the Tiger Bay facility. The survey specifically analyzed the effects of the operation of the plant on the nearby U.S. Agri-chem plant. The results of the analysis showed that noise levels will remain below the OSHA 8-hour threshold. The proposed additional capacity use will not increase ambient noise levels in the area surrounding the plant.

2.3.9 Other Environmental Features

This section is not applicable to the request in this application.

CHAPTER 3

THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

Section/Title

3.1 BACKGROUND

The Tiger Bay Cogeneration facility began commercial operation on January 1, 1995. It consists of a 184-MW combustion turbine and a steam turbine generator that is currently limited to 74.9 MW. The capacity of the steam turbine is actually 10 to 15 MW higher. FPC proposes to use the additional steam capacity, resulting in energy conservation without any additional impact to the environment or the consumption of natural resources, such as fuel and water.

The facility is currently fully permitted and approved under federal, state, and local planning and permitting authority. Because of the proposed use of the additional steam capacity, which invokes the PPSA process, FPC is seeking to consolidate the current permits and approvals into a single PPSA site certification for the Tiger Bay facility.

3.2 SITE LAYOUT

The facility is located on a 6.2-acre tract of land that is leased from USAC. Refer to figure 3-1 for a site layout.

3.3 FUEL

The combustion turbine at this facility is permitted to combust pipeline natural gas as the primary fuel for 8,760 hours of operation per year. Florida Gas Transmission (FGT) is the supplier of the natural gas for this facility. The air permit also allows the combustion turbine to burn low sulfur (0.05% S) distillate fuel oil as the secondary fuel up to 3,742,327 gallons per calendar year (300 hours of full-load operation).

3.4 AIR EMISSIONS AND CONTROLS

The following air permits are in effect for the Tiger Bay Cogeneration Facility:

- **FDEP AC-53-214903 / PSD-FL-190 - A 258 MW Cogeneration Facility**
- **FDEP AO53-261950 - Wastewater Treatment System Spray Dryer with Baghouse**

Attachments 3-1 and 3-2, respectively, are copies of the above referenced permits. The Title V application, which incorporates these two air emission permits, was submitted on June 13, 1996.

3.4.1 Air Emissions Types and Sources

Attachment 3-1 is a copy of the facility's Prevention of Significant Deterioration (PSD) permit, which describes the air emissions sources and quantifies the pollutant emissions. In addition, Attachment 3-2 is a copy of the air operation permit for the zero liquid discharge (ZLD) system, which handles any liquid wastes from the plant.

3.4.2 Air Emissions Controls

Please refer to Attachments 3-1 and 3-2 for a description of the low-NOx burner firing system on the combustion turbine and the spray dryer emission controls on the ZLD system.

105 0223-005-cc (1)

Figure 3-1 Site Layout

REFERENCE DRAWINGS

NO.	DATE	REVISION	BY	APPROVED
G	9-16-92	REVISED PER COMMENT	REH	CJR
F	9-3-92	REVISED PER COMMENT	REH	CJR
E	8-14-92	REVISED PER COMMENT	REH	RWH
D	7-8-92	FINAL ISSUE FOR ESTIMATE	REH	RWH
C	6-18-92	REVISED PER COMMENTS - ISSUED FOR ESTIMATE	REH	RWH
B	6-1-92	REVISED LAYOUT	REH	RWH
A	4-1-92	ISSUED FOR PROPOSAL	BHG	RWH

SCALE: 1"=30'		
DWN. BHG	DATE 3-31-92	
CHK. CWL	DATE 4-1-92	
APPV. RWH	DATE 4-1-92	

DESTEC ENGINEERING

TIGER BAY COGEN
PLOT PLAN

PROJECT NO.: 1253
CLIENT: CENTRAL FLORIDA POWER, L.P.
DWG. NO.: 1253-G-101.01 REV. 0

3.4.3 Best Available Control Technology

The Best Available Control Technology (BACT) determination is part of the PSD permit, which is contained in Attachment 3-1.

3.4.4 Design Data for Control Equipment

Since the control equipment design has already been approved by issuance of the PSD permit, this section is not applicable to the request in this application.

3.4.5 Design Philosophy

Since the design philosophy has already been reviewed and approved by issuance of the PSD permit, this section is not applicable to the request in this application.

3.5 PLANT WATER USE

The following water permits are in effect for the Tiger Bay Cogeneration Facility:

- **SWFWMD Water Use Permit - 2010840.00 (Attachment 2-6)**
- **NPDES General Permit No. FLR00B625 (Attachment 2-7)**
- **The facility has been given an FDEP "de minimis" exemption for the industrial wastewater, since this is a zero-discharge system. (Attachment 3-3)**
- **Polk County Septic Tank Permit (Attachment 3-4)**
- **Polk County Drinking Water Registration (Attachment 3-5)**

3.5.1 Heat Dissipation System

The heat dissipation system consists of a heat recovery steam generator (HRSG) and a cooling tower system. These are described in greater detail in the following sections.

3.5.1.1 System Design

Heat from the combustion turbine exhaust is used by the HRSG to produce steam that is then used to generate electricity from the steam turbine. Current steam turbine capacity is voluntarily limited to 74.9 MW. FPC is proposing to use the additional 10 to 15 MW of steam turbine capacity that are available.

A mechanical induced draft cooling tower system is used to cool process water from the HRSG. The source of this water is described below. The water from the cooling tower that remains after evaporation and drift is then recycled back to the steam condenser to again cool the process water from the HRSG, with no off-site discharge.

3.5.1.2 Source of Cooling Water

A sixteen-inch diameter, 800 feet deep well exists and is in use on site to satisfy the process water requirements. Please refer to the SWFWMD Water Use Permit contained in Attachment 3-3 for the approval of this well.

Boiler blowdown from the HRSG, and wastewater from the dewatering skid and oil/water separator are discharged to the recycle sump, and then routed to the cooling tower as makeup water.

3.5.1.3 Dilution System

This section is not applicable to the request in this application.

3.5.1.4 Blowdown, Screened Organisms, and Trash Disposal

Blowdown of the cooling tower and the heat recovery boiler is necessary to prevent a buildup of dissolved solids from scaling the recirculating water system. This wastewater is then treated and recycled using the ZLD system or it is sent to USAC's Ft. Meade Chemical Plant to be used in their process. This process is permitted under the facility's Industrial Wastewater Permit, which is contained in Attachment 3-5. No screened organisms or trash result from the cooling water system.

3.5.2 Domestic / Sanitary Wastewater

The domestic and sanitary wastewater from this facility is routed by gravity flow to a septic tank that is located in the southwest corner of the facility next to the temporary parking. Refer to Figure 3-1 for a copy of the site layout. The facility has received a Septic Tank Permit from Polk County for the operation of this system. Refer to Attachment 3-6 for a copy of this permit and its application.

3.5.3 Potable Water Systems

A drinking water registration for the Tiger Bay facility is currently being processed by Polk County. Attachment 3-7 is a copy of the application, which was submitted by FPC on July, 7 1997. A four-inch diameter, 500 feet deep well exists and is in use on site to satisfy the potable water requirements. The potable well water is treated with liquid hypochlorite prior to storage in an aboveground tank.

3.5.4 Process Water Systems

There are two types of industrial wastewater generated at the Tiger Bay facility, which are process wastewater and impacted stormwater runoff. Process wastewater consists of cooling water blowdown, blowdown from the heat recovery boiler, condensate wastewater, and maintenance wash water from floor drains. Impacted stormwater runoff consists of rainfall that has contacted industrial processes. The impacted stormwater is completely contained and recycled as process water or enters the process wastewater stream directly.

Tiger Bay can operate a zero liquid discharge (ZLD) system for the treatment of the facility's industrial wastewater and then recycle this water back into the process water stream. Tiger Bay also routes their wastewater to a 1.4 million gallon holding tank and then to USAC's Ft. Meade Chemical Plant, where the wastewater is used in their process. Tiger Bay releases no process water discharges to either surface water or groundwater.

3.6 CHEMICAL AND BIOCIDE WASTE

This section is not applicable to the request in this application.

3.7 SOLID AND HAZARDOUS WASTES

3.7.1 Solid Wastes

The ZLD system produces a salt cake as a result of the drying of the wastewater discharge. This material is non-hazardous and is sent to the Polk County landfill for disposal.

The sanitary waste from the facility is picked up by Browning-Ferris Industries (BFI) and delivered to the Polk County landfill.

3.7.2 Hazardous Wastes

FPC requested and was granted approval as a conditionally exempt small quantity generator for this facility. Attachment 3-6 is a copy of the application and the approval.

3.8 ON-SITE DRAINAGE SYSTEM

The Tiger Bay facility on-site drainage system is currently permitted under the FDEP Industrial Wastewater Permit and the NPDES General Permit, which are included as Attachments 3-3 and 2-7, respectively, to this application. The facility also has a stormwater management plan, a Best Management Practices (BMP) Plan and a Spill Prevention, Control, and Countermeasures (SPCC) Plan. All of these plans are in effect. Refer to figure 3-2 for a copy of the Tiger Bay Plant Drainage Plot Plan.

3.9 MATERIALS HANDLING

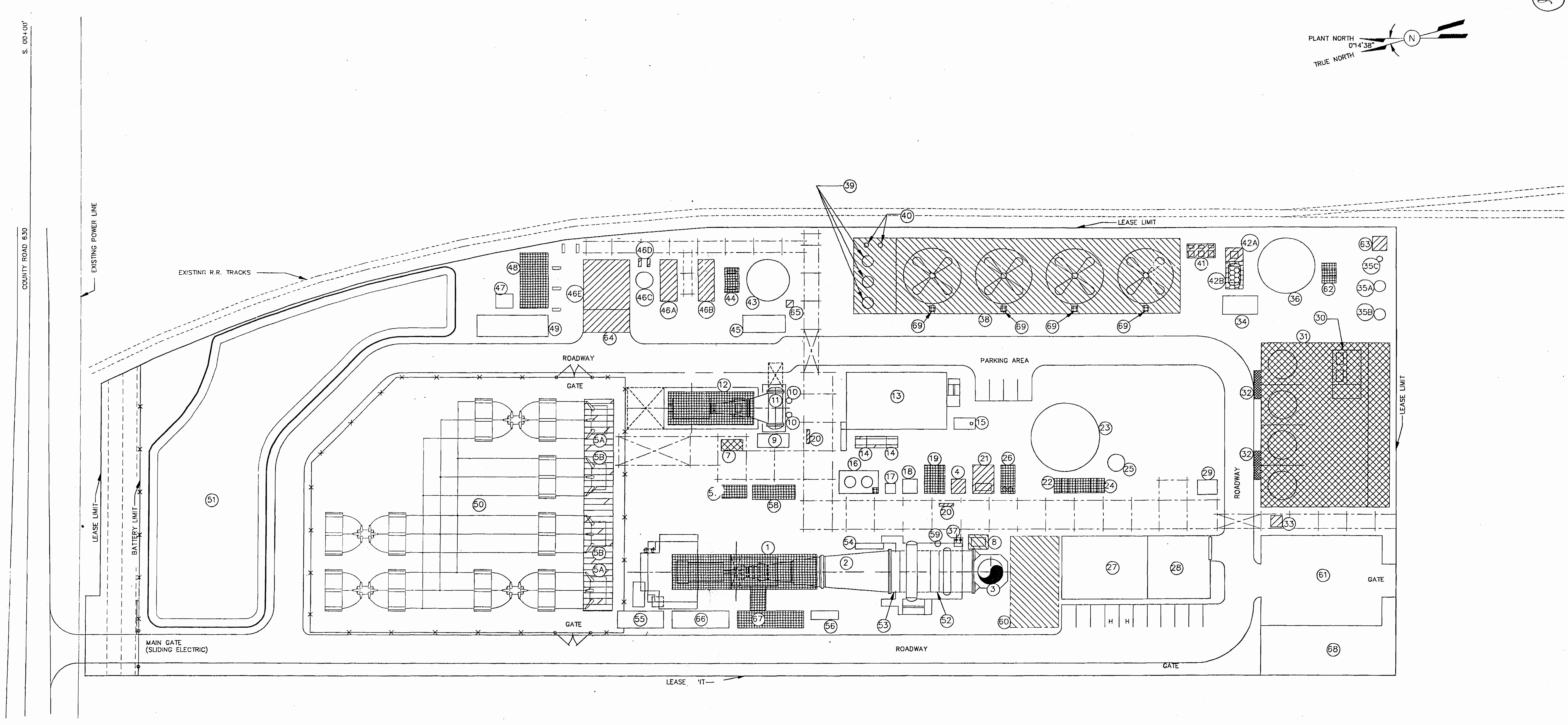
Water treatment chemical storage tanks are surrounded by closed diked areas. Side valves on the diked areas allow controlled discharge of rainwater to the recycle sump.

One above ground tank is located on the site, used for the storage of lubricating oil. Inventory does not exceed 9,500 gallons. The storage tank was designed with welded steel construction in accordance with ASME standards. The lube oil storage tank is surrounded by a concrete dike draining to the Oil/Water Separator. The dike has been provided with a barrier coating which is impervious to oil. Plant operators visually inspect the tank for leaks and volume during their rounds.

There is also one, 10,000 gallon, sulfuric acid storage tank. The sulfuric acid is used for pH control of the cooling water. This tank was manufactured in accordance with all applicable ASME codes and standards. The tank is surrounded by a dike which is capable of retaining the full contents, plus a rainfall event. Plant operators visually inspect the tank during each shift for leaks and shifts in volume.

Trucks deliver water treatment chemicals and oil to the site. The plant has a written procedure for truck unloading to ensure safety and minimization of potential for spills.

(2)



ITEM LEGEND

1 GAS TURBINE GENERATOR
2 HEAT RECOVERY BOILER
3 STACK
4 CONTINUOUS EMMISSIONS MONITORING SYSTEM (CEMS)
5A MAIN TRANSFORMERS (SWITCHYARD)
5B AUXILLIARY TRANSFORMERS (SWITCHYARD)
6 DELETED
7 LUBE OIL SKID
8 OIL/WATER SEPARATOR AND SUMP
9 EJECTOR SYSTEM
10 CONDENSATE PUMPS
11 CONDENSER
12 STEAM TURBINE GENERATOR
13 CONTROL ROOM BUILDING
14 AUXILLIARY TRANSFORMERS
15 STANDBY GENERATOR
16 WATER POLISHER SKID
17 PRECOAT SKID
18 DEWATER SKID
19 BOILER FEEDWATER PUMPS
20 SAMPLE COOLER SKIDS (2)
21 BOILER CHEMICAL FEED SKID
22 NOX WATER TRANSFER PUMPS
23 POLISHED WATER STORAGE TANK
24 RETURN CONDENSATE PUMPS
25 RETURN CONDENSATE TANK
26 AIR COMPRESSOR SKID
27 ADMINISTRATION BUILDING
28 MAINTENANCE SHOP
29 OFFSITE METERING AREA BUILDING
30 FUEL OIL AND LUBE OIL TRANSFER AND STORAGE
31 FUEL OIL TANK STORAGE AREA
32 FUEL OIL LOADING STATIONS
33 FOAM GENERATOR
34 FIRE HOUSE BUILDING WITH PUMPS
35A SERVICE WATER WELL PUMP
35B SERVICE WATER WELL PUMP
35C POTABLE WATER WELL PUMP
36 SERVICE WATER/FIRE WATER TANK
37 RECYCLE WATER SUMP & PUMPS
38 COOLING WATER TOWER (4 CELLS)
39 CIRCULATING WATER PUMPS
40 AUXILLIARY COOLING WATER PUMPS
41 CWT CHEMICAL TREATMENT SKIDS
42A ACID TRANSFER PUMPS
42B ACID STORAGE TANK
43 WASTEWATER STORAGE TANK
44 WASTEWATER PUMPS
45 ZLD CONTROL BUILDING
46A BRINE CONCENTRATOR
46B BRINE CONCENTRATOR
46C CONCENTRATED BRINE TANK
46D BRINE TRANSFER PUMPS
46E SPRAY DRYER
47 GAS CHROMATOGRAPH BUILDING
48 FUEL GAS FILTER/SEPARATOR
49 FUEL GAS METERING AREA
50 ELECTRICAL SWITCH YARD
51 LINED STORMWATER MANAGEMENT POND
52 SCR SPOOL
53 CO SPOOL
54 DUCT BURNER SKID
55 GENERATOR AUXILLIARY COMPARTMENT
56 CO2 FIRE PROTECTION SKID
57 GTG WATER WASH SKID
58 GTG WATER INJECTION SKID
59 BOILER BLOWDOWN TANK
60 GTG MAINTENANCE LAYDOWN AREA
61 TEMPORARY PARKING
62 SERVICE WATER PUMPS
63 POTABLE WATER SKID
64 DUMPSTERS
65 CHEMICAL SUMP AND PUMPS
66 PACKAGED ELECTRICAL & ELECTRONIC CONTROL CENTER (PEECC)
67 MECHANICAL CONTROL COMPARTMENT (MAC)
68 DRAIN FIELD/SEPTIC TANK AREA
69 CWT FAN GEAR BOX DRIP PANS (4)

LEGEND – FLUID DESTINATION

- VALVE CLOSED / PROCESS – TO OIL / WATER SUMP
- OPEN VALVE / PROCESS – TO CHEMICAL SUMP OR W.W. STORAGE TANK
- NON – PROCESS (YARD DRAINAGE) TO STORM SYSTEM.
- VALVE OPEN – TO OIL / WATER SUMP
- VALVE CLOSED / NORMALLY CLEAR WATER GOES TO STORM SYS. / PUMP OUT OIL SPILLS.
- OPEN DRAIN / TO OIL / WATER SUMP
- VALVE CLOSED / NORMALLY GOES TO CHEMICAL SUMP /PUMP OUT SPILLS

Figure 3-2

0' 100' 200'

NOTE: COOLING TOWER BLOWDOWN IS ROUTED TO WASTE WATER STORAGE TANK

REFERENCE DRAWINGS

NO.	DATE	REVISION	BY	APPROVED	NO.	DATE	REVISION	BY	APPROVED

SCALE: 1"=30'
DWN. BHG DATE 9-23-92
CHK. DATE
APPV. DATE

DESTEC ENGINEERING

TIGER BAY COGEN
PLANT DRAINAGE PLOT PLAN

PROJECT NO.: 1253
CLIENT: CENTRAL FLORIDA POWER, L.P.
DWG. NO.: SK-1253-G-101.03
REV.

DWG NO. SK-1253-G-101.03

CHAPTER 4

ENVIRONMENTAL EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

Section/Title

4. ENVIRONMENTAL EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

This section of the application is not applicable since the Tiger Bay Cogeneration Facility is an existing facility and all construction activities have ended. Commercial operation of this facility began in January of 1995.

The additional generation capacity requested in this application will not result in any modification to the existing steam generator or any additional construction. There will only be a change in the control system setting that regulates how much of the extra steam is vented.

CHAPTER 5

EFFECTS OF PLANT OPERATION

<u>Section/Title</u>

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

5.1.1 Temperature Effect on Receiving Body of Water

Since there is no surface discharge, this section is not applicable to the request in this application.

5.1.2 Effects on Aquatic Life

This section is not applicable to the request in this application.

5.1.3 Biological Effects of Modified Circulation

This section is not applicable to the request in this application.

5.1.4 Effects of Offstream Cooling

The cooling tower receives heated water from the heat recovery boiler. Approximately 5% of the water is lost to evaporation, and the remaining 95% is reused as process water. Emissions from the cooling tower are limited to steam. No other effects from the cooling process occur.

5.1.5 Measurement Program

This section is not applicable to the request in this application.

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

5.2.1 Industrial Wastewater Discharges

Industrial wastewater discharges are discussed in Section 3.5.4. In addition, the FDEP Industrial Wastewater permit (Attachment 3-3) addresses this subject. There are no industrial wastewater discharges to surface water or groundwater.

5.2.2 Cooling Tower Blowdown

Cooling tower blowdown can be treated by the ZLD system and then be reused in the steam cycle. However, most of the wastewater is sent to the 1.4MG holding tank before it is forwarded to USAC's Ft. Meade Chemical plant to be used in their process.

5.2.3 Measurement Programs

The flow from the wastewater storage tank to the ZLD system is measured using an in-line totalizing flow meter.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 Surface Water

Tiger Bay is a zero discharge facility for industrial wastewater and contact stormwater. Non-contact stormwater has been authorized under the DEP Industrial Wastewater stormwater and NPDES permits.

5.3.2 Groundwater

Attachment 3-3 contains the SWFWMD Water Use Permit for the Tiger Bay facility. Groundwater impacts were analyzed and authorized under this permit.

5.3.3 Drinking Water

As discussed in Section 3.5.3, a drinking water registration application is currently being processed by Polk County.

5.3.4 Leachate and Runoff

This facility is a zero-discharge facility and there are no industrial wastewater discharges to the surface water or groundwater.

5.3.5 Measurement Program

This section is not applicable to the request in this application.

5.4 SOLID/HAZARDOUS WASTE DISPOSAL IMPACTS

5.4.1 Solid Wastes

There will be no additional wastes generated due to the request in this application.

5.4.2 Hazardous Wastes

FPC requested and was granted approval from FDEP as a conditionally exempt small quantity generator for this facility. Attachment 3-6 is a copy of the application and the approval. There will be no additional wastes generated due to the request in this application.

5.5 SANITARY AND OTHER WASTE DISCHARGES

There will be no additional sanitary wastes generated due to the request in this application. The existing permitted septic system remains adequate.

5.6 AIR QUALITY IMPACTS

Air Quality impacts of the Tiger Bay facility will not change as a result of the increase in steam capacity utilization. The maximum air quality impacts were quantified in the PSD permit application for the facility, which is included as Attachment 5-1 to this application, and permitted under the PSD permit, which is Attachment 3-1.

5.7 NOISE

An ambient noise impact analysis was performed by KBN Engineering and Applied Sciences (now Golder Associates) during the original permit application process. The analysis examined the impacts of operating either a GE or Westinghouse turbine. The GE combustion turbine was actually installed and is in operation. The results of the noise analysis showed that minimal impact from the operation of the facility will occur when compared to the background ambient noise level. The complete noise analysis report is contained in Attachment 2-10.

5.8 CHANGES IN NON-AQUATIC SPECIES POPULATIONS

This section is not applicable to the request in this application.

5.9 OTHER PLANT OPERATION EFFECTS

The Tiger Bay facility has no other substantive effects on the environment surrounding the plant. The only effect from the proposed use of the additional steam capacity will be to generate an additional 10 to 15 MW of electricity from the steam turbine. The plant's operation effects are fully discussed in Attachment 2-5.

5.10 ARCHAEOLOGICAL SITES

This section is not applicable to the request in this application.

5.11 RESOURCES COMMITTED

This section is not applicable to the request in this application.

5.12 VARIANCES

This section is not applicable to the request in this application.

CHAPTER 6

TRANSMISSION LINES AND OTHER LINEAR FACILITIES

Section/Title

6.0 TRANSMISSION LINES AND OTHER LINEAR FACILITIES

This section of the application is not applicable to this request because the transmission facilities are already in existence and no changes are required.

CHAPTER 7

ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

Section/Title

7.0 ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

The construction and operation of the Tiger Bay facility have had a positive economic and social impact on Polk County. A total of approximately 19 to 22 individuals are employed at the facility, and the plant adds to the county's tax base. The facility's impact to the Polk County population is discussed in greater detail on pages 22 - 25 of Attachment 2-5.

CHAPTER 8

SITE AND PLANT DESIGN ALTERNATIVES

Section/Title

8.0 SITE AND PLANT DESIGN ALTERNATIVES

This section of the application is not applicable to this request because the cogeneration facility is already in existence.

CHAPTER 9

COORDINATION

Section/Title

9. COORDINATION

The following individuals have been contacted regarding this PPSA certification application:

Name	Agency	Telephone Number
Hamilton Oven	DEP	(850) 487-0472
Steven Palmer	DEP	(850) 487-0472
Paul Darst	DCA	(850) 488-4925
Michael Balser	SWFWMD	(941) 534-1448
Brian Sodt	CFRPC	(941) 534-7130
Merle Bishop	Polk Co.	(941) 534-6084
Douglas Bailey	FGFWFC	(850) 488-6661
Robert Trappe	Florida PSC	(850) 413-6632

CHAPTER 10

ATTACHMENTS

Section/Title

10.0 ATTACHMENTS

Attachment No.	Title
1 - 1	Petition for Need
2 - 1	Polk County Site Approval (SA-92-01) and Conditional Use Permit (CUP-92-17)
2 - 2	Polk County Commercial Site Plan Approval
2 - 3	Polk County Letter listing approval dates
2 - 4	Population Growth Chart
2 - 5	Impact Assessment Statement
2 - 6	SWFWMD Water Use Permit (2010840.00)
2 - 7	NPDES General Permit (FLR00B625)
2 - 8	Ecological / Archaeological / Historical Resources Assessment
2 - 9	Meteorology and Ambient Air Quality excerpt from Hines Application
2 - 10	Noise Survey
3 - 1	FDEP PSD Permit (AC53-214903 / PSD-FL-190) and amendment
3 - 2	Spray Dryer Air Permit (AO53-261950)
3 - 3	Industrial Wastewater exemption letter from FDEP and Industrial Wastewater Permit (IC53-221795A)
3 - 4	Polk County Septic Tank Permit (53-0004-98I/M)
3 - 5	Polk County Drinking Water Registration Application
3 - 6	EPA Hazardous Waste Status Application
5 - 1	FDEP PSD Application

ATTACHMENT 1 - 1

PETITION FOR NEED

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition to Determine Need for Existing Tiger Bay Electrical Power Plant and Nominal Electrical Capacity Increase to that Plant by Florida Power Corporation.	Docket No. Submitted for filing: August 18, 1997

FLORIDA POWER CORPORATION'S PETITION TO DETERMINE NEED FOR EXISTING TIGER BAY ELECTRICAL POWER PLANT AND NOMINAL ELECTRICAL CAPACITY INCREASE TO THAT PLANT

Florida Power Corporation ("Florida Power"), hereby petitions the Florida Public Service Commission (the "Commission") pursuant to Section 403.519, F.S., and Rule 25-22.081, F.A.C., to (1) determine the need for the existing Tiger Bay cogeneration facility and a nominal increase in the electrical capacity of that facility, (2) file its order making that determination with the Florida Department of Environmental Protection ("DEP") pursuant to Section 403.507, F.S., and (3) waive the application of Rule 25-22.082, F.A.C., as provided in Rule 25-22.082(9), F.A.C., and Section 120.542, F.S.

Because Florida Power proposes to increase the electrical output from the existing steam turbine over 75 megawatts, DEP is requiring that the facility be certified in accordance with the applicable provisions of the Power Plant Siting Act ("PPSA") -- including Section 403.519, which requires a need determination by the Commission. To satisfy this literal reading of the PPSA, Florida Power submits this Petition.

As discussed more fully below, the Commission has, as a practical matter, previously determined the need for the Tiger Bay cogeneration facility's electrical capacity in other dockets. Additionally, Florida Power's proposed use of a nominal 10-12 megawatts of additional steam electric capacity (simply by using steam currently vented and increasing steam pressure) at the facility constitutes a de minimis increase in Florida Power's approximate 7,000 megawatt statewide capacity. Moreover, the nominal capacity increase would impose no additional costs on the ratepayer, involve no additional equipment or operational changes to the facility, and produce no increased emissions or other environmental impact. Furthermore, the fuel savings ratepayers will receive from this capacity increase are expected to exceed $14.2 million over the next ten years. For these reasons, Florida Power believes that the Commission should grant the Petition. Because the Commission has, as a practical matter in prior Orders, already determined the need for the Tiger Bay facility, and given the de minimis increase in that facility's capacity sought by Florida Power, Florida Power further requests that the Commission expedite its review of this Petition.

I. Background

Florida Power is an investor-owned utility that provides electric service to more than 1.2 million customers in its service area, maintains its principal place of business at 3201 34th Street South, St. Petersburg, Florida 33711, and is subject to the Commission's regulatory jurisdiction pursuant to Chapter 366, F.S. All pleadings, notices, orders or other documents required to be served in this docket should be addressed to the undersigned counsel.

As authorized by Rule 25-22.080(1), F.A.C., Florida Power commences this need determination proceeding prior to filing its Tiger Bay facility site certification application with DEP. Florida Power expects to file its site certification with DEP this month. Section 403.519, F.S., and Rules 25-22.080 to 25-22.081, F.A.C., vest the Commission with exclusive jurisdiction to determine the need for the Tiger Bay facility and the nominal capacity increase, applying the standards set forth in Section 403.519, F.S.

Tiger Bay Limited Partnership completed the construction of the nominally rated 220 megawatt Tiger Bay cogeneration facility in late 1995. The facility consists of a combustion turbine and a separate steam turbine. Because the steam turbine was specifically operated to not produce more than 75 megawatts, the plant was not subject to the PPSA. Florida Power believes, however, that the steam turbine is capable of producing approximately 85.5 net megawatts simply by changing a computer program to alter the control set points on the steam turbine and operate the system at a 5% increased pressure level.

Between 1988 and 1991, Florida Power entered into five purchased power agreements with qualifying facilities for a total committed capacity of 217 megawatts, which were ultimately served by the Tiger Bay facility. The Commission reviewed and approved those contracts and, in so doing, essentially determined that such capacity was needed. See, e.g., In re: Joint petition for approval of cogeneration contract between Florida Power Corporation and General Peat Resources, L.P., Docket No. 890915-EQ, Order No. 22473 (Jan. 1, 1990) (in approving the contract, the Commission held that "there are indicated capacity needs from both a utility and a statewide perspective in 1995."). Copies of this and the other Commission Orders approving the contracts are appended hereto as Exhibit 1.

Tiger Bay Limited Partnership acquired the interests in these five purchased power contracts by assignment from each of the original qualifying facility entities. Consequently, Florida Power received the electrical output of the Tiger Bay cogeneration facility.

On August 29, 1991, the Commission approved FPC's statewide generation expansion plans consisting of, among other things, "500 MW of purchased power in 1995 . . . ." In re: Planning Hearings on Load Forecasts Generation Expansion Plans, and Cogeneration Prices for Florida's Electric Utilities, Docket No. 910004-EU, Order No. 24989 (Aug. 29, 1991), a copy of which is appended hereto as Exhibit 2. This 500 megawatts included the purchased power from the Tiger Bay cogeneration facility through the assignment of the purchased power agreements from the individual qualifying facilities to Tiger Bay Limited Partnership.

On January 20, 1997, Florida Power agreed to purchase the Tiger Bay facility from the Tiger Bay Limited Partnership and terminate the five related purchased power agreements. Florida Power sought the Commission's approval of the agreement, requested recovery of the facility purchase cost, and requested that the fuel expense associated with the operation of the Tiger Bay facility be approved for recovery through the Fuel Clause. Florida Power and two intervenors executed a stipulation, which resolved all disputed issues. On June 9, 1997, the Commission approved the stipulation and Florida Power's purchase of the Tiger Bay facility and termination of the five purchased power contracts stating that "the Stipulation reduces FPC's ratepayers' liability throughout the remaining term of the [purchased power agreements and] . . . represents a reasonable balance between potential ratepayer neutrality to the transaction and encouragement of company contributions." In re: Petition for expedited approval of agreement with Tiger Bay Limited Partnership to purchase Tiger Bay cogeneration facility and terminate related purchased power contracts by Florida

Power Corporation, Docket No. 970096-EQ, Order No. PSC-97-0652-S-EQ (June 9, 1997) at page 2, a copy of which is appended hereto as Exhibit 3.

II. A Need Exists For The Tiger Bay Cogeneration Facility And De Minimis Increase In Capacity As Recognized In Previous Commission Orders

In making a need determination, Section 403.519, F.S., requires the Commission to take into account five factors:

(1) the need for electric system reliability and integrity;

(2) the need for adequate electricity at a reasonable cost;

(3) whether the proposed plant is the most cost-effective alternative method;

(4) the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant; and

(5) other matters within its jurisdiction which it deems relevant.

The existing facility and the de minimis increase in rated capacity meet the statutory requirements.

As noted above, the Commission, on several occasions, has acknowledged the need for the capacity provided by the Tiger Bay cogeneration facility. The Commission's approval of Florida Power's five cogeneration contracts, its statewide load forecasts and generation expansion plans (which included all of Florida Power's purchased power contracts), and its recent approval of Florida Power's purchase of the Tiger Bay facility, for all practical intents and purposes, are tantamount to a determination of need for the facility. For example, factors 1 through 3 above, certainly were addressed in the statewide need determination and in the Commission's initial approval of Florida Power's purchased power contracts. See Exhibits 1 and 3. Moreover, the Commission's approval of

Florida Power's purchase of the Tiger Bay facility and recovery of fuel costs through the Fuel Clause, also necessarily implies that there is a need for the facility and that it is the most cost-effective alternative available to meet Florida Power's capacity requirements taking into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, and other relevant matters.

The PPSA requires consideration of conservation measures available to mitigate the need for a proposed plant. The Tiger Bay facility constitutes a conservation measure by statutory definition. Obtaining capacity from cogeneration facilities is a recognized conservation measure pursuant to §366.82, F.S. Specifically, §366.82(2) provides that goals to be adopted by the Commission include those designed to "[increase] the development of cogeneration ... ." Moreover, §366.82(3) provides that "Utility programs may include variations in rate design, load control, <u>cogeneration</u>, residential energy conservation subsidy, or any other measure within the jurisdiction of the commission which the commission finds likely to be effective ... ." The Tiger Bay facility, by its very nature, satisfies this goal because it is a conservation measure and the added nominal megawatts is an enhancement of that conservation measure.

Similarly, the nominal 10-12 megawatt increase also represents the most cost-effective alternative to new construction or purchase of power from all feasible and prudent alternatives. Florida Power proposes to increase the capacity a nominal 10-12 megawatts simply by changing a computer program to alter the set points on the steam turbine. This will result in capturing steam that is currently being vented and increase steam pressure by 5%, will not involve any material operational changes or equipment expansions to the plant, and will be accomplished at no additional cost to the ratepayer. This enhancement will bring more benefits, in the form of additional, reliable power, to Florida Power's customers at no additional cost. Indeed, in this regard, Florida Power will be able to substitute this additional no-cost power for the more expensive power generated from its other generation sources, thus passing on additional savings to its ratepayers. Attached hereto as Exhibit 4 is a detailed analysis of the expected savings over ten years with an additional 10 megawatts of load increase at the Tiger Bay facility. The savings are based on a blend of seven (7) months at 10 additional megawatts and five (5) months at six (6) megawatts. This nominal increase in the megawatts produces approximately $14,256,000.00 in cumulative savings to ratepayers over ten years.

III. Waiver Of The Rule 25-22.082, F.A.C., Requirements Is Warranted

Rule 25-22.082(2), F.A.C., requires an investor-owned electric utility to evaluate supply-side alternatives to its next planned generating unit by issuing a Request for Proposals ("RFP") prior to filing a petition for determination of need under Section 403.519, F.S. Recent amendments to the Florida Administrative Procedure Act, however, authorize state agencies to grant waivers to requirements of their rules when:

> the purpose of the underlying statute will be or has been achieved by other means by the person and when application of a rule would create a substantial hardship or would violate principles of fairness.

Given the unique nature of the circumstances requiring this Petition -- determining the need for an <u>existing</u> facility and for a nominal capacity increase to that facility

-- Florida Power believes that a waiver of the requirements of Rule 25-22.082, F.A.C., is warranted.

As an initial matter, issuing an RFP would be a meaningless exercise. The incremental costs of the Tiger Bay facility are zero, because the plant has already been paid for. No proposal submitted through the RFP process therefore could be better than the existing facility. Waiver of this requirement is thus appropriate on this ground alone. Moreover, the nearly $14.3 million savings expected for ratepayers during the next ten years due to the capacity increase (which will impose no additional cost on the ratepayers) warrants waiver of this requirement as well.

Waiver is also appropriate under the criteria set forth in Section 403.519. First, the purpose of Section 403.519 has been achieved. As demonstrated above and in Exhibits 1-3, the Commission, as a practical matter, has already considered the issues required for a need determination under the PPSA. Waiver of the requirements of Rule 25-22.082, F.A.C., thus will not undermine the purpose of Section 403.519, F.S. Requiring Florida Power, on the other hand, to issue an RFP for alternatives to the already constructed and operating Tiger Bay cogeneration facility makes no logical sense and would be inconsistent with the Commission's prior Orders demonstrating the need for the facility.

Second, application of Rule 25-22.082, F.A.C., would create a substantial hardship for Florida Power. Complying with the RFP requirements of the rule alone would impose a significant financial and administrative burden on Florida Power. Issuing, evaluating and responding to proposals also would create an unnecessarily burdensome and duplicative review of issues considered by the

Commission previously. Thus, the eventual certification of the site would be delayed -- also a significant economic and legal hardship on Florida Power.

WHEREFORE, Florida Power respectfully requests that:

(1) a formal proceeding be held in accordance with Section 120.57(1), F.S.;

(2) the Commission give notice of any hearing and commencement of the proceedings as required by Rule 25-22.080(3), F.A.C.;

(3) the Commission expedite its review of the Petition;

(4) the Commission waive the requirements of Rule 25-22.082, F.A.C. in accordance with subsection (9) of that Rule and §120.542, F.S.;

(5) the Commission submit a final report to DEP under Section 403.507, F.S.; and

(6) the Commission formally determine that there is a continuing need for the Tiger Bay cogeneration facility and a need for an additional, nominal 10-12 megawatts of steam capacity at the facility, and file its order making such determination with DEP in accordance with Section 403.507, F.S.

Respectfully submitted,

OFFICE OF THE GENERAL COUNSEL-
FLORIDA POWER CORPORATION

By ______________________

R. Alexander Glenn
Post Office Box 14042
St. Petersburg, FL 33733-4042
Telephone: (813) 866-5587
Facsimile: (813) 866-4931

ATTACHMENT 2 - 1

POLK COUNTY SITE APPROVAL (SA-92-01) AND CONDITIONAL USE PERMIT (CUP-92-17)

Imperial

Polk County

Board of County Commissioners

DEPARTMENT OF DEVELOPMENT COORDINATION

DEVELOPMENT SERVICES DIVISION
PHIL McLEMORE
Development Services Director

MERLE H. BISHOP
Director

November 20, 1992

Central Florida Power, L.P.
Post Office Box 4411
Houston, Texas 77210-4411

Re: Case File #SA-92-01 (and CUP-92-17)
Property located on south side of County Road 630, 2.3 miles east of County Road 555, Fort Meade, Florida

Dear Gentlemen:

This is to officially notify you of the action taken by the Board of County Commissioners on Tuesday, November 17, 1992, regarding the above captioned request for Site Approval of a Non-Certified Electric Power Generating Facility Permit pursuant to Section 2.125.1 of the Furture Land Use Element in a Rural Conservation (RC) zoning district.

The Board, after due consideration, voted 4/0 to approve the request, subject to the following conditions:

1. The project shall undergo a Commercial Site Plan Review (CSPR). At the time of CSPR the applicant shall demonstrate satisfaction of standards 5, 6 and 7 of Policy 2.125-15 (b) of the Polk County Comprehensive Plan- this shall include satisfaction of all applicable drainage requirements as outlined in Policies 3.104-A5 - 3.104-A8. The review of and determination of satisfaction of standards 5, 6 and 7 shall proceed as indicated by the Polk County Comprehensive Plan, Policy 2.125-15. **

2. Any use of fuel oil beyond that initially permitted by the Florida Department of Environmental Regulation, (FDER) and as reflected in the application for the CUP, shall require and application for and approval of modification to this CUP.

1253 2.1.1.3.1

POST OFFICE BOX 2096 BARTOW, FLORIDA 33830 PHONE (813) 534-6792 FAX (813) 534-6407

3. The applicant shall submit letters furnished by the Polk County Planning Division, to all federal, state and local regulatory agencies having jurisdictional or regulatory control over the applicant's construction or operation of the plant at the time the applicant applies to these agencies. These letters establish the County's interest in participating in the agencies' permitting process. If application has already been made, letters will be supplied to the agencies under separate cover. (PLG)

4. Copies of all Federal, State and local permits required for this project shall be provided to Developement Coordination staff by the time of final development approval, (request for a building permit), from the County. An exception is provided to this requirement for the NPDES stormwater operating (versus construction) permit required for the facility. A copy of that permit shall be provided once received by the applicant, but is not required by time of final development order. (PLG)

5. No parking shall be allowed in the C.R. 630 road right-of-way. (PLG)

6. Acceleration/deceleration lanes shall be provided for the project entrance in accordance with the requirements of Polk County Engineering Services at the time of Commercial Site Plan Review. A minor traffic review will also be required at this time. (DES/PLG)

7. A copy of the final Spill Countermeasures and Control Plan (SPCC) shall be provided to Polk County Department of Public Safety as well as the Planning Divison. A draft copy shall be made available to these Divisions by time of commercial site plan review. (PLG)

8. By the time of commercial site plan review, the applicant shall obtain a written letter of approval from the Polk County Department of Environmental Services, Division of Solid Waste, regarding the capacity to accept all wastes proposed to be disposed of in the County landfills. By the time of final development approval (request for a building permit), the acceptability of the waste types proposed shall also be confirmed, in writing, by the Division of Solid Waste, with an attached list of those waste types. All waste products not disposed of in County landfills shall be disposed of according to applicable State and Federal regulations. (PLG) **

9. If the facility does not utilize a zero-liquid discharge system for industrial wastewater disposal, or at any time proposes a discharge of industrial wastewater, the applicant shall be required to obtain a modification to the CUP. (PLG)

10. The applicant shall implement any additional requirements imposed by the Fire Marshall's office at the time of Commercial Site Plan Review, regarding the on-site equipment storage structures, manned and unmanned, regarding provisions for adequate fire protection. (Fire Marshall--at IRM)

11. Copies of any air emissions monitoring and report data shall be provided, upon request, to the Polk County Air Monitoring staff, in the form requested, i.e. hard copy and /or soft/disk and/or by modem.

12. In addition to providing the county with a copy of the annual operating report as required by the FDER, the applicant shall provide the County with a semi-annual report detailing the following: the amount of fuel oil used, the number of hours fuel oil was used, and how this relates to the maximum emission levels permitted for this facility (for the year or appropriate time period) by the FDER/EPA. Copies of reports should be provided to Polk County's Department of Environmental Services and to the Planning Division.

13. This project must comply with Ordinance 88-04 (as amended), the "Polk County Flood Protection Surface Water Management Code". The regulations set forth in this Ordinance apply in all areas of flood hazard and to all lands lying within 100 feet of a watercourse within the unincorporated areas of Polk County.

It is our policy to require implementation of an activity to begin within twelve (12) months after the date of approval. Please notify us if you anticipate problems in meeting this schedule.

This project shall comply with all applicable regulations, including the adopted Polk County Comprehensive Plan.

Your request for Site approval of a Non-Certified Electric Power Generating Facility, has therefore been approved.

Sincerely,

Phil McLemore

Phil McLemore
Development Services Director

PM:bg

xc: KBN Engineering
U.S. Agri-Chemical Corporation
Destec Engineering
County Departments

**NOTE - Conditions #1 and #8 have been met as of November 17, 1992.

ATTACHMENT 2 - 2

POLK COUNTY COMMERCIAL SITE PLAN APPROVAL

Imperial

Polk County

Board of County Commissioners

DEPARTMENT OF DEVELOPMENT COORDINATION

DEVELOPMENT SERVICES DIVISION
PHIL McLEMORE
Development Services Director

MERLE H. BISHOP
Director

March 18, 1993

Ms. A.C. Kimball
Environmental Planner
c/o KBN Engineering
5680 West Cypress St.
Suite 1
Tampa, FL 33607

RE: Tiger Bay Cogeneration Facility (CUP 92-17 & SA 92-01)
Commercial Site Plan Review

Dear Ms. Kimball:

This letter is written in response to your request of March 16 for a written confirmation that a Commercial Site Plan Review has taken place and was approved as required in condition #1 of CUP 92-17. The information submitted in your correspondence of March 16 is accurate (see attached letter) and depicts the process in which Polk County reviewed and approved a Commercial Site Plan for the Tiger Bay Cogeneration Facility.

Evidence of the approved Commercial Site Plan is shown on a copy of the site plans by way of a County stamp signed by Pat Moylan of our Engineering Services Division (see attachment A of your letter) and by way of a signed commercial permit (see attachment B of your letter).

If you should need any additional information of confirmation please contact us.

Sincerely,

Phil McLemore

Phil McLemore, Director
Development Services

POST OFFICE BOX 2096 BARTOW, FLORIDA 33830 PHONE (813) 534-6792 FAX (813) 534-6407

ATTACHMENT A

Best Available Copy

(FEET)
0' 60' 90'
15 30
(METERS)

P.02

+158.8 EXISTING ELEVATION POINTS

+158.51 PROPOSED ELEVATION POINTS

EXISTING CULVERTS

PROPOSED CULVERTS

PROPERTY BOUNDARY

FENCE

RAILROAD TRACKS

NTOURS REPRESENT MASS
ME, FINISH PAD GRADES
PROCESSES ARE NOT
ILL BE AT ELEVATIONS
HIGHER THAN THE PROPOSED
GROUND.

APPROVED
POLK COUNTY
ENGRG DIV
DRIVEWAY PERMIT #
1321 - 92
DATE: 11-23-92
BY: DAM

COMMERCIAL SITE REVIEW NO. 133-92
POLK COUNTY ENGINEERING DEPARTMENT
PRODUCTION DATE
TRAFFIC DATE 11-23-92
DRAINAGE DATE

The development owners shall be liable for storm water runoff damage to adjacent properties and responsible for obtaining the necessary DER / Water Management permits.

JAN 25 1992

DESTEC ENGINEERING

ECT
...nmental Consulting & Technology, Inc.

ISSUE FOR PERMITTING

PROJECT NO. 921110100

RECEIVED
NOV - 9 1992
ENGINEERING SERVICES
DEVELOPMENT COORDINATION

...RADING & DRAINAGE PLAN
...ND PROPOSED CONDITIONS

CLIENT: TIGER BAY COGEN

DWG. NO.: E-3 | REV.

DWG NO.

PAVGRA...

XREF POINTST

XREF SITEHT

713 7354571

03-04-1993 12:15

ATTACHMENT B

BEST AVAILABLE COPY

DEPARTMENT OF DEVELOPMENT COORDINATION
DIVISION OF ENGINEERING SERVICES
POST OFFICE BOX 1519, BARTOW, FLORIDA 33830-4938
(813) 534-6500

RECEIVED OCT 20 1992 ENGINEERING SERVICES DEVELOPMENT COORDINATION

APPLICATION FOR COMMERCIAL PERMITTING
SITE DRAINAGE AND ROADWAY ACCESS REVIEW

PROJECT NAME: Tiger Bay Cogeneration facility

LOCATION: CR 630 SEC. 21 TWP. 31S RNG. 25E

OWNER'S NAME: U.S. Agri-Chemicals Corporation; Contact: Steven Sosick PHONE NO. 813-285-8121

MAILING ADDRESS: 3225 CR 630 West, Fort Meade, Florida 33841-9799

ENGINEER: Destec Engineering, Inc.; Contact: Robert S. Chatham PHONE NO. 713-735-4087

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

CONTRACTOR: N/A PHONE NO. N/A

MAILING ADDRESS: N/A JAN 25 1992

SUBMITTED BY: KBN Engineering and Applied Sciences, Inc.; Contact: Roger B. Anderson 813-287-1717

The following items are required for a first submittal review:

* One (1) Set of Site Plans, (2) Two Sets if any part is in Flood Zone, Four (4) Sets are required for Final Approval.

** One (1) Set of Drainage Calculations, Two (2) Sets if any part is in a Flood Zone.

N/A One (1) Copy of Approved F.D.O.T. Driveway Permit, Letter of Intent, or F.D.O.T. approval of an existing drive - will be required on all State Road entranceways.

** Development information to comply with Polk County Flood Protection and Surface Water Management Ordinance #88-04, as amended.

Is any portion of this site located within a Flood Zone "A" according to F.E.M.A.'s Federal Insurance Rate Maps? ____ YES x NO ____ UNKNOWN.

Project information: P.U.D.# N/A Z.C.R.# N/A C.U.P.# 92-17

FOR OFFICE USE ONLY

Commercial Site Review #: 133-92 Fee: 195.00

Commercial Access Review #: 1521-92 Fee: 50.00

S.W.M. Permit Issued #: SW- ____ Fee: ____

TOTAL FEES REQUIRED: 245.00

RECEIVED OCT 19 1992 DEVELOPMENT SERVICES

Approved By: [signature] DATE: 11-23-92

Receipt # ____ Building Permit # ____

PROVISIONS OF PERMITTING

THE OWNER OR CONTRACTOR WILL BE RESPONSIBLE FOR CONTACTING THE INSPECTION DIVISION AT 534-4027 AT LEAST 2 DAYS IN ADVANCE OF REQUIRED INSPECTIONS. A COPY OF THIS PERMIT AND OR AN ENGINEERING DIVISION APPROVED SET OF PLANS WILL BE ON-SITE FOR ALL CONSTRUCTION PHASES.

THE OWNER OR CONTRACTOR WILL BE RESPONSIBLE FOR THE MAINTENANCE OF TRAFFIC AND CONSTRUCTION SIGNING IN ACCORDANCE WITH THE FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN STANDARDS INDEX 600.

THE OWNER OR CONTRACTOR WILL BE RESPONSIBLE FOR NOTIFYING ALL UTILITIES WITHIN THE RIGHT OF WAY AND FOR RESOLVING ANY CONFLICTS THAT THE NEW CONSTRUCTION CREATES.

THE CONSTRUCTION APPROVED BY THIS PERMIT IS BASED ON THE ENGINEERING DATA SUBMITTED AND POLK COUNTY WILL NOT BE RESPONSIBLE FOR DAMAGES OF ANY NATURE ARISING FROM THIS PERMIT.

SIGNED: R S Chatham DATE: 10-16-92
OWNER OR AGENT

*See attached commercial site plan package.
**Included in the Stormwater Management report and paving, grading, and drainage plans submitted to Polk County on October 16, 1992.

ATTACHMENT 2 - 3

POLK COUNTY LETTER LISTING APPROVAL DATES

POLK COUNTY
Board of County Commissioners

Planning Division

P.O. Box 1969
330 W. Church St.
Bartow, FL 33830
(813) 534-6084
SUNCOM 569-6084
FAX (813) 534-6021

December 28, 1993

Ms. A.C. Kimball, Staff Environmental Planner
KBN Engineering and Applied Sciences, Inc.
5405 West Cypress Street, Suite 215
Tampa, Florida

Re: Tiger Bay Limited Partnership cogeneration facility
Consistency of Development Approvals with the Comprehensive Plan

Dear Ms. Kimball:

The purpose of this letter is to clarify the status of the Tiger Bay Limited Partnership cogeneration facility development approvals relative to the Polk County Comprehensive Plan. The Tiger Bay cogeneration facility received three major development approvals from Polk County:

1. Non-Certified Electric Power Generating Facility Site Approval (approved November 17, 1992);

2. Conditional Use Permit (approved November 17, 1992); and

3. Commercial Site Plan (approved on November 23, 1992).

Both the Non-Certified Electric Power Generating Facility Site Approval (SA) and the Conditional Use Permit (CUP) were approved under the April 9, 1991, version of Polk County Comprehensive Plan. The Commercial Site Plan review was approved under the November 19, 1992, version of the Comprehensive Plan.

The SA specifically addresses consistency with Comprehensive Plan criteria for cogeneration facilities. However, all development approvals issued by Polk County including the CUP and the Commercial Site Plan Approval must be consistent with the Comprehensive Plan in effect at the time of the approval. Section 4.301 F.1. of the April 9, 1991, and November 19, 1992, plans, states:

> After a comprehensive plan, or element or portion thereof, has been adopted in conformity with this act [Chapter 163, FS], all development undertaken by, and all actions taken in regard to development orders by, governmental agencies in regard to land covered by such plan of element shall be consistent with such plan or element as adopted.

Therefore, the SA and CUP approvals must be in compliance with the April 9, 1991, plan, and the Commercial Site Plan Approval must be consistent with the November 19, 1992, plan. Once approvals are granted, they are vested from future amendments to the Comprehensive Plan so long as the approvals remain in effect. Plan amendments are not retroactively applied to projects once they have received necessary development approvals.

All development approvals granted for the Tiger Bay cogeneration facility are consistent with the Comprehensive Plan in effect at the time the approvals were granted. Further, there are no substantive changes between the April 19, 1991, and November 23, 1992, Comprehensive Plans which would create inconsistencies between the facility's SA and CUP approvals and the Commercial Site Plan Approval.

Sincerely,

James B. Malless

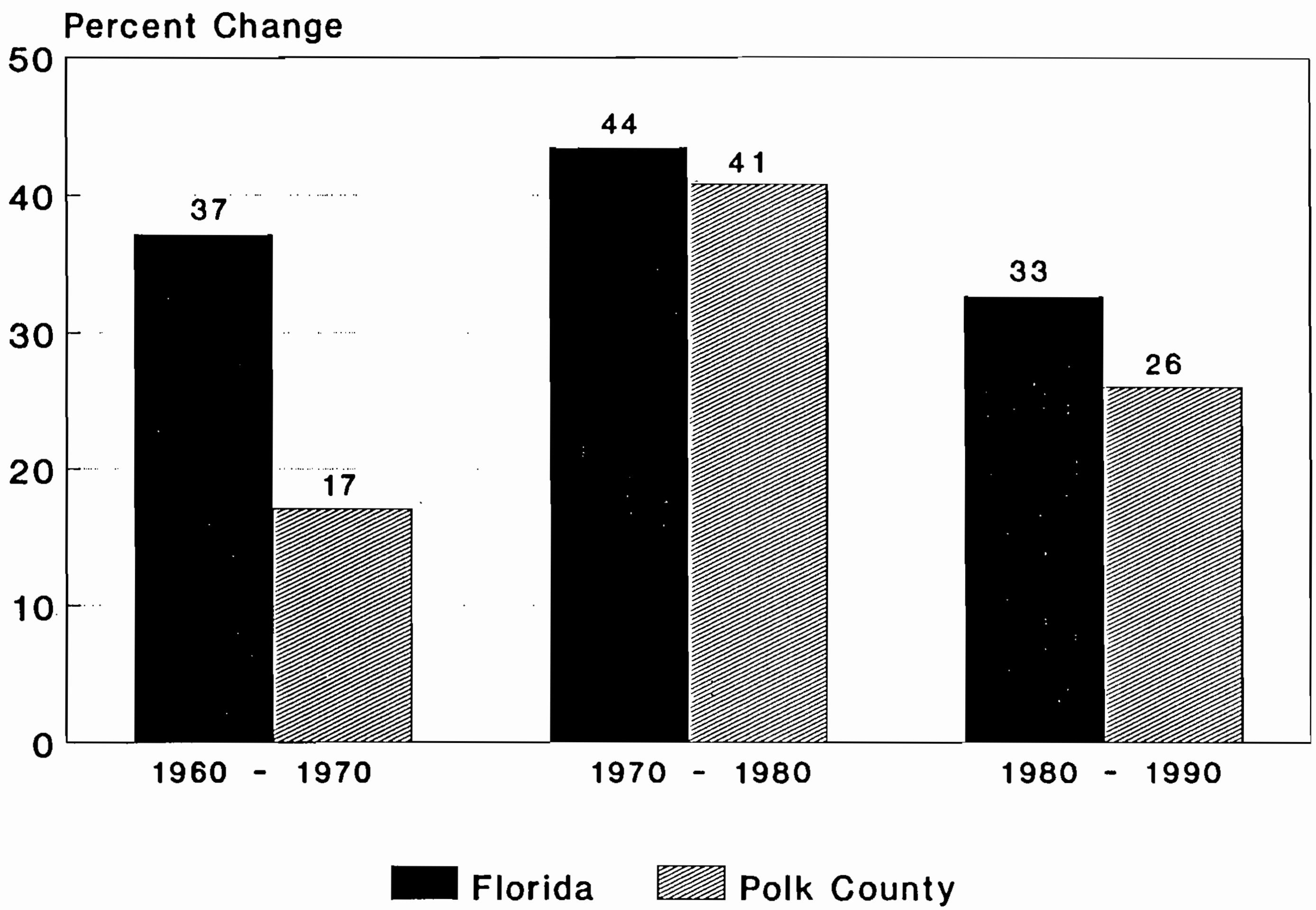
James B. Malless, AICP
Planning Manager

JBM:ack/dbf.9(1)

ATTACHMENT 2 - 4

POPULATION GROWTH CHART

FPC/SCA



Source: BEBR, Florida Population: Census Summary 1990, 1991

Florida Power CORPORATION

Polk County Site

POPULATION GROWTH 1960 - 1990
FLORIDA AND POLK COUNTY

ATTACHMENT 2 - 5

IMPACT ASSESSMENT STATEMENT

IMPACT ASSESSMENT STATEMENT
TIGER BAY
COGENERATION PLANT

Applicant:

Central Florida Power, L.P.
2500 City West Blvd., Suite 150
Houston, Texas 77042

Prepared For:

Polk County Development Services
330 W. Church Street
Bartow, Florida 33830

Prepared By:

KBN Engineering and Applied Sciences, Inc.
5680 West Cypress Street, Suite I
Tampa, Florida 33607

July 1992
T12018B1

KBN

July 10, 1992

Mr. Phil McLemore, Director
Polk County Development Services
330 W. Church Street
Bartow, FL 33830

Re: Tiger Bay cogeneration plant (formerly Central Florida Cogeneration Plant)
Impact Assessment Statement

Dear Mr. McLemore:

On behalf of Central Florida Power, L.P., KBN Engineering and Applied Sciences, Inc. (KBN), is pleased to submit the enclosed Impact Assessment Statement for the Tiger Bay cogeneration plant. Thank you for allowing us the additional time necessary to prepare this portion of our applications for Conditional Use Approval and Non-certified Electric Power Generating Plant Site Approval.

Please do not hesitate to call should you have any questions or comments regarding this submittal. Thank you for your time and consideration in this matter.

Sincerely,

Roger B. Anderson

Roger B. Anderson, AICP
Senior Environmental Planner

RBA:ack/vdp.4

Enclosure

xc: R. Chatham
R. Herbanek
G. Uebelhoer
J. Malless, Polk County Planning Dept.
12018.0200

KBN ENGINEERING AND APPLIED SCIENCES, INC.
5680 West Cypress Street Suite I Tampa, FL 33607 813/287-1717 FAX: 813/287-1716

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IMPACT ASSESSMENT STATEMENT

INTRODUCTION

Central Florida Power, L.P., is proposing to construct and operate the Tiger Bay cogeneration facility, a nominal 206-megawatt (MW) combined-cycle cogeneration facility on a 6.2-acre tract on the U.S. Agri-Chemicals complex near Fort Meade, Florida (see Map A, Location Map). Destec Engineering, Inc., is under contract to the limited partnership to perform engineering services for the project. KBN Engineering and Applied Sciences, Inc. (KBN), has been contracted by Destec Engineering to provide environmental and local government permitting; Environmental Consulting Technologies, Inc. (ECT), has been contracted by Destec Engineering to provide environmental permitting.

This Impact Assessment Statement has been prepared for the Tiger Bay cogeneration facility in accordance with the Polk County Comprehensive Plan requirements for non-certified power-generating facilities and for the Conditional Use Permit requirements the County's zoning code. The purpose of this report is to outline and describe potential impacts of the facility on the County and surrounding areas in accordance with these regulations. For the most part, conceptual/preliminary design of the facility is complete. However, design of some systems, such as the industrial wastewater disposal system, is still underway. Three methods of industrial discharge are under consideration:

1. Offsite percolation pond and/or sprayfield,
2. Pre-treatment and discharge to the City of Fort Meade's municipal wastewater treatment plant (WWTP), and
3. A zero liquid discharge system.

A description of the three possible wastewater disposal methods is included in Section D of this report. In addition, the method of wastewater disposal will affect other impacts associated with the plant. Therefore, where applicable, impacts discussed throughout the report are described for each of the three options.

Site Conditions Analysis

The 6.2-acre site is located in a vacant, relatively flat area of the U.S. Agri-Chemicals complex. Soil classifications for the site and surrounding vicinity are shown on Map D, Soils Survey. According to the Polk County Soils Survey, the site has "urban" soils, which are indicative of areas that are more than 85 percent developed. Soils research conducted on the site reveals a mixture of fine- to medium-grain sandy soils and clays with pockets of organic materials in subsoil strata at depths of 2 to 4 feet on the east and south edges of the site. In addition, a spoil area was identified in the south-central portion of the site. This spoil pile contains residual soils from construction activities at the chemical plant.

A topographic survey of the project site is shown on Map B, Topographic Map. As Map B indicates, the site slopes from the south to the north, dropping approximately 5 feet from one end of the site to the other. In general, the site elevation is approximately 156 feet, with average high elevations at 159 feet. A slightly higher elevation (approximately 162 feet) is located in the spoil area, however, this elevation is an anomaly and does not represent normal topographic conditions.

No natural drainage features exist on the tract. Stormwater runoff is by sheetflow from the south to the north to a drainage ditch located within the CR 630 right-of-way.

The site is devoid of significant environmental features; no wetlands, trees, shrubs, listed species or listed species habitats exist. Site vegetation consists of ruderal and grassy communities that are regularly mowed.

The site is situated adjacent to the Fort Meade Chemical Products Plant within the existing U.S. Agri-Chemicals complex. Fort Meade Chemical Plant will serve as the cogeneration facility's steam host (see Figure 1, Aerial Photograph). The site, while currently vacant, was formerly used for construction staging and parking during the development of the chemical plant..

Facility Description

The cogeneration facility will consist of one gas turbine (GT) electric generating unit, equipped 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 GT/HRSG unit will be fired primarily with natural gas; distillate fuel oil will be used as the backup/startup fuel for the GT. The annual distillate oil usage is anticipated to be no greater than 300 hours per year. The GT will use 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 duct burner will be fired with natural gas only and may operate for 8,760 hours a year. The steam from the HRSG will power a steam turbine-generator of no greater than 74 MW.

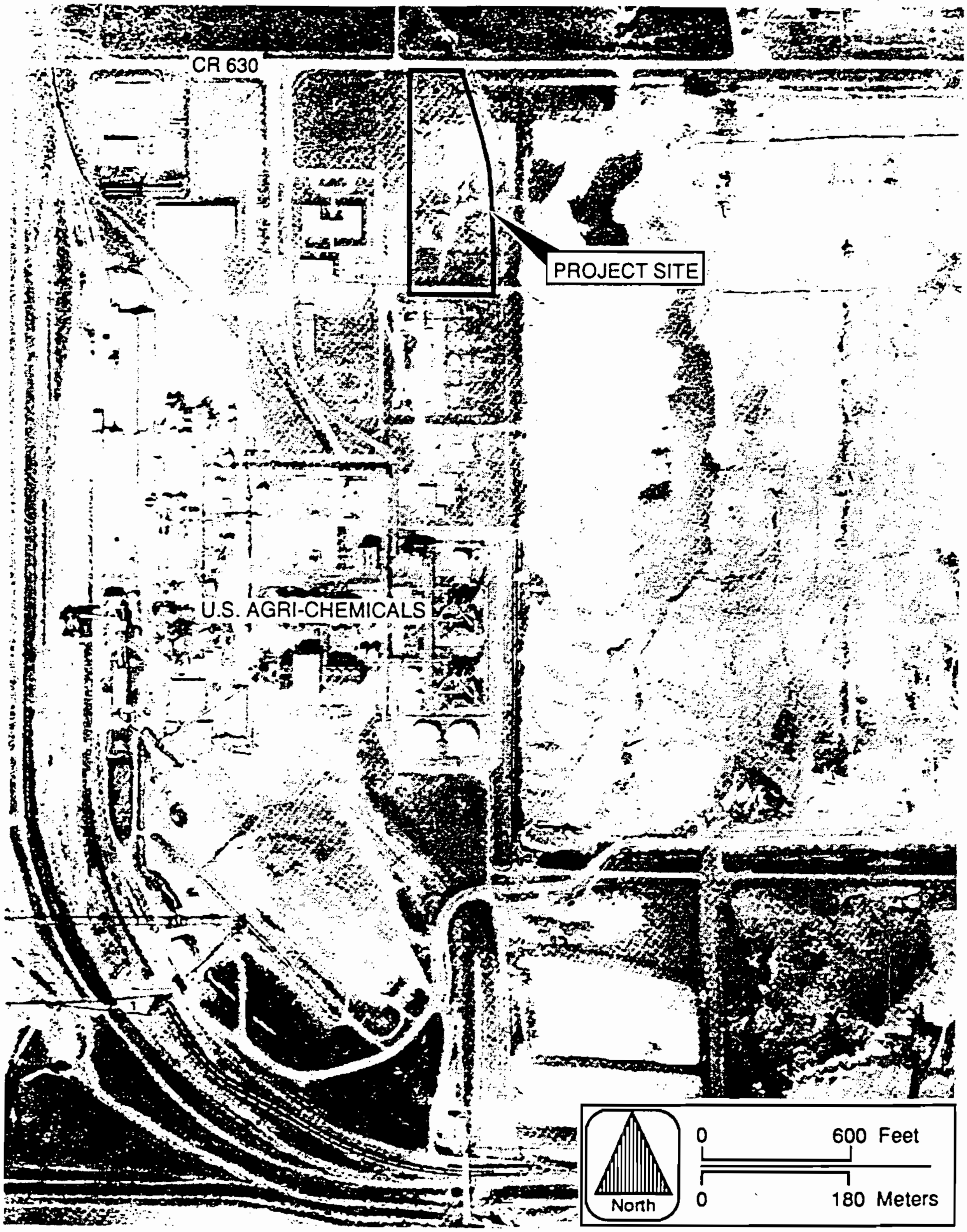


FIGURE 1
CENTRAL FLORIDA COGENERATION PLANT
AERIAL PHOTOGRAPH

SOURCES: POLK CO., 1988; KBN, 1992.

DESTEC ENGINEERING, INC.

Approximately 40,000 lb/hour of low-pressure steam will be exported to the U.S. Agri-Chemicals Fort Meade Chemical Products Plant for process use. Electrical power will supply the electrical utility grid. A simplified flow diagram is presented in Figure 2.

A. LAND AND NEIGHBORHOOD CHARACTERISTICS (For Zone Change Requests and Conditional Use Permits)

Purpose: To assess the compatibility of the requested zoning district with the adjacent property and to evaluate the suitability of the site for development.

1. How and why is the site suitable for the uses allowed by the requested zoning district?

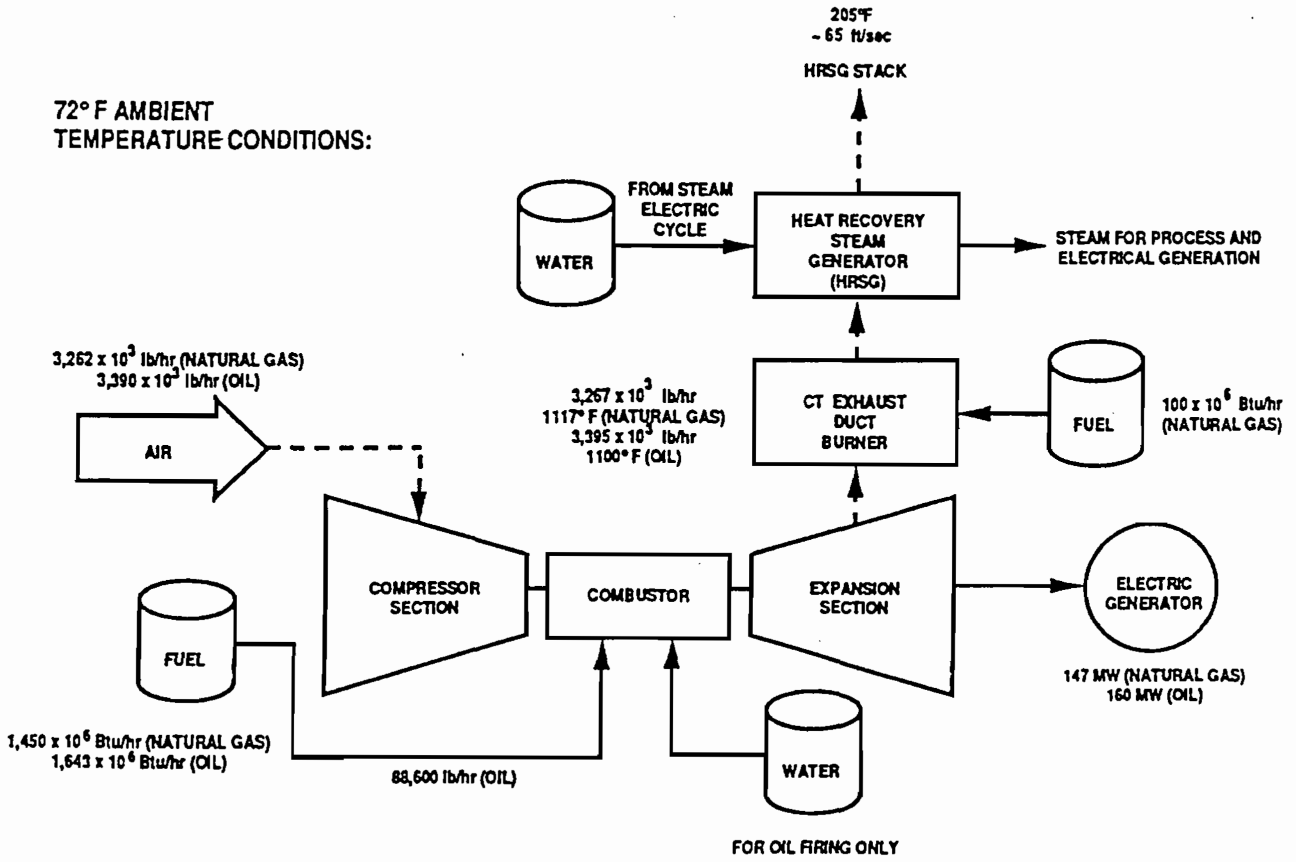
The Tiger Bay cogeneration facility has been located and designed to ensure compatibility with the site and surrounding area. The following factors were instrumental in establishing site suitability:

Existing Conditions:

- The site is located in an existing industrial facility, the U.S. Agri-Chemicals complex, which is situated in an industrialized, phosphate-mining area. Surrounding land uses include phosphate mining to the east, the U.S. Agri-Chemicals complex to the south and west, reclaimed lands to the north, and the Alcoa plant to the northeast (see Map C-3, Surrounding Land Use Map). In addition, there are no residential structures within a 1-mile radius of the site.
- The site offers proximity to a host facility for process steam (the U.S. Agri-Chemicals Fort Meade Chemical Products Plant), a necessary component of the cogeneration operational requirements.
- The site is a cleared, previously impacted, vacant parcel with no significant environmental features.

Land Use:

- The location of the facility is consistent with Comprehensive Plan criteria for the site's designated future land use classification (PM-Phosphate Mining) and for location of non-certified electric power generating facilities (see Map C-1, Future Land Use Map).



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

FIGURE 2
TIGER BAY COGENERATION PLANT
SIMPLIFIED FLOW DIAGRAM

SOURCE: KBN, 1992.

DESTEC ENGINEERING, INC.

(A more detailed analysis of Comprehensive Plan land use issues is provided in Section I.1 of this document).

Zoning:

- The site is located in the RC-Rural Conservation zoning district (see Map C-2, Zoning Map), which allows electric power generating facilities (Class III Essential Uses) as a conditional use (see Appendices D and E).

Due to the existing industrial conditions and land-use and zoning characteristics, the site is well suited for a cogeneration facility.

2. Calculate and list the total area of each type of land use and land cover existing on the site.

Land Use: The 6.2-acre site is a vacant parcel in an existing industrial complex. There are no structures or infrastructure located in the project area.

Land Cover: Land cover for the entire 6.2-acre site consists of ruderal and grassy communities that are regularly mowed. There are no existing uses located on the site.

3. Does the site adjoin an area zoned to prohibit uses allowed in the requested zoning district? If it does, describe any incompatibility and special efforts needed to minimize the differences.

The site does not adjoin an area which prohibits Class III Essential Uses. The site is located within an existing industrial complex which is zoned RC-Rural Conservation (see Map C-2, Zoning Map). All lands adjacent to the site are also zoned "RC." There are no incompatibilities or special efforts needed to minimize impact on adjoining sites.

4. Discuss whether the rezoning of the site would lower the value of the adjoining properties or would allow uses that would adversely affect the neighborhood.

The proposed cogeneration plant will be located in an existing industrialized phosphate-mining area. Surrounding land uses include phosphate mining to the east, the U.S. Agri-Chemicals complex to the south and west, reclaimed lands to the north, and the Alcoa plant to the northeast (see Map C-3, Surrounding Land Use Map). No residential dwellings are located within a 1-mile radius of the site, nor are any changes from the existing industrial configuration expected within the near future. The proposed cogeneration facility will be linked to surrounding industrial and phosphate-mining uses through its connection to the thermal host facility, the U.S. Agri-Chemicals Fort Meade Chemical Products Plant. Due to its compatibility with adjacent uses and connection to the U.S. Agri-Chemicals complex, the cogeneration plant is appropriate for this location. In fact, the cogeneration plant is more consistent with, and will add more value to, the existing industry in the area than certain uses normally permitted in the RC district, such as single-family residential. Therefore, the intended use will not lower the value, or otherwise adversely affect, the nature of this industrialized area.

5. **Describe how the location of natural features (e.g., lakes, streams, trees, etc.) and the site's topography will be considered in the overall plan for all physical improvements.**

There are no natural features, including lakes, streams, trees, or wetlands located on the site. As Map B-1, Topographic Map, illustrates, the site has no significant topographical features. Grading and drainage plans will follow the site's natural flow to the north. A series of surface ditches and swales and/or a system of catch basins will be used to collect stormwater runoff and divert it to a lined stormwater retention pond located at the northern end of the site, as shown on Map G, Drainage Map. Since there are no natural features and minimum topographic relief on the site, there are no natural constraints to the physical improvements necessary for site development.

6. **Discuss the types of agricultural activities for which the site has been or is being used and calculate the total acreage for each type of agricultural use before and after the development.**

The site has not been used for agricultural purposes in the last decade. No agricultural uses are planned for the future.

7. **If the proposed zone change is located in an area presently undeveloped, explain how the requested zoning district may influence future development patterns.**

The proposed cogeneration facility will be located in an existing industrial complex. All lands immediately adjacent to the site are committed to industrial or phosphate-mining-related activity. These existing uses are not expected to change in the near future. The cogeneration facility is linked to the adjacent phosphate-mining uses through its connection to the U.S. Agri-Chemicals Fort Meade Chemical Products Plant, which is serving as the host for low pressure steam. As such, the facility is both a consistent and appropriate part of the normal and orderly development of the area. In addition, the Tiger Bay cogeneration facility's site design offers buffering and other positive design features, including pollution-control devices, which will facilitate growth and provide for economic benefits to the area while maintaining compatibility with adjacent uses.

B. LAND AND NEIGHBORHOOD CHARACTERISTICS (For Planned Unit Developments).

Not applicable.

C. ACCESS ROADS AND HIGHWAYS

Purpose: To assess the impact of the proposed development on the existing, planned, and programmed road system.

1. Calculate the number of vehicle trips per day expected to be generated daily and at peak hour.

Operational Traffic: The following table, Table 1, has been prepared to identify the vehicle trips expected to be generated by the Tiger Bay cogeneration facility. As shown on this table, the traffic generated by the facility during normal operation will vary slightly [62 to 70 average daily trips (ADT)], depending upon the type of industrial wastewater disposal alternative selected for the plant. The number of trips will vary based on the number of employees needed to operate the wastewater system and the number of solid waste trips, needed to transport the by-products of the water treatment systems, as applicable. Other employee and operational trips would remain constant regardless of the final selected wastewater alternative.

The a.m. peak hour for the facility is expected to occur between 6:30 and 7:30 a.m. when a total of 22 trips are anticipated. These trips are identified on Map E-3 and predominantly comprise employee trips and incidental early pick-ups and deliveries. The p.m. peak hour will occur between 2:30 p.m. and 3:30 p.m. during the shift change. The p.m. peak is expected to generate 26 trips including employee and pick-up and delivery vehicle movements.

All trips generated by the Tiger Bay cogeneration facility will access and depart the project using CR 630 (see Maps E-1 through E-3). The trip movements are almost equally split between east and west travel directions, with 47 percent traveling west on CR 630 to CR 555 and SR 39 and

Table 1. Trip Generation During Facility Operation

Trip Mode	Trips Per Wastewater Treatment Disposal Option		
	Percolation Pond/Sprayfield (trips/day)	Connection to Fort Meade WWTP Water (trips/day)	Zero Liquid Discharge (trips/day)
Employees[a]			
Day Shift	34	34	36
Evening Shift	4	4	6
Night Shift	4	4	6
Pick-ups/Deliveries			
Average	14	14	14
Peak	20	20	22
Total Average Trips/Day	56	56	62
Total Peak Trips/Day	62	62	70

[a] Based on ITE Trip Generation Manual Standard of three trips per employee (except for operators at two trips/day).

53 percent traveling east on CR 630 to U.S. Highway 17 (U.S. 17). Trip directional splits are hand calculated based on existing road conditions and land-use distribution in greater Polk County. Trips accessing and departing the facility will, in general, move in either an easterly or westerly direction, then north toward the residential and commercial areas within Polk County in and surrounding the cities of Bartow, Winter Haven, and Lakeland. Based on this projected directional movement of traffic from the Tiger Bay cogeneration facility, approximately 29 to 33 ADT will access and depart the facility traveling west on CR 630 while 33 to 38 ADT will travel east toward Fort Meade and U.S. 17.

The peak-hour directional trip movements are anticipated to also conform to the projected east-west splits, with 10 peak-hour movements approaching and departing the facility from the west and 12 from the east. The p.m. peak-hour is anticipated to produce 12 trips westbound and 14 eastbound trips. The maximum peak-hour left-turn movements into the project will occur during the p.m. peak-hour traffic when potentially all 14 trips may access the facility via left-hand turns from CR 630. However, under normal circumstances these peak-hour trips would include both accessing and departing trip movements.

Construction Traffic: Construction of the Tiger Bay cogeneration facility is anticipated to occur over an 18-month period beginning in the summer of 1993 and ending by December 1994. The construction traffic generated during this process is anticipated to include construction employees (craft and nonmanual), engineers, contractors, surveyors, and associated personnel (see Table 2). In addition, the movement of equipment and materials is anticipated to use truck transport and trains. The average daily trips during the construction of the facility are projected to be between 276 and 281 trips per day for construction personnel, as well as equipment and materials movements. During peak construction periods, the average daily trips accessing the site will increase to between 426 and 438 trips. These peak construction periods are anticipated to be brief periods during the installation of major plant components.

The construction employee trips are anticipated to conform to the directional movements on CR 630 and regional roadways as projected for operational traffic. The directional split will be 47 percent accessing and departing the facility via westerly movements on CR 630 and 53 percent for easterly movement. The construction truck traffic is expected to use the less congested routes to the site. Therefore, an estimated 75 percent of the truck trips will use SR 39 and CR 555 to CR 630 and the site. Major equipment, such as the gas turbine, steam turbine, and HRSG are

Table 2. Trip Generation During Facility Construction

Trip Mode	Trips Per Wastewater Treatment Disposal Option		
	Percolation Pond/Sprayfield (trips/day)	Connection to Fort Meade WWTP Water (trips/day)	Zero Liquid Discharge (trips/day)
Employment			
Average	163	163	171
Peak	266	266	278
Vehicular Traffic Average	110	110	110
Peak	160	160	160
Total Average Trips/Day	276	276	281
Total Peak Trips/Day	426	426	438

anticipated to be delivered by train at appropriate intervals during construction. The existing rail spur on the U.S. Agri-Chemicals facility will be used to unload the components to minimize roadway or traffic blockage during the transport and unloading periods.

2. Indicate what modifications to the present transportation system will be required as a result of the proposed development.

Map E-1 shows transportation corridors, available traffic counts, and levels of service for roadways in the vicinity of the proposed facility. With the exception of U.S. 17, which is a 4-lane divided highway, roadways in the vicinity of the site are rural, 2-lane facilities. As indicated by the level of activity recorded by the traffic counts on CR 630 and the roadway's Level of Service (LOS) A, there are no existing transportation-related deficiencies in the site area.

Based on a background LOS A traffic volume and the low expected trip generation for the facility, road improvements are not indicated. The maximum peak-hour left-turn movements are anticipated to be below the Florida Department of Transportation (FDOT) standard (30 left-turn movements) requiring the construction of a left-turn lane. The anticipated peak left-turn movements for the Tiger Bay cogeneration facility will be 14 turns during the p.m. peak hour.

3. List the total number of parking spaces and describe the type of parking facilities to be provided in the proposed development.

The Tiger Bay cogeneration facility will provide 14 employee parking spaces, including 2 spaces for the handicapped. These parking spaces will be located adjacent to the administration and control buildings. Parking will be for employees and visitors to the facility. Loading and unloading spaces are provided onsite. These spaces will be for fuel oil unloading and transfer, delivery of chemical feed, lube oils and parts, and maintenance materials and supplies (see site plan for location of parking and loading spaces).

4. Indicate the proposed methods of access to the existing public roads (e.g., direct frontage, intersecting streets, frontage roads, etc.).

Access to the Tiger Bay cogeneration facility will be provided by a driveway off of CR 630 directly into the plant (see site plan for details of access).

5. What modes of transportation other than the automobile have been considered (e.g., pedestrian, bicycle, bus, train, or air)? Describe the modes.

The Tiger Bay cogeneration facility is anticipated to be accessed by employee private vehicles and by trucks making deliveries to the facility. Other modes of transportation, i.e., pedestrian, bicycles, bus, train, or air, are not anticipated to be modes of transportation needed by the facility. The possible exception will be the delivery of major plant components by train during construction.

D. SEWAGE

Purpose: To determine the impact caused by sewage generated from the proposed development.

1. Calculate the amount of sewage in gallons per day (GPD) expected to be generated by the proposed development.

Domestic Wastewater: Domestic wastewater is expected to be produced at an average rate of between 560 to 665 gpd, depending on the number of personnel required for the chosen method of industrial wastewater discharge. Generation calculations are based upon average estimates of 16 to 19 employees, at an estimated production rate of 35 gallons per person per day.

Other Wastewater Streams: Operation of the Tiger Bay cogeneration facility will produce several wastewater streams. The largest single wastewater effluent will be blowdown from the cooling tower. Lesser streams will comprise boiler blowdown from the HRSG, possibly the reject stream from the demineralization process, and plant drains (service water) and wash water. The combined total of the effluent generated by the project will be approximately 167,000 to 360,000 gallons per day. For zero liquid discharge, the effluent will be zero.

2. Describe the proposed method and level of treatment, and the method of effluent disposal for the proposed sewage treatment facilities.

Domestic Wastewater: Domestic wastewater will be disposed of through one of the three following methods: a septic tank system; a pump and haul holding tank; or through hookup to the Fort Meade WWTP. Hookup to the Fort Meade WWTP would only be utilized in the event that the facility's industrial discharge is also directed to the Fort Meade WWTP. If either land application or zero liquid discharge options are selected, a septic tank and drainfield system or a holding tank may be used to dispose of the domestic and sanitary waste. Should septic tanks or a holding tank be utilized, sanitary waste would be segregated from industrial effluent to ensure that federal and state requirements are satisfied.

Other Wastewater Streams:
Three alternative industrial wastewater disposal options are being evaluated for the Tiger Bay cogeneration plant:

1. Offsite percolation pond and/or sprayfield,
2. Pretreatment and discharge to the City of Fort Meade's WWTP, and
3. A zero liquid discharge system.

Each option is described below.

Percolation Pond/Sprayfield: A hydrologic investigation of an approximate 163-acre parcel for slow rate land application is being conducted. Figure 3 illustrates the location of this parcel.

The land application parcel was mined to recover phosphate ore by the U.S. Agri-Chemicals Corporation prior to 1975. It was reclaimed by backfilling the voids created by mining with the permeable sand tailings byproduct, applying a thin layer of topsoil, and grading and revegetating the site. The land has been backfilled to approximately 30 feet above grade; sand thickness ranges from 30 to 65 feet.

The hydrologic investigation and analysis concludes that the 163-acre site is suitable for land application of up to 290,000 gallons per day of effluent. The investigation is now focusing upon groundwater quality analysis and modeling to confirm that groundwater quality criteria at the proposed facility boundary will be maintained. Upon completion of this analysis, an application for a land application facility will be submitted to the Florida Department of Environmental Regulation (FDER).

Fort Meade WWTP: Discharge to the City of Fort Meade will entail pumping the combined effluent to the City of Fort Meade's WWTP. The effluent would then be mixed with other influent to the plant and subjected to primary and secondary conventional treatment. Following treatment, the effluent from the Fort Meade WWTP is applied to a 360-acre parcel of reclaimed, phosphate-mined land.

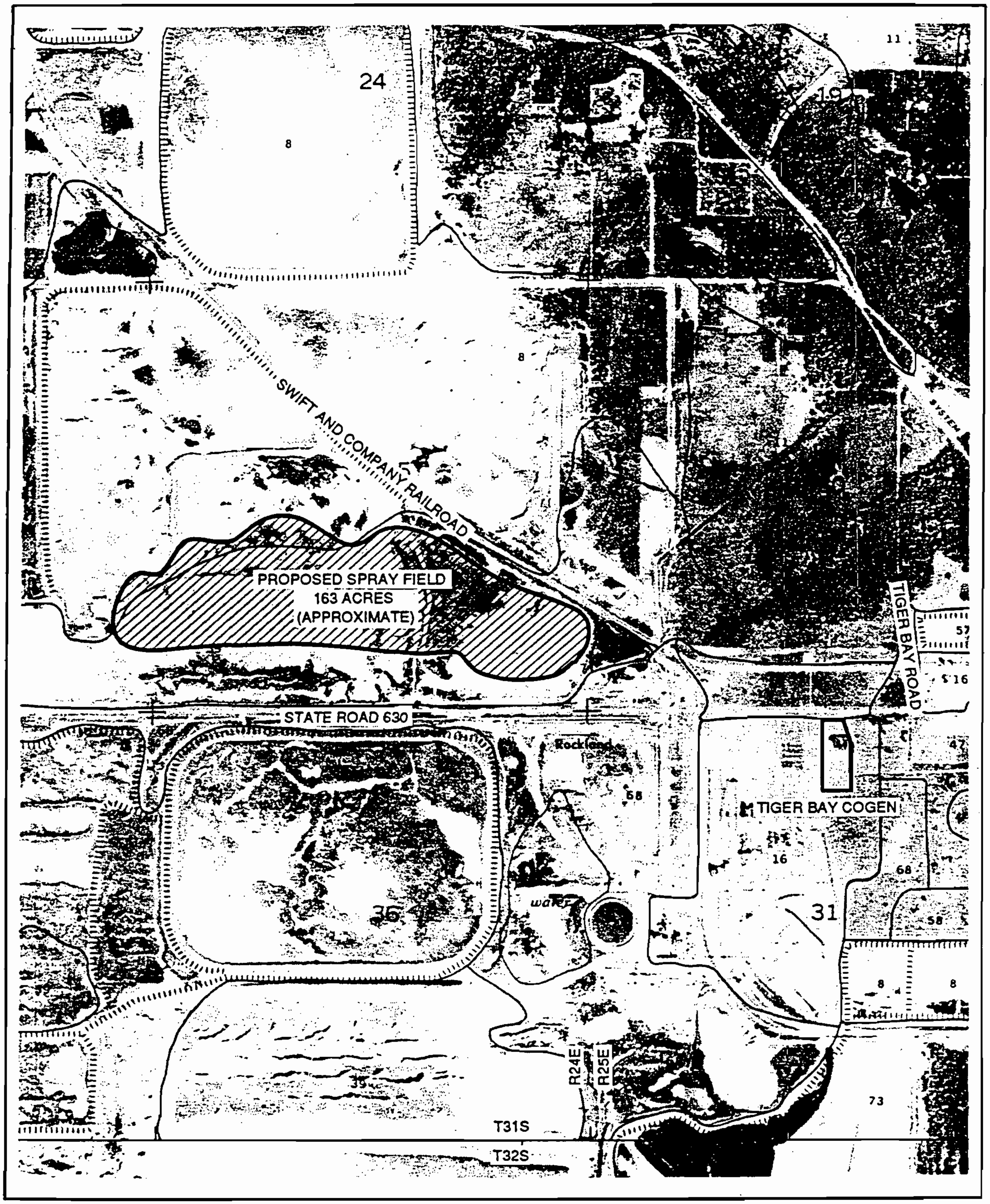


FIGURE 3
PROPOSED LAND APPLICATION AREA
TIGER BAY COGEN PLANT
FORT MEADE, FLORIDA
SOURCE: ECT, 1992

A headwork analysis is being performed by the City of Fort Meade. The city will determine if it has sufficient capacity to treat the expected effluent volume. If this analysis proves that the plant can successfully treat the Tiger Bay cogeneration facility effluent, contractual conditions will be discussed with the city.

Zero Liquid Discharge: As discussed in Section D1, industrial process wastewater will be generated from cooling tower blowdown, the plant sumps, and drains from the HRSG blowdown. These industrial process wastewater streams will be routed to the zero liquid discharge system. Floor drains will be located around the process equipment, such as the steam turbine generator, the HRSG, and the combustion turbine generator areas. The water discharge to the floor draining from these areas will be service water used for general housekeeping. The floor drains will discharge to an oil/water separator and will be managed as discussed for the fuel unloading area.

Industrial process wastewater will discharge to a closed circuit wastewater treatment system. In this system, industrial process wastewater will first be concentrated into a brine using a vapor compressor seeded slurry evaporation system. The concentrated brine stream from the evaporator will be further dewatered in a crystallizer or spray dryer. Distillate from the brine concentrator and crystallizer will be reclaimed for reuse in the plant. The solids produced by the crystallizer or spray dryer (>80 percent solids) will be shipped offsite for disposal in a landfill. The brine concentrator produces a very pure distillate and a reject brine containing all of the salt in the feed and very little water. In this application, the distillate would be recycled for use as makeup to the heat recovery boiler and the cooling tower. The system operates by pumping treated feedwater through the heat exchanger where it picks up heat from counter flowing hot distillate. Concentrated brine slurry is pumped to the floorbox where it is distributed as a thin film on the inside of tubes. As the thin film flows down the tubes, the brine is heated. Water is drawn out in the form of steam vapor and flows to the bottom of the tubes, into the steam cavity. The water vapor is drawn from the steam cavity through mist eliminator pads, to filter out any entrained liquid water on its way to the vapor compressor. The compressor raises the vapor saturation temperature above the boiling point of the recirculating brine. This compressed (low pressure) steam is then reintroduced to the evaporator where it gives up its heat of vaporization (to heat the brine in the falling film on the inside of the tube) and condenses on the outside of the tube wall. The condensate would be collected in a distillate tank and pumped through the heat exchanger prior to recycling it to the heat recovery boiler or the cooling tower.

The crystallizer is designed to further concentrate the waste brine from the brine concentrator. The hot brine feed is pumped into the recirculation pump suction and mixes with recirculating concentrated brine slurry. Concentrated brine slurry is pumped through the heater by the recirculation pump and then re-enters the vapor body where the added heat causes the slurry to flash. The vapor collects in the upper steam cavity of the vapor body and is drawn through the mist eliminator vanes, to filter out any entrained solids on its way to the vapor compressor.

As in the case of the evaporator, the compressor raises the vapor saturation temperature above the boiling point of the recirculating brine. This compressed steam is then introduced to the shell side of the heater. Here it gives up its heat of vaporization (to heat the brine slurry inside the tubes) and condenses on the outside of the tube wall. This condensate is collected in the condensate tank and pumped to the brine concentrator distillate line. The high solids slurry will be discharged to a filter press to remove most of the remaining free water. The filter cake produced will contain >80 percent solids. Filtrate will be returned to the crystallizer.

If a spray dryer is selected, the hot brine from the brine concentrator will be atomized into a hot gas stream. The hot gases cause the water to flash evaporate, the resulting dry solids being collected in the bottom of the spray dryer. The hot gas stream used to cause the flash evaporation is created by combustion of natural gas. The cooled gas stream existing from the spray dryer will pass through a bag house to control fugitive emissions of solids. The solids produced by the spray dryer will be dry and retained in a bin for collection and offsite disposal.

To accommodate disposal of wastewater effluent, a combination of two or more of the alternatives described above may be implemented to adequately meet environmental permitting requirements.

3. Indicate the relationship of the proposed sewage system to Polk County's plans and policies for sewage treatment systems. Identify the service provider.

All of the wastewater disposal options are consistent with Polk County's plans and policies for sewage treatment systems because disposal of industrial and domestic effluent is not dependent upon county infrastructure or services. The Tiger Bay cogeneration facility will be self-sufficient with respect to effluent disposal unless the option to discharge to the City of Fort Meade WWTP is selected. In that case, the City of Fort Meade will be the service provider.

E. WATER SUPPLY

Purpose: To determine the amount of water to be used, how it will be distributed, and the impact on the surrounding area.

1. Indicate the proposed source of water supply, the type of treatment, and the relationship of the system to Polk County's plans and policies for water supply systems. Identify the service provider.

Source and Provider: Water from the Floridan aquifer will be used to provide water for facility needs. One primary production well capable of producing 1,500 gallons per minute (gpm) or less will be permitted and drilled at the location shown on the site plan; a standby well of equal capacity will be installed adjacent to the production well. The onsite wells will provide both potable and industrial water needs for the Tiger Bay cogeneration facility.

Treatment: Potable water will be chlorinated prior to use by employees. Water used for industrial purposes may require treatment prior to industrial use.

Relationship to Plans: Proposed water supply and treatment are generally consistent with Polk County's plans and policies for industrial facilities.

2. Calculate the estimated volume of consumption in gallons per day (GPD).

Industrial Water: Make-up water for cooling operations and service water will be provided through onsite wells at a volume between 1.7 and 1.9 million gallons per day. Boiler makeup water, at an estimated volume of 110 gpm, will be provided by U.S. Agri-Chemicals. Water consumption will be affected by the method of disposal used for industrial wastewater.

Potable Water: Potable water uses at the plant will include water for drinking, washing, and sanitary facilities. Potable water for the plant will be from the service water system, which will be supplied by Floridan aquifer well water which has been chlorinated prior to use. The average expected potable water usage is approximately 2,000 gallons per day. This low quantity is based on the fact that the facility will employ an average of 16 to 19 people in an average 24-hour period.

Fire Suppression Water: The fire suppression system will consist of a looped hydrant water line encircling the facility along the perimeter road, as shown on the site plan. Supplemental hydrants will be strategically placed in the interior portion of the site adjacent to strategic pieces of equipment. Hydrants will be placed not more than 700 feet apart and will be located to provide unrestricted access within the facility.

Fire suppression water will be provided by dedicated capacity in the raw water storage tank. Motor-driven and diesel-engine-driven fire suppression water pumps will be provided with a design of 1,000 gpm at 125 pounds per square inch (psi) of pressure. This equipment will be located in the fire pump house as shown on the site plan. In addition, 440,000 gallons of fire suppression water storage is provided by the raw water tank.

Use of these fire suppression facilities will be limited to emergency conditions and during routine maintenance and testing. Maintenance and testing will consist of flushing the lines and testing pressure on a regular basis. This testing would produce approximately 60,000 gallons per test, or 2,000 gallons per day on an annual average basis.

F. SURFACE WATER MANAGEMENT AND DRAINAGE

Purpose: To determine the impact of drainage on the groundwater and surface water quality and quantity caused by the proposed development.

1. Discuss the impact the proposed development will have on surface water quality. Consider discharges into surface waters such as detergent, solvents, fuel, oil, silts, sediments, surface runoff, and thermal discharges.

A surface water management system will be constructed as an integral part of the facility. Regulatory agency review of this system will be performed by the FDER pursuant to Chapter 17-25, Florida Administrative Code (F.A.C.), and by the Polk County Division of Development Engineering Services as part of the county's Commercial Site Plan approval process.

The surface water management system will be constructed by first grading the site to drain to the north. A series of surface ditches and swales and/or catch basins will be used to collect stormwater runoff and divert it to a lined stormwater retention pond located at the northern end of the site (as shown on Map G, Drainage Map) to meet FDER requirements. The system will be designed to retain the first 1 inch of rainfall runoff and to limit the post-development peak discharge to the pre-development peak rate for the 25-year, 24-hour storm event. The stormwater detention pond will discharge to the ditch which runs parallel to CR 630 along the southern right-of-way boundary after treatment. Flow will enter the McCullough Creek tributary to the Peace River where its flows beneath CR 630.

In addition to these design features, the surface water management system includes several other provisions to maintain the quality of stormwater runoff. The first inch of rainfall that contacts specific production equipment with the potential of oil and grease contamination within the facility will be routed to an oil and water separator and then discharged either to the stormwater system or to the industrial process water stream. Process water will be managed separately from stormwater runoff. Secondary containment of fuel and process chemical tanks will capture storm water and contain spills or leaks. Finally, Spill Control and Countermeasures and Best Management Practices plans will be implemented to minimize the facility's impact on water quality.

2. **Describe the alteration to the site's natural drainage features, including wetlands, that would be necessary to develop the project. Describe the impact of such alterations on the fish and wildlife resources of the site.**

The site is devoid of significant environmental features; no wetlands, trees, shrubs, listed species, or listed species habitats have been identified there. Site vegetation consists of ruderal and grassy communities that are regularly mowed. Due to the absence of environmental features on the site and the disturbed and industrial nature of surrounding land, impacts to fish and wildlife resources are expected to be minimal.

A minimal amount of alteration to the site's natural drainage features will be required to implement the development plans described above. Grading requirements will be minimal because the majority of the site currently drains north to the roadside swale constructed adjacent to the CR 630 right-of-way. Grading will be limited to cutting and filling to the finish elevations, as required.

3. **Describe local aquifer recharge and groundwater conditions and discuss the changes to these water supplies which would result from development of the site.**

The impact of the proposed withdrawal on the surface water management system and, conversely, the impact of the proposed surface water management system on the withdrawal and water availability at the project site will be minimal. The proposed withdrawal will result in a depression of the potentiometric surface of the Floridan aquifer at the withdrawal point of less than 5 feet and a depression of the water table by less than 2 feet according to the modeling described above. These projections do not exceed the adverse impact criteria of the Southwest Florida Water Management District (SWFWMD). Because the site has not been mined, a 15- to 20-foot-thick zone of phosphate matrix (ore) remains beneath the site. The clay in this ore results in a permeability of less than 10^{-4} cm/sec, thereby acting as a confining layer between the water table and the Floridan aquifer. As a result, the withdrawal from the Floridan aquifer will not create a corresponding depression in the surficial water aquifer nor intercept runoff by creating downward leakage and interfere with the surface water management system.

Conversely, the surface water management system is not expected to have a material affect on the water availability at the site or the withdrawal. An estimated 2.26 acres of impervious area (including pond area) will be created by construction of the facility. This area will drain to the proposed lined stormwater pond and then offsite. In its current condition, the site possesses a runoff coefficient of 0.79; multiplying the impervious acreage to be created times the average annual rainfall of 53 inches per year and this subtotal by the difference in the runoff coefficients yields a worst-case net decrease in percolation of 617,000 gallons per year. Due to the confining layer between the surficial and Floridan aquifers, the area has a low potential for recharge. The reduction in recharge to the Floridan aquifer can be conservatively calculated by multiplying the number of impervious acres times SWFWMD's estimated recharge rate of 2 inches per year. This calculation shows that recharge to the Floridan aquifer could be reduced by not more than 123,000 gallons per year. On a regional basis, neither of these changes are considered significant.

G. SOLID WASTE MANAGEMENT

Purpose: To assure the governing agencies and the developer that solid waste disposal is adequate and environmentally safe for the proposed development.

1. **Calculate the solid waste disposal volume expected to be generated in terms of pounds or tons per day and in terms of cubic yards per day.**

The following table lists estimated solid waste volumes expected to be generated by the facility. This estimate takes into account the possibility of solid waste that would be produced in the event that a zero liquid discharge system is selected for industrial wastewater discharge.

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Table 1. Trip Generation During Facility Operation

Trip Mode	Trips Per Wastewater Treatment Disposal Option		
	Percolation Pond/Sprayfield (trips/day)	Connection to Fort Meade WWTP Water (trips/day)	Zero Liquid Discharge (trips/day)
Employees[a]			
Day Shift	34	34	36
Evening Shift	4	4	6
Night Shift	4	4	6
Pick-ups/Deliveries			
Average	14	14	14
Peak	20	20	22
Fuel Oil Delivery[b]			
Normal Operation	0	0	0
Fuel Oil Operation	78	78	78
Total Average Trips/Day	56	56	62
Total Peak Trips/Day	140	140	148

[a] Based on ITE Trip Generation Manual Standard of three trips per employee (except for operators at two trips/day).

[b] Distillate fuel oil use is expected to occur during start-up of the facility and during periods when natural gas, the primary fuel source for the facility, is not available.

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To Robert Chatham	From A C Kimball
Co. Destec	Co.
Dept. Revised table	Phone # as faxed to
Fax # Polk Co. yesterday.	Fax #

Waste Type	Percolation Pond/Sprayfield (volume)	Connection to Fort Meade WWTP Water (volume)	Zero Liquid Discharge (volume)
Domestic Waste[a]	15 cu yd/wk	15 cu yd/wk	15 cu yd/wk
Crystallizer Solids	0	0	1.1 cu yd/day
Waste Oil	2 barrels/month	2 barrels/month	2 barrels/month
Solvents/Cleaners	1 barrel/month	1 barrel/month	1 barrel/month

[a] Non-compacted waste; approximately one dumpster load per week.

2. Identify the solid waste disposal site and the entity responsible for disposal.

Domestic wastes will be disposed of by an authorized franchise dealer, possibly at either the Southeast, North Central, or Northeast Landfills. All other waste will be disposed of in compliance with state and federal regulations.

The following table further described landfills in proximity to the site:

Name	Approximate Distance from Site (miles)	Type
Southeast	26	Class I
North Central	14	Class I
Northeast	40	Class I

H. POPULATION

Purpose: To determine the impact of the proposed development's additional population.

1. Calculate the projected resident (and transient) population of the proposed development and/or the generated population in the case of commercial or industrial uses.

The Tiger Bay cogeneration plant is a proposed industrial facility which will not in itself provide residential dwelling units nor accommodate a defined population. The facility will, however, impact the county's population based on the following employment characteristics.

The facility is expected to employ an average of 19 to 22 employees, with peak employment of 40 to 43 individuals. During an average 24-hour period, three shifts of employment will range from between 16 to 19 individuals, depending upon wastewater disposal design of the plant (see the following table).

Employees	Number of Employees per Wastewater Disposal Option		
	Percolation Pond/Sprayfield	Connection to Fort Meade WWTP Water	Zero Liquid Discharge
Average Permanent Employment	19	19	22
Peak	40	40	43
Average 24-hour Shift	16	16	19

The Tiger Bay cogeneration plant is expected to create permanent job opportunities for between 19 and 22 individuals. Approximately half of the employees, or 8 to 11 individuals, are expected to relocate permanently to Polk County; the remaining employees are expected to come from the existing county work force.

Peak post-construction employment is expected to occur during the start-up of the facility (the first several months of operation) and during annual maintenance turnaround (average two weeks annually). Additional employees during these times will typically be contract employees who work for equipment manufacturers, employees of Destec Engineering's Houston office, and/or local maintenance contractors. Other than those individuals living within the county, peak period employees are not expected to relocate permanently to the area.

2. If the proposed development is a commercial or industrial project, describe the employment characteristics--including the anticipated number of employees, type of skills or training required for the new jobs, the percentage of employees that will be found locally or are expected to be drawn from outside the county or state, and the number of shifts per day and employees per shift.

The Tiger Bay cogeneration plant will employ a total of between 19 and 22 individuals. On an average, 16 to 19 individuals will be employed in the plant during any given day.

The plant will operate three shifts per 24-hour period. Distribution of employees by shift is shown in the following table:

Shift	Number of Employees per Wastewater Disposal Option		
	Percolation Pond/Sprayfield	Connection to Fort Meade WWTP Water	Zero Liquid Discharge
Day	12	12	13
Evening	2	2	3
Night	2	2	3

Most positions at the Tiger Bay cogeneration plant will require trained, highly skilled individuals. To the extent possible, positions will be filled by qualified Polk County residents; however, due to the highly technical nature of the facility, it is likely that certain positions will be filled by experienced personnel from outside the area. Approximately 50 percent of employees are expected to be hired from within the Polk County work force. The remaining 50 percent, approximately 8 to 11 individuals, are expected to relocate permanently to Polk County once operation of the plant commences.

The following table outlines the employment characteristics anticipated for the Tiger Bay cogeneration plant, assuming the average 24-hour employment of 19 employees required by the zero liquid discharge industrial wastewater disposal system:

Average Number of Employees	Type of Skill	Number Expected from Polk County	Shifts		
			Day	Evening	Night
3	Manager	1	3	0	0
1	Engineer	0	1	0	0
9	Operator	4 to 5	3	3	3
5	Maintenance	2 to 3	5	0	0
1	Administration	1	1	0	0

3. Indicate the expected demographic composition of the additional population (age/socioeconomic factors).

Generally, employees will be young to middle-aged, depending upon the amount of experience required for the position. Salaries are expected to fall within the mid- to high-range for Polk County. Annual salary ranges for facility employees are expected to fall between $16,000 and $60,000, with the majority being in the $32,000 annual salary range.

4. Describe the development's proposed service area and indicate the service area's present population.

The Tiger Bay cogeneration facility will service the electrical grid. Due to the nature of electrical distribution in the grid, a definite service area is not applicable.

I. GENERAL INFORMATION

Purpose: To determine if any special needs or problems will be created by the proposed development.

1. How does the requested zoning action or proposed development relate to any existing or proposed land use plans? (Including the Polk County Comprehensive Plan)

The Tiger Bay cogeneration plant's Future Land Use classification is PM-Phosphate Mining, as identified on Map C-1, Future Land Use Map. The facility as proposed meets the Polk County Comprehensive Plan definition of a low-impact non-certified electric power generating facility:

> "Low-Impact Non-Certified Electric-Power Generating Facility meet the definition of a cogeneration facility pursuant to Section 210 of the Public Utility Regulation Policy Act of 1978 (PURPA) and are certified as "Qualifying Facilities" from the Federal Energy Regulatory Commission." [Polk County Comprehensive Plan (April 19, 1991), Glossary, page 255 (see Appendix A)].

According to language in the Polk County Comprehensive Plan, such facilities are permitted in land-use categories that allow the host facility:

> "Low-Impact Non-Certified Electric-Power Generating Facilities shall be permitted in land use categories that allow the thermal host facility and also in the following land use categories: 1. Industrial, 2. Business Parks, 3. Institutional." [Polk County Comprehensive Plan (April 19, 1991), Future Land Use Element, Policy 2.125-I1, page 111 (see Appendix B)].

The host facility for the proposed cogeneration plant is an existing, phosphate-mining-related chemical plant, which is permitted in the PM-Phosphate Mining land use category as an allied industry [see Policy 2.114-A3(a), Appendix C]. Further, non-certified electric power generating facilities are listed as a permitted activity in the PM-Phosphate Mining land use category [see Policy 2.114-A3(e), Appendix C]. Therefore, the proposed facility is consistent with Comprehensive Plan locational guidelines. In order to ensure compliance with other Comprehensive Plan requirements, the facility will require Non-certified Electric Power Generating Facility Site Approval from the Board of County Commissioners.

2. Are there any special problems with the site? How are they to be corrected or minimized?

There are no site characteristics that are considered special problems from either an environmental, engineering, or design standpoint.

3. How will the general public be served by the proposed zoning action or proposed development?

Florida's rapid growth has resulted in a shortage of electrical-generating capacity. The proposed Tiger Bay cogeneration plant will supply a portion of the needed electricity to the electrical grid, as well as providing thermal energy to a host facility. Cogeneration (the sequential production of steam and electricity) provides this electricity at a higher level of fuel efficiency as compared to conventional steam electric generating plants.

4. List and discuss special features of the proposed development that promote desirability and contribute to neighborhood needs.

The Tiger Bay cogeneration facility has been located and designed to be compatible with the surrounding area and to provide for neighborhood needs. The facility will be located in an existing industrial complex, the U.S. Agri-Chemicals complex, which is situated in a industrialized area. The cogeneration facility will contribute directly to the needs of its thermal host, the U.S. Agri-Chemicals Fort Meade Chemical Products Plant, by providing thermal heat for the plant's process use.

Impacts associated with the maintenance and operation of the facility will be mitigated by several design features. The use of natural gas as the primary fuel source will result in a cleaner combustion than most other fossil fuel sources. In addition, state-of-the-art air pollution control devices, advanced design combustors which limit NO_x emissions, will be used to reduce air pollution. Industrial wastewater discharge and stormwater management systems will meet or exceed state and federal regulations. Finally, the facility will provide a benefit to the region by supplying much-needed electricity to the grid, helping to prevent brown-outs and black-outs, which can result from high demands during critical use periods.

5. Discuss the demand on and provision for the following services:

a. Recreation

The proposed facility is expected to attract between 8 and 11 new permanent residents in the county. The majority of these new residents will probably locate in Bartow, Winter Haven, and Lakeland. It is anticipated that the relatively small number of new residents, as well as their predicted dispersal throughout the county, will result in an insignificant impact on recreational facilities.

b. Educational Facilities (preschool/elementary/junior high/high school)

The Tiger Bay cogeneration facility will result in a small number of new residents who are expected to relocate to Polk County. Impact to the county's educational system is anticipated to be minimal.

c. Health Care (emergency/hospital)

In the event of a medical emergency, the facility will be served by the Polk County EMS, located approximately 3 miles from the facility in Fort Meade. Bartow Memorial Hospital is located approximately 9 miles to the north of the facility, in the City of Bartow. Under nonemergency conditions, health care for employees will be provided by local health care professionals.

d. Fire Protection

The Tiger Bay cogeneration plant will fall within the service area of the Fort Meade Fire Department (Station 220), which is located approximately 3 miles from the site. In addition to fire services provided by Fort Meade, the facility will feature onsite fire protection as follows:

- Hydrants will be placed at a maximum of 700 feet apart,
- Fire suppression water flow will be provided at 1,000 gpm at the fire suppression water pump,
- Foam fire suppression systems will be located adjacent to the fuel oil unloading area and the fuel storage tank,
- A 440,000-gallon raw water storage tank will be provided onsite,
- Fire suppression water monitors will be placed at strategic locations around fire hazards,
- Fixed suppression will be provided at various locations around the prime movers.

All aspects of the fire prevention system will meet the requirements of the 1988 Polk County Fire Prevention Code.

e. Police Protection and Security

The Tiger Bay cogeneration plant will fall within the jurisdiction of the Polk County Sheriff's Department. The plant will also be secured by a chain link fence and limited access points.

f. Electrical Power Supply

The facility will provide its own operational electricity needs. Start-up and back-up electricity will be provided by the utility grid.

6. Estimate the ad valorem tax yield to the County government and the School Board for each of the next five (5) years.

Final engineering design and subsequent permitting requirements for the facility are subject to further refinement at this time. Because these elements will bear upon construction and equipment costs, it is impossible to give an accurate estimate of the ad valorem tax rates anticipated for the facility. In addition, tax credits for pollution control facilities are dependent upon equipment requirements in the final engineering design. However, a general estimate of total capital expenditure for real and personal property falls between $120 and $140 million. This would result in approximately $1.5 to $1.7 million per year in tax revenue for the county. Construction of the facility will be completed by late 1984.

J. MAPS

Purpose: To give the public agencies and the developer a clear graphic illustration and visual understanding of the proposed development and the potential positive and negative impacts resulting from the development.

Maps shall be of sufficient type, size, and scale to facilitate complete understanding of the elements of the proposed development. Scales shall be clearly indicated on each map and the dates of preparation and revisions should be included. The following maps shall accompany all Impact Assessment Statements.

Map A: A location map showing the relationship of the development to cities, highways, and natural features;

Map B: A Topographic Map with contour intervals of no greater than five (5) feet, the identification of the property boundaries, and a delineation of the areas of special flood hazard (100 year flood plain) as shown on the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency (FEMA) for Polk County;

Map C: A Land Use and Zoning Map showing the existing uses and zoning on and abutting the proposed development;

Map D: A Soils Map with soils designated according to Soil Conservation Service classifications. If available, U.S.D.A. Soil Conservation Service (SCS) soil surveys are preferable;

Map E: A Traffic Circulation Map identifying any existing roads on or adjacent to the proposed development and indicating the name of the roads, maintenance jurisdiction, and pavement and right-of-way widths;

Map F: A Site Plan showing land uses; the layout of lots; the type and maximum density for each type of residential area; the typical minimum lot sizes and dimensions for each use and unit type; and the dimensions, locations, and types of buffers, easements, open space areas, parking and loading areas, setbacks, and vehicular circulation routes; and

Map G: A Drainage Map delineating existing and proposed drainage areas, water retention areas, drainage structures, drainage easements, canals, wetlands, watercourses, and other major drainage features.

Impact Assessment Statements for Planned Unit Developments shall address the entire PUD; however, Map F (Site Plan) and Map G (Drainage Map) need only address the area(s) requested for Tentative Approval (the entire PUD only if the entire PUD has been requested for Tentative Approval).

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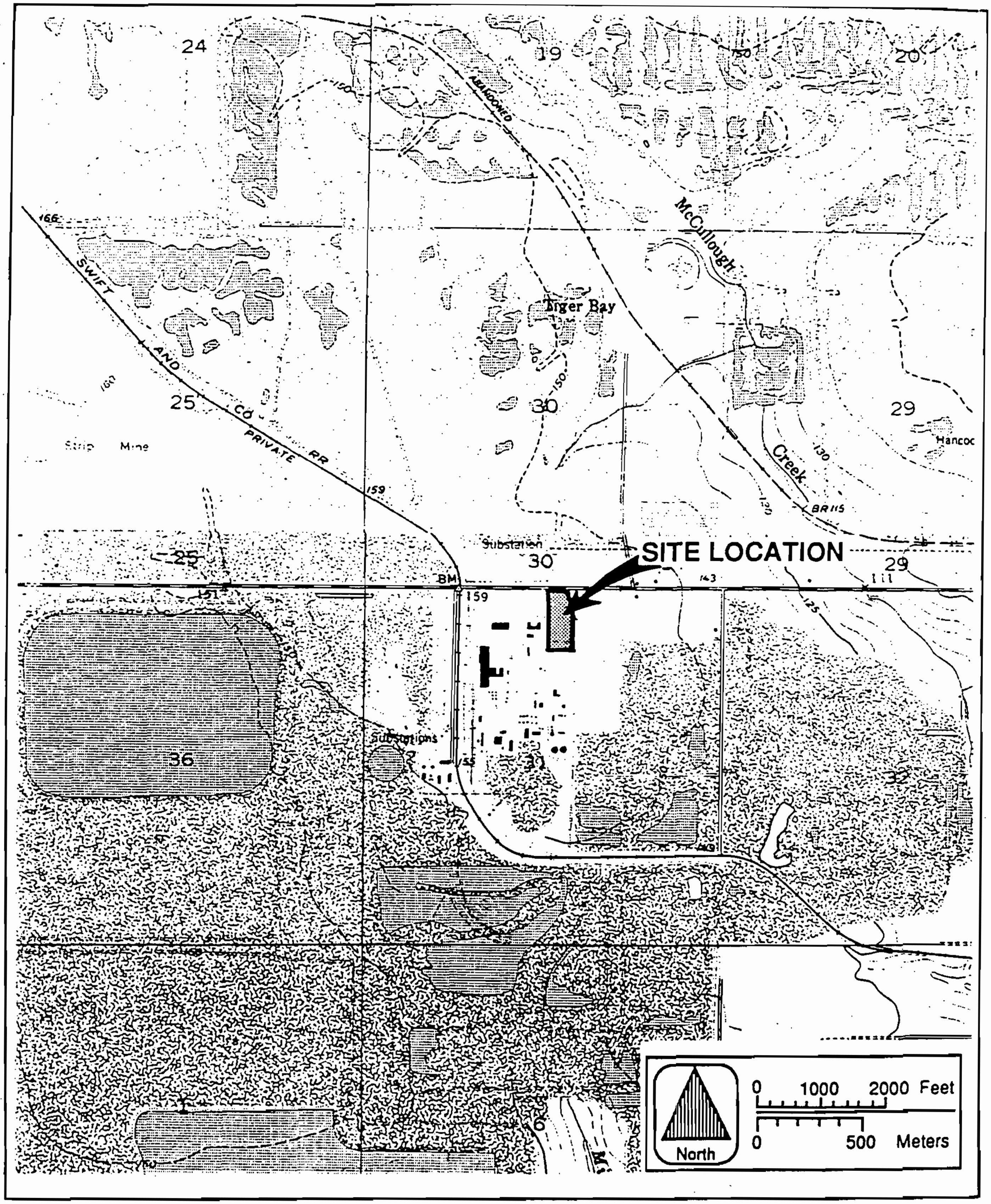
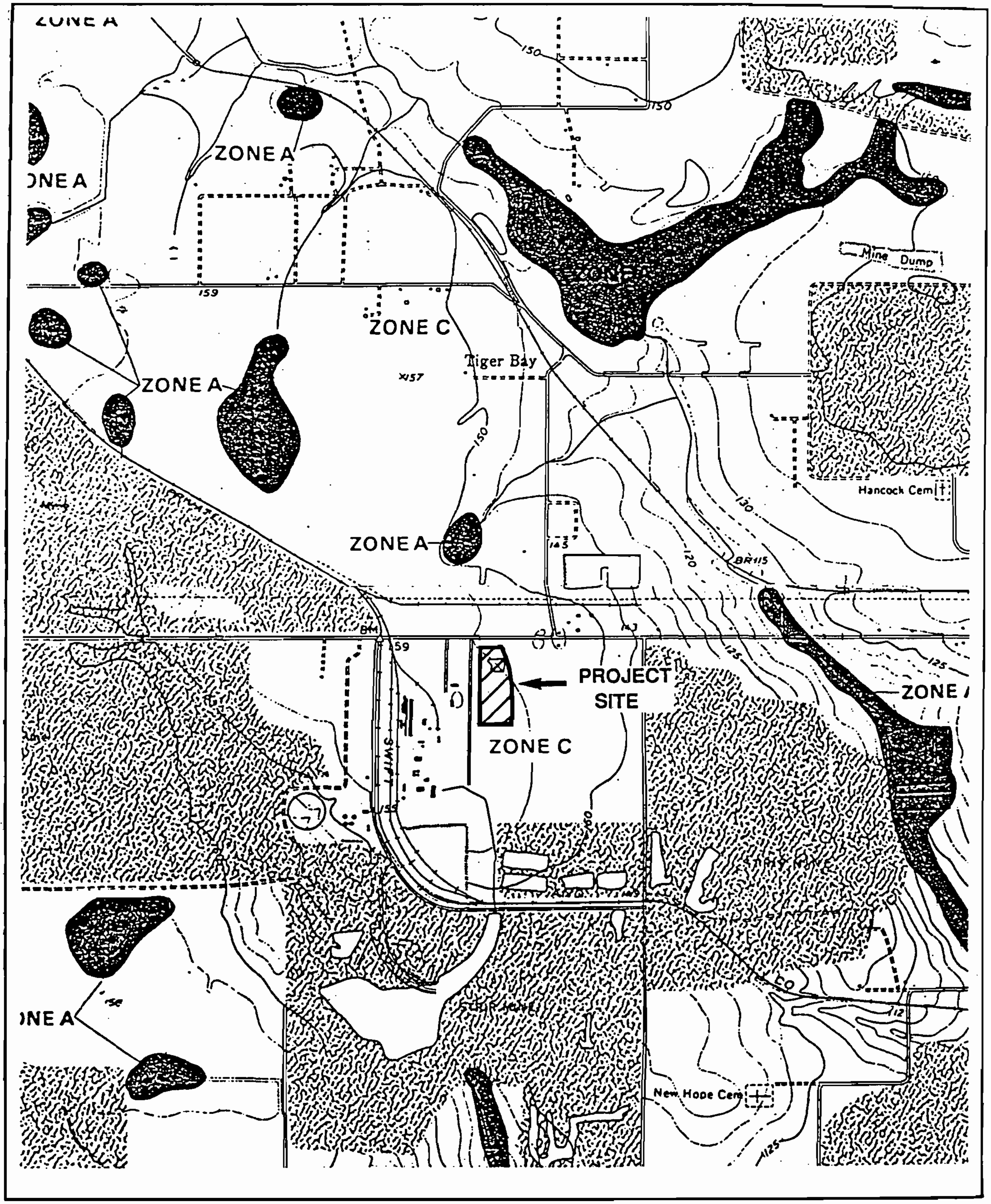


MAP A
CENTRAL FLORIDA COGENERATION PLANT
LOCATION MAP

SOURCES: USGS, 1972, KBN, 1992.

DESTEC ENGINEERING, INC.



MAP B-2
FLOOD PLAIN MAP

SOURCES: FEMA, JANUARY 19, 1983; KBN, 1992.

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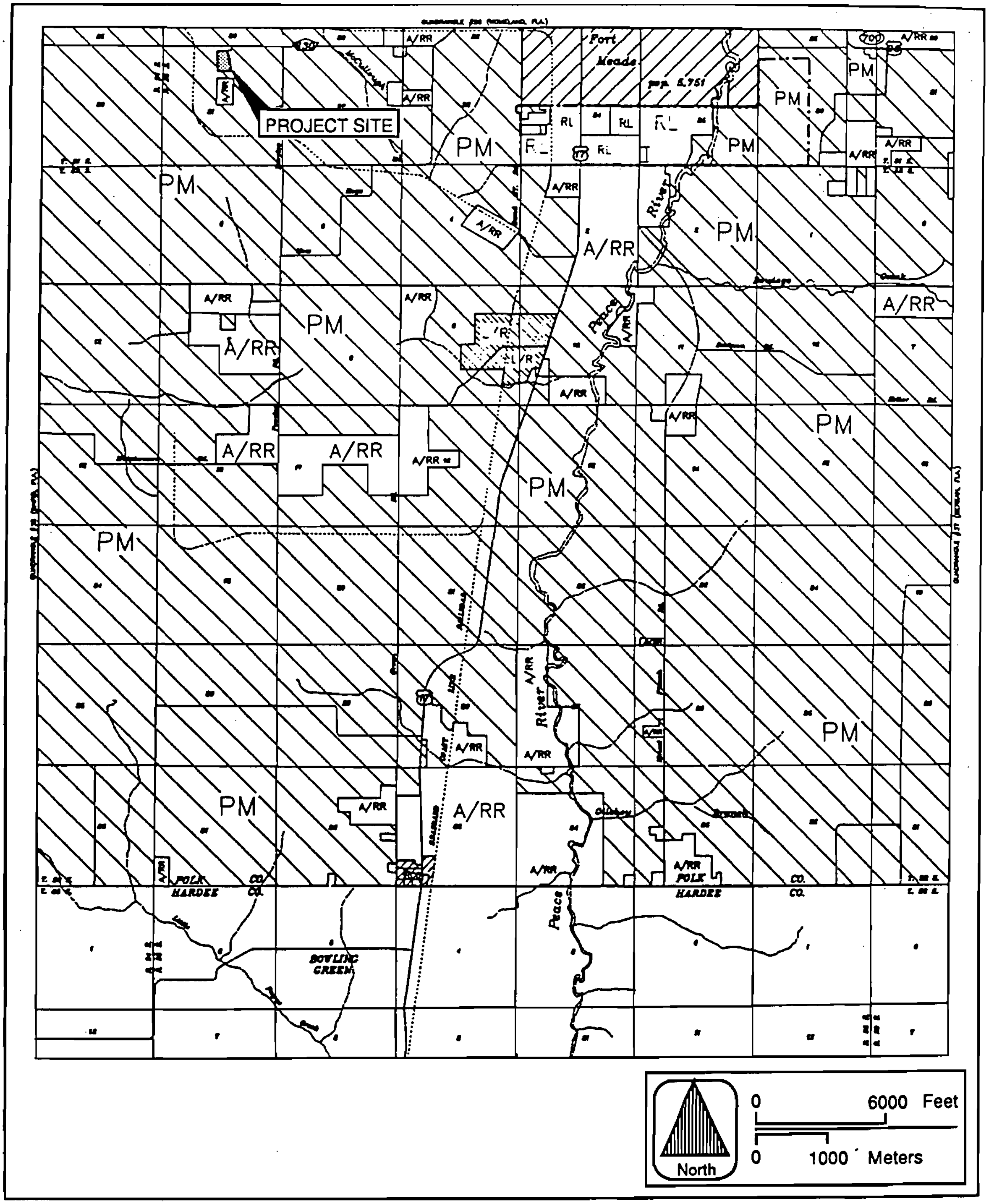
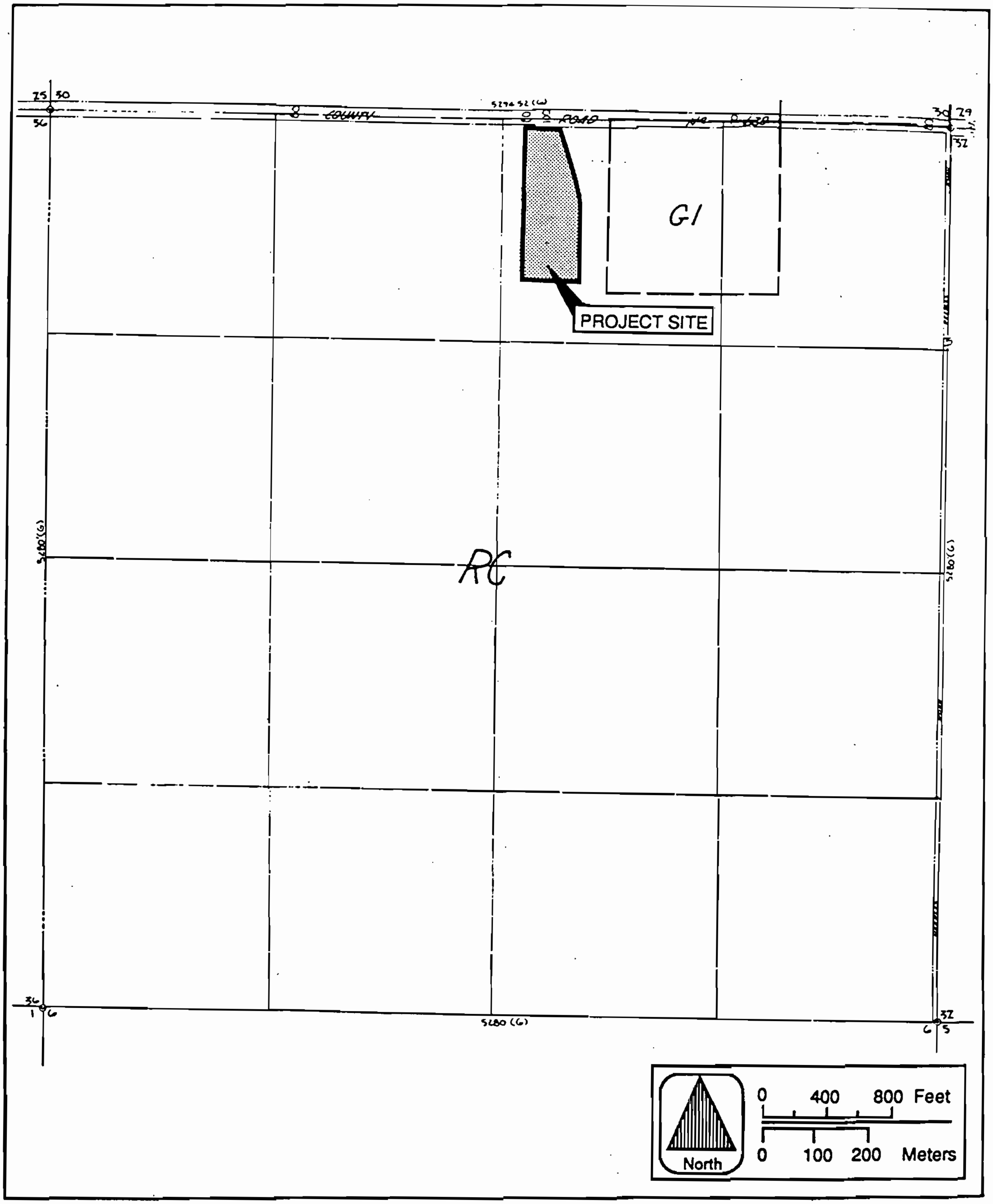


MAP C-1
CENTRAL FLORIDA COGENERATION PLANT
FUTURE LAND USE MAP

SOURCES: POLK CO. COMPREHENSIVE PLAN, 1991; KBN, 1992.

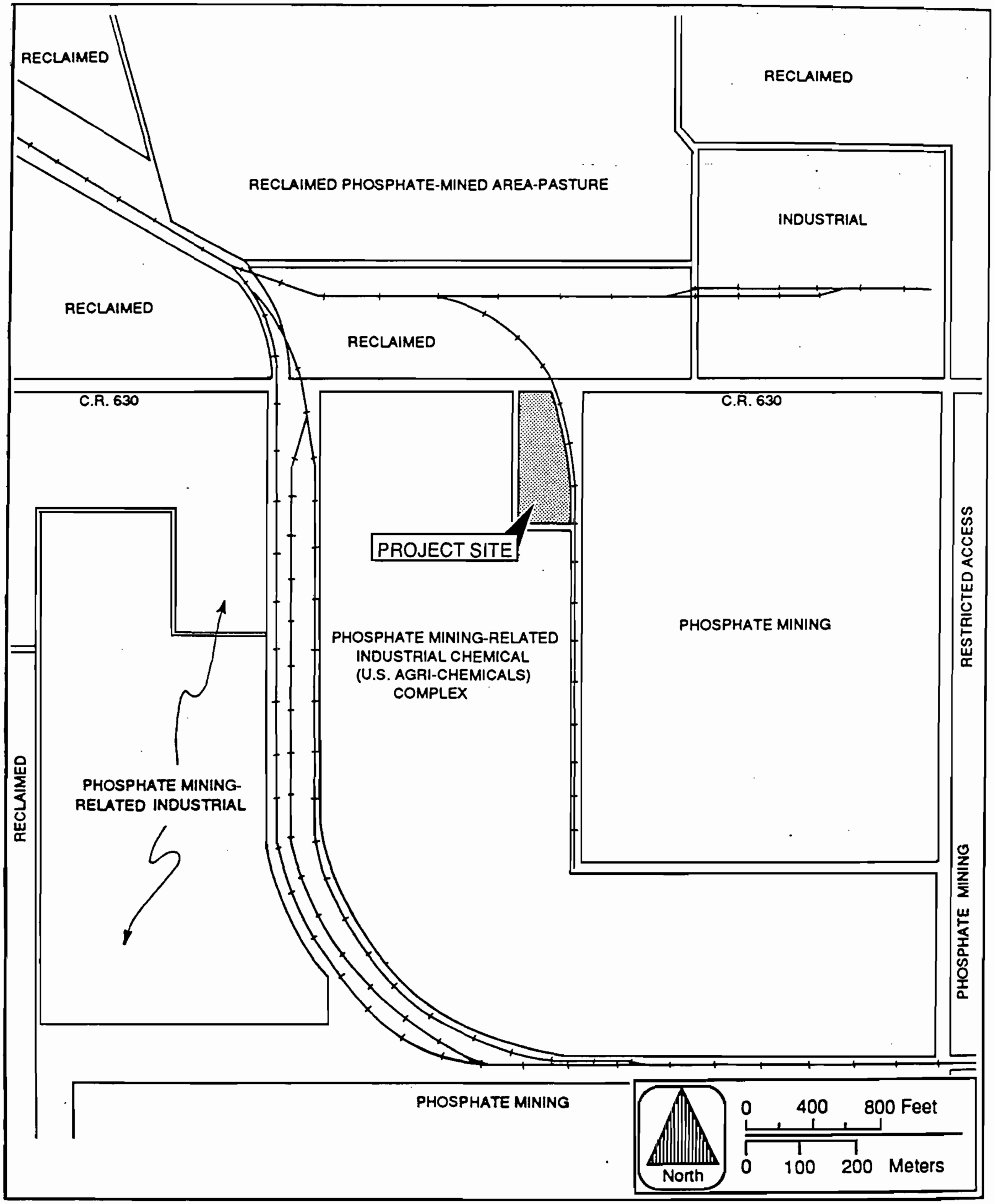
DESTEC ENGINEERING, INC.



MAP C-2
CENTRAL FLORIDA COGENERATION PLANT
ZONING MAP

SOURCES: POLK CO.; KBN, 1992

DESTEC ENGINEERING, INC.



MAP C-3
CENTRAL FLORIDA COGENERATION PLANT
SURROUNDING LAND USE

SOURCE: KBN, 1992.

DESTEC ENGINEERING, INC.

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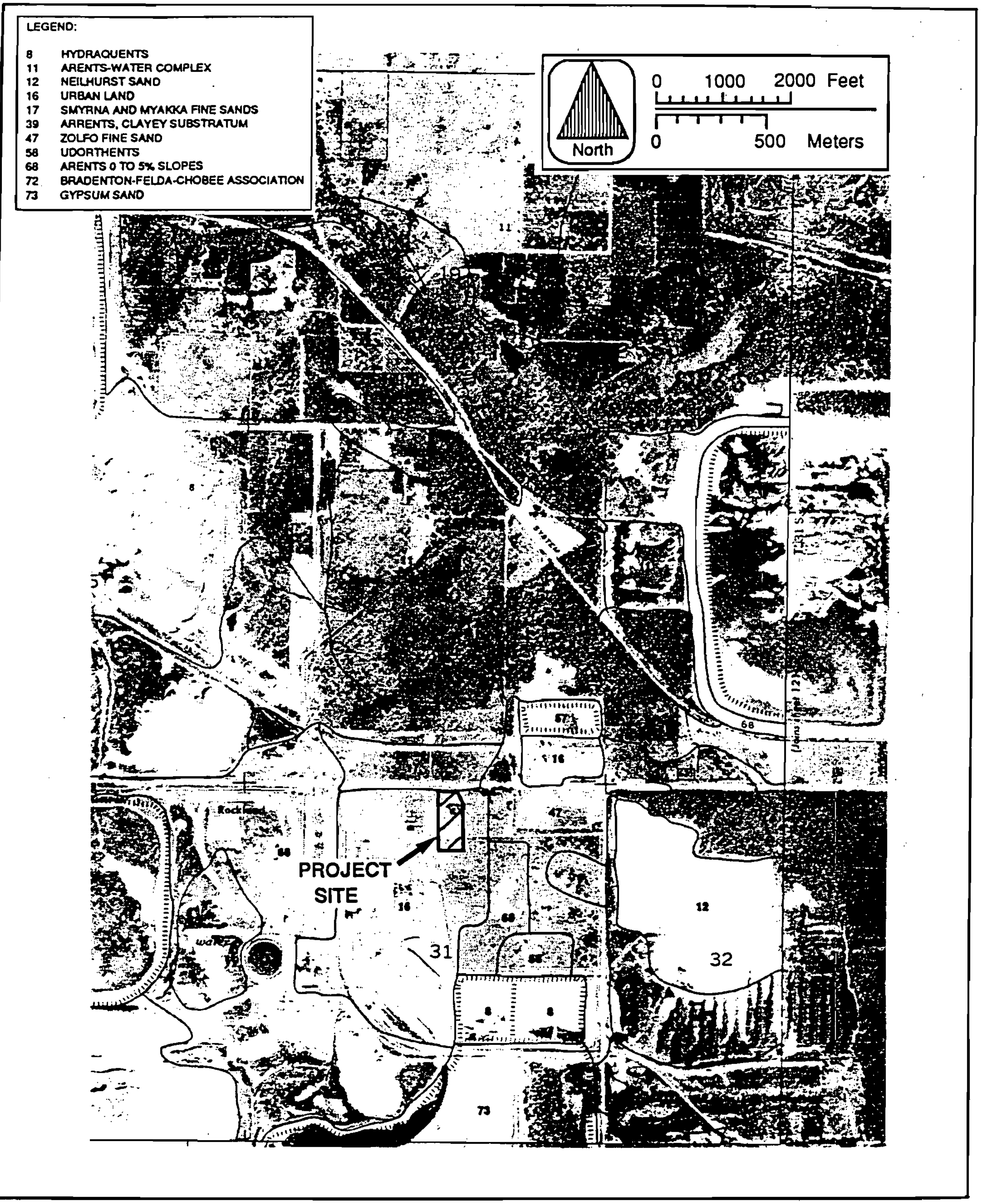
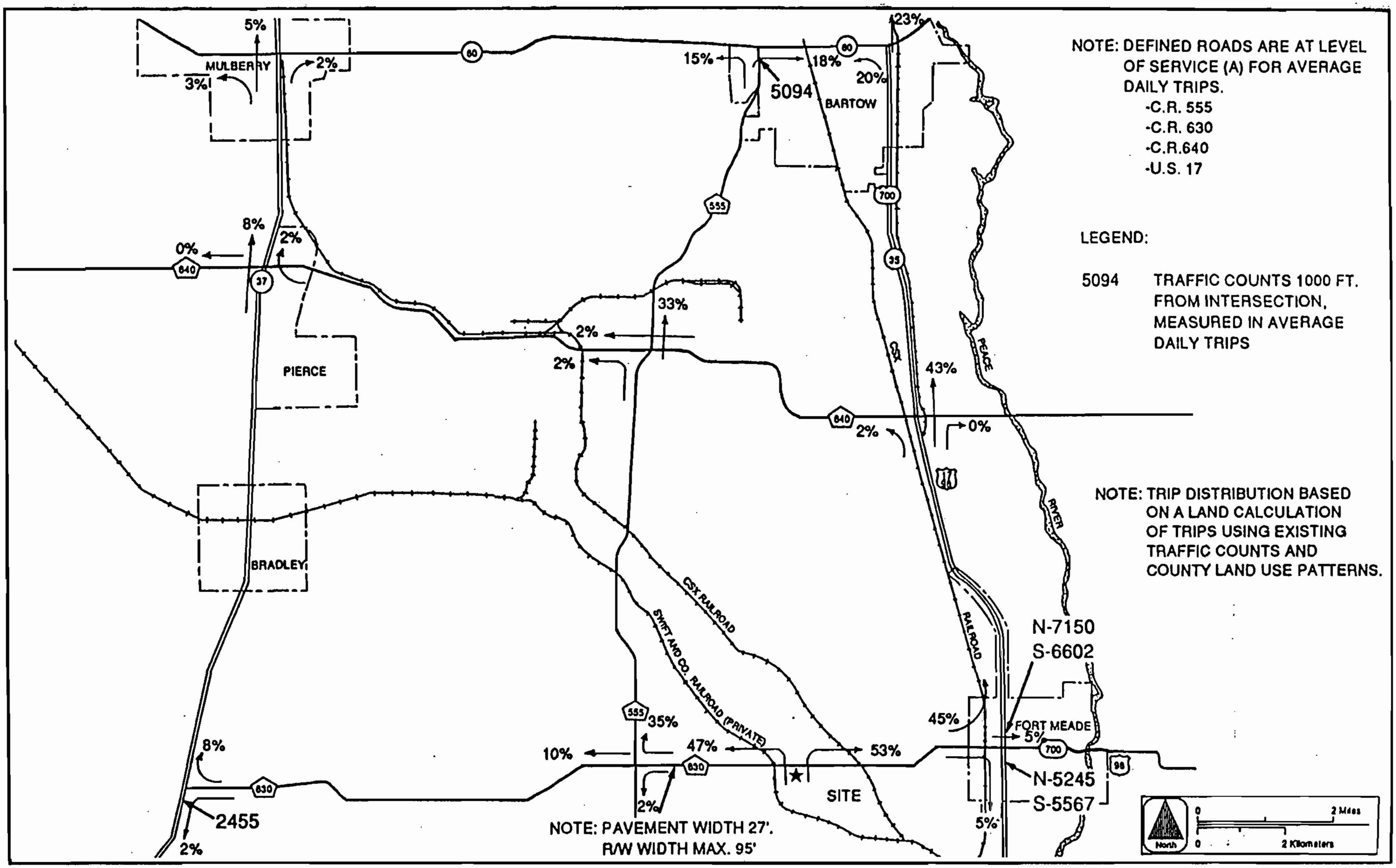


MAP D
TIGER BAY COGENERATION PLANT
SOIL SURVEY

SOURCES: POLK COUNTY SOIL SURVEY, SEPTEMBER, 1988; KBN, 1992.

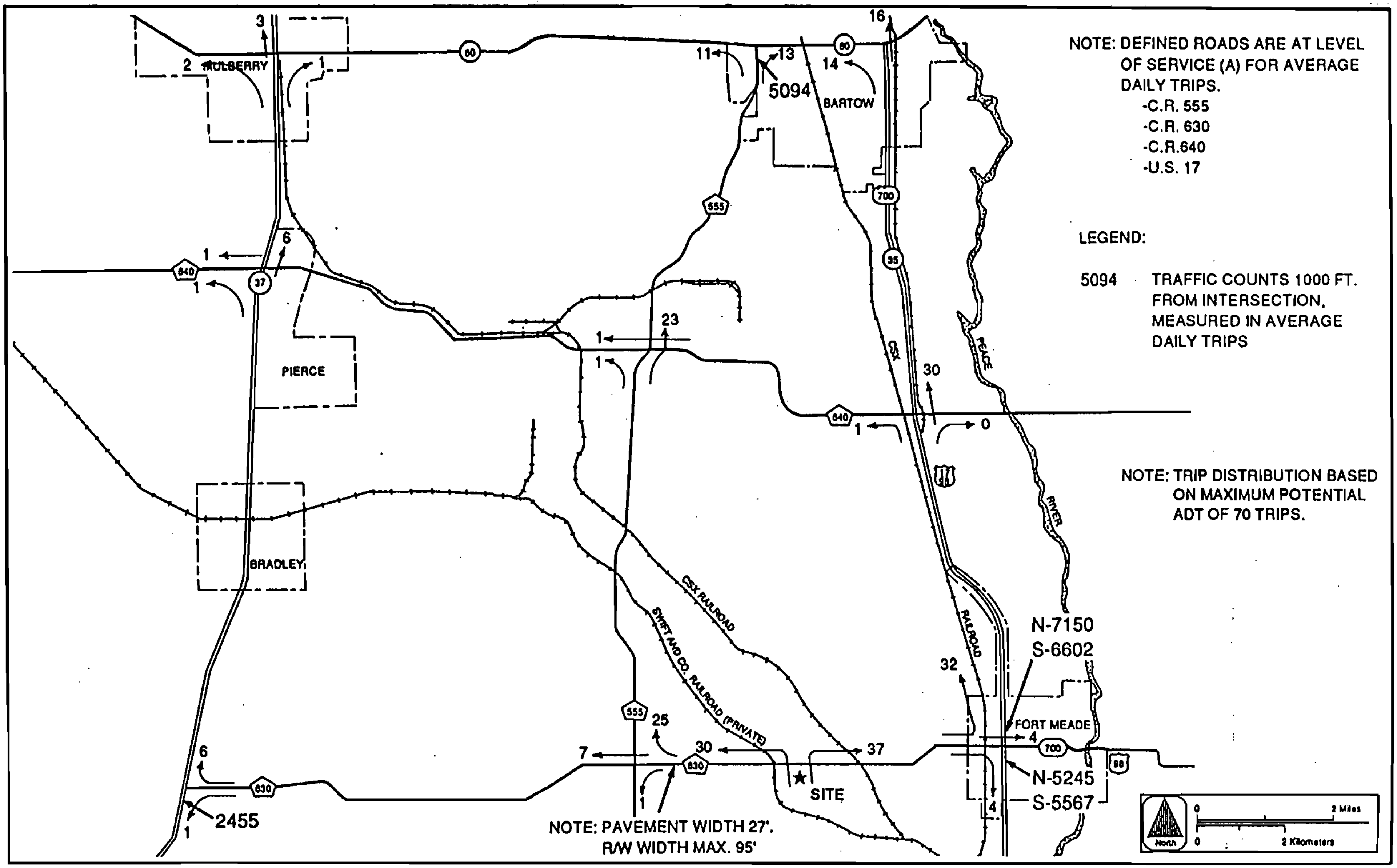
DESTEC ENGINEERING, INC.



MAP E-1
TIGER BAY COGENERATION PLANT
TRIP DISTRIBUTION

SOURCE: FDOT, 1989.

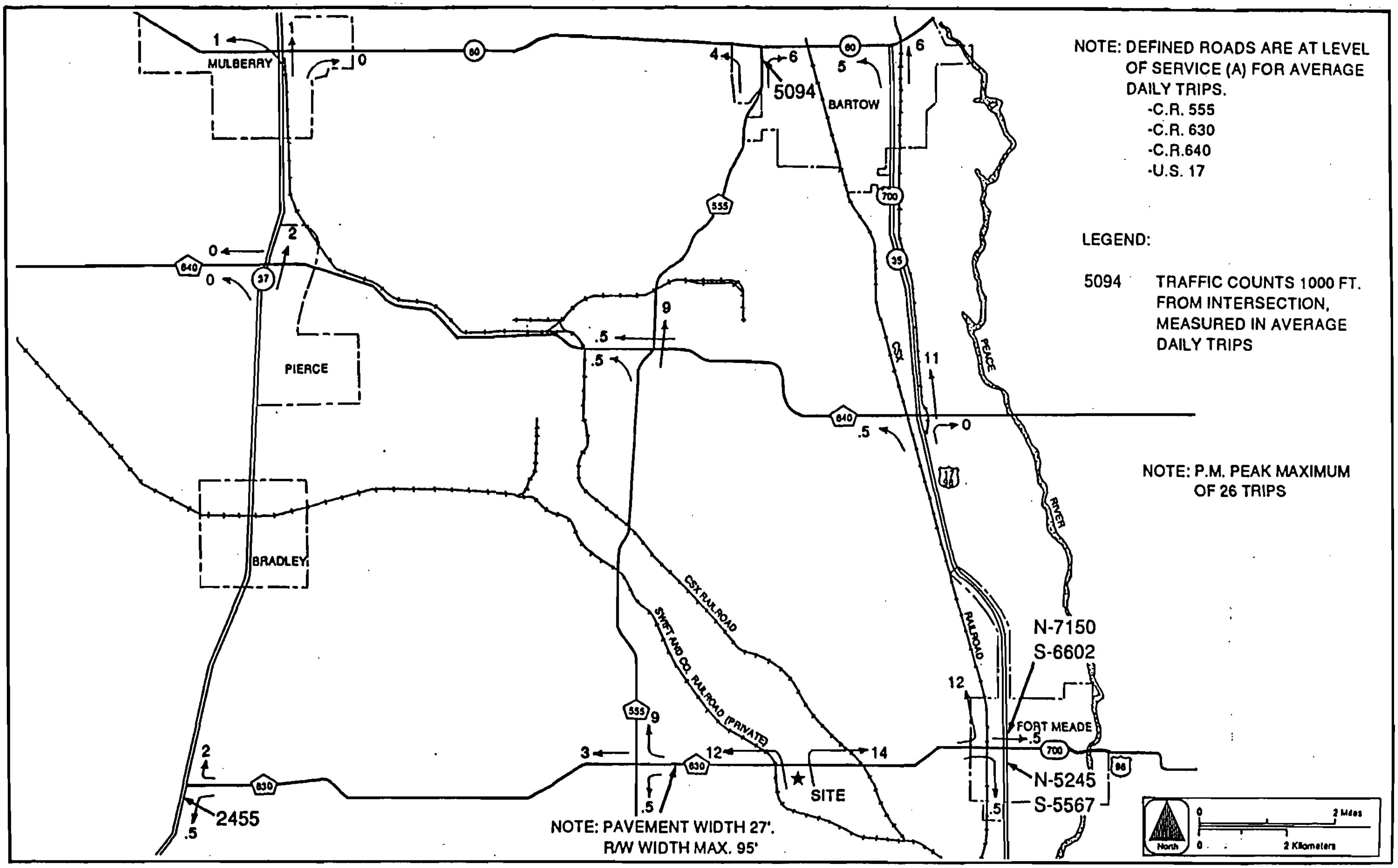
DESTEC ENGINEERING, INC.



MAP E-2
TIGER BAY COGENERATION PLANT
AVERAGE DAILY TRIPS

SOURCE: FDOT, 1989.

DESTEC ENGINEERING, INC.



MAP E-3
TIGER BAY COGENERATION PLANT
P.M. PEAK HOUR TRIPS

SOURCE: FDOT, 1989.

DESTEC ENGINEERING, INC.

ATTACHMENT 2 - 6

SWFWMD WATER USE PERMIT (2010840.00)

Southwest Florida Water Management District

2379 Broad Street • Brooksville, Florida 34609-6899 • 1-800-423-1476 (Florida Only) or
(352) 796-7211 • SUNCOM 628-4150 • T.D.D. Number Only (Florida Only): 1-800-231-6103

7601 Highway 301 North
Tampa, Florida 33637-6759
1-800-836-0797 or (813) 985-7481
SUNCOM 578-2070

170 Century Boulevard
Bartow, Florida 33830-7700
1-800-492-7862 or (941) 534-1448
SUNCOM 572-6200

115 Corporation Way
Venice, Florida 34292-3524
1-800-320-3503 or (941) 486-1212
SUNCOM 526-6900

2303 Highway 44 West
Inverness, Florida 34453-3809
(352) 637-1360

August 26, 1997

RECEIVED
AUG 27 1997
Environmental
Department

Florida Power Corporation
Post Office Box 14042, MAC H2G
St. Petersburg, FL 33733

Subject: Final Agency Action Transmittal Letter
Transfer Water Use Permit No. 2010840.00

Your Water Use Permit(s) has been approved contingent on no objections being received within 14 days after receipt of this notice of Final Agency Action. Your Permit has been approved subject to all terms and conditions set forth in the approved Permit(s).

Any person who is substantially affected by the District's Final Agency Action concerning a Permit may challenge this Permit by requesting an Administrative Hearing in accordance with Section 120.569, Florida Statutes (F.S.), and Part V of Chapter 40D-1, Florida Administrative Code (F.A.C.). A request for hearing must (1) state any disputed issues of material fact; (2) explain how each petitioner's substantial interests will be affected by the District's action; and (3) otherwise comply with Rule 40D-1.521. A request for hearing must be filed with (received by) the Agency Clerk of the District at the address above within 14 days of receipt of this notice of Final Agency Action. Receipt is deemed to be the fifth day after the date on which this notice is deposited in the United States mail. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.569, F.S.

Please be advised that the Governing Board has formulated a water shortage plan as referenced in Condition 4 of the Standard Water Use Permit Conditions (Exhibit A), and will implement such a plan during periods of water shortage. You will be notified during a declared water shortage of any change in the conditions of your Permit(s) or any suspension of your Permit(s), or of any restriction on your use of water for the duration of any declared water shortage. Please further note that water conservation is a condition of your Permit(s) and should be practiced at all times.

One of the enclosed ID tags must be affixed in a prominent location on each permitted withdrawal facility. The necessary tag(s) and instructions are enclosed. If you have any questions or concerns about your Permit, please contact the Regulation Department or contact this office at Extension 4343.

Should your address change you must notify the District within 30 days.

Sincerely,

James P. Marshall, Supervisor
Records and Data Department

TRANSTL2.FAA
R.4-26-95

JPM:kat
Enclosures: Approved Permit, Surface Water and/or Well Tags w/Instructions, and Rule 40D-1.521, F.A.C.

cc: Central Florida Power

Excellence Through Quality Service

Best Available Copy

TRANSFEREE SHOULD COMPLETE ALL ITEMS. INCOMPLETE INFORMATION MAY DELAY PROCESSING

ase Print or Type

APPLICATION FOR TOTAL TRANSFER OF WUP NO. 2010840.00

TOTAL OWNED OR LEGALLY CONTROLLED ACRES TO BE TRANSFERRED FROM PERMIT

Use Classification(s): Industrial or Commercial (from current Permit) County: Polk

Section(s) 31 ; Township(s) 31 ; Range(s) 25

Number of acres ______ owned 6.2 leased* ______ legally controlled = 6.2 total acres to be transfe

***Applications for Leased property must be either a joint application in the name of the lessee and the property owner c in the name of the property owner.**

TRANSFEREE: Florida Power Corporation

Address P. O. Box 14042; MAC H2G

City St. Petersburg State FL Zip 33733

Telephone (813) 866-4387

The Transferee having acquired the ownership, or other legal control of all of the permitted water withdrawal facility or land on which the facility is located and all of the withdrawals subject to such permit, does hereby accept such Tran subject to all terms and conditions contained in such permit issued with this Transfer, and does assume responsibility complying with all such terms and conditions.

NSFEREE MUST SIGN BELOW.
AUTHORIZED AGENT MUST SUBMIT AUTHORIZATION TO SIGN

Signature of Transferee or Authorized Agent

W. Jeffrey Pardue, CEP; Director, Environmental Services

Name and Title (Print or Type)

Date: 7/8/97

7/9/97

Signature of Permittee
(Not required, but may be submitted)

Date: 7/9/97

= =

SWFWMD USE ONLY

= =

Based upon the information furnished, the transfer of this permit including all withdrawals subject to such permit w approved by the District on AUGUST 25, 1997 and the permit is transferred to the transferee. This total trans is subject to all terms and conditions set forth in the prior permit.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
Received
JUL 11 1997
BRD-BARTOW

horized District Representative
UTHWEST FLORIDA WATER MANAGEMENT DISTRICT

BJ JARVIS, DIRECTOR, RECORDS & DATA DEPT.
Name and Title

Attachment: MIA-ETBWUCA Map (Page 3), and MIA-ETBWUCA Section-Township-Range List (Page 4), R.3-17-92
WUP Assign Permit Form No.: 46.10-001, Rev. 09-09-93 TRANS.COM

TRANSFERRED ON: AUGUST 25, 1997
TO: FLORIDA POWER CORPORATION
P O BOX 14042
MAC H2G
ST. PETERSBURG FL 33733

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
WATER USE
INDIVIDUAL
PERMIT NO. 2010840.00

PERMIT ISSUE DATE: February 23, 1993
EXPIRATION DATE: February 23, 1999

IT IS THE PERMITTEE'S RESPONSIBILITY TO RENEW THIS PERMIT BEFORE THE EXPIRATION DATE, WHETHER OR NOT THE PERMITTEE RECEIVES PRIOR NOTIFICATION BY MAIL.

This permit, issued under the provisions of Chapter 373, Florida Statutes, and Florida Administrative Code 40D-2 authorizes the Permittee to withdraw the quantities outlined herein, and may require various activities to be performed by the Permittee as outlined by the Special Conditions. This permit, subject to all terms and conditions, meets all District permitting criteria.

GRANTED TO:

Central Florida Power Limited Partnership
2500 City West Blvd., Suite 150
Houston, TX 77042

ABSTRACT: This is a new permit for the industrial water use requirements of a proposed power generating station. The permitted quantities are 1.70 million gallons per day (MGD) Annual Average daily and 2.10 MGD Peak Monthly daily. There is no Maximum daily quantity. Approximately ninety-four percent (1.6 MGD) is used for cooling water make-up, less than six percent (0.1 MGD) is used for maintenance and other industrial uses, and less than one percent (0.001 MGD) will be used for the personal sanitary requirements of 22 employees. The permitted quantities are based on the requirements of the power generating station as submitted by the Permittee in the Water Use Permit application. One-hundred percent of the cooling water (1.6 MGD) is lost due to evaporation. The power station is designed as a zero-discharge facility, meaning all wastewater (i.e. boiler and cooling tower blowdown water) generated by this plant is treated and reused on-site, rather than being discharged off-site. Special Conditions have been included addressing metering of all withdrawals and providing monthly pumpage, submittal of specific capacity test data to determine the site-specific transmissivity, specific well construction characteristics, and submittal of quarterly water quality data.

TOTAL QUANTITIES AUTHORIZED UNDER THIS PERMIT (in gpd)

AVERAGE: 1,700,000 PEAK MONTHLY: 2,100,000

Use	Average	Peak Monthly
Industrial or Commercial:	1,700,000 gpd	2,100,000 gpd

See Withdrawal Table for quantities permitted for each withdrawal point.

PROPERTY LOCATION: Polk County, approximately 3 miles west of the City of Fort Meade or approximately 3 miles east of the intersection of County Hwy. 630 and County Hwy. 555.

TYPE OF APPLICATION: New

WATER USE CAUTION AREA: Southern

APPLICATION FILED: November 3, 1992

ACRES: 6.2 Leased

APPLICATION AMENDED: N/A

WATER USE: INDUSTRIAL OR COMMERCIAL

FACILITY NAME	USE TYPE
Tiger Bay Cogeneration	Consumptive Cooling Industrial Other Uses Personal Sanitary Use

I.D. NO. PERMITTEE/ DISTRICT	LOCATION LAT/LONG	DIAM. (INCHES)	DEPTH TOTAL/CASED	USE	GALLONS PER DAY AVERAGE	GALLONS PER DAY PEAK MONTHLY
P1 / 1	274443/815059	16	800 / 360	I/C	1,700,000	2,100,000
P2 / 2	274443/815058	16	800 / 360	I/C	1,700,000	2,100,000
P3 / 3	274443/815058	4	500 / 360	I/C	1,000	2,000

I/C=Industrial or Commercial

DISTRICT I.D. NO.	SECTION/TOWNSHIP/RANGE
1, 2 and 3	31/31/25

SPECIAL CONDITIONS:

All conditions referring to approval by the Permitting Department Director, Resource Regulation, shall refer to the Bartow Permitting Department Director, Resource Regulation.

1. All reports required by the permit shall be submitted to the District on or before the tenth day of the month following data collection and shall be addressed to:

   Permits Data Section, Resource Regulation
   Southwest Florida Water Management District
   2379 Broad Street
   Brooksville, Florida 34609-6899

   Unless otherwise indicated, three copies of each plan or report, with the exception of pumpage, rainfall, evapotranspiration, water level or water quality data which require one copy, are required by the permit.

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2. Within 90 days of permit issuance, completion of construction of the withdrawal facility or prior to activation of a stand-by source, District ID Nos. 1 and 2, Permittee ID Nos. P1 and P2, shall be equipped with non-resettable, totalizing flow meter(s), or other measuring device(s) as approved in writing by the Permitting Department Director, Resource Regulation, unless an extension is granted by the Director. Such device(s) shall have and maintain an accuracy within five percent of the actual flow as installed. Total withdrawal and meter readings from each metered withdrawal shall be recorded on a monthly basis and reported to the Permits Data Section (using District forms) on or before the tenth day of the following month. If a metered withdrawal is not utilized during a given month, a report shall be submitted to the Permits Data Section indicating zero gallons. Prior to meter installation, non-use shall be documented with monthly pumpage reports indicating zero gallons withdrawn.

3. Water quality samples shall be collected and analyzed, for parameter(s), and frequency(ies) specified below. Water quality samples from production wells shall be collected whether or not the well is being used, unless infeasible. If sampling is infeasible the Permittee shall indicate the reason for not sampling on the water quality data form. Water quality samples shall be analyzed by a Department of Health and Rehabilitative Services (DHRS) certified laboratory under Environmental Laboratory Certification General Category "1". At a minimum, water quality samples shall be collected after pumping the well at its normal rate for a pumping time specified in the table below, or to a constant temperature, pH, and conductivity. In addition, the Permittee's sampling procedure shall follow the handling and chain of custody procedures designated by the certified laboratory which will undertake the analysis. Any variance in sampling and/or analytical methods shall have prior approval of the Permitting Department Director, Resource Regulation. Reports of the analyses shall be submitted to the Permits Data Section (using District forms) on or before the tenth day of the following month, and shall include the signature of an authorized representative and certification number of the certified laboratory which undertook the analysis. The parameters and frequency of sampling and analysis may be modified by the Permitting Department Director, Resource Regulation, as necessary to ensure the protection of the resource.

District ID No.	Permittee ID No.	Minimum Pumping Time (minutes)	Parameter	Sampling Frequency
1	P1	30	TDS, Chlorides, Sulfates	February, May August, November

Water quality samples shall be collected based on the following timetable:

Weekly	Same day of each week
Monthly	Same week of each month
Quarterly	Same week of months specified
Semi-annually	Same week of months specified

ARCHIVED

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Analyses shall be performed according to procedures outlined in the current edition of Standard Methods for the Examination of Water and Wastewater by the American Public Health Association-American Water Works Association-Water Pollution Control Federation (APHA-AWWA-WPCF) or Methods for Chemical Analyses of Water and Wastes by the U.S. Environmental Protection Agency (EPA).

4. The Permittee shall construct the proposed wells according to the surface diameter and casing depth specifications below. The casing depth specified is to prevent the unauthorized interchange of water between different water bearing zones. If a total depth is listed below, this is an estimate, based on best available information, of the depth at which high producing zones are encountered. However, it is the Permittee's responsibility to have the water in the well sampled during well construction, before reaching the estimated total depth. Such sampling is necessary to ensure that the well does not encounter water quality that cannot be utilized by the Permittee, and to ensure that withdrawals from the well will not cause salt-water intrusion.

District ID No.	Permittee ID No.	Surface Diameter	Minimum Casing Depth	Estimated Total Depth
1	P1	16"	360'	800'
2	P2	16"	360'	800'
3	P3	4"	360'	500'

a. The casing shall be continuous from land surface to the minimum depth stated above.
b. All well casing (including liners and/or pipe) must be sealed with neat cement to the depth specified above.
c. The proposed well(s) shall be constructed of materials that are resistant to degradation of the casing/grout due to interaction with the water of lesser quality. A minimum grout thickness of two (2) inches is required on wells four (4) inches or more in diameter.
d. A minimum of twenty (20) feet overlap and two (2) centralizers is required for Public Supply wells, and all wells six (6) inches or more in diameter.
e. The finished well casing depth shall not vary from these specifications by greater than ten (10) percent unless advance approval is granted by the Permitting Department Director, Resource Regulation, or the Supervisor of the Well Construction Permitting Section in Brooksville.
f. Advance approval from the Permitting Department Director, Resource Regulation is necessary should the Permittee propose to change the well location or casing diameter.

5. For the purpose of determining site-specific transmissivity, a step drawdown and constant rate specific capacity test shall be performed on District ID No. 1, Permittee ID No. P1, after the well has been fully developed. The test shall be performed in accordance with the specifications set forth in Design Aid 3.B, Water Use Permit Information Manual (see attachment). The recorded raw data shall be submitted to the Permits Data Section within thirty days of completion of the well.

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STANDARD CONDITIONS:

1. The Permittee shall comply with the Standard Conditions attached hereto, incorporated herein by reference as Exhibit "A" and made a part hereof.

Authorized Signature
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

STANDARD WATER USE PERMIT CONDITIONS

1. If any of the statements in the application and in the supporting data are found to be untrue and inaccurate, or if the Permittee fails to comply with all of the provisions of Chapter 373, F.S., Chapter 40D, or the conditions set forth herein, the Governing Board shall revoke this permit in accordance with Rule 40D-2.341, following notice and hearing.

2. This permit is issued based on information provided by the Permittee demonstrating that the use of water is reasonable and beneficial, consistent with the public interest, and will not interfere with any existing legal use of water. If, during the term of the permit, it is determined by the District that the use is not reasonable and beneficial, in the public interest, or does impact an existing legal use of water, the Governing Board shall modify this permit or shall revoke this permit following notice and hearing.

3. The Permittee shall not deviate from any of the terms or conditions of this permit without written approval by the District.

4. In the event the District declares that a Water Shortage exists pursuant to Chapter 40D-21, the District shall alter, modify, or declare inactive all or parts of this permit as necessary to address the water shortage.

5. The District shall collect water samples from any withdrawal point listed in the permit or shall require the permittee to submit water samples when the District determines there is a potential for adverse impacts to water quality.

6. The Permittee shall provide access to an authorized District representative to enter the property at any reasonable time to inspect the facility and make environmental or hydrologic assessments. The Permittee shall either accompany District staff onto the property or make provision for access onto the property.

7. Issuance of this permit does not exempt the Permittee from any other District permitting requirements.

8. The Permittee shall cease or reduce surface water withdrawal as directed by the District if water levels in lakes fall below applicable minimum water level established in Chapter 40D-8 or rates of flow in streams fall below the minimum levels established in Chapter 40D-8.

9. The Permittee shall cease or reduce withdrawal as directed by the District if water levels in aquifers fall below the minimum levels established by the Governing Board.

10. The Permittee shall practice water conservation to increase the efficiency of transport, application, and use, as well as to decrease waste and to minimize runoff from the property. At such time as the Governing Board adopts specific conservation requirements for the Permittee's water use classification, this permit shall be subject to those requirements upon notice and after a reasonable period for compliance.

BEST AVAILABLE COPY

Southwest Florida
Water Management District
Brooksville, Florida 34609-6899 • 352-796-7211 • 1-800-423-1476
WATER USE PERMIT TAG

2010640 FLORIDA POWER CORP.

WUP Number		Permittee
1,700,000	2,100,000	N/A
Average GPD	Peak Monthly	Maximum GPD
P1 / 1	16	02/23/1999
Owner ID/District ID	Size (inches)	Expires

Southwest Florida
Water Management District
Brooksville, Florida 34609-6899 • 352-796-7211 • 1-800-423-1476
WATER USE PERMIT TAG

2010640 FLORIDA POWER CORP.

WUP Number		Permittee
1,700,000	2,100,000	N/A
Average GPD	Peak Monthly	Maximum GPD
P2 / 2	[illegible]	[illegible]
Owner ID/District ID	Size (inches)	Expires

Southwest Florida
Water Management District
Brooksville, Florida 34609-6899 • 352-796-7211 • 1-800-423-1476
WATER USE PERMIT TAG

2010640 FLORIDA POWER CORP.

WUP Number		Permittee
1,000	2,000	N/A
Average GPD	Peak Monthly	Maximum GPD
P3 / 3	4	02/23/1999
Owner ID/District ID	Size (inches)	Expires

ATTACHMENT 2 - 7

NPDES GENERAL PERMIT (FLR00B625)

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
STORM WATER GENERAL PERMIT COVERAGE NOTICE

February 15, 1996

Dear Operator:

Your Notice of Intent (NOI) for the facility noted below has been processed by the U.S. Environmental Protection Agency. This facility is authorized to discharge storm water associated with industrial or construction activity under the terms and conditions imposed by EPA's NPDES storm water general permit issued for use in the state of Florida. Your facility's NPDES Baseline Industrial storm water permit number is FLR00B825.

EPA's storm water general permit requires certain storm water pollution prevention and control measures, possible monitoring and reporting, and annual inspections. Among the conditions and requirements of this permit, you must prepare and implement a pollution prevention plan (PPP) that is tailored to your industrial or construction site. Enclosed is a summary guidance document designed to assist you in the development and implementation of your PPP. The summary is organized according to the phases of the pollution prevention planning process. A set of worksheets and an example of a pollution prevention plan are provided for your assistance. As a facility authorized to discharge under this storm water general permit, all terms and conditions must be complied with to maintain coverage and avoid possible penalties.

FACILITY:
Tiger Bay Cogeneration Plant
3219 County Road 630
Fort Meade, FL 33841-
274452, 0815059,
, ~~21~~ 31, ~~0215~~ 31S 025E

OPERATOR:
Tiger Bay Limited Partnership
2500 City West Blvd Ste 150
Houston
TX 77042-

If you need to obtain a copy of the permit, please call the EPA Office of Water Resource Center at (202)260-7786. If you have general questions concerning the storm water program, please call the EPA Region 04 contact: Roosevelt Childress, (404)347-3012 x 2980.

ATTACHMENT 2 - 8

ECOLOGICAL / ARCHAEOLOGICAL / HISTORICAL RESOURCES ASSESSMENT

ECOLOGICAL/ARCHAEOLOGICAL/HISTORICAL RESOURCE ASSESSMENT OF THE TIGER BAY COGENERATION FACILITY SITE

PREPARED FOR:

DESTEC ENERGY, INC.
2500 Citywest Blvd., Suite 150
Houston, TX 77042

PREPARED BY:

ECT

Environmental Consulting & Technology, Inc.

5405 Cypress Center Drive
Suite 200
Tampa, Florida 33609
(813) 289-9338

92111-0300

MAY 1993

ECOLOGICAL/ARCHAEOLOGICAL/HISTORICAL RESOURCE ASSESSMENT OF THE TIGER BAY COGENERATION FACILITY SITE

1.0 INTRODUCTION

Destec Energy, Inc. (Destec) contracted Environmental Consulting & Technology, Inc. (ECT) to conduct an assessment documenting the presence or potential for occurrence of ecological/archaeological/historical resources on the proposed Tiger Bay cogeneration facility site. The site of the proposed nominal 206-megawatt (MW) combined cycle cogeneration facility is a 6.23-acre parcel adjacent to the U.S. Agri-Chemicals Corporation (USAC) complex on County Road (CR) 630, approximately 3 miles west of the city of Fort Meade (Section 31, Township 31 South, Range 25 East, Polk County, Florida).

The site resource assessment evaluated the potential for: (1) the occurrence of wetlands and/or surface waters under the jurisdictional permitting authority of federal, state, and/or regional wetlands regulatory agencies; (2) the presence or likelihood for occurrence of state and/or federally listed endangered and/or threatened plant and animal species; and (3) existence or potential for occurrence of historical or archaeological sites. This assessment reports on the presence or absence of significant natural resources such as wetlands/surface waters, threatened and/or endangered species and historical/archaeological resources. Further, it provides a professional opinion based on available information of the ecological or other permitting risks associated with the land transaction/site development.

2.0 METHODS

ECT examined recent blue-line aerial photographs (January 1992), recent National Wetlands Inventory Maps (NWI)/U.S. Geological Survey quadrangle topographic maps (Bowling Green, Florida, 1988), Soils Conservation Service (SCS) soil survey maps (1927 and October 1990), the Destec Water Use Permit Application for the

Tiger Bay cogeneration facility (November 1992) and the Impact Assessment Statement Tiger Bay cogeneration plant (July 1992) to review all of the current information available on site drainage, soils, and wetlands.

ECT also conducted a search of known records available on endangered and threatened species for the immediate region of the proposed facility site by reviewing in-house data files. The ECT data files consist of information obtained through consultations with the U.S. Fish and Wildlife Service (USFWS), the Florida Game and Freshwater Fish Commission (FGFWFC), the Florida Natural Areas Inventory (FNAI), the University of South Florida Herbarium and the Florida Audubon Society, as well as published reports such as the Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida, FGFWFC (November 1, 1992) and the USFWS Region 4-Endangered and Threatened Species Redbook (January 1993).

After a review of available data, an ECT senior ecologist conducted a thorough site survey on December 31, 1992. The survey consisted of walking pedestrian transects across the site in a way that provides a complete census of the property. The ECT ecologist mapped and photographed any wetlands or surface water bodies encountered with an estimate of wetland acreage by jurisdictional authority. The ecologist also recorded the occurrence of any threatened or endangered species observed during the survey, including any signs thereof, such as gopher tortoise burrows, eagles' nests, etc. ECT also contacted the Florida Division of Historical Records (DHR) to request a determination for the presence or potential for occurrence of historical or archaeological resources on the site.

3.0 RESULTS

3.1 Wetlands

The proposed site for the Tiger Bay cogeneration facility is a cleared, vacant parcel of land that was used for construction staging and parking during development of the adjacent chemical plant. Currently, the parcel can be characterized as a maintained, ruderal grassy field. Existing vegetation consists of both planted and opportunistic, pioneer species such as bahia grass, hairy indigo, bermuda grass, smut grass, rustweed, broomsedge, finger grass, wild sensitive plant, begger-ticks, natal grass, spurge, love grass, sandspur, foxtail grass, and sweet broom. The site is well-drained, high ground and generally flat, except for a raised area of aggregate located on the south-central portion of the site. The aggregate area is overgrown with ruderal shrubs, grasses, and forbs such as dog fennel, begger-ticks, broomsedge, bermuda grass, groundsel bush, shrub verbena, and camphorweed.

Prior to the site clearing, the soils on the property were mapped as Blanton Fine Sand and Leon Fine Sand. Blanton Fine Sand has good drainage and typically supports sandhill vegetation. Leon Fine Sand exhibits poor drainage characteristics and is usually associated with pine flatwoods. Neither soil type is listed as a hydric soil for Polk County (Hydric Soils of Florida Handbook, July 1990). The U.S. Department of Agriculture SCS Hydric Soils of the United States publication (June 1991) does list Leon as a hydric soil exhibiting poor drainage with a water table less than 1.5 feet (ft) from the surface for approximately 2 weeks during the growing season. However, it should be noted that the SCS report also states that some phases of the Leon soil series are not hydric. As reported in the Hydric Soils of Florida Handbook, the Leon soil series is not a hydric soil type in Polk County, Florida. Therefore, it can be assumed that the phases of Leon soil within Polk County are the nonhydric soil series referred to in the national SCS publication.

Currently, soils on the site are mapped as Urban Land. The Urban Land map unit represents soils which have been so altered that they can no longer be recognized as natural. A recent soil study at the site showed that soils consist of a mixture of fine-to-medium grain sandy soils and clay with pockets of organic materials in the subsoil strata at depths of 2 to 4 ft on the eastern and southern edges of the parcel.

No natural drainage features exist on the site. Stormwater runoff sheet flows from the south to the north and ultimately collects along a drainage ditch parallel to CR 630. A review of the NWI map of the site revealed that no wetlands have been identified within or adjacent to parcel boundaries.

A small manmade drainage swale created from uplands is located at the southwestern corner of CR 630 and the USAC railroad track. The narrow drainage swale is less than 0.01 acre in size and occupies an area between two culverts. The swale is vegetated by hydrophytic vegetation characteristic of shallow, low land areas exhibiting fluctuating hydroperiods and includes club rush, galingale, smartweed, carpetgrass, pennywort and false pimpernel. The swale was saturated but not ponded at the time of the site investigation. The swale connects via the growth of wetlands vegetation to the railroad culvert, but a higher area of ground blocks a vegetative connection to the culvert at CR 630. A small ponded area contiguous to the culvert at CR 630 was dominated by submergent and emergent aquatic macrophytes such as creeping seedbox and cattail. The seasonal high water elevation established for the swale is greater (153.0 ft) than either of the invert elevations of the culverts (150.3 ft and 151.4 ft) as provided on the topographic map developed by Polston Engineering, Inc. for the Tiger Bay cogeneration site (July 1992). Photographs depicting site conditions are provided in an appendix to this report (Figures 1 through 8).

3.2 Archaeological/Historical Resources

The DHR has indicated that the Florida Master Site File has no record of any archaeological sites or historical standing structures on the subject property (see attached letter from DHR). DHR has also indicated to ECT there is a low potential for any significant archaeological or historical sites to be present within the project area. Correspondence from DHR addressing this potential is also attached.

3.3 Endangered or Threatened Species

No records of endangered or threatened species were discovered for the site or the immediate vicinity from the review of in-house data files. In addition, no listed species or their preferred habitats were observed during the site investigation.

4.0 CONCLUSIONS

4.1 Wetlands

Based upon the historical and existing soils, hydrology, vegetation and the NWI map for the site, the subject parcel does not support any natural wetlands or surface waters under the jurisdiction of any federal, state, or regional agency. However, the site does contain an unnatural, manmade drainage swale. A Florida Department of Environmental Regulation (FDER) 17-25 stormwater permit was required and easily obtainable for the filling and relocation of this drainage conveyance (Permit No. IC53-221795 issued May 4, 1993). Based upon the manmade origin and hydrology of the swale, no other wetland permit approvals were necessary.

Since the manmade swale does not apparently hold an appreciable volume of standing water for a sufficient duration after a normal storm event, the U.S. Army Corps of Engineers (USACE) normally does not claim these types of drainage conveyances. In order to obtain further documentation that the subject swale is not within the 404 wetlands jurisdiction of USACE, ECT met with Mr. Perry Horner, USACE Tampa office for a formal wetlands determination on March 11, 1993 (see attached letter to USACE in correspondence appendix). During the meeting, Mr. Horner determined that no waters of the United States are present within the property boundaries of the project site. The USACE provided correspondence in response to a formal request by ECT that no waters of the United States are located on the subject parcel (the two referenced letters are provided in the correspondence appendix). Therefore, a USACE Nationwide 26 Permit is not required for filling within the swale associated with project development.

Since the swale was created from uplands and does not significantly affect the drainage of wetlands in the vicinity, the Southwest Florida Water Management District (SWFWMD) also confirmed via a telephone communication on January 19, 1993 that the swale is not waters of SWFWMD (Mr. Alberto Martinez, SWFWMD Tampa office, personal communication). Since FDER is the lead agency for 17-25 stormwater permitting for the site, SWFWMD will not require any additional permit approvals for the ditch relocation. The FDER through the 17-25 process typically addresses any requirements for dredging and filling in waters of the state in the stormwater permit application sufficiency review. The FDER did not require any additional conditions associated with dredge and/or fill impacts during sufficiency. Therefore, FDER has "defacto" concluded no jurisdictional wetlands are present on the site. In addition, no mitigation is required for FDER permit approvals.

4.2 Archaeological/Historical Resources

ECT has received confirmation from DHR that there are no known or there is a low potential for archaeological or historical resources on the project site based on the review of the Florida Master Site Files. Hence, Destec can proceed with site development without any further involvement from the DHR.

4.3 Endangered or Threatened Species

No endangered or threatened species were either observed or expected to occur on the site based on habitat suitability; there will be no impacts to listed species associated with project development.

Based upon the information compiled for this report, it is our professional opinion that there are no significant ecological/archaeological/historical resources associated with the development of the proposed Tiger Bay cogeneration plant site.

Anthony N. Arcuri, M.A.
Senior Ecologist

Ann M. O'Neil, M.S., A.S.L.A.
Senior Planner

PHOTOGRAPHIC
APPENDIX

Best Available Copy

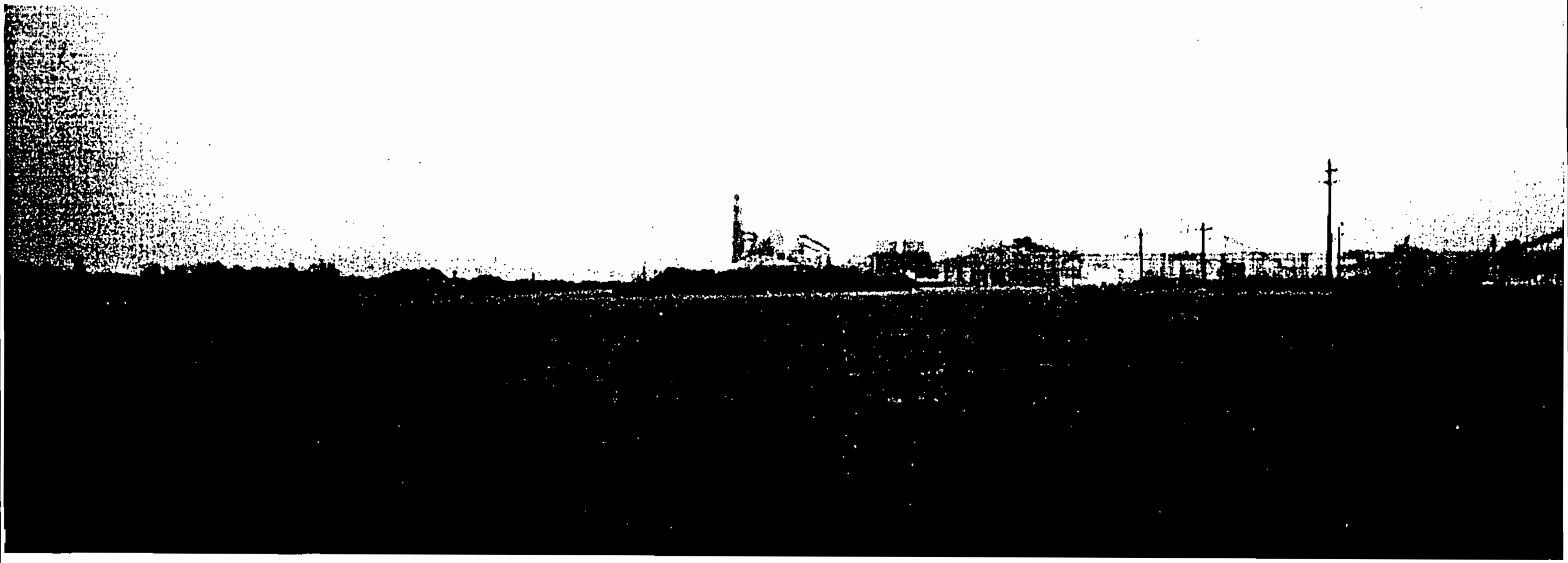


Figure 1. Photograph of the project site facing southwest with the overgrown aggregate area in the south-central portion of the site and chemical plant in the background (December, 1992).

Figure 2. Close-up photograph of the aggregate pile overgrown with weedy shrubs, grasses, and forbes (December, 1992).

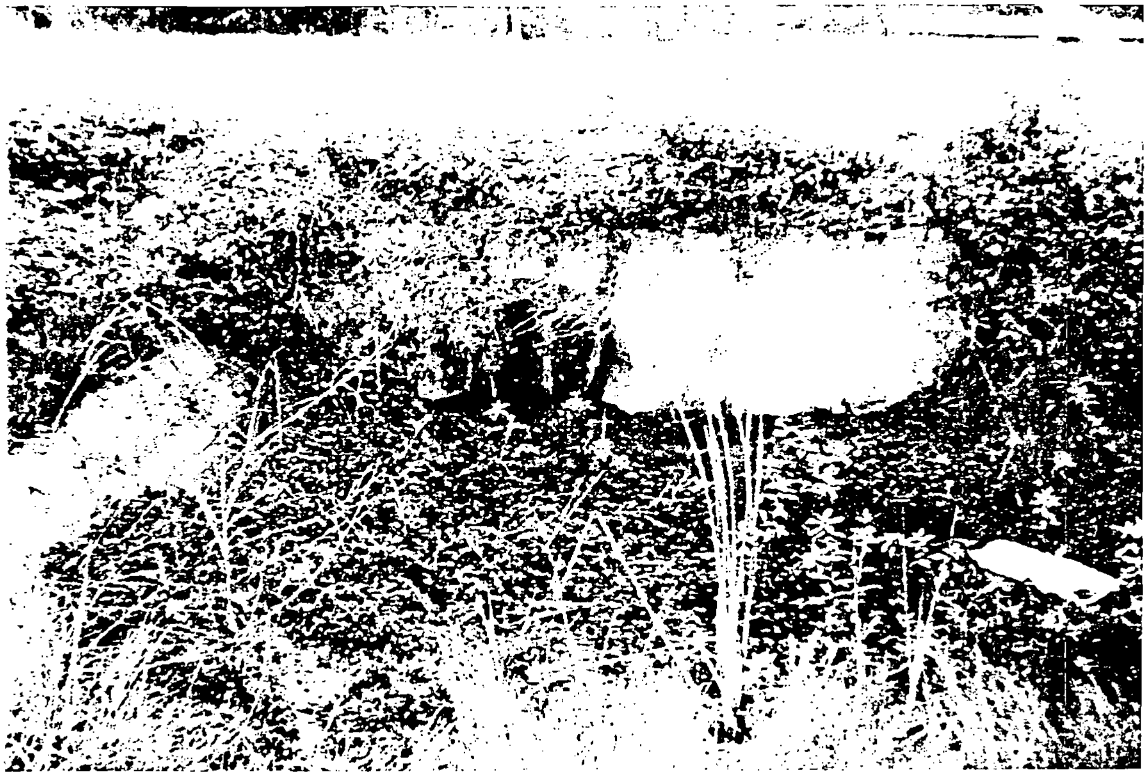


Figure 3. Photograph of the culvert underneath C.R. 630 with small ponded area facing due north (December, 1992).

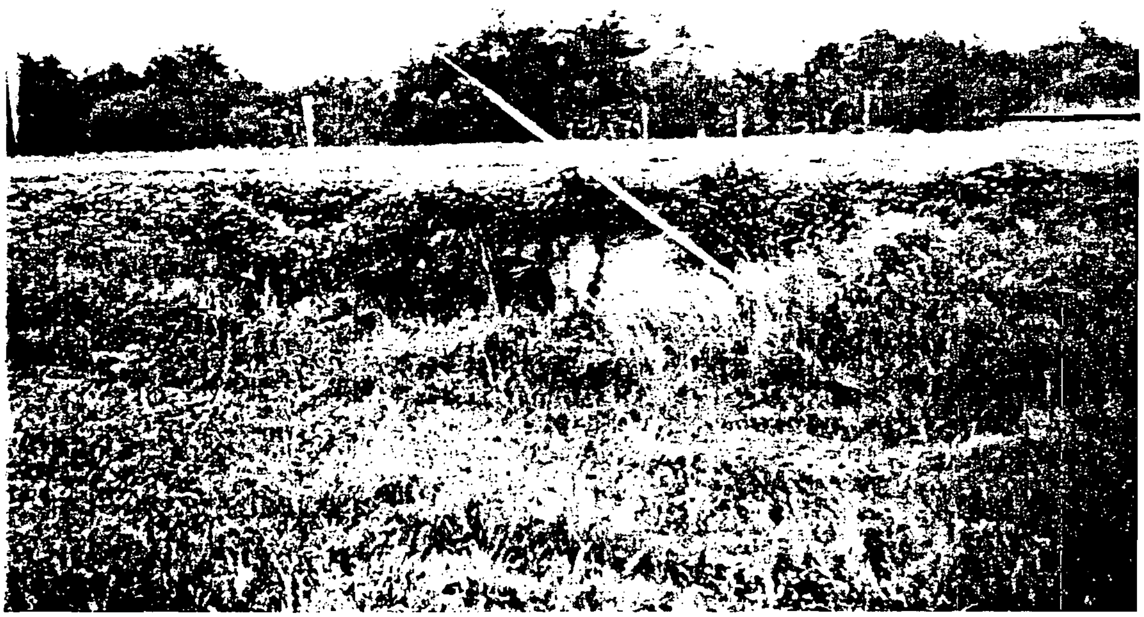


Figure 4. Photograph of the C.R. 630 culvert showing a higher area of land in the foreground situated in front of the drainage swale (December, 1992).

Figure 5. Photograph of the C.R. 630 culvert and pipeline in the background with the beginning of the drainage swale located just in front of the pipeline in the foreground (December 1992).

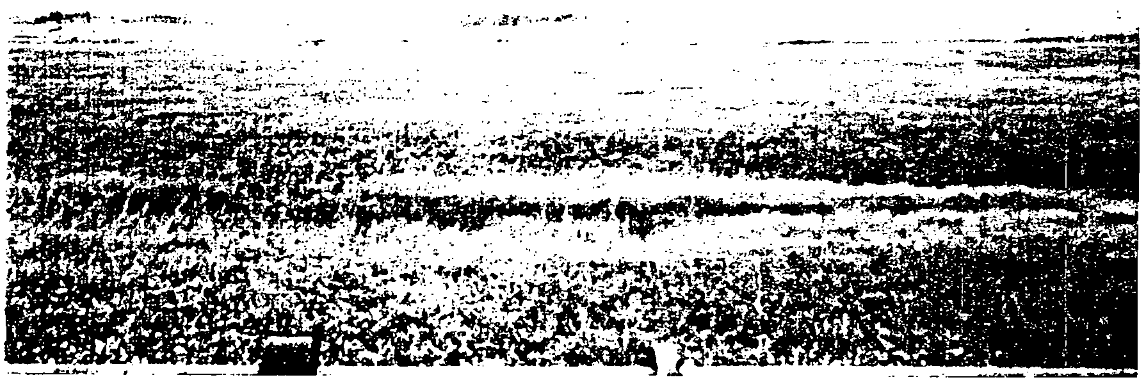


Figure 6. Photograph of the drainage swale facing south with a portion of the pipeline in the foreground (December, 1992).

Figure 7. Photograph of the drainage swale with connection to the USAC railroad track culvert facing due east (December, 1992).

Figure 8. Photograph of the culvert connection to the drainage swale at the USAC railroad track (December, 1992).

CORRESPONDENCE
APPENDIX

REC'D JAN 7 1993

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

January 4, 1993

Ms. Ann M. O'Neil, Senior Planner
Environmental Consulting & Technology, Inc.
5405 Cypress Center Drive, Suite 200
Tampa, FL 33609

Dear Ms. O'Neil:

In response to your inquiry of December 28, 1992, the Florida Site File lists no archaeological sites or historical standing structures in the following parcel of Polk County: T31S, R25E, Sec. 31. Therefore, we are aware of no such resources in or on the six acre subject parcel. Florida Site File Manuscript #352 covers a survey done within a mile of your work area.

In interpreting the results of our search, please remember that state and federal laws require formal environmental review for some projects. Record searches by the staff of the Florida Site File do not constitute such a review of cultural resources. If your project falls under these laws, you should contact the Compliance Review Section of the Bureau of Historic Preservation at 904-487-2333 or at this address. That office would be able to give you an authoritative opinion as to the potential for any archaeological sites or historic structures on the parcel about which you wrote.

If you have any further questions concerning the Florida Site File, please contact Steve Amiss or myself at 904-487-2299.

Sincerely,

Robin D. Jackson
Assistant Supervisor, Florida Site File

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State

DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

February 1, 1993

Ms. Ann M. O'Neil
ECT
P.O. Box 20866
Tampa, Florida 33622-0866

In Reply Refer To:
Denise M. Breit
Historic Sites Specialist
(904) 487-2333
Project File No. 930061

RE: Cultural Resource Assessment Request
Township 31 South, Range 25 East, Section 31
Polk County, Florida

Dear Ms. O'Neil:

In accordance with the procedures contained in the applicable local ordinance, we have reviewed the above referenced project(s) for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical or architectural value.

A review of the Florida Site File indicates that no significant archaeological or historical sites are recorded for or likely to be present within the project area. Furthermore, because of the project location and/or nature it is unlikely that any such sites will be affected. Therefore, it is the opinion of this office that the proposed project will have no effect on historic properties listed, or eligible for listing, in the National Register of Historic Places, or otherwise of historical or architectural value. The project may proceed.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Laura A. Kammerer
for George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/Bdb

ECT
Environmental Consulting & Technology, Inc.

February 18, 1993
92111-0300

Mr. Perry Horner
Field Biologist
U.S. Army Corps of Engineers
P.O. Box 19247
Tampa, Florida 33686-9247

Re: **U.S. Army Corps of Engineers**
Wetland Jurisdictional Determination for
the Tiger Bay Cogeneration Facility Site
Polk County, Florida

Dear Mr. Horner:

As requested, Environmental Consulting & Technology, Inc. (ECT) is providing this correspondence to verify our meeting on March 11, 1993, for 8:00 a.m. at the ECT Tampa office (see enclosed map). We are meeting at ECT in order to drive over to the above-referenced project site together. The purpose of our meeting and field review is for you to provide ECT and Destec Energy, Inc. representatives with a U.S. Army Corps of Engineers (USACE) wetlands jurisdictional determination of the proposed Tiger Bay Cogeneration Facility site.

The site of the proposed 206-megawatt combined cycle cogeneration facility is a 6.23-acre parcel located adjacent to the U.S. Agri-Chemical complex on County Road 630, approximately 3 miles west of the city of Fort Meade (Township 31 South, Range 25 East, Section 31, Polk County). The proposed development site is a cleared, vacant parcel of land which was formerly used for construction staging and parking during development of the adjacent chemical plant. The site can be characterized as well-drained, urban land maintained as a ruderal grassy field. At issue is whether or not a 0.01-acre man-made, shallow drainage swale created from uplands and located at the northeastern corner of the project site is subject to the 404 wetlands jurisdiction of USACE.

Project development plans are to relocate the swale to the property boundary, a few feet to the northeast. A Florida Department of Environmental Regulation 17-25 stormwater permit application has been submitted for the project site.

5405 Cypress Center Drive
Suite 200
Tampa, FL 33609

P.O. Box 20866
Tampa, FL 33622-0866

(813) 289-9338

FAX (813) 289-9388

T-ADM(K-LTR4.031)--021893

Mr. Robert S. Chatham, P.E., Destec Energy, Inc., will also be in attendance during our site review. If you have any questions, please do not hesitate to contact me. Both Mr. Chatham and I look forward to meeting with you. Thank you for your attention to this matter.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.

Anthony N. Arcuri

Anthony N. Arcuri
Senior Ecologist

ANA/kms

Enclosure

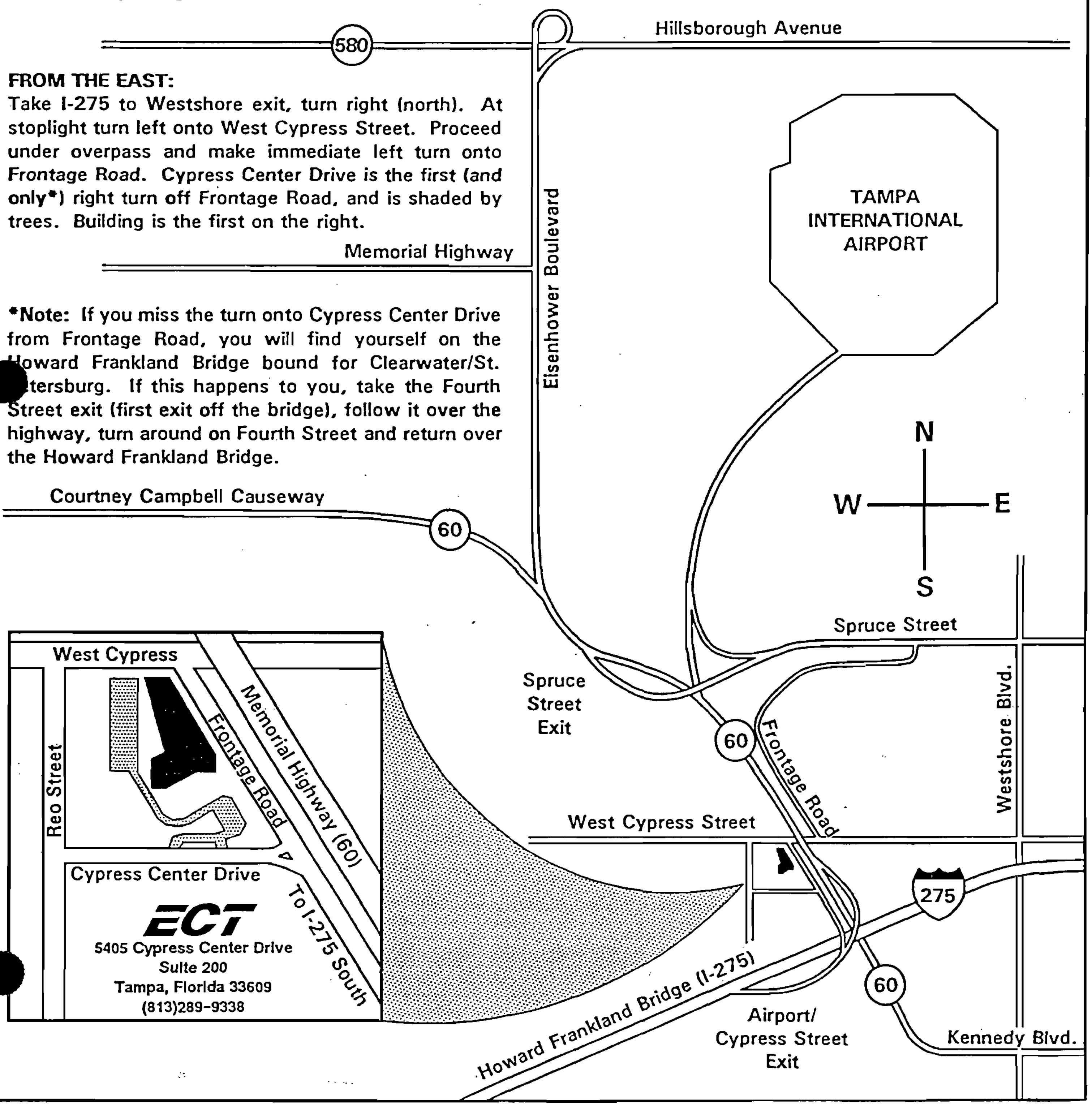
cc: Robert Chatham, P.E., Destec Energy, Inc.
Gary Uebelhoer, Project Manager, ECT

FROM THE WEST VIA THE HOWARD FRANKLAND BRIDGE (I-275):
Take Airport Exit (second exit off the Howard Frankland, immediately after Kennedy Street exit), and follow it over the overpass, where it divides. Take the left fork (Cypress Street exit), then take the first left off Frontage Road onto Cypress Center Drive, which is shaded by trees. Building is first on right.

FROM THE WEST VIA COURTNEY CAMPBELL CAUSEWAY:
Take the Spruce Street/Airport exit off Memorial Highway (60), and follow Spruce Street to Westshore Boulevard. Make a right onto Westshore Boulevard and go to Cypress Street. At the light make a right onto Cypress Street and follow it under the overpass. Then make an immediate left turn onto Frontage Road. Cypress Center Drive, which is shaded by trees, is the first (and only*) right turn off Frontage Road. First building on right.

FROM THE EAST:
Take I-275 to Westshore exit, turn right (north). At stoplight turn left onto West Cypress Street. Proceed under overpass and make immediate left turn onto Frontage Road. Cypress Center Drive is the first (and only*) right turn off Frontage Road, and is shaded by trees. Building is the first on the right.

***Note:** If you miss the turn onto Cypress Center Drive from Frontage Road, you will find yourself on the Howard Frankland Bridge bound for Clearwater/St. Petersburg. If this happens to you, take the Fourth Street exit (first exit off the bridge), follow it over the highway, turn around on Fourth Street and return over the Howard Frankland Bridge.



ECT
Environmental Consulting & Technology, Inc.

March 23, 1993
92111-0500

Mr. Perry Horner
Field Biologist
U.S. Army Corps of Engineers
Post Office Box 19247
Tampa, Florida 33686-9247

Re: U.S. Army Corps of Engineers
Wetland Jurisdictional Determination
for the Tiger Bay Cogeneration Facility Site
Polk County, Florida

Dear Mr. Horner:

Thank you for meeting with Mr. Robert Chatham, Destec Energy, Inc. (Destec) and me on March 11, 1993 to determine if the above-referenced project site contains waters of the United States. Based upon the information reviewed during the meeting, it is my understanding you have determined the subject property does not contain any waters of the United States and therefore, dredge and fill permits from the U.S. Army Corps of Engineers (USACE) for construction on the site would not be required.

Environmental Consulting & Technology, Inc. (ECT), as an agent for Destec, is hereby requesting the USACE provide documentation through written correspondence that the Tiger Bay Cogeneration site does not contain waters of the United States and the submittal of a dredge and fill permit application to the USACE is not required for any construction on the property.

Enclosed are the following materials for proper site reference:

1) Existing topography maps of the Tiger Bay Cogeneration Site (1"=50' and 1"=20');

2) The Paving, Grading, and Drainage Plan of the Tiger Bay Cogeneration site including existing and proposed conditions (1" = 30'); and

3) A set of ground level photographs depicting site conditions.

5405 Cypress Center Drive
Suite 200
Tampa, FL 33609

P.O. Box 20866
Tampa, FL 33622-0866

(813) 289-9338

FAX (813) 289-9388

If you should require any additional information, please do not hesitate to contact me. Thank you for your timely response on this matter.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.

Anthony N. Arcuri

Anthony N. Arcuri
Senior Ecologist

ANA/dtm

Enclosure

cc: Robert S. Chatham, P.E., Destec Energy, Inc.
Gary Uebelhoer, ECT Project Manager

DEPARTMENT OF THE ARMY
TAMPA REGULATORY FIELD OFFICE, JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 19247
TAMPA, FLORIDA 33686-9247

REPLY TO
ATTENTION OF

March 31, 1993

Tampa Regulatory
Field Office
199340701
JURISDICTIONAL-NPR

Environmental Consulting & Technology, I
ATTN: Mr. Anthony Arcuri
5405 Cypress Center Drive, Suite 200
Tampa, Florida 33609

Dear Mr. Arcuri:

Reference is made to your correspondence received March 25, 1993, for a jurisdictional determination for " TIGER BAY COGENERATION FACILITY" at Section 31, Township 31 South, Range 25 East, Polk County, Florida. An office meeting was held on March 11, 1993 by Perry Horner of my staff.

The location site referenced above will not require a Department of the Army permit as there are no areas on the site which are regulated by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. If any changes in the location are found necessary another jurisdictional determination should be conducted. It is your responsibility to obtain state or local approvals for your project, if required.

This jurisdictional delineation is valid for a period no longer than 3 years from the date of this letter unless new information warrants revision of the delineation before the expiration date. Any reliance upon jurisdictional correspondence beyond that time frame may lead to incorrect planning and design efforts as well as possible violations of current Federal laws and/or regulations.

Thank you for your cooperation with the U.S. Army Corps of Engineers Regulatory Program. If you have any questions regarding this letter, or the Corps of Engineers regulations, please contact Mr. Wm. Perry Horner, at our Tampa Field Office, telephone (813)840-2908.

Sincerely,

Joseph R. Bacheler
Chief, Tampa Regulatory
Field Office

Enclosures

ATTACHMENT 2 - 9

METEOROLOGY AND AMBIENT AIR QUALITY EXCERPT FROM HINES APPLICATION

2.3.7 Meteorology and Ambient Air Quality

2.3.7.1 Meteorology

REGIONAL CLIMATE

The climate in central Florida is classified as subtropical with maritime influences from both the Atlantic Ocean and the Gulf of Mexico. Summers are long, warm, and relatively humid, while winters are mild because of the latitude and the warming influence of the Gulf Stream. Coastal locations average slightly warmer in winter and cooler in summer than do the inland areas. The summer heat is tempered by sea breezes along the coasts and by frequent afternoon or early evening thunderstorms in all areas. Thunderstorms, which on the average, occur on about one-half of the days in the summer, frequently are accompanied by a temperature drop of as much as 10 to 20 degrees. They cause high winds, heavy rain, occasional hail, and frequent lightning. Tornadoes that reach the surface are a rare occurrence in this part of the state, and very destructive tornadoes are almost nonexistent. Tornadoes are most likely to occur during seasonal changes when cool, dry air and warm, moist air clash.

Hurricanes are tropical cyclones in which winds reach speeds of 74 mph or more and blow in a large spiral around a relatively calm center. Near the center (eye), hurricane winds may gust to more than 200 mph, and the storm dominates the ocean surface and lower atmosphere over tens of thousands of square miles. The fastest non-gust wind speed (fastest mile of wind) recorded at Tampa was 84 mph, and the fastest 5-minute average was 75 mph. These both occurred with the passage of the Labor Day hurricane of September 3 to 5, 1935 (NOAA, 1977).

Gentle breezes occur almost daily in all areas. Because most of the large-scale wind patterns affecting Florida have passed over water surfaces, hot drying winds seldom occur. High local winds of short duration occur occasionally in connection with thunderstorms in summer and with cold fronts moving across the state in other seasons.

The humidity in Florida is generally high. Inland areas with greater temperature extremes experience slightly lower relative humidity, especially during times of hot weather. On the average, variations in relative humidity from one place to another are small; humidities range from about 50 to 65 percent during the afternoon hours to about 85 to 95 percent during the night and early morning hours.

Heavy fogs are usually confined to the night and early morning hours in the late fall, winter, and early spring months. On the average, they occur on about 19 days a year at Lakeland, based on a 24-year period of record (NOAA, 1977a). These fogs usually dissipate or thin soon after sunrise; heavy daytime fog is seldom observed in Florida.

Temperature and precipitation data representative of the site are available for Bartow, 8 miles north of the site, and Wauchula, 17 miles south of the site. Additional climatological data for the site area is available from the weather service offices at Tampa (47 miles northwest), Orlando (62 miles northeast), and Lakeland (21 miles north-northwest). Based on discussions with and recommendations from FDER, observations from the "first order" National Weather Service (NWS) station at Tampa are being used as representative surface and upper air wind data for the site.

The following temperature statistics are based on data collected at Bartow and Wauchula for the period-of-record 1951 through 1980. These data are summarized in Table 2.3.7-1. For normal daily mean minimum temperatures, January exhibits the lowest value of approximately 49°F. January also exhibits the lowest normal mean monthly temperature, 61°F. The highest normal daily maximum temperature (92°) occurs in July and August. Highest and lowest record temperatures of 103°F and 18°F were recorded at Bartow in June 1977 and December 1962, respectively.

Based on the same 30-year record (Gale Research, 1985), normal annual rainfall is approximately 53 inches. The monthly statistics (Table 2.3.7-2) show the start of the rainy season in May or June and its end in September. Most of the summer rainfall is derived from local showers or thunderstorms. The highest normal monthly rainfall is approximately 8.5 inches and occurs in July. November and December are the driest months, with an average of approximately 2 inches of precipitation. The maximum rainfall in one day was 6.32 inches and occurred in October 1975 (Wauchula). Record monthly precipitation occurred in July 1960, when 17.6 inches of rain were recorded (Bartow).

Wind data selected to represent the site were obtained from the Tampa International Airport, the nearest meteorological station for which comprehensive wind data are readily available. March has the highest mean monthly wind speed of 9.7 mph (Gale Research, 1985). The lowest mean monthly wind speed of 7.2 mph is usually encountered in August. An easterly prevailing wind direction is evident during most of the year. The annual average wind speed is 7.7 mph. The predominant wind direction during the 1982 to 1986 time period was from the east-northeast, which occurred approximately 12 percent of the time. Wind directions from the east, northeast, and east-southeast each occurred more than 8 percent of the time. A wind rose for Tampa is presented on Figure 2.3.7-1.

DISPERSION METEOROLOGY

STABILITY. Atmospheric stability in conjunction with general wind patterns and mixing height determines the potential of the atmosphere to disperse airborne pollutants. Atmospheric stability conditions are typically categorized as unstable, neutral, or stable. An unstable atmosphere is one in which rapid diffusion takes place in both the horizontal and vertical directions. In terms of temperature change with height, an unstable atmosphere is characterized by a sharp decrease in temperature with height. Neutral conditions, which are characterized by moderate decreases of temperature with height, are common in the atmosphere and are associated with moderate diffusion rates. A stable atmosphere is characterized by a slight decrease (less than 1°C per 100 meters), or even an increase in temperature with height, and greatly reduced diffusion rates in comparison with unstable or neutral atmospheric conditions.

The stability classifications presented in this section are based on the Turner (1970) classification scheme, which assigns a stability on the basis of surface wind speed, cloud cover, and solar insolation. Appendix 10.5.6.1 contains a summary of the joint frequency of occurrence of wind speed and wind direction categories classified according to stability class based on meteorological data for Tampa International Airport for the period 1982 to 1986. This is referred to as STAR (STability ARay) program data.

MIXING HEIGHT. An important parameter which describes the regional dispersion capability of the atmosphere is mixing height. Mixing height is simply the vertical extent of the surface layer within which relatively vigorous mixing of pollutants takes place. Holzworth (1972) has compiled statistical summaries for mixing height at various locations throughout the United States based on twice daily radiosonde measurements. The abundance of moisture from the ocean around southern Florida creates high humidities and low-level cloudiness that absorb heat and generally prevent the mixing height from subsiding below 500 meters. Because mixing heights are dependent upon surface temperatures, afternoon levels reach above 1,400 meters under intense solar insolation. Lesser diurnal mixing height fluctuations occur at coastal stations in Florida, as compared to inland locations, due primarily to moderating effects of the ocean.

Table 2.3.7-3 presents the seasonal and annual average mixing heights for the period 1960 to 1964 as observed at Tampa International Airport. The Tampa upper air station has been considered regionally representative of the site by FDER in previous applications. Holzworth's comparison of morning and afternoon mixing heights based on data for 62 locations throughout the United States is shown on Figures 2.3.7-2 and 2.3.7-3. These data indicate that the site area experiences mixing heights that are typical of or higher than large areas of the eastern half of the United States. Thus, the site area experiences better than average dispersion conditions.

<u>*ON-SITE HOURLY METEOROLOGICAL MONITORING DATA ANALYSIS AND SUMMARY*</u>

A 1-year, on-site monitoring program is being conducted for meteorological and air quality parameters. Data from the first four months of the program are presented here; the remaining 8 months of data will be provided in an addendum. The monitoring program is described in Appendix 2.3.7.3.

WIND SPEED (10 METERS). The 10-meter wind speed data collected during the period of October 15, 1991, through February 14, 1992, are presented in Appendix 10.5.6.2. There were a total of 2,943 observations reported during this period, which represents a data recovery rate of 99.9 percent. The average wind speed during this period was 6.4 mph (2.9 m/sec). The maximum hourly average wind speed was 21.0 mph (9.4 m/sec). The average wind speed recorded at Tampa for this period was 7.8 mph (3.5 m/sec).

WIND DIRECTION (10 METERS). The 10-meter wind direction data collected during the period of October 15, 1991, through February 14, 1992, are presented in Appendix 10.5.6.2. There were a total of 2,943 hourly averages reported for a data recovery rate of 99.9 percent. The prevailing winds during this period were from the northeast, north-northeast, and north, as shown on Figure 2.3.7-4, which is a wind rose for the 4-month period. Wind direction data for this same 4-month period recorded at the Tampa NWS Station indicated prevailing winds from the east-northeast, as shown on Figure 2.3.7-5. This comparison of site and Tampa wind data for the same 4-month period indicates that while there was a stronger northerly component at the site, conditions were generally similar.

2.3.7.2 Ambient Air Quality

REGIONAL AIR QUALITY

The Polk County Site is located in an area that FDER currently classifies as attainment for all criteria pollutants (Section 17-2.420, F.A.C). It is designated as Class II from a Prevention of Significant Deterioration (PSD) standpoint. The nearest Class I area is the Chassahowitzka Wilderness Area, located approximately 109 km to the northwest.

Ambient air monitoring data are available which can be used to characterize the existing conditions in the vicinity of the site. A map depicting the locations of the existing ambient air quality monitoring sites is presented as Figure 2.3.7-6. The FDER data from these monitors for 1990 are summarized in Table 2.3.7-4. FDER collected ambient total suspended particulate (TSP) data during 1990 at several locations in the vicinity. However, the TSP standards have now been replaced with standards for particulate matter less than or equal to 10 micrometers aerodynamic diameter (PM_{10}). The nearest FDER PM_{10} data are from the Tampa metropolitan area and are not very representative of Polk County. However, the TSP data for Polk County indicate that existing PM_{10} concentrations would also be well below National and Florida Ambient Air Quality Standards (AAQS).

Concentrations of SO_2 have been measured by FDER at Lakeland and Nichols. FDER data from 1990 show existing SO_2 concentrations at that nearby location to be well below the AAQS. Ambient data for nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3) and lead (Pb) have been collected by FDER only in the Tampa and Sarasota metropolitan areas. Given the rural nature of the site, existing concentrations of these pollutants, which are usually associated more closely with urban environments (since they are emitted primarily by mobile sources), should be well below the applicable standards.

A 1-year monitoring program was conducted recently by Tampa Electric Company at two sites in western Polk County, approximately 12 miles to the southwest of the FPC Polk County Site monitoring location. A summary of data from these stations, which operated from April 1, 1991 through March 31, 1992 is presented in Table 2.3.7-5.

ON-SITE HOURLY AMBIENT AIR QUALITY MONITORING DATA ANALYSIS AND SUMMARY

The 1-year on-site air quality monitoring station is currently in operation. Air quality data from the first 4 months of operation are presented below; the remaining 8 months of data will be provided in an addendum. The monitoring program is described in Appendix 2.3.7.3.

SULFUR DIOXIDE (SO_2). A tabulation of the hourly SO_2 concentrations measured at the on-site station during the period of October 15, 1991, through February 14, 1992, are presented in Appendix 10.5.6.3 and summarized in Table 2.3.7-6. A total of 2,650 hourly averages were reported for a data recovery of 89.8 percent. A graphic presentation of the hourly data collected over the 4-month period is shown on Figure 2.3.7-7.

As indicated in Table 2.3.7-6, SO_2 concentrations recorded for all averaging periods are well below the allowable National and Florida AAQS.

OZONE (O_3). A tabulation of the hourly O_3 concentrations measured on-site during the period of October 15, 1991, through February 14, 1992, are presented in Appendix 10.5.6.3 and summarized in Table 2.3.7-6. A total of 2,873 hourly averages were reported for a data recovery of 97.3 percent. These hourly data are presented on Figure 2.3.7-8.

As indicated in Table 2.3.7-6, the recorded values were well within the allowable NAAQS and FAAQS.

PARTICULATE MATTER (PM_{10}). Sampling for PM_{10} was performed on a once every sixth day basis. The monitoring results are summarized in Table 2.3.7-6 and presented in Appendix 10.5.6.4. The data indicate that background PM_{10} concentrations are well below the National and Florida AAQS. Valid samples were recovered from the primary sampler for a data recovery of 100.0 percent. Data from the 21 sampling periods are depicted on Figure 2.3.7-9.

BACKGROUND AIR QUALITY CONCENTRATIONS

Background air quality concentrations to be utilized in the modelling analysis are compiled from two sources - data collected on-site and data from the 1990 FDER state air quality data base. The on-site data were used for SO_2, O_3, and PM_{10}. The data from the FDER data base were used for CO, NO_2, and Pb. The FDER data base from the Tampa area were reviewed, and the

ATTACHMENT 2 - 10

NOISE SURVEY

Final

TIGER BAY
COGENERATION FACILITY
NOISE SURVEY

Prepared For:

Destec Engineering, Inc.
2500 Citywest Blvd., Suite 175
Houston, Texas 77042

Prepared By:

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

August 1992
12103B1/R1

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1.0 INTRODUCTION

KBN Engineering and Applied Sciences, Inc. (KBN) has conducted a noise analysis for the proposed Tiger Bay cogeneration facility. The proposed cogeneration facility, with a nominal generating capacity of 206 megawatts (MW), is to be located in Polk County, Florida. The proposed site is located along County Road 630 (CR 630) and is approximately 3 miles (5 km) west of Fort Meade. The site location relative to surrounding areas is presented in Figure 1. The proposed site is adjacent to the U.S. Agri-Chemicals Corporation (USAC). An aerial photograph depicting the proposed site boundary is presented in Figure 2. The noise analyses included on-site measurement of existing ambient noise levels and an assessment of future noise impacts due to construction and operation of the proposed facility.

2.0 REGULATIONS AND CRITERIA

2.1 SOUND LEVEL DEFINITION

Refer to Section A-1 in Appendix A.

2.2 U.S ENVIRONMENTAL PROTECTION AGENCY (EPA) AND OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)

EPA (1974) has developed indoor and outdoor noise criteria for various land uses (see Table 1) as a guide for protecting public health and welfare. These criteria relate to short-term and day-night average SPLs. The L_{eq} is the equivalent constant SPL that would be equal in sound energy to the varying SPL over the same time period. For industrial complexes, EPA recommends an indoor and outdoor SPL of 70 dBA for hearing loss consideration.

The current OSHA threshold limit value for an 8-hour duration (i.e., typical 8-hour workers shift) is 85 dBA (ACGIH, 1991). This limit refers to the SPL which it is believed that nearly all workers may be repeatedly exposed without adverse effect on their ability to hear and understand normal speech.

Predicted sound levels for the Tiger Bay cogeneration facility will be compared against both the EPA recommended and OSHA threshold values. Because the nearest residential area is 3 miles from the proposed site, it is doubtful that the proposed project will affect noise levels in residential areas. Therefore, no comparisons were made to the EPA recommended residential noise criteria.

6/2/92

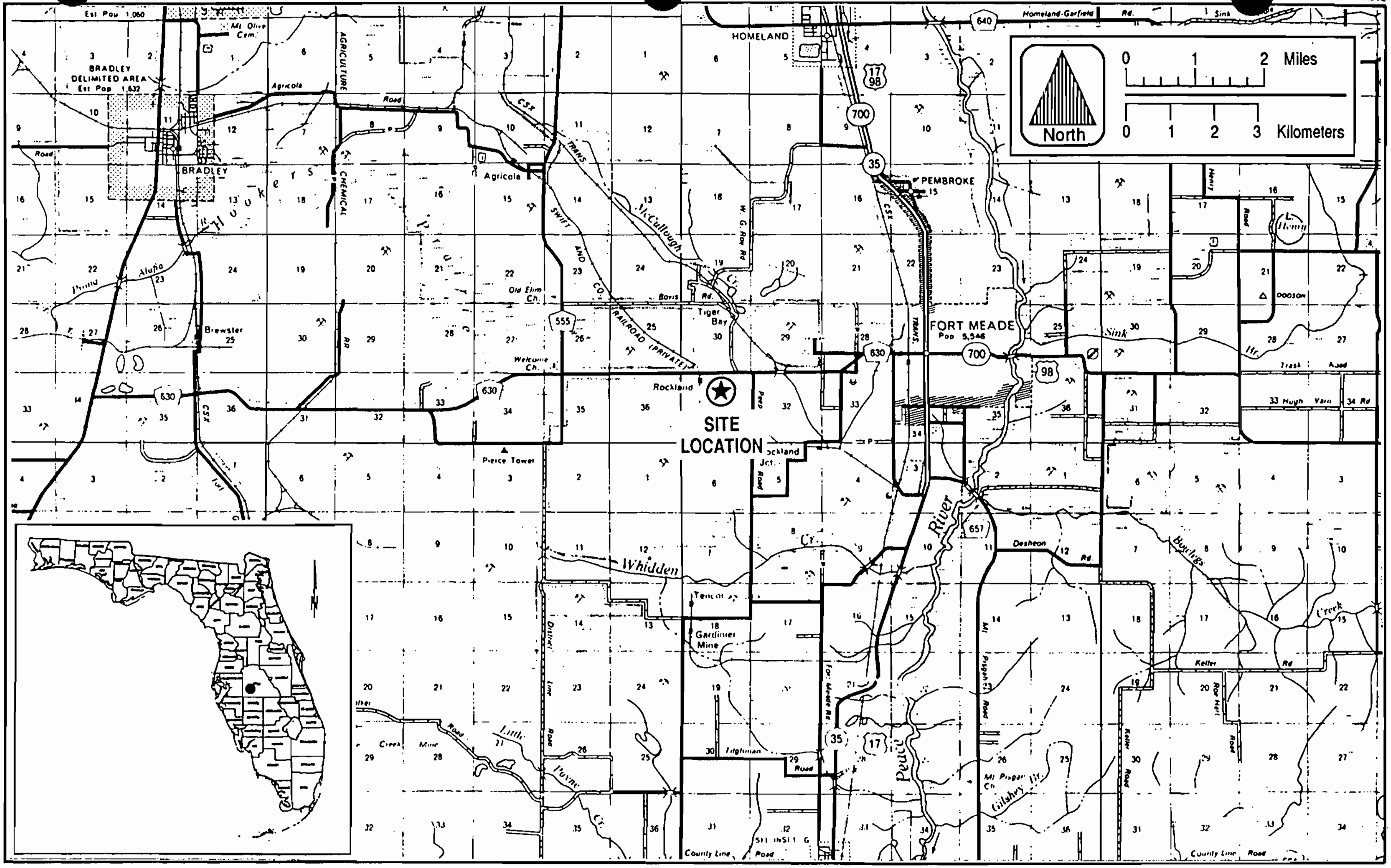

Figure 1 SITE LOCATION MAP
TIGER BAY COGENERATION FACILITY

SOURCES: FDOT, 1977; KBN, 1992.

Best Available Copy

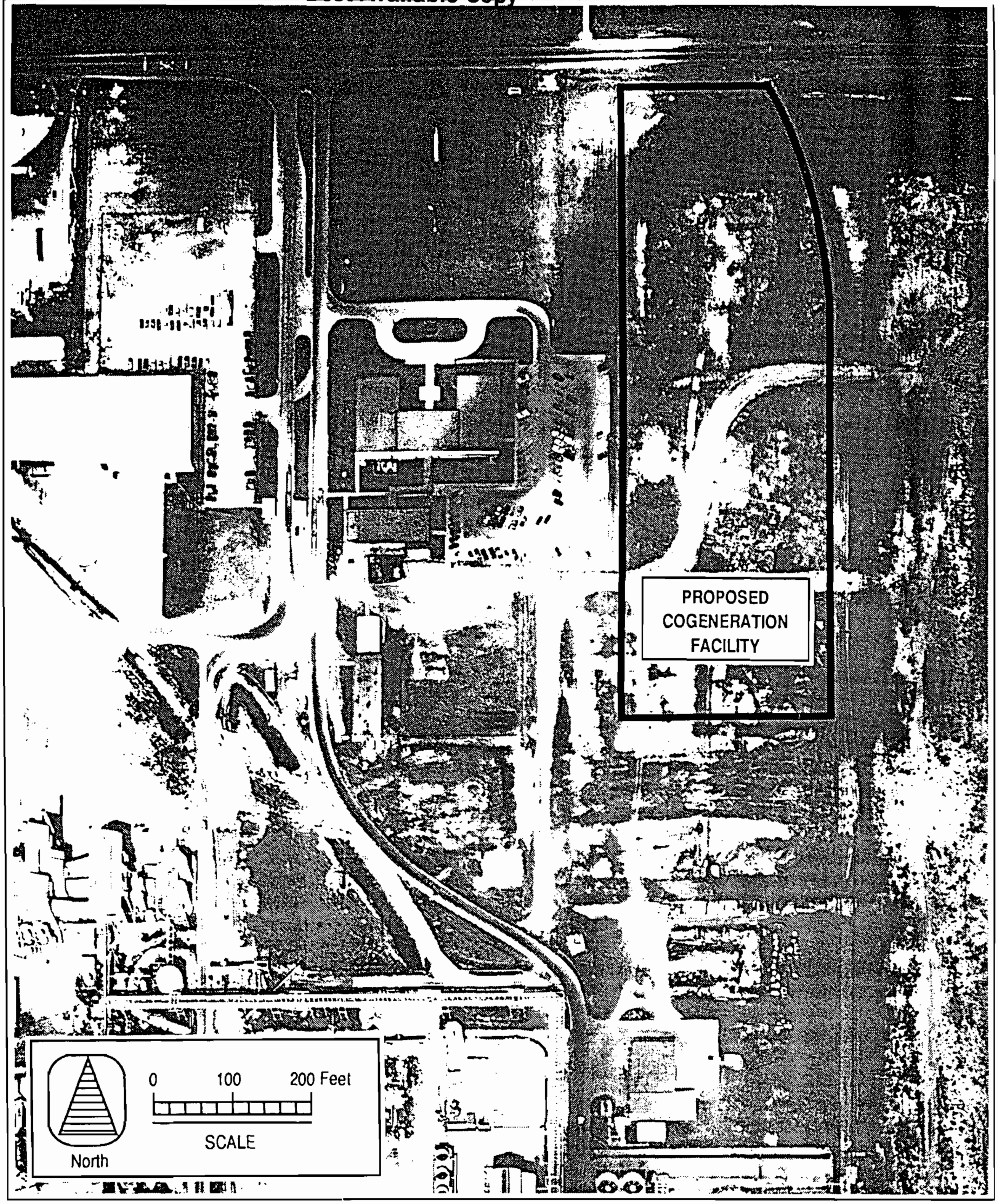

Figure 2 AERIAL VIEW OF PROPOSED TIGER BAY COGENERATION FACILITY SITE

KBN

Table 1. EPA-Recommended Noise Criteria

		Indoor			Outdoor		
	Measure[a]	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects (b)	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects (b)
Residential With Outside Space and Farm Residences	L_{dn}	45		45	55		55
	$L_{eq}(24)$		70			70	
Residential With No Outside Space	L_{dn}	45	45				
	$L_{eq}(24)$		70				
Commercial	$L_{eq}(24)$	(a)	70	70(c)	(a)	70	70(c)
Inside Transportation	$L_{eq}(24)$	(a)	70	(a)			
Industrial	$L_{eq}(24)$(d)	(a)	70	70(c)	(a)	70	70(c)
Hospitals	L_{dn}	45		45	55		55
	$L_{eq}(24)$	70			70		
Educational	$L_{eq}(24)$	45		45	55		55
	$L_{eq}(24)$(d)	70			70		
Recreational Areas	$L_{eq}(24)$	(a)	70	70(c)	(a)	70	70(c)
Farmland and General Unpopulated Land	$L_{eq}(24)$				(a)	70	70(c)

Notes:

a. Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity.
b. Based on lowest level.
c. Based only on hearing loss.
d. An $L_{eq}(8)$ of 75 dB may be identified in these situations so long as the exposure over the remaining 16 hours per day is low enough to result in a negligible contribution to the 24-hour average, i.e., no greater than an L_{eq} of 60 dB.

[a] L_{dn} is the day-night average A-weighted equivalent sound level, with a 10-decibel weighting applied to nighttime levels. L_{eq} (24) is the equivalent A-weighted sound level over 24 hours.

Source: EPA, 1974.

2.3 STATE OF FLORIDA

FDER has not promulgated a noise ordinance or noise regulations at this time.

2.4 POLK COUNTY

Polk County has not promulgated a noise ordinance or noise regulations at this time.

3.0 EXISTING NOISE MEASUREMENTS

3.1 INTRODUCTION

A baseline noise survey was conducted April 27 and 28, 1992, at the Tiger Bay cogeneration site. The objectives of the survey were to determine existing ambient noise levels at the plant's property boundary and nearby receptors within USAC's administration and office buildings. The data collected include sound-level measurements and octave band data at four locations around the Tiger Bay cogeneration site property boundary, three locations within USAC's existing office building, and one location in an adjacent USAC building where hearing tests are administered.

The subsections that follow present the results, equipment, procedures, and monitoring locations of the survey.

3.2 RESULTS

The results of the ambient sound-level survey are presented in Table 2. This table presents minimum, maximum, and L_{eq} sound pressure levels expressed in dBA observed at each monitoring site.

Based on a review of the strip charts, the minimum SPL represents the baseline conditions in the vicinity of the plant. These values were used to describe the baseline conditions exclusive of the major non-facility noise sources (i.e., aircraft and vehicles) which were excluded from the database whenever possible.

The L_{eq} levels for the property boundary monitoring locations ranged from 61.1 dBA at Site 1 during the late night (midnight) to 49.6 dBA at Site 3 during the evening (9:00 p.m.).

The L_{eq} levels for the sites within the USAC buildings ranged from 44.7 dBA at Site 7 during the early afternoon to 32.4 dBA at Site 5 during the early morning (3:00 a.m.).

Table 2. Ambient Noise Survey Results for the Tiger Bay Cogeneration Site and USAC Facility

Site ID	Date	Start Time	Stop Time	Sound Pressure Levels (dBA) Minimum	Maximum	Leq	Predominant Noise Sources
1	4/27/92	1508	1538	50.3	73.8	57.2	Cooling tower
	4/27/92	2344	0014	57.3	64.9	61.1	Cooling tower; truck traffic
2	4/27/92	1550	1620	46.1	68.5	53.5	Cooling tower; truck traffic
	4/27/92	2302	2332	54.1	61.9	57.3	Cooling tower; truck traffic
	4/28/92	1000	1030	46.1	68.3	53.2	Cooling tower; truck traffic
3	4/27/92	2100	2130	44.3	67.2	49.6	Cooling tower; truck traffic
	4/28/92	0033	0103	50.6	65.5	54.4	Cooling tower
	4/28/92	0912	0942	44.2	78.9	52.2	Plant auto traffic; lawn mower
4	4/27/92	2141	2211	50.2	59.8	53.3	Cooling tower; truck traffic
	4/27/92	2219	2249	51.0	61.2	54.0	Cooling tower; truck traffic
	4/28/92	1051	1121	46.2	71.2	53.5	Cooling tower; traffic in parking lot
5	4/27/92	1225	1255	40.3	51.7	42.5	General office noise; trucks outside
	4/28/92	0243	0313	30.2	36.4	32.4	
	4/28/92	1345	1415	30.6	58.3	35.4	Air conditioner; voices; office noise
6	4/27/92	1140	1210	41.4	56.2	42.7	Machine room; air conditioner; voices
	4/28/92	0203	0233	41.8	49.0	43.6	Air conditioner; machine room
	4/28/92	1300	1330	39.5	59.9	42.9	Machine room; air conditioner; voices
7	4/27/92	1412	1442	35.0	75.6	44.7	Trucks; voices; door opening/closing
	4/28/92	0119	0149	34.6	50.9	38.1	Trucks; steam releases
	4/28/92	1201	1231	32.8	48.8	36.8	Trucks; wind
8	4/28/92	1432	1502	31.4	40.0	37.0	Air conditioner; voices; footsteps

Source: KBN, 1992.

The major contributing noise sources in the area are the existing USAC cooling towers and vehicular traffic into and out of the USAC facility. Traffic on CR 630 also contributes to the ambient noise levels at the property boundary sites.

Average L_{eq} levels were calculated for each site based on the collected data and were used in the construction and operational impact analysis (Sections 4.0 and 5.0).

3.3 NOISE MONITORING EQUIPMENT AND PROCEDURES

The noise monitoring equipment and procedures are outlined in Section A-2 of Appendix A.

3.4 NOISE MONITORING LOCATIONS AND SCHEDULE

Four noise monitoring sites were located around the property boundaries of the Tiger Bay cogeneration site, and four monitoring sites were located at discrete points within USAC buildings. The noise monitoring locations are shown on Figure 3. Table 3 shows the grid coordinates of the noise monitoring sites relative to the grid center reference point at the proposed combustion turbine location. Sites 1 through 4 were located along the facility's boundary. Sites 5, 6, and 8 were located inside the USAC office building. Site 7 was located in the safety/training building just to the south of the USAC administration building. Hearing tests for USAC workers are administered in an audiometric test room within this building.

Noise monitoring was conducted to obtain 30-minute readings during daytime (i.e., 7:00 a.m. to 10:00 p.m.) and nighttime sampling periods.

4.0 <u>CONSTRUCTION NOISE IMPACTS ASSESSMENT</u>

4.1 INTRODUCTION

Construction activities at the facility site will increase ambient noise levels at the property boundary and at the adjacent USAC facility. Major noise sources during the construction phase will likely be cranes, bulldozers, heavy-duty trucks, earth graders, and air compressors/welders. These sources have maximum noise levels ranging from about 70 to 90 dBA (at 50 ft) (EPA, 1971).

Background and average equivalent SPLs observed during the daytime at the property boundary receptors (refer to Section 3.1, Table 2) are expected to increase during the construction phase of

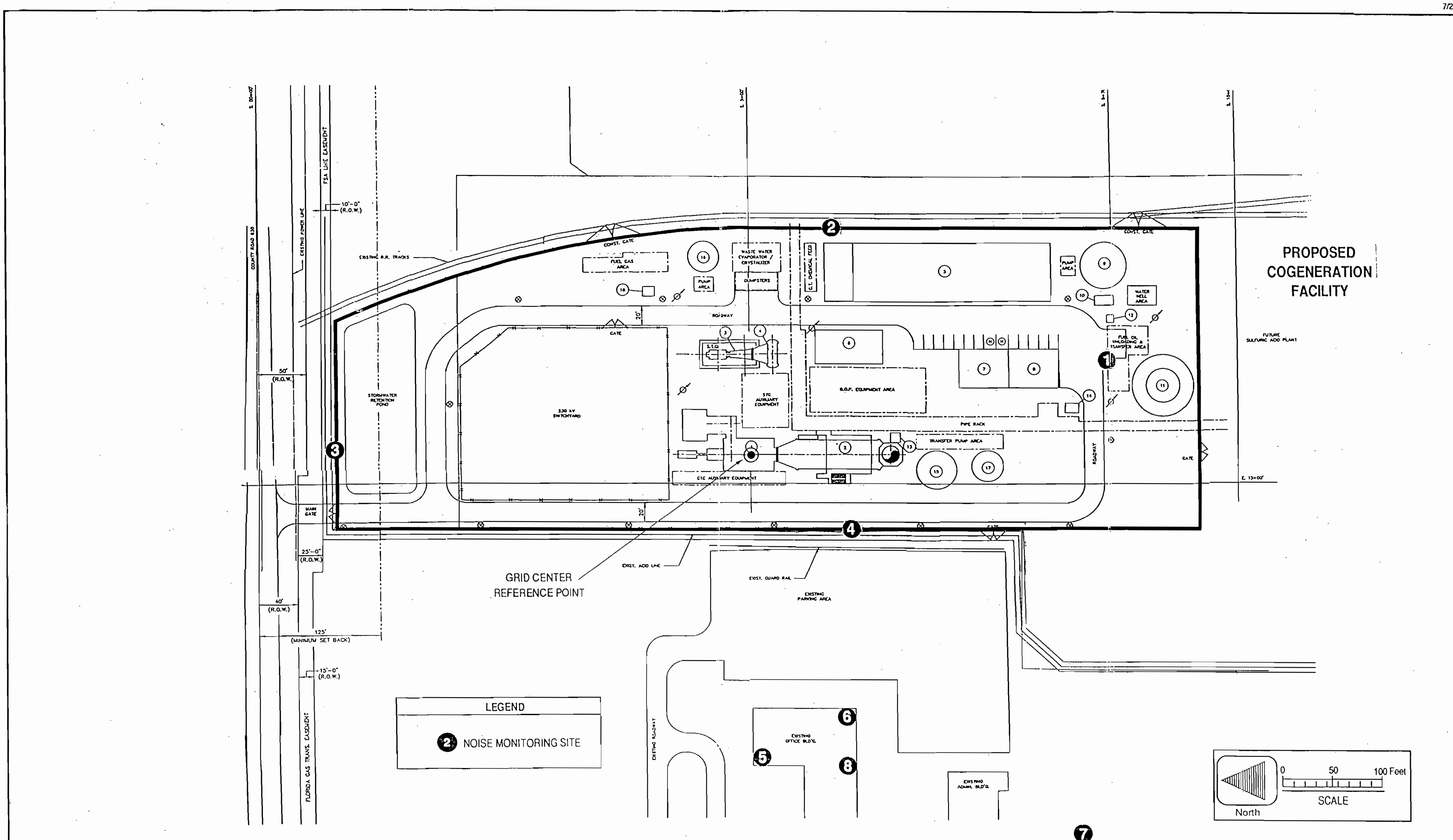

Figure 3 TIGER BAY COGENERATION FACILITY
NOISE MONITORING SITE LOCATIONS

KBN

Table 3. Location of Noise Monitoring Sites at the Tiger Bay Cogeneration Site and USAC Facility

Site Number	Site Location[a] X (ft)	Site Location[a] Y (ft)	Distance From Grid Center (ft)	Direction From Grid Center (degrees)
1	84.8	-367.3	377	167
2	242.9	-74.3	254	107
3	8.1	466.9	467	1
4	-69.9	-96.3	119	216
5[b]	-294.6	15.5	295	273
6[b]	-252.9	-117.9	279	245
7[b]	-390.2	-351.3	525	228
8[b]	-304.1	-122.9	328	248

[a] Relative to a grid center reference point located at the proposed combustion turbine unit.
[b] Sites located inside buildings.

Source: KBN, 1992.

the project. The increase in average equivalent SPLs (L_{eq}) during construction is expected to be conservative, since the assumption will be made that all construction equipment will be operating at maximum capacity and at the same time for the entire day.

4.2 RESULTS

The results of the construction noise impact analysis are presented in Table 4. The predicted impacts using daytime background L_{eq} values reflect the construction period noise levels in combination with existing facility operations. This scenario more realistically represents noise levels that likely will be observed.

Using the background L_{eq}, the maximum calculated impacts at the property boundary during construction are predicted to range from 79.8 dBA at Site 4 (west property line) to 70.5 dBA at Site 3 (north property line). The maximum calculated impacts within the USAC buildings are predicted to range from 47.4 dBA at Site 6 to 44.5 dBA at Site 7. As presented, the predicted noise levels at the property boundary exceed the EPA-recommended value of 70 dBA, but are well below the OSHA threshold of 85 dBA for an 8-hour duration. Additionally, predicted impacts within USAC's buildings are well below the OSHA standard for commercial indoor locations and are only slightly above the existing noise levels in these facilities.

4.3 METHODOLOGY AND PROCEDURES

The NOISECALC model (NYSDPS, 1986) was used to predict the maximum noise levels produced by a combination of likely noise sources with and without background noise levels. A description of this model is presented in Section A-3 of Appendix A.

A schedule of construction equipment anticipated for use on the proposed project was provided. In order to simulate a realistic scenario of construction equipment noise impacts, a conservative estimate of the number and type of construction equipment was developed in order to calculate noise levels. Table 5 presents a representative list of the major types of construction equipment that will potentially be used and their associated SPLs and octave bands. For the purpose of the analyses, all equipment was assumed to operate concurrently over a period of at least 1 hour. The noise levels resulting from the combination of construction equipment and existing noise sources were input as multiple sources into NOISECALC. Construction noise source octave bands were estimated from EPA, 1971. Since it is unlikely that all the equipment would be operating simultaneously and continuously, this assessment is conservative.

Table 4. Predicted Sound Pressure Levels (SPLs) at Facility Property Boundary and USAC Due To Construction Phase of the Project

Site	Monitored Background Value[a] (dBA)	Predicted SPL From Construction Activities (dBA)	Total Predicted SPL (dBA)	EPA Recommended Indoor/Outdoor Criteria (dBA)	OSHA 8-hour Threshold Value (dBA)
1	57.2	79.7	79.7	70	85
2	53.4	78.3	78.3	70	85
3	50.9	70.5	70.5	70	85
4	53.4	79.8	79.8	70	85
5[b]	39.0	45.1	46.1	70	85
6[b]	42.8	45.5	47.4	70	85
7[b]	40.8	42.1	44.5	70	85
8[b]	37.0	45.5	46.1	70	85

[a] Average of daytime background L_{eq} values.
[b] Indoor Sites.
Source: KBN, 1992.

Table 5. Example of Major Construction Equipment and Associated Noise Levels for the Tiger Bay Cogeneration Project

Construction Equipment[a]	Noise Level per Unit @ 50 ft (dBA)	Sound Power Level (dB) for Octave Band Center Frequency (Hz)										Sound Power Level (dB)	Sound Power Level (dBA)
		31.5	63	125	250	500	1K	2K	4K	8K	16K		
Caterpillar Bulldozer	73.4	0.0	106.6	103.6	101.6	102.6	99.6	96.6	94.6	96.6	0.0	110.9	105.3
Gas-Driven Welding Unit	78.0	0.0	102.6	103.6	106.6	106.6	102.6	104.6	98.6	89.6	0.0	112.8	109.8
Crawler Crane	83.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	0.0	122.5	115.6
Truck Crane	83.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	0.0	122.5	115.6
Air Compressor, Gas	76.1	0.0	93.6	94.6	106.6	101.6	103.6	101.6	96.6	89.6	0.0	110.4	108.0
Dump Truck	83.6	0.0	0.0	118.6	116.1	113.1	109.6	106.1	102.1	0.0	0.0	121.8	115.3
Dirt Scraper	83.8	0.0	111.6	118.6	116.6	114.6	109.6	104.6	98.6	92.6	0.0	122.5	115.6

[a] Includes only major construction noise sources greater than 70 dBA.

Sources: Destec Engineering, Inc., 1992. (equipment list)
EPA, 1971.(Octave Band and SPLs)
KBN, 1992.

Background L_{eq} values were used to calculate impacts at the four property line receptors identified previously (Sites 1 through 4) and at eight additional receivers along the eastern side of the USAC buildings adjacent to the cogeneration site. The additional receiver sites, along with information about the construction materials used in the USAC buildings, were used to predict noise impacts at the four locations inside the USAC buildings (see Figure 1).

5.0 OPERATIONAL NOISE IMPACT ASSESSMENT

5.1 INTRODUCTION

Operational noise impacts were predicted for all monitoring sites and the Tiger Bay cogeneration control room using the NOISECALC model as described in Section 4.3. Impacts were predicted for both the GE 7FA and Westinghouse 501F gas turbines with and without sound attenuation packages. The proposed noise sources, their locations and their octave bands and overall SPL's are presented in Table 6. Reference data for the proposed noise sources are presented in Appendix B. These data include estimated noise information supplied by manufacturers of the anticipated (or comparable) equipment and procedures outlined in EEI for the determination of source-specific octave band data for other major noise sources.

Noise levels inside the USAC office building and Tiger Bay cogeneration control room were predicted using sound transmission loss procedures based on the building construction material. Based on a visual inspection, the USAC buildings were determined to be constructed of 6-inch concrete block with plexiglass windows. The cogeneration facility's prefabricated control room was assumed to be constructed of aluminum lagging with 1/2-inch gypsum walls with a 2-foot high glass window bank along each wall. Procedures as defined by Harris (1991) were used to determine the sound transmission loss in order to predict noise levels within these structures (see Appendix B).

Both anticipated gas turbine-generator types were modeled with and without manufacturer-supplied sound attenuation packages. Sound levels estimated for a standard attenuation package design were provided for the Westinghouse gas turbine and included an overall noise reduction of 5 dBA (see Appendix B). Since no attenuation data were provided by GE, the Westinghouse scenario was applied to the GE gas turbine in order to predict attenuated noise impacts from both gas turbines.

Table 6. Sound Levels of Proposed Major Noise Sources at the Tiger Bay Cogeneration Facility

Source	Source Location[a] X (m)	Source Location[a] Y (m)	Sound Power Level (dB) for Octave Band Center Frequency (Hz) 31.5	63	125	250	500	1K	2K	4K	8K	16K	Sound Power Level (dB)	Sound Power Level (dBA)
Combustion Turbine (GE)[b]	0.0	0.0	88.2	93.2	91.2	87.2	85.2	86.2	91.2	85.2	75.2	0.0	98.5	94.6
Combustion Turbine (Westinghouse)[b]	0.0	0.0	134.8	128.6	125.8	113.5	106.5	106.5	106.3	104.0	103.3	0.0	136.2	115.0
Steam Turbine Generator	32.0	0.0	111.5	117.5	115.5	110.5	106.5	102.5	99.5	91.5	85.5	0.0	121.0	109.0
Cooling Tower (4-Cell)														
Fan 1	62.70	-37.68	0.0	99.6	96.6	92.6	90.6	90.6	89.6	91.6	91.6	0.0	103.4	98.0
Fan 2	63.04	-52.90	0.0	99.6	96.6	92.6	90.6	90.6	89.6	91.6	91.6	0.0	103.4	98.0
Fan 3	62.21	-69.90	0.0	99.6	96.6	92.6	90.6	90.6	89.6	91.6	91.6	0.0	103.4	98.0
Fan 4	63.10	-83.74	0.0	99.6	96.6	92.6	90.6	90.6	89.6	91.6	91.6	0.0	103.4	98.0
Main Transformer 1	30.82	30.82	97.5	103.5	105.5	100.5	100.5	94.5	89.5	84.5	77.5	0.0	109.5	100.9
Main Transformer 2	-5.40	30.62	101.4	107.4	109.4	104.4	104.4	98.4	93.4	88.4	84.4	0.0	113.4	104.8
Boiler Feedwater Pump[c]	18.47	-41.49	95.0	101.0	99.0	98.0	97.0	96.0	95.0	94.0	90.0	0.0	106.6	101.9
Cooling Tower Circulating Pump 1[c]	61.04	-24.66	95.0	101.0	99.0	98.0	97.0	96.0	95.0	94.0	90.0	0.0	106.6	101.9
Cooling Tower Circulating Pump 2[c]	58.08	-24.65	95.0	101.0	99.0	98.0	97.0	96.0	95.0	94.0	90.0	0.0	106.6	101.9

Note: All sources estimated using data provided by the manufacturers and EEI Electric Power Plant Environmental Noise Guide.

[a] Relative to the proposed CT unit.
[b] Denotes estimated sound levels without sound attenuation package. To simulate estimated noise levels with a manufacturer supplied sound attenuation package 5 dB was subtracted from all octave band levels above 125 H_z. These data are not guaranteed by the manufacturer.
[c] Sound data developed by using EEI data for a 1300 horsepower pump and subtracting 2 dB from the overall sound levels to simulate the pumps to be used for the proposed Tiger Bay Cogeneration project.

Source: KBN, 1992.

Because actual noise field data for the GE 7FA and Westinghouse 501F gas turbines are not yet available, the octave band data supplied by GE and Westinghouse are estimated levels only, based on units of similar design, and are not guaranteed.

5.2 RESULTS

The maximum calculated average 24-hour L_{eq} values at each receiver with the operation of the new facility and the GE and Westinghouse gas turbines with no sound attenuation are presented in Table 7. For the GE gas turbine, the 24-hour average L_{eq} values for property boundary Sites 1, 3, and 4 are below the EPA-recommended hearing loss threshold of 70 dBA. The calculated L_{eq} value at Site 2 exceeds this threshold. For the Westinghouse gas turbine, the 24-hour average L_{eq} values for Sites 2 and 4 exceed the 70 dBA threshold. All property boundary noise levels are well below the OSHA 8-hour threshold of 85 dBA.

As presented in Table 7, the calculated L_{eq} values for the indoor sites at USAC for both the GE and Westinghouse gas turbine configurations do not exceed 51 dBA. Impacts predicted inside the cogeneration control room range from 47.4 dBA to 53.4 dBA for the GE and Westinghouse gas turbines, respectively. These predicted impacts are well below the OSHA 8-hour threshold.

The maximum calculated average 24-hour L_{eq} values at each receiver with the operation of the new facility and the GE and Westinghouse gas turbines with the manufacturers sound attenuation packages are presented in Table 8. For the GE gas turbine, predicted noise impacts are virtually unchanged with or without the sound attenuation package because the GE gas turbine is not the dominant noise source at the plant boundary area. Therefore, a decrease in overall sound levels generated by the GE gas turbine has very little overall effect on predicted noise impacts. For the Westinghouse gas turbine, noise impacts decrease slightly with the sound attenuation package because the Westinghouse gas turbine has a higher estimated overall sound power level than the GE gas turbine (based on manufacturers supplied data). Therefore, an overall decrease in noise levels from the Westinghouse gas turbine has a more pronounced effect on predicted noise impacts. All predicted impacts are below the OSHA 8-hour threshold.

Table 7. Calculated Operational L_{eq} SPL Values for the Tiger Bay Cogeneration Project Without Noise Attenuation[a]

Site	Background L_{eq}[b] (dBA)	L_{eq} (dBA) for Ambient and Proposed Facility GE CT	Westinghouse CT	EPA Recommended Indoor/Outdoor Criteria (dBA)	OSHA 8-hour Threshold Value (dBA)
1	59.6	65.8	68.5	70	85
2	55.8	75.3	76.2	70	85
3	53.4	61.6	65.4	70	85
4	53.7	68.7	76.3	70	85
5 [c]	38.8	41.4	50.1	70	85
6 [c]	43.1	44.1	49.8	70	85
7 [c]	41.3	41.9	45.5	70	85
8 [c]	37.0	40.0	49.0	70	85
Tiger Bay Cogeneration Control Room [c]	NA	47.4	53.4	70	85

Note: NA = not applicable.

[a] The combustion turbines are not equipped with a manufacturers sound attenuation package.
[b] Average of daytime and nightime background L_{eq} values.
[c] Indoor sites.

Source: KBN, 1992.

Table 8. Calculated Operational L_{eq} SPL Values for the Tiger Bay Cogeneration Project With Noise Attenuation[a]

Site	Background L_{eq}[b] (dBA)	L_{eq} (dBA) for Ambient and Proposed Facility		EPA Recommended Indoor/Outdoor Criteria (dBA)	OSHA 8-hour Threshold Value (dBA)
		GE CT	Westinghouse CT		
1	59.6	65.8	67.6	70	85
2	55.8	75.3	75.8	70	85
3	53.4	61.6	64.3	70	85
4	53.7	68.6	74.4	70	85
5 [c]	38.8	41.4	50.0	70	85
6 [c]	43.1	44.1	49.6	70	85
7 [c]	41.3	41.9	45.5	70	85
8 [c]	37.0	40.0	48.8	70	85
Tiger Bay Cogeneration Control Room [c]	NA	47.4	53.3	70	85

Note: NA = not applicable.

[a] The combustion turbines are equipped with a manufacturers sound attenuation package.
[b] Average of daytime and nightime background L_{eq} values.
[c] Indoor sites.

Source: KBN, 1992.

6.0 CONCLUSIONS

6.1 CONSTRUCTION NOISE IMPACTS

As presented in Table 4, construction noise impacts at the proposed property boundaries are predicted to exceed the recommended EPA industrial noise criteria of 70 dBA for hearing loss consideration but are below the OSHA threshold value of 85 dBA. As stated, these impacts are conservative. The NOISECALC model assumes the construction noise sources operate continuously at their maximum noise levels (see Table 5). In reality, this will not be the case since equipment will be operating intermittently, at lower noise levels or not at all during portions of the construction process. Therefore, overall noise levels will most likely be lower than predicted by the model. Indoor noise levels predicted for the construction phase are predicted to be well below the EPA and OSHA thresholds of 70 and 85 dBA, respectively.

6.2 OPERATIONAL NOISE IMPACTS

Predicted noise impacts due to the operation of the cogeneration facility are predicted to be below OSHA thresholds at all modeled sites. Impacts are also predicted to be below EPA recommended noise levels except at Site 2, for the GE gas turbine, and Sites 2 and 4 for the Westinghouse gas turbine. Overall noise levels predicted by the model are conservative. In reality, buildings and other structures at the cogeneration site will tend to decrease noise levels associated with the operation of the cogeneration facility. Also, the noise data provided by both GE and Westinghouse for the gas turbines does not account for the effects of a heat recovery boiler, which will decrease noise levels from the exhaust end of the gas turbine (one of the major noise sources).

Based upon the assumptions made in the noise impact assessment and the results of the modeling, there should be no detrimental affect on the existing noise levels at the USAC facility. Indoor noise levels may increase slightly, due to the proposed facility but are well within OSHA standards. Outdoor noise levels may increase, but will remain below the OSHA 8-hour standard. Based on the results of the background noise survey, outdoor noise levels are predicted to increase most at Sites 2 and 4. Because Site 2 is along the eastern property boundary, increased noise levels in that area may be least noticeable to USAC workers since the major portion of the USAC facility lies to the south and west of the proposed cogeneration site. Noise level increases at Site 4 may be noticeable to workers entering and leaving the east office parking area.

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APPENDIX A

A.1 SOUND PRESSURE LEVEL DEFINITION

Decibels are calculated as a logarithmic function of the sound level in air to a reference effective pressure, which is considered the hearing threshold. Sound pressure level (SPL) is defined as:

$$SPL = 20 \log_{10} (Pe/Po) \text{ [decibels]}$$

where: Pe = measured RMS effective pressure of the sound wave, and
Po = reference effective pressure of 20 micropascals (μPa).

SPLs must be measured using a properly calibrated sound level meter meeting American National Standards Institute (ANSI) specifications for Type II or better equipment.

A.2 NOISE MONITORING EQUIPMENT AND PROCEDURES

The noise monitoring equipment used during the survey was as follows:

1. Continuous Noise Monitoring Equipment:
   a. Bruel & Kjaer (B&K) Type 2230 Precision Integrating Sound-Level Meter
   b. B&K Type 2639 Microphone Preamplifier
   c. B&K Type 4155 Prepolarized Condenser Microphone
   d. Primeline Model 6723 Two-Pen Portable Strip Chart Recorder
   e. Windscreen, tripod, and various cables
2. Octave-Band Sound-Level Monitoring Equipment
   a. Continuous noise monitoring equipment noted above
   b. B&K Type 1625 One-Third-Octave and Full-Octave Filter Set
3. Sound-Level Meter Calibration Unit
   a. B&K Type 4230 Sound-Level Calibrator (94 dB @ 1,000 Hz)

The B&K Type 2230 sound-level meter complies with Type I precision requirements set forth by ANSI S1.4 for sound-level meters.

Monitoring was conducted using the procedures specified by ANSI. The continuous ambient noise monitoring was performed using fast-response mode to obtain A-weighted sound levels. A windscreen was used since all measurements were taken outside. Random incidence response as specified by ANSI was used for microphone positions. A continuous record of the output data was made on the strip chart during all monitoring. SPLs were collected at each location and consisted of three noise parameters:

L_{eq}-- The sound pressure level averaged over the measurement period; this parameter represents the continuous steady sound pressure level which would have the same total acoustic energy as the real fluctuating noise over the same time period.

Maximum-- The maximum sound pressure level observed during the sampling period.

Minimum-- The minimum sound pressure level observed during the sampling period.

Monitoring was conducted using the sound-level meter mounted on a tripod at a height of 5 ft abovegrade. An output cable connected the sound-level meter with the strip chart recorder. The strip chart recorder was located away from the sound-level meter so that the time of day and comments could be recorded without disturbing or influencing the sound-level meter during sampling. Field notes were recorded during monitoring and included identifying meteorological conditions and major noise sources.

The B&K Type 2230 sound-level meter and the B&K Type 1625 octave band analyzer, which are designed to be connected and operated as a single unit, were used to measure source noise characteristics. This system setup permitted the measurement and recording of octave band sound pressure levels. Both instrument systems were calibrated at the beginning and at the end of each sampling period using the B&K Type 4230 sound-level calibrator. All calibrations were within 0.1 dBA of the reference sound level.

A.3 MODEL DESCRIPTION

NOISECALC was developed by the New York State Department of Public Service to assist with noise calculations for major power projects. Noise source levels are entered as octave band SPLs. Coordinates, either rectangular or polar, can be specified by the user. All noise sources are assumed to be point sources; line sources can be simulated by several point sources. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified by the American National Standard Institute Method for the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1978). Path-specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Attenuation due to barriers can be specified by giving the coordinates and height of the barrier. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated. Background noise levels can be incorporated into the program and are used to calculate overall SPLs. For the purposes of this analysis, atmospheric attenuation was the only option used.

APPENDIX B

GEI&PSS
Industrial Sales Dept.
Bldg. 2, 4th Flr.
1 River Road
Schenectady, NY 12345

Date: 5/15

TO: DAVID BARE

FROM: Steve Hart
Bldg. 2, Rm 443
(518) 385-9829
8*235-9829

1 pages of information follow this cover page

Comments: CALL IF YOU HAVE ANY QUESTIONS.

SUBJECT: NOISE LEVEL ESTIMATE OUTSIDE OF TURBINE COMPARTMENT ON 7FA COMBUSTION TURBINES

The following noise data is an estimate based on data taken on an operating 7F and should be representative of levels that will be achieved on the 7FA. This information is not guaranteed.

OCTAVE BAND	31	63	125	250	500	1K	2K	4K	8K
SPL (dB) (re 20uPa)	81	86	84	80	78	79	84	78	68

@3'

Overall dBA = 87

June 23, 1992

Mr. Ronald Herbanek
Destec Engineering
2500 City West Blvd./Ste. 1700
Houston, Texas 77210-4411

cc: Harry Kent
Mosi Fazeli

Subject: Gator Cogen Responses

Dear Ron:

The following are in response to your request for information regarding the subject project.

ITEM 1: DID THE PREVIOUS ESTIMATED NOISE DATA TAKE INTO ACCOUNT ANY SPECIAL SOUND ATTENUATION?

The numbers provided to Dave Bare on May 15, 1992 were estimated levels that did not include any special sound attenuation. It should be noted, however, that the 7FA base unit includes 8 feet of inlet silencing and an off-base acoustic enclosure around the turbine compartment. The 7F unit that these numbers were taken from included 8 feet of inlet silencing and an acoustic barrier wall in lieu of the acoustic enclosure. GE estimates that the numbers provided are still applicable to the 7FA, however.

ITEM 2: WHAT WOULD BE THE ESTIMATED NOISE DATA IF SPECIAL SOUND ATTENUATION WERE INCLUDED?

Because the numbers provided were near field noise levels only, they will stay the same even if special sound attenuation is provided. The addition of additional inlet silencing, etc. will effect far field noise levels only.

ITEM 3: DO THESE NUMBERS INCLUDE THE EFFECTS OF AN HRSG?

Again, because the numbers provided are near field noise levels only, the HRSG effects will not alter these numbers. The only affect would be on far field noise levels.

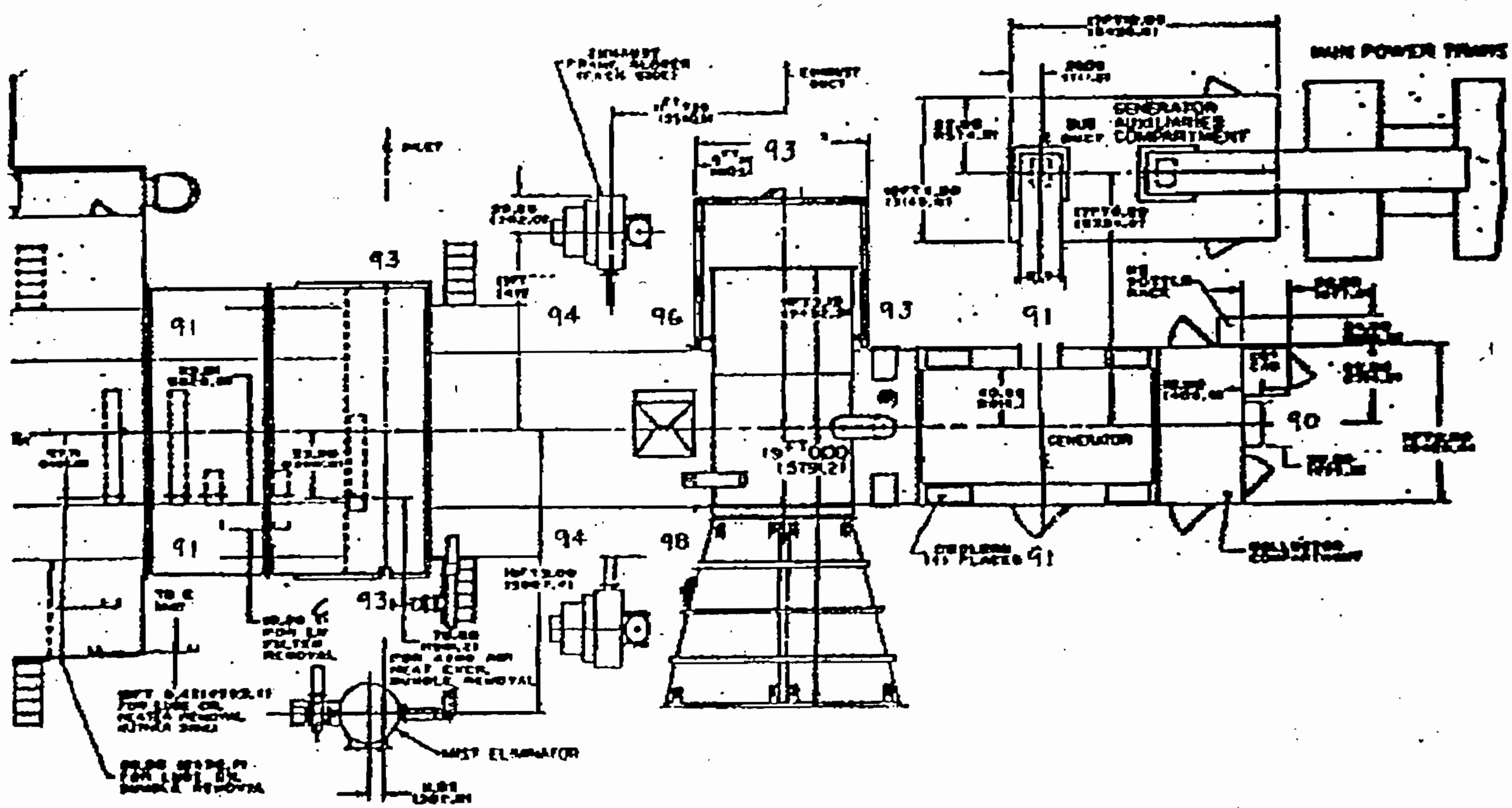
ITEM 4: IS SOUND DATA AVAILABLE AT DIFFERENT LOCATIONS AROUND THE 7FA GAS TURBINE?

Attached are estimated sound levels at various locations around a 7EA gas turbine. As I mentioned on the telephone, GE does not have this kind of data available for the 7FA. The information provided does not necessarily reflect what would be seen on the 7FA.

RECEIVED 06/24 11:27 1992 AT 9043324189 PAGE 3 (PRINTED PAGE 3)
SENT BY:DESTEC ENGINEERING ; 6-24-92 ; 9:20 ; PURCHASING DEPT→ 9043324189;# 3
JUN 23 '92 03:09PM INDUSTRIAL 2-411

Best Available Copy

Figure 12.3
Typical Sound Levels at 3 Ft, in dBA
MS7001, Base Load



9/8/87

**Westinghouse
Electric Corporation**

**Power Generation
Business Unit**

FACSIMILE TRANSMITTAL

Date: May 13, 1992
FAX: 904-332-4189

To: Gail Rampersaud

KBM Gainesville

Pages: (including cover sheet) 2

From: Robert A. Putnam

Environmental Compliance
Westinghouse Electric Corporation
4400 Alafaya Trail -- MC 504
Orlando, Florida 32826-2399

(407) 381-6781
WIN: 439-6781

FAX: (407) 381-6619

Message: Gail, As we discussed this morning, you may use the following 400' SPL's as an estimated envelope for the BASE spectrum of a single W501F, standard stack, 2 stage pad filter, oil fuel. This is merely an estimate, based on field data from similar units, adjusted upward to establish an envelope within which the W501F would lie.

page 2
to: Gail Rampersaud
KBM
from: Bob Putnam
W501F Econopac Far Field Estimated Sound LEvel Envelope

w/out HRSG
with exhaust silencer

Octave Band Center Frequency in Hertz @400'									
Cardinal Position	31.5	63	125	250	500	1K	2K	4K	8K
(north) Inlet Axis	78	73	72	61	57	56	53	49	47
(east)	82	75	72	60	51	52	53	50	49
(south) Exhaust Axis	83	79	76	62	57	56	55	55	55
(west)	82	75	72	60	51	52	53	50	49

Bear in mind that these numbers are estimated levels only, and are for an Econopac configuration. The 400 distance is measured from the equipment source envelope at a height of 5 feet above the ground. A flat unobstructed terrain is assumed. The presence of a waste heat boiler will modify all 400' estimated levels, but most significantly those on the exhaust axis. Almost any degree of silencing is possible with a waste heat boiler, so that certainly a configuration could be devised which would yield the above estimated SPL's.

The estimated OPTION sound package would simply yield a 5 dB(A) decrease in overall A-weighted level, but would probably not be reflected in a uniform 5 dB(A) decrease in all octave bands. For your purposes, it may be sufficiant to assume that 31.5, 63, and 125 Hz band levels would not decrease at all with the OPTION (5 dB(A)) package, and all other bands would decrease exactly 5 dB. Again, this assumption would likely constitute an envelope within which the W501F is estimated to lie.

Bob Putnam

cc: R. Grinage

GC9-10A

BEST AVAILABLE COPY

THE MARLEY COOLING TOWER COMPANY

MARLEY

Destec Engineering
Request for Quotation
Budget Request Inquiry
Mechanical Draft Cooling Tower
Gator Cogen Project
Central Florida

June 5, 1992

SOUND DATA

MODEL 489-4.0-4

	dBA	Band/Hz	63	125	250	500	1000	2000	4000	8000
*5' AO	86		88	85	81	79	79	78	80	80

* Air Opening Above Grade

DESTEC ENGINEERING

Best Available Copy

c.c. RSC

DESTEC ENGINEERING, INC.
2500 CITY WEST BLVD., SUITE 150
HOUSTON, TX 77042

FACSIMILE TRANSMITTAL

DATE: June 6, 1992

PLEASE DELIVER THE FOLLOWING PAGES TO:

ATTN: Gail Rampersaud
COMPANY KRN
FAX # (904) 332- 4189
LOCATION/FACILITY Gaterland

IF TRANSMISSION IS INCOMPLETE PLEASE CALL:

NAME Ron Herbanek
COMPANY Destec Engineering
PHONE # (713) 735-4197
FAX # (713) 735-4092
TOTAL PAGES ______ (including this page)

SUBJECT/REFERENCE Gatox Cogen - Noise Study

MESSAGE: Data for input & major action items (Per telecon 6/5/92)

Major Pump preliminary data:

1) boiler feedwater pumps 1 (operating) @ 750hp - horiz. centrifugal (multi stage) ℄ 4ft above grade

2) circ. water pumps 2 (operating) @ 700hp - vertical turbine motor 4ft above grade

Open Items: RESP

1) HRSG sound data (Ft. Lauderdale) verification/definitive - GR
2) GT vendor sound data verification/definition (attenuation) - RH
3) Cooling Tower Manuf sound data - RH
4) Implement EEI STG sound data (model) 75 mWatts - GR
5) Main Transformer MVA and/or NEMA sound rating - RH
6) Implement directional GT sound data (Westinghouse) - GR

Date: 17-Jun-92 09:32
From: REESE (Reese, Bill)
: ROBERTS
ies-to: REESE
Subject: TRANSFORMER SOUND LEVELS - GATOR COGEN
Importance: HIGH
Message-id: A8063F2A01AEAEAE
Re-sent-by: REESE

RON,

NEMA STANDARD TR 1-0.05 REQUIRES THAT TRANSFORMERS SHALL BE DESIGNED SO THAT AVERAGE SOUND LEVELS WILL NOT EXCEED THE FOLLOWING VALUES:

60/80/100	MVA,	MT-001,	MAIN	TRANSF.(20X12X15),=	81 DECIBELS
120/160/200	MVA,	MT-002,	MAIN	TRANSF.(22X13X17),=	84 DECIBELS
12/16	MVA,	AT-001,	AUX.	TRANSF.(16X12X15),=	73 DECIBELS
12/16	MVA,	AT-002,	AUX.	TRANSF.(16X12X15),=	73 DECIBELS

DIMENSIONS IN BRACKETS ARE IN FEET.

THE AUDIBLE SOUNDS GENERATED BY THE TRANSFORMER IS COMPOSED OF DISCRETE TONES WHOSE FREQUENCIES ARE EVEN MULTIPLES OF TRANSFORMER EXITATION FREQUENCY (60 HZ). MICROPHONE STATIONS FOR MAKING THESE MEASUREMENTS ARE PACED 3 FEET APART, AT A RADIUS OF 6 FEET FROM THE TRANSFORMER MAIN TANK. ER ANSI C57.12.90)

IF REQUIRED, WE CAN GET THE MANUFACTURER TO MAKE OCTAVE BAND MEASUREMENTS OF OUR TRANSFORMERS AFTER THEY ARE MANUFACTURED, BUT THAT TESTING REQUIREMENT IS NOT PART OF OUR TRANSFORMER SPECIFICATION AND THE STANDARDS DO NOT REQUIRE THE MANUFACTURER TO MEET ANY CRITERIA OTHER THAN THAT STATED ABOVE.

BILL

Ron,

THE COOLING TOWER NOISE DATA WAS CONFIRMED BY MARLEY AS 5' DISTANCE AT GRADE.

Joe
6/17/92

Electric Power Plant Environmental Noise Guide

Volume I
2nd Edition

Edison Electric Institute

Prepared by:
Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, MA 02138
Report No. 3637

TABLE 4.3 ESTIMATED SOUND POWER LEVEL AND DIRECTIVITY EFFECTS OF TURBINE-GENERATOR ASSEMBLIES AND EXCITERS

(a) SOUND POWER LEVEL OF TURBINE-GENERATOR-EXCITER ASSEMBLY

Overall

$$L_W = 113 + 4 \log (\text{MWe}), \quad (\text{dB})$$

where MWe is the gross electrical generating rating of the unit, in megawatts.

A-Weighted

$$L_W = 101 + 4 \log (\text{MWe}), \quad (\text{dB})$$

where MWe is the gross electrical generating rating of the unit, in megawatts.

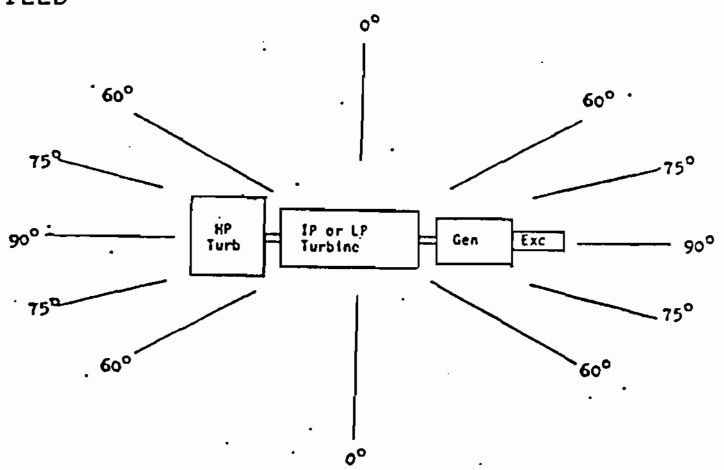
Octave-Band Center Frequencies

Subtract the following values (in dB) from the overall sound power level for the nine standard octave bands:

Hz	31	63	125	250	500	1000	2000	4000	8000
dB	9	3	5	10	14	18	21	29	35

(b) ESTIMATED DIRECTIVITY CORRECTIONS TO THE FREE-FIELD NOISE RADIATED FROM TURBINE-GENERATOR UNIT WHEN THERE ARE NO NEARBY REFLECTING SURFACES TO DISTORT THE SOUND FIELD

Angle From Normal to Turbine Axis (See sketch)	Directivity Correction (dB)
0°-60°	0
60°-75°	-3
75°-90°	-6



(c) SOUND POWER LEVEL OF EXCITER, ALONE, WITH COVERED BRUSH AREA

For driven exciter, add sound power level of drive unit.

Octave Band Center Frequency, Hz									Overall	A-Weighted
31	63	125	250	500	1000	2000	4000	8000		
Sound Power Level, dB										
--	--	104	101	100	99	97	90	85	108	104

4.2.5 Transformers

Sound Power Level

Two methods for estimating the sound power levels of transformers are given in Table 4.5. Method 1 requires using the NEMA Sound Level Rating, the total surface area of the four walls of the transformer, and the frequency adjustments given in the table. Method 2 requires measuring the sound pressure levels as specified in the table. By either method, the noise of the cooling fans should be included.

Directivity Effects

Transformers are treated as omnidirectional sound sources for purposes of siting.

Tonal Characteristics

Transformers should be treated as having tonal components at 120, 240, 360, and 480 Hz, falling into the 125-, 250-, and 500-Hz octave bands.

Temporal Characteristics

Transformers are steady, continuous noise sources.

Source Height

The top of the transformer tank should be taken as the source height.

Support Data

The two estimation methods given in Table 4.5 are taken from a transformer noise project [6] that included approximately 40 transformer installations. The transformers covered a rating range of 20 to 450 MVA.

In a second study on transformer noise from 33 substations, an empirical relationship was developed from field-measurement data for 58 transformers having power ratings of from 6 MVA to 1100 MVA [7].

Although the findings were in general agreement, the estimation procedures resulting from the two studies are not readily combined into a single common prediction method, due to the different objectives and data taking of the two projects.

In both studies, the field measurements showed that "standard" transformers have A-weighted sound levels ranging from slightly above the maximum permitted by the NEMA Standard to as much as 5 to 6 dB(A) below the maximum permitted. "Standard" transformers are units constructed without benefit of special quieting treatments. "Quiet" transformers incorporate various forms of quieting treatments and, depending upon the noise reduction specified, may be up to 25 dB(A) below the NEMA Standard.

TABLE 4.5. SOUND POWER LEVELS OF TRANSFORMERS

$$L_w = L_p + 10 \log S \text{ (dB)}$$

where L_p is the close-in sound pressure level (0.3 m from side wall or 2 m from fan cooling section), as determined by Method 1 or 2 below, and S is the total surface area of the four side walls of the transformer, in m^2.

ESTIMATION METHOD 1

To obtain close-in L_p, add the following values to the NEMA Sound Pressure Level Rating — either standard rating or specified lower-than-standard rating. (The resulting values are estimated sound pressure levels for the nine standard octave bands.) Add to NEMA Sound Rating (dB):

Hz	31	63	125	250	500	1000	2000	4000	8000
dB	-3	+3	+5	0	0	-6	-11	-16	-23

ESTIMATION METHOD 2

For an existing installed transformer, measure L_p in octave bands at positions specified in Part 9.04 Audible Sound Level Tests of NEMA Standards Publication TR1-1974 [5] while the cooling fans are in operation.

SUPPLEMENTARY DATA APPROXIMATIONS

1. For standard (unquieted) transformer:

   NEMA Sound Rating ≈ 55 + 12 log MVA dB(A)

2. For quieted transformer (optional, rating variable):

   NEMA Sound Rating ≈ 45 + 12 log MVA dB(A)

3. A-weighted sound power level:

   L_w = NEMA Sound Rating + 10 log S dB(A)

4. Transformer side wall area:

   10 log S = 14 + 2.5 log MVA

In above relationships,

MVA = megavolt-ampere rating of transformer
S = surface area of four side walls of transformer, in m^2

4.3.2 Pumps

Large pumps are used for a wide variety of power plant applications, such as: boiler feed pumps, reactor feed pumps, circulating water pumps, condensate pumps, hotwell pumps, emergency fire pumps, fuel oil pumps, cooling tower booster pumps, and service water pumps. Field measurements and/or observations made at many of these installations indicate that the drive motor usually produces more noise than the pump does. The exceptions are the large, high pressure, high capacity boiler and reactor feed pumps, where the pump may produce higher noise levels than its driver mechanism. For all pump-motor sets, except boiler and reactor feed pumps, it is suggested that the total sound power level be calculated on the basis of the motor drive only, in accordance with Section 4.3.1. For pumps driven by auxiliary steam turbines, calculate the total sound power level on the basis of the turbine data of Section 4.3.5. For boiler and reactor feed pumps, the information given below should be used.

Sound Power Level

The estimated sound power levels of boiler and reactor feed pumps are given in Table 4.7. The first part of the table gives the overall and A-weighted sound power levels for pumps in two groups: 1000 to 9000 kW (1300 to 12000 hp) and 9500 to 18000 kW (12600 to 24000 hp). The second part of the table gives the octave band corrections for these two groups.

Directivity Effects

Although discrete frequencies from the pumps may display directivity effects, the directions are usually unpredictable. Therefore, both the broadband and tonal noise from pumps should be considered omnidirectional.

Tonal Characteristics

The data on the pumps in the 1000 to 9000 kW range indicate no strong tones or discrete frequencies.

The data for many of the pumps in the 9500 to 18000 kW range show tonal components in the 250 to 2000 Hz octave bands. Therefore, these larger pumps should be treated as having discrete frequency tones, unless the user knows that specific pumps do not produce these tones.

Temporal Characteristics

Feed pumps are generally steady, continuous noise sources.

Source Height

The source height of a pump should be taken as the elevation of the the drive shaft of the pump.

TABLE 4.7. ESTIMATED SOUND POWER LEVELS OF BOILER AND REACTOR FEED PUMPS

Pump Power Rating		Sound Power Level (dB)	
kW	hp	Overall	A-Weighted
1000	1300	108	104
2000	2700	110	106
4000	5300	112	108
6000	8000	113	109
9000	12000	115	111
----	----	---	---
9500	12600	113	112
12000	16000	115	114
15000	20000	119	118
18000	24000	123	122

Octave-Band Center Frequency (Hz)	Octave-Band Correction (dB) Subtract from Overall L_w	
	Pump Rating 1000-9000 kW (1300-12000 hp)	Pump Rating 9500-18000 kW (12600-24000 hp)
31	11	19
63	5	13
125	7	15
250	8	11
500	9	5
1000	10	5
2000	11	7
4000	12	19
8000	16	23

Support Data

Sound pressure level data have been analyzed for 23 feed pumps operating in both fossil fuel and nuclear plants. The power rating of the pump shows the most reasonable relationship with sound output. Figure 4.13 gives the measured A-weighted sound levels at 1 m plotted against rated pump power in kW and hp. Six different pump manufacturers and 16 different power stations (4 nuclear) are represented in the data. The smaller feed pumps are generally motor driven, and the larger ones are generally steam-turbine driven.

Since the frequency distribution of the noise from motor-driven and turbine-driven pumps differs in this study they are plotted separately in Figure 4.14. Most of the turbine-driven pumps are characterized by strong

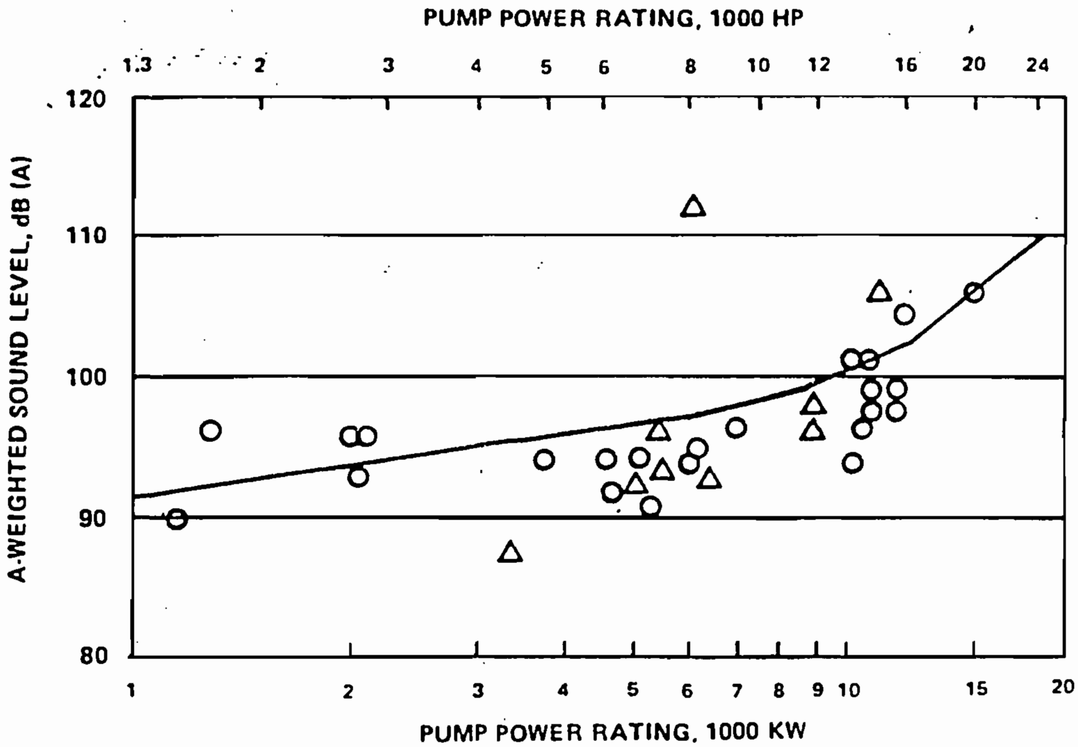


Figure 4.13. Measured A-weighted sound levels at 1 m distance, plotted against power rating of feed pumps. Open circles indicate known values of pump power rating, Δ indicates power estimate based on other pump conditions (rpm, water flow, pressure). Solid curve represents suggested design curve. Rev. 1983.

tonal components in the 250 to 2000 Hz bands. The peak tone levels are shown by open circles in the plot at the upper half of Figure 4.14. Without these tones, the sound pressure levels of these pumps would generally fall within the shaded zone. This tonal composition influences the shape of the suggested design curve of Figure 4.13, which rises sharply for pumps having a power rating above 8000 kW. All five A-weighted sound levels above 100 dB(A) on Figure 4.13 are caused by tonal components.

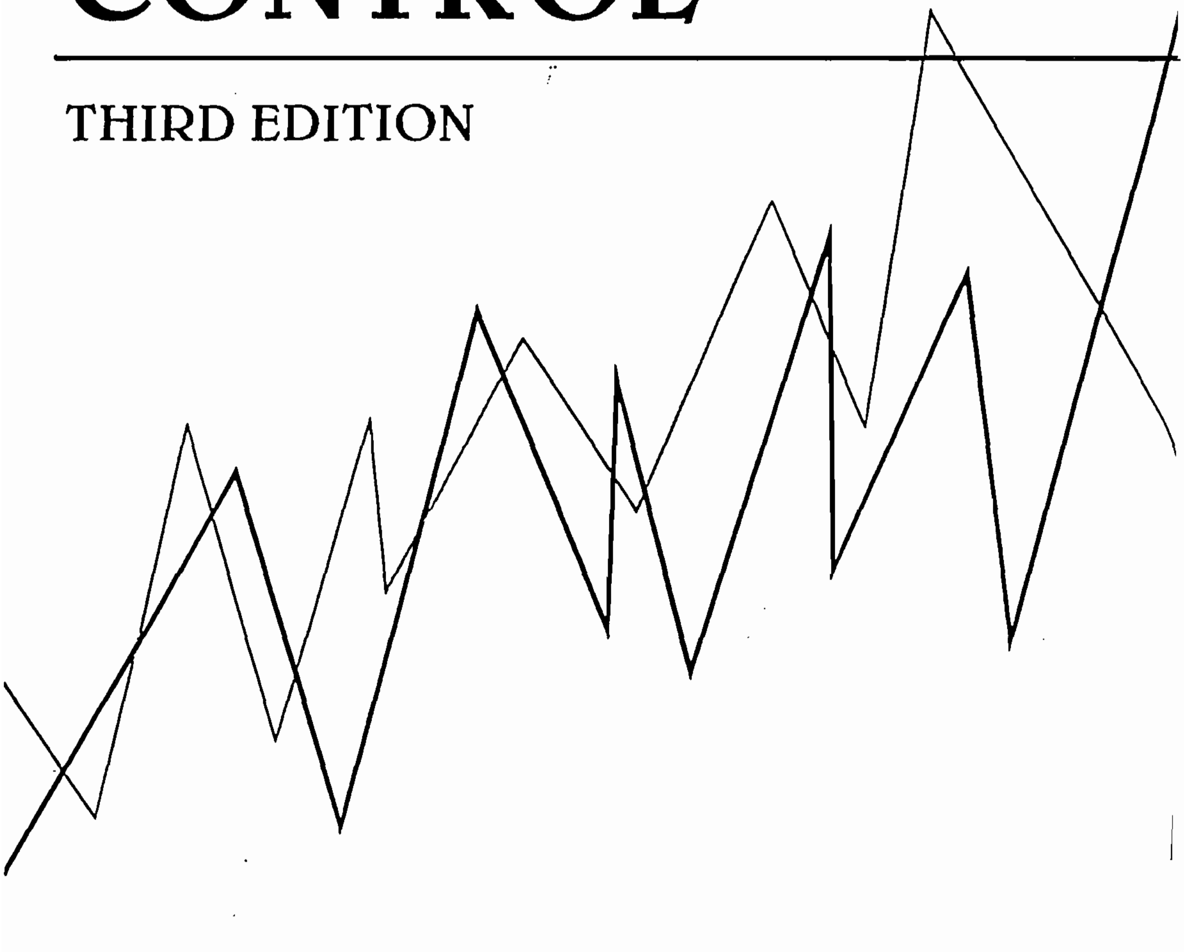
The spectrum shape for the pumps in the lower power range is approximately an average of the two solid curves shown in the upper and lower portions of Figure 4.14; the spectrum shape for pumps in the higher power range is represented by the dotted portion of the upper plot of Figure 4.14. Although the spectrum of a given pump probably will not have tonal components in all the bands between 250 and 2000 Hz the use of this spectrum shape will cover almost any pump having a peak level in any of these bands

Rev. 1984

HANDBOOK OF

ACOUSTICAL MEASUREMENTS AND NOISE CONTROL

THIRD EDITION



CYRIL M. HARRIS

Weighted Sound Reduction Index

Weighted sound reduction index R_w is a single-number rating calculated in accordance with ISO 717,[7] from measured values of sound reduction index (the ISO term equivalent to transmission loss). This is an international standard single-number rating for airborne sound calculated in a similar way to sound transmission class. The differences are as follows: the frequency range of the reference contour and for measurement[8] is 100 to 3150 Hz, and there is no 8-dB limitation in the fitting procedure. Sound transmission class (STC) and weighted sound reduction index R_w are usually about the same.

Weighted Normalized Impact Sound Pressure Level

Weighted normalized impact sound pressure level is a single-number rating derived, in accordance with ISO 717,[9] from normalized impact sound pressure levels measured in accordance with ISO 140 Part VI.[5] This is an international standard single-number rating for impact sound transmission that uses the same fitting procedure and contour as impact insulation class (IIC) with the exception that there is no 8-dB limitation in the fitting procedure. Laboratories are required, however, to report the maximum deficiency if it is greater than 8 dB. Instead of using an inverted right-hand axis like IIC, the rating is given by the reference contour level at 500 Hz. The weighted normalized impact sound pressure level decreases as the protection provided by the floor increases.

SOUND INSULATION OF A SINGLE-LEAF PARTITION

A single-leaf partition is a partition having both exposed faces rigidly connected so that they move as one. This type of partition includes all kinds of solid homogeneous panels (such as drywall, plywood, glass, solid concrete, and concrete blocks). A sandwich construction (such as a honeycomb panel) may act as a single-leaf panel if the core is rigid. The sound transmission loss of a single-leaf panel depends mainly on its mass per unit area, its stiffness, and on the intrinsic damping in the material or at the edges of the panel.

Mass Law

The *mass law* is a semiempirical expression that may be used to predict transmission loss for thin, homogeneous single-leaf panels. The mass law is written symbolically as

$$\mathrm{TL} = 20 \log_{10} (mf) - 48 \text{ dB} \tag{31.1a}$$

where TL = transmission loss, dB
m = surface mass, kg/m^2
f = frequency, Hz

In the U.S. Customary System of units

$$\mathrm{TL} = 20 \log_{10} (mf) - 34 \text{ dB} \tag{31.1b}$$

where m = mass per unit area, lb/ft^2

An increase in transmission loss is expected with increasing mass, because the heavier the panel, the less it vibrates in response to sound waves, hence the less sound energy it radiates on the other side. The mass law applies to thin panels of most common building materials at frequencies below the coincidence frequency, which is discussed in the next section.

The mass law predicts that transmission loss will increase by 6 dB for each doubling of the surface mass or the frequency. An increase in mass can be achieved either by increasing material thickness or by selecting denser material. The surface mass for 1-mm thicknesses of some common building materials is given in Table 31.1. Examples of mass-law behavior are given in Fig. 31.3.

TABLE 31.1 Surface Mass for 1-mm Thicknesses and Constant A (for Calculation of Critical Frequency f_c) for Some Common Building Materials

Material	Surface mass, kg/m² per mm thickness	Constant A, Hz · mm
Aluminum	2.7	12,900
Concrete, dense poured	2.3	18,700
Hollow concrete block	1.1	20,900
Fir timber	0.55	8,900
Glass	2.5	15,200
Lead	11.0	55,000
Plexiglas or Lucite	1.15	30,800
Steel	7.7	12,700
Drywall	0.8	39,000
Plywood	0.6	21,700

Stiffness and the Coincidence Dip

Generally, there is a range of frequencies in which the transmission loss of a partition is controlled by its stiffness and damping. The effect is most pronounced at a *critical frequency* at which the wavelength of free bending waves in the panel coincides with the wavelength of sound in air. The average transmission loss shows a characteristic *coincidence dip* at frequencies from just below the critical frequency to an octave or more above.

The sharpness of the coincidence dip is determined by panel homogeneity, sound energy losses in the material, and energy transfer to the supporting structure. The greater these losses, the shallower and broader the coincidence dip, and the less it affects the STC.

The *critical frequency* at which this dip occurs depends on the material's stiffness and its thickness: the stiffer or thicker the layer of material, the lower the frequency. The two curves for drywall and plywood [both about 10 kg/m² (2 lb/ft²)] in Fig. 31.3 have very similar transmission loss at low frequencies, increasing steadily, in good agreement with the mass law. The dip for the plywood occurs at a lower frequency than that for the drywall because the plywood is stiffer. Although they weigh the same, the plywood has a lower STC because of this dip.

The coincidence frequency for building materials listed in Table 31.1 can be calculated by dividing the applicable value of the constant A by the thickness in millimeters. For example, concrete has A = 18,700, so a layer of concrete 100 mm (4 in) thick has a coincidence frequency near 187 Hz.

ATTACHMENT 3 - 1

FDEP PSD PERMIT (AC53-214903 / PSD-FL-190) AND AMENDMENT

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

January 8, 1997

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Jeffrey J. Fassett
Senior Plant Engineer
DESTEC / Tiger Bay Limited Partnership
3219 State Road 630 West
Fort Meade, Florida 33841

Re: FINAL Permit Amendment No. 1050223-003-AC (PSD-FL-190)
Tiger Bay Cogen, Combined Cycle Unit

Dear Mr. Fassett:

The Department has reviewed DESTEC / Tiger Bay's October 23 letter requesting an amendment to its permit to extend the compliance date for achievement of the 15 parts per million nitrogen oxides (15 ppm NOx) emission limit. This request is acceptable and the permit is hereby amended as follows:

Specific Condition 15(a)

FROM: For this turbine, if the 15 (gas)/42 (oil) ppmvd, corrected to 15% O_2 emission rates cannot be met by 12/31/97, SCR or other control technology will be installed. Hence the permittee shall install a duct module suitable for future installation of SCR equipment.

TO: The NOx maximum emission limit of 97.2 pounds per hour (equivalent to 15 ppm @ 15% O_2) firing gas/326 pounds per hour (equivalent to 42 ppm @ 15% O_2) firing distillate fuel oil will be achieved not later than 12/31/98 using appropriate combustion technology improvements or SCR.

Table 1, Footnote B

FROM: The NOx maximum limit will be lowered to 97.2 (lbs/hr) equivalent to 15 ppmvd @ 15% O_2 not later than 12/31/97 using appropriate combustion technology improvements or SCR.

TO: The NOx maximum emission limit of 97.2 pounds per hour (equivalent to 15 ppm @ 15% O_2) will be achieved not later than 12/31/98 using appropriate combustion technology improvements or SCR.

A copy of this letter shall be filed with the referenced permit and shall become part of the permit.

Sincerely,

Howard L. Rhodes, Director
Division of Air Resources Management

HLR/aal/hh

Enclosures

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Printed on recycled paper.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF FINAL PERMIT AMENDMENT

In the Matter of an
Application for Permit Amendment

Mr. Jeffrey M. Keenan
DESTEC Energy, Inc.
Post Office Box 4411
Houston, Texas 77210-4411

DEP File No. 1050223-003-AC
PSD-FL-190

Enclosed is a letter that amends Permit Number PSD-FL-190. This letter amends Specific Condition No. 15(a) to extend the 15 ppm NOx compliance date from December 31, 1997 to December 31, 1998. This permit amendment is issued pursuant to Section 403, Florida Statutes.

Any party to this order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, F.S., by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Legal Office; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 14 (fourteen) days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

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

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF FINAL PERMIT AMENDMENT (including the FINAL permit amendment) was sent by certified mail (*) and copies were mailed by U.S. Mail before the close of business on 1-8-97 to the person(s) listed:

Mr. Jeffrey M. Keenan, DESTEC *
Mr. Jeffrey J. Fassett, DESTEC *
Mr. Brian Beals, EPA
Mr. John Bunyak, NPS
Mr. Bill Thomas, SWD
Mr. Roy Harwood, Polk County

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Kari Fober 1-8-97
(Clerk) (Date)

JAN 1 3 1997

FINAL DETERMINATION

DESTEC / Tiger Bay Cogen

Amendment of Permit No. 1050223-003-AC
Tiger Bay Cogen Combined Cycle Unit

An Intent to Issue an air construction permit amendment for DESTEC / Tiger Bay Limited Partnership, Tiger Bay Cogen Combined Cycle Unit located five miles west of Ft. Meade, Polk County was distributed on November 21, 1996. The Notice of Intent was published in the The Ledger of Lakeland, Polk County on December 2, 1996. Comments were not submitted in response to the public notice. DESTEC recommended a clarification in Specific Condition No. 15(a) as to the final NO_x limits while firing distillate fuel oil. It is consistent with limit of 42 ppm given elsewhere in the permit.

The final action of the Department will be to issue the permit amendment as proposed, except with the clarification cited by DESTEC.

FLORIDA

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

December 2, 1994

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

RECEIVED
DEC - 9 1994
ENVIRONMENTAL DEPT.

Mr. Robert S. Chatham
Senior Environmental Engineer
Destec Energy, Inc.
Post Office Box 4411
Houston, Texas 77210-4411

RE: Amendment to Construction Permit
NSPS Custom Fuel Monitoring Schedule
Tiger Bay Limited Partnership
Tiger Bay Cogeneration Facility
AC 53-214903 [PSD-FL-190(A)]

Dear Mr. Chatham:

The Department has reviewed your August 3, 1994 request, with supporting data and additional data submitted on September 9 and 22, 1994, for an NSPS Custom Fuel Monitoring Schedule. The schedule would only apply to a monitoring schedule for sulfur dioxide (SO_2) and nitrogen oxide (NO_x) when natural gas is being fired at the subject facility (refer to Attachment No. 1). The facility is required by the permit to comply with Subpart GG of the New Source Performance Standards (NSPS), 40 CFR 60. For sources utilizing pipeline quality natural gas, 40 CFR 60.334(b) and 40 CFR 60.334(b)(2) state that a custom fuel monitoring schedule, if supported by data which demonstrates compliance with NSPS emission limits, may be approved by the Administrator of EPA. This authority has been delegated to EPA's regional offices and a copy of the subject request was jointly submitted to EPA Region IV for a determination. The Department, received a letter from EPA on October 12, 1994, stating that a custom fuel monitoring schedule for this facility was acceptable, if it complied with all items of the attachment to the custom fuel monitoring guidance memo issued by EPA Headquarters on August 14, 1987 (Refer to Attachment No. 2). The results from a minimum of three sampling events for six consecutive months were provided by the permittee, which demonstrated consistent compliance with the allowable sulfur dioxide emissions limits specified under 40 CFR 60.333 and this permit. Therefore, upon issuance of the amended permit, the permittee shall begin monitoring the sulfur content of natural gas as specified in 2.b. of the Custom Fuel Monitoring Schedule for Natural Gas. In accordance with the EPA determination, the permit Specific Conditions will be amended as follows:

I. <u>Specific Condition Number;</u>

18. <u>From</u>

Sulfur and nitrogen content and lower heating value of the fuel being fired in the combustion turbines shall be determined as specified in 40 CFR 60.334(b). Any request for a future custom monitoring schedule shall be made in writing and directed to the Southwest District office. Any custom schedule approved by DEP pursuant to 40 CFR 60.334(b) will be recognized as enforceable provisions of the permit, provided that the holder of this permit demonstrates that the provisions of the schedule will be adequate to assure continuous compliance. The records of distillate fuel oil usage shall be kept by the company for a two-year period for regulatory agency inspection purposes. For sulfur dioxide, periods of excess emissions shall be reported if the fuel being fired in the gas turbine exceeds 0.05 percent sulfur by weight.

<u>To</u>

This source shall be in compliance with all requirements of 40 CFR 60, Subpart GG (Standards of Performance for Stationary Gas Turbines), 40 CFR 60, Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units), and Rule 62-296.800(2)(a), F.A.C. (Standards of Performance for New Stationary Sources (NSPS)).

A. <u>Natural Gas</u>

Pursuant to 40 CFR 60.334(b)(2), a custom fuel monitoring schedule shall be followed for the natural gas fired at this facility and shall be as follows:

<u>Custom Fuel Monitoring Schedule for Natural Gas</u> (NG)

1. Monitoring of fuel nitrogen content shall not be required when NG is the only fuel being fired in the turbines.

2. Sulfur Monitoring

a. Analysis for fuel sulfur content of the NG fired at this facility shall be conducted using one of the approved ASTM reference methods for the measurement of sulfur in gaseous fuels, or an approved alternative method. The reference methods are ASTM D1072-80, ASTM D3031-81, ASTM D3246-81, and ASTM D4084-82, as referenced in 40 CFR 60.335(b)(2).

b. This custom fuel monitoring schedule shall become effective on the date this permit is amended. Effective the date of this custom schedule, sulfur monitoring of NG fired at the facility shall be conducted twice monthly for six months. If this monitoring shows little variability in the fuel sulfur content and indicates consistent compliance with 40 CFR 60.333, then sulfur monitoring shall be conducted once per quarter for six quarters.

c. If, after the monitoring required in item 2(b) above, or herein, the sulfur content of the NG fuel shows little variability and, calculated as sulfur dioxide, represents consistent compliance with the sulfur dioxide emission limits specified under 40 CFR 60.333 and in this permit, sample analysis shall be conducted twice per annum. This monitoring shall be conducted during the first and third quarters of each calendar year.

d. Should any sulfur analysis, as required in items 2(b) or 2(c), above, indicate noncompliance with 40 CFR 60.333 or this permit, the owner or operator shall notify the Department of such excess emissions and the custom schedule shall be re-examined by the Environmental Protection Agency. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

3. If there is a change in fuel supply, the owner or operator must notify the Department of such change for re-examination of this custom schedule. A substantial change in fuel quality shall be considered as a change in fuel supply. Sulfur monitoring shall be conducted weekly during the interim period when this custom schedule is being re-examined.

4. Records of sample analysis and fuel supply pertinent to this custom fuel monitoring schedule for NG shall be retained for a period of five years, and be available for inspection by personnel of federal, state, and local air pollution control agencies.

B. <u>Distillate Fuel Oil</u>

The records of distillate fuel oil usage shall be kept by the company for a five-year period for regulatory agency inspection purposes. For sulfur dioxide, periods of excess emissions shall be reported if the distillate fuel oil being fired in the gas turbine exceeds 0.05 percent sulfur content, by weight.

II. <u>Attachments to be Incorporated;</u>

- **Destec letter received September 12, 1994.**
- **FDEP letter dated August 18, 1994.**
- **U.S. EPA letter received October 12, 1994.**

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes (F.S.). The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the applicant of the amendment request/application and the parties listed below must be filed within 14 days of receipt of this amendment. Petitions filed by other persons must be filed within 14 days of the amendment issuance or within 14 days of their receipt of this amendment, whichever occurs first. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, F.S.

The Petition shall contain the following information:

(a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
(d) A statement of the material facts disputed by Petitioner, if any;
(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and,
(g) A statement of the relief sought by petitioner, stating precisely the action the petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this amendment. Persons whose substantial interests will be affected by any decision of the Department with regard to the amendment request/application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this amendment in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, Florida Administrative Code.

This letter amendment must be attached to Construction Permit, No. AC 53-214903 [PSD-FL-190(A)], and shall become part of the permit.

Sincerely,

Howard L. Rhodes

Howard L. Rhodes
Director
Division of Air Resources
Management

HLR/cl/b

Attachments

cc: G. Kissel, SWD
J. Harper, EPA
J. Bunyak, NPS
K. Kosky, KBN

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this AMENDMENT and all copies were mailed by certified mail before the close of business on 12/6/94 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to 120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Barbara J. Boutwell 12/6/94
Clerk Date

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

In the matter of an
Application for Permits by:

Mr. Robert I. Taylor, Project Manager
Central Florida Power, L.P.
2500 City West Blvd., Suite 150
Houston, Texas 77042

DER File No. AC53-214903
PSD-FL-190
Polk County

_______________________________________/

Enclosed is Permit Number AC 53-214903 for Central Florida Power, L.P. to consruct a 258 MW cogeneration facility in Ft. Meade, Polk County, Florida. This permit is issued pursuant to Section(s) 403, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 5-17-93 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT FILED, on this date, pursuant to §120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

_________ (Clerk)   5-17-93 (Date)

Copies furnished to:

B. Thomas, SW District
K. Kosky, P.E., KBN
J. Harper, EPA
J. Bunyak, NPS
L. Novak, Polk County

Final Determination

Central Florida Power, Limited Partnership
Ft. Meade, Polk County, Florida

258 MW Cogeneration Facility

Permit Number: AC53-214903
PSD-FL-190

Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

May 6, 1993

Final Determination

The Technical Evaluation and Preliminary Determination for the permit to construct a 258 cogeneration facility at Central Florida Power, Limited Partnership (CFPLP), in Ft. Meade, Polk County, Florida, was distributed on January 15, 1993. The Notice of Intent to Issue was published in The Polk County Democrat on February 4, 1993. Copies of the evaluation were available for public inspection at the Department's offices in Tampa and Tallahassee.

CFPLP's application for a permit to construct a 258 MW cogeneration facility has been reviewed by the Bureau of Air Regulation in Tallahassee. No adverse comments were submitted by the U.S. Environmental Protection Agency (EPA) in their letter dated February 16, 1993, or by the U.S. Department of the Interior (Fish and Wildlife Services) in their letter of February 5, 1993.

Comments regarding the Technical Evaluation and Preliminary Determination (Sypnosis of Application) and Permit Specific Conditions were submitted by Kennard F. Kosky, P.E., President of KBN Engineering and Applied Sciences, Inc. The Bureau has considered Mr. Kosky's comments and agreed to the changes proposed in the wording and adjustment of numerical limits to reflect manufacturer's specifications since these changes will not affect the potential emissions considered during the evaluation of this project. The amendments to the Specific Conditions of the permit are as follows:

RESPONSE TO COMMENTS NOS. 1, 2, 3, 4, AND 5

These changes will be incorporated in Table 1.

RESPONSE TO COMMENTS NOS. 5 AND 6

The table on page 9 of the BACT determination and Table 1 of the permit (Specific Condition No. 1) will be amended to reflect these comments.

BACT DETERMINATION BY DER (PAGE 8)

This paragraph will be added to the NO_x control section: For this turbine, an even lower NO_x emission level than 15 (gas)/42 (oil) ppmvd, corrected to 15% O_2, may become a condition of this permit pursuant to F.A.C. Rule 17-4.080, Modification of Permit Conditions.

RESPONSE TO ITEM NO. 2 ON KBN'S LETTER OF JANUARY 30, 1993

Information given to DER and to the U.S. Department of Interior (Fish and Wildlife Services) indicates that General Electric's goal is to attempt a NO_x level of 9 ppmvd when firing natural gas.

IN RESPONSE TO THE U.S. DEPARTMENT OF INTERIOR, SPECIFIC CONDITION NO. 15 WILL BE CHANGED AS FOLLOWS:

FROM: The permittee shall leave sufficient space in the heat recovery steam generator suitable for future installation of SCR equipment should the facility be unable to meet the NO_x standards, if required.

TO: The permittee shall comply with the following by 12/31/97:

a) For this turbine, if the 15 (gas)/42 (oil) ppmv emission rates cannot be met by 12/31/97, SCR or other control technology will be installed. Hence, the permittee shall install a duct module suitable for future installation of SCR equipment.

IN RESPONSE TO THE MARCH 11, 1993, LETTER FROM KENNARD F. KOSKY, KBN

The Department has determined the following:

Mandating SCR: The Department is giving the permittee the flexibility to incorporate any design feature to meet the 15 (gas) ppmvd at 15% O_2 NO_x emission limit. SCR or other control technology shall be installed if the 15 (gas) ppmvd cannot be met by 12/31/97.

Lowering the permit/BACT limit for NO_x: The Department may revise the permitted emission level for NO_x. For this turbine, an even lower NO_x emission level than 15 (gas)/42 (oil) ppmvd, corrected to 15% O_2, may become a condition of this permit, pursuant to F.A.C. Rule 17-4.080, Modification of Permit Conditions.

SPECIFIC CONDITION NO. 14 WILL BE MODIFIED AS FOLLOWS. THE PARAGRAPH IN BOLD WAS INADVERTENTLY OMITTED IN THE DRAFT PERMIT

Specific Condition No. 14: Test results will be the average of 3 valid runs. The Southwest District office will be notified at least 30 days in writing in advance of the compliance test(s). The sources, combustion turbine and duct burner, shall operate between 95% to 100% of the maximum capacity for the ambient conditions experienced during compliance test(s). **The turbine manufacturer's capacity vs temperature (ambient) curve shall be included with the compliance test results.** Compliance test results shall be submitted to the Southwest District office no later than 45 days after completion.

The final action of the Department will be to issue construction permit **AC**53-214903 (PSD-FL-190) with the changes noted above.

Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

PERMITTEE:
Central Florida Power, L.P.
2500 City West Blvd., Ste. 150
Houston, Texas 77042

Permit Number: AC53-214903
PSD-FL-190
Expiration Date: January 1, 1996
County: Polk
Latitude/Longitude: 27°44'46.7"N
81°51'0.3"W
Project: A 258 MW Cogeneration Facility

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-210, 212, 275, 296, 297 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

Central Florida Power, Limited Partnership, proposes to operate a 258 MW cogeneration facility consisting of one combustion turbine generator, one steam turbine generator, one duct burner-fired heat recovery steam generator and ancillary equipment. This facility is located near Ft. Meade, Polk County, Florida. The UTM coordinates are Zone 17, 416.22 km East and 3069.22 km North.

The sources shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Central Florida Power, Limited Partnership's (CFPLP) application received on June 15, 1992.
2. Department's letters dated July 14 and October 9, 1992.
3. CFPLP's letters received on August 26, October 9, and October 23, 1992.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

a. Have access to and copy any records that must be kept under the conditions of the permit;

b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

GENERAL CONDITIONS:

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

(x) Determination of Best Available Control Technology (BACT)
(x) Determination of Prevention of Significant Deterioration (PSD)
(x) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;

GENERAL CONDITIONS:

- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

Emission Limits

1. The maximum allowable emissions from this source shall not exceed the emission rates listed in Table 1.

2. Visible emissions for full load operation shall not exceed 10% opacity when firing natural gas and 20% opacity when firing distillate fuel oil.

Operating Rates

3. This source is allowed to operate continuously (8,760 hours per year).

4. This source is allowed to use natural gas as the primary fuel for 8,760 hours per year and low sulfur distillate fuel oil (0.05% S) as the secondary fuel up to 3,742,327 gallons per calendar year.

5. The permitted materials and utilization rates for the combined cycle gas turbine system shall be as stated in the application. The operating parameters include, but are not limited to:

184 MW Combustion Turbine

a) The maximum heat input of 1,849.9 MMBtu/hr (LHV) at 27°F and at base load for distillate fuel oil.

b) The maximum heat input of 1,614.8 MMBtu/hr (LHV) at 27°F and at base load for natural gas.

SPECIFIC CONDITIONS:

Duct Burner

c) The maximum heat input of 100 MMBtu/hr (HHV) of natural gas.

6. Any change in the method of operation, equipment or operating hours pursuant to Rule 17-212.200, F.A.C., Definitions-Modifications, shall be submitted to DER's Bureau of Air Regulation and Southwest District offices.

7. Any other operating parameters established during compliance testing and/or inspection that will ensure the proper operation of this facility shall be included in the operating permit.

Compliance Determination

8. Compliance with the NO_x, SO_2, CO, PM, PM_{10}, and VOC standards shall be determined (while operating at 95-100% of the permitted maximum heat rate input corresponding to the particular ambient conditions) within 180 days of initial operation of the maximum capability of the unit and annually thereafter, by the following reference methods as described in 40 CFR 60, Appendix A (July, 1992 version) and adopted by reference in F.A.C. Rule 17-297.

- Method 1 Sample and Velocity Traverses for Stationary Sources
- Method 2 Determination of Stack Gas Velocity and Volumetric Flow Rate
- Method 3 Gas Analysis
- Method 5 Determination of Particulate Emissions from Stationary Sources
  or
  Method 17 Determination of Particulate Emissions from Stationary Sources
- Method 18 Measurement of Gaseous Organic Compound Emissions by Gas Chromatography
- Method 9 Visual Determination of the Opacity of Emissions from Stationary Sources
- Method 8 Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources
- Method 10 Determination of Carbon Monoxide Emission from Stationary Sources
- Method 20 Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines
- Method 25A Determination of Total Gaseous Organic Concentrations Using a Flame Ionization Analyzer

SPECIFIC CONDITIONS:

- Method 201A and Method 202: Determination of PM_{10} Emissions from Stationary Sources and Determination of Condensible Particulate Emissions from Stationary Sources

Other DER approved methods may be used for compliance testing after prior Departmental approval.

9. Method 5 or Method 17 or Method 201A and Method 202 must be performed to determine the initial compliance status of particulate matter emissions of the unit. Thereafter, the opacity emissions test, Method 9, may be used unless the applicable opacity is exceeded. Also, the ambient particulate matter entering the gas turbine can be subtracted from the total particulate matter emissions if that quantity can be measured at the inlet of the gas turbine.

10. Compliance with the SO_2 and sulfuric acid mist emission limit can also be determined by calculations based on fuel analysis using ASTM D4294 for the sulfur content of liquid fuels and ASTM D3246-81 for sulfur content of gaseous fuel.

11. Trace elements of Beryllium (Be) shall be tested during initial compliance test using EMTIC Interim Test Method. As an alternative, Method 104 may be used; or Be may be determined from fuel sample analysis using either Method 7090 or 7091, and sample extraction using Method 3040 as described in the EPA solid waste regulations SW 846.

12. Mercury (Hg) shall be tested during initial compliance test using EPA Method 101 (40 CFR 61, Appendix B) or fuel sampling analysis using methods acceptable to the Department.

13. During performance tests, to determine compliance with the NO_x standard, measured NO_x emissions at 15 percent oxygen will be adjusted to ISO ambient atmospheric conditions by the following correction factor:

$$NO_x = (NO_{x\ obs}) \left(\frac{P_{ref}}{P_{obs}}\right)^{0.5} e^{19}\ (H_{obs} - 0.00633) \left(\frac{288°K}{T_{AMB}}\right)^{1.53}$$

where:

SPECIFIC CONDITIONS:

NO_x = Emissions of NO_x at 15 percent oxygen and ISO standard ambient conditions.

$NO_{x\ obs}$ = Measured NO_x emission at 15 percent oxygen, ppmv.

P_{ref} = Reference combustor inlet absolute pressure at 101.3 kilopascals (1 atmosphere) ambient pressure.

P_{obs} = Measured combustor inlet absolute pressure at test ambient pressure.

H_{obs} = Specific humidity of ambient air at test.

e = Transcendental constant (2.718).

T_{AMB} = Temperature of ambient air at test.

14. Test results will be the average of 3 valid runs. The Southwest District office will be notified at least 30 days in writing in advance of the compliance test(s). The sources, combustion turbine and duct burner, shall operate between 95% and 100% of maximum capacity for the ambient conditions experienced during compliance test(s). The turbine manufacturer's capacity vs temperature (ambient) curve shall be included with the compliance test results. Compliance test results shall be submitted to the Southwest District office no later than 45 days after completion.

15. The permittee shall comply with the following by 12/31/97:

a) For this turbine, if the 15 (gas)/42 (oil) ppmvd, corrected to 15% O_2 emission rates cannot be met by 12/31/97, SCR or other control technology will be installed. Hence, the permittee shall install a duct module suitable for future installation of SCR equipment.

16. The permittee shall install, calibrate, maintain, and operate a continuous emission monitor in the stack to measure and record the nitrogen oxides emissions from this source. The continuous emission monitor must comply with 40 CFR 60, Appendix B, Performance Specification 2 (July 1, 1992).

17. A continuous monitoring system shall be installed to monitor and record the fuel consumption on the CT and duct burner. While water/steam injection is being utilized for NO_x control, the water/steam to fuel ratio at which compliance is achieved shall be incorporated into the permit and shall be continuously monitored. The system shall meet the requirements of 40 CFR Part 60, Subpart GG.

SPECIFIC CONDITIONS:

18. Sulfur and nitrogen content and lower heating value of the fuel being fired in the combustion turbines shall be determined as specified in 40 CFR 60.334(b). Any request for a future custom monitoring schedule shall be made in writing and directed to the Southwest District office. Any custom schedule approved by DER pursuant to 40 CFR 60.334(b) will be recognized as enforceable provisions of the permit, provided that the holder of this permit demonstrates that the provisions of the schedule will be adequate to assure continuous compliance. The records of distillate fuel oil usage shall be kept by the company for a two-year period for regulatory agency inspection purposes. For sulfur dioxide, periods of excess emissions shall be reported if the fuel being fired in the gas turbine exceeds 0.05 percent sulfur by weight.

Rule Requirements

19. This source shall comply with all applicable provisions of Chapter 403, Florida Statutes, Chapters 17-210, 212, 275, 296, 297 and 17-4, Florida Administrative Code and 40 CFR 60 (July, 1992 version).

20. The sources shall comply with all requirements of 40 CFR 60, Subpart GG and Subpart Dc, and F.A.C. Rule 17-296.800,(2)(a), Standards of Performance for Stationary Gas Turbines and Standards of Performance for Industrial, Commercial, and Institutional Steam Generating Units.

21. Issuance of this permit does not relieve the facility owner or operator from compliance with any applicable federal, state, or local permitting requirements and regulations (F.A.C. Rule 17-210.300(1)).

22. This source shall be in compliance with all applicable provisions of F.A.C. Rules 17-210.650: Circumvention; 17-210.700: Excess Emissions; 17-296.800: Standards of Performance for New Stationary Sources (NSPS); 17-297: Stationary Sources-Emissions Monitoring; and, 17-4.130: Plant Operation-Problems.

23. If construction does not commence within 18 months of issuance of this permit, then the permittee shall obtain from the Department a review and, if necessary, a modification of the control technology and allowable emissions for the unit(s) on which contruction has not commenced (40 CFR 52.21(r)(2)).

24. Quarterly excess emission reports, in accordance with the July 1, 1992 version of 40 CFR 60.7 and 60.334 shall be submitted to the Department's Southwest District office.

SPECIFIC CONDITIONS:

25. Fugitive dust emissions, during the construction period, shall be minimized by covering or watering dust generation areas.

26. Pursuant to F.A.C. Rule 17-210.300(2), Air Operating Permits, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: sulfur content and the lower heating value of the fuel being fired, fuel usage, hours of operation, air emissions limits, etc. Annual reports shall be sent to the Department's Southwest District office by March 1 of each calendar year.

27. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

28. An application for an operation permit must be submitted to the Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this 17th day
of May, 1993

**STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION**

Virginia B. Wetherell

Virginia B. Wetherell
Secretary

CENTRAL FLORIDA POWER, L.P. - AC53-214903 (PSD-FL-190)
258 MW COMBINED CYCLE GAS TURBINE

Table 1 - Allowable Emission Rates

Pollutant	Fuel[A]	Allowable Emission[C] Standard/Limitation	Basis
NO_x (CT)	Gas	15 ppmvd @ 15% O_2 (97.2 lbs/hr; 425.7 TPY)[B]	BACT
	Gas	25 ppmvd @ 15% O_2 (161.9 lbs/hr; 709.1 TPY)	BACT
	Oil	42 ppmvd @ 15% O_2 (326 lbs/hr; 48.9 TPY)	BACT
NO_x (DB)	Gas	0.1 lbs/MMBtu (10 lbs/hr, 43.8 TPY)	BACT
CO (CT)	Gas	15 ppmvd (48.8 lbs/hr; 213.7 TPY)[D]	BACT
	Oil	30 ppmvd (98.4 lbs/hr; 14.8 TPY)	BACT
CO (DB)	Gas	10 lbs/hr; 43.8 TPY	BACT
VOC (CT)	Gas	2.8 lbs/hr; 12.3 TPY	BACT
	Oil	7.5 lbs/hr; 1.1 TPY	BACT
VOC (DB)	Gas	2.9 lbs/hr; 12.7 TPY	BACT
PM_{10} (CT)	Gas	9 lbs/hr; 39.4 TPY	BACT
	Oil	17 lbs/hr; 2.6 TPY	BACT
PM_{10} (DB)	Gas	0.0100 lbs/MMBtu	BACT
SO_2 (CT)	Gas	4.86 lbs/hr; 21.3 TPY	Appl.
	Oil	99.7 lbs/hr; 15.0 TPY	Appl.
SO_2 (DB)	Gas	0.3 lbs/hr; 1.32 TPY	Appl.
H_2SO_4 (CT)	Gas	5.95×10^{-1} lbs/hr; 2.6 TPY	Appl.
	Oil	1.22 lbs/hr; 0.183 TPY	Appl.
H_2SO_4 (DB)	Gas	3.7×10^{-2} lbs/hr; 1.61×10^{-1} TPY	Appl.
Opacity	Gas	10% opacity[D]	BACT
	Oil	20% opacity[D]	BACT
Hg	Oil	3.0×10^{-6} lbs/MMBtu (5.55×10^{-3} lbs/hr; 8.32×10^{-4} TPY)	Appl.
As	Oil	4.2×10^{-6} lbs/MMBtu (7.77×10^{-3} lbs/hr; 1.17×10^{-3} TPY)	BACT
Be	Oil	2.5×10^{-6} lbs/MMBtu (4.62×10^{-3} lbs/hr; 6.94×10^{-4} TPY)	BACT
Pb	Oil	8.9×10^{-6} lbs/MMBtu (1.65×10^{-2} lbs/hr; 2.47×10^{-3} TPY)	Appl.

A) Fuel: <u>Natural Gas</u>: Emissions are based on 8760 hours per year operating time.
Fuel: <u>Distillate Fuel Oil (0.05% S)</u>: Emissions are based on fuel usage equivalent to 300 hours per year at maximum capacity (i.e., 3,742,327 gallons per year).
B) The NO_x maximum limit will be lowered to 97.2 (lbs/hr) equivalent to 15 ppmvd @ 15% O_2 not later than 12/31/97 using appropriate combustion technology improvements or SCR.
C) Emission rates are based on 27°F at base load.
D) At full load conditions.

Best Available Control Technology (BACT) Determination
Central Florida Power, L.P.
Polk County
PSD-FL-190

The applicant proposes to construct a cogeneration facility near Ft. Meade, Polk County. This generator system will consist of a 184 MW General Electric PG7221FA combustion turbine generator (CT), equipped with a duct burner-fired heat recovery steam generator (HRSG), which will be used to power a nominal 74 MW steam turbine generator (ST).

The applicant has requested to burn natural gas for 8760 hours per year and distillate fuel oil, with a 0.05 percent sulfur content for a maximum 3,742,327 gallons per year. The applicant has indicated the maximum annual tonnage of regulated air pollutants emitted from the facility at base load, 27°F and type of fuel fired to be as follows:

Pollutant	Emissions (TPY) Gas PG7221FA (8460 hrs)	Gas Duct Burner (8760 hrs)	Oil PG7221FA (300 hrs)	Total	PSD Significant Emission Rate (TPY)
NO_x	684.7	43.8	48.9	777.4	40
SO_2	20.5	1.3	15	36.8	40
PM/PM_{10}	38.1	4.4	2.6	45.1	25/15
CO	206.5	43.8	14.8	265.1	100
VOC	11.80	12.7	1.1	25.6	40
H_2SO_4	2.5	0.16	1.9	4.5	7
Be	nil	nil	6.94×10^{-4}	6.94×10^{-4}	0.0004
Hg	nil	nil	8.32×10^{-4}	8.32×10^{-4}	0.1
Pb	nil	nil	2.47×10^{-4}	2.47×10^{-4}	0.6
As	nil	nil	1.17×10^{-3}	1.17×10^{-3}	0

Florida Administrative Code (F.A.C.) Rule 17-212.400(2) (f) (3) requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in the previous table.

Date of Receipt of a BACT Application

June 15, 1992

BACT Determination Requested by the Applicant

Pollutant	Proposed Limits
NO_x	25 ppmvd @ 15% O_2 (natural gas burning) 42 ppmvd @ 15% O_2 (for oil firing) Control Technology: Dry Low-NO_x Burners when firing natural gas and steam/water injection when firing distillate oil
SO_2	0.05% sulfur by weight (fuel oil firing)
CO, VOC	Combustion Control
PM/PM_{10}	Combustion Control

BACT Determination Procedure

In accordance with Florida Administrative Code Chapter 17-212, this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination the Department shall give consideration to:

(a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).

(b) All scientific, engineering, and technical material and other information available to the Department.

(c) The emission limiting standards or BACT determinations of any other state.

(d) The social and economic impact of the application of such technology.

The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine for the emission source in question the most stringent control available for a similar or identical source or source category. If it is shown that this level of control is technically or economically infeasible for the source in question, than the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

The air pollutant emissions from combined cycle power plants can be grouped into categories based upon what control equipment and techniques are available to control emissions from these facilities. Using this approach, the emissions can be classified as follows:

- o Combustion Products (e.g., particulates). Controlled generally by good combustion of clean fuels.
- o Products of Incomplete Combustion (e.g., CO). Control is largely achieved by proper combustion techniques.
- o Acid Gases (e.g., NO_x). Controlled generally by gaseous control devices.

Grouping the pollutants in this manner facilitates the BACT analysis because it enables the equipment available to control the type or group of pollutants emitted and the corresponding energy, economic, and environmental impacts to be examined on a common basis. Although all of the pollutants addressed in the BACT analysis may be subject to a specific emission limiting standard as a result of PSD review, the control of "nonregulated" air pollutants is considered in imposing a more stringent BACT limit on a "regulated" pollutant (i.e., particulates, sulfur dioxide, fluorides, sulfuric acid mist, etc,), if a reduction in "nonregulated" air pollutants can be directly attributed to the control device selected as BACT for the abatement of the "regulated" pollutants.

BACT POLLUTANT ANALYSIS

COMBUSTION PRODUCTS

Particulate Matter (PM/PM_{10})

The design of this system ensures that particulate emissions will be minimized by combustion control and the use of clean fuels. The particulate emissions from the combustion turbine when burning natural gas and fuel oil will not exceed 9 lbs/hr and 17 lbs/hr, respectively. The Department accepts the applicant's proposed control for particulate matter and heavy metals.

Lead, Mercury, Beryllium, Arsenic (Pb, Hg, Be, As)

The Department agrees with the applicant's rationale that there are no feasible methods to control lead, mercury, arsenic, and beryllium; except by limiting the inherent quality of the fuel.

Although the emissions of these toxic pollutants could be controlled by particulate control devices, such as a baghouse or scrubber, the amount of emission reductions would not warrant the added expense. As this is the case, the Department does not believe that the BACT determination for PM would be affected by the emissions of these pollutants.

PRODUCTS OF INCOMPLETE COMBUSTION

Carbon Monoxide (CO)

The emissions of carbon monoxide exceed the PSD significant emission rate of 100 TPY. The applicant has indicated that the carbon monoxide emissions from the proposed combined cycle turbine is on exhaust concentrations of 15 ppmv for natural gas firing and 30 ppmv for fuel oil firing.

The majority of BACT emissions limitations have been based on combustion controls for carbon monoxide and volatile organic compounds minimization, additional control is achievable through the use of catalytic oxidation. Catalytic oxidation is a postcombustion control that has been employed in CO nonattainment areas where regulations have required CO emission levels to be less than those associated with wet injection. These installations have been required to use LAER technology and typically have CO limits in the 10-ppm range (corrected to dry conditions).

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst such as platinum. Combustion of CO starts at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required. For CT/HRSG combinations, the oxidation catalyst can be located directly after the CT or in the HRSG. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency.

Due to the oxidation of sulfur compounds and excessive formation of H_2SO_4 mist emissions, oxidation catalyst are not considered to be technically feasible for gas turbines fired with fuel oil.

Catalytic oxidation has not been demonstrated on a continuous basis when using fuel oil.

Use of oxidation catalyst technology would be technically feasible for this natural gas-fired unit; however, the cost of $10,000 per ton for the PG7221FA of CO removed will have an adverse economic impact on this project.

The Department is in agreement with the applicant's proposal of combustor design and good operating practices as BACT for CO for this cogeneration project.

ACID GASES

Nitrogen Oxides (NO_x)

The emissions of nitrogen oxides represent a significant proportion of the total emissions generated by this project, and need to be controlled if deemed appropriate. As such, the applicant presented an extensive analysis of the different available technologies for NO_x control.

The applicant has stated that BACT for nitrogen oxides will be met by using water/steam injection (when firing distillate fuel oil) and advanced combustor design to limit emissions to 25 ppmvd (corrected to 15% O_2) when burning natural gas and 42 ppmvd (corrected to 15% O_2) when burning fuel oil.

A review of the EPA's BACT/LAER Clearinghouse indicates that the lowest NO_x emission limit established to date for a combustion turbine is 4.5 ppmvd at 15% oxygen. This level of control was accomplished through the use of water injection and a selective catalytic reduction (SCR) system.

Selective catalytic reduction is a post-combustion method for control of NO_x emissions. The SCR process combines vaporized ammonia with NO_x in the presence of a catalyst to form nitrogen and water. The vaporized ammonia is injected into the exhaust gases prior to passage through the catalyst bed. The SCR process can achieve up to 90% reduction of NO_x with a new catalyst. As the catalyst ages, the maximum NO_x reduction will decrease to approximately 86 percent.

The effect of exhaust gas temperature on NO_x reduction depends on the specific catalyst formulation and reactor design. Generally, SCR units can be designed to achieve effective NO_x control over a 100-300°F operating window within the bounds of 450-800°F, although recently developed zeolite-based catalysts are claimed to be capable of operating at temperatures as high as 950°.

Most commercial SCR systems operate over a temperature range of about 600-750°F. At levels above and below this window, the specific catalyst formulation will not be effective and NO_x reduction will decrease. Operating at high temperatures can permanently damage the catalyst through sintering of surfaces.

Increased water vapor content in the exhaust gas (as would result from water or steam injection in the gas turbine combustor) can shift the operating temperature window of the SCR reactor to slightly higher levels.

Although technically feasible, the applicant has rejected using SCR on the combined cycle because of economic, energy, and environmental impacts. The applicant has identified the following limitations:

a) Reduced power output.
b) Emissions of unreacted ammonia (slip).
c) Disposal of hazardous waste generated (spent catalyst).
d) Ammonium bisulfate and ammonium sulfate particulate emissions (ammonium salts) due to the reaction of NH_3 with SO_3 present in the exhaust gases.
e) The energy impacts of SCR will reduce potential electrical power generation of more than 7 million kwh per year.
f) Incremental cost effectiveness for the application of SCR technology to the Central Florida Power project was considered to be $7,400 per ton of NO_x removed.

Since SCR has been determined to be BACT for several combined cycle facilities, the EPA has clearly stated that there must be unique circumstances to consider the rejection of such control on the basis of economics.

In a recent letter from EPA Region IV to the Department regarding the permitting of a combined cycle facility (Tropicana Products, Inc.), the following statement was made:

> "In order to reject a control option on the basis of economic considerations, the applicant must show why the costs associated with the control are significantly higher for this specific project than for other similar projects that have installed this control system or in general for controlling the pollutant."

For fuel oil firing, the cost associated with controlling NO_x emissions must take into account the potential operating problems that can occur with using SCR in the oil firing mode.

A concern associated with the use of SCR on combined cycle projects is the formation of ammonium bisulfate. For the SCR process, ammonium bisulfate can be formed due to the reaction of sulfur in the fuel and the ammonia injected. The ammonium bisulfate formed has a tendency to plug the tubes of the heat recovery steam generator leading to operational problems. As this is the case, SCR has been judged to be technically infeasible for oil firing in some previous BACT determinations.

The latest information available now indicates that SCR can be used for oil firing provided that adjustments are made in the ammonia to NO_x injection ratio. For natural gas firing operation, NO_x emissions can be controlled with up to a 90 percent efficiency using a 1 to 1 or greater ammonia injection ratio. By lowering the injection ratio for oil firing, testing has indicated that NO_x can be controlled with efficiencies ranging from 60 to 80 percent. When the injection ratio is lowered there is not a problem with ammonium bisulfate formation since essentially all of the ammonia is able to react with the nitrogen oxides present in the combustion gases. Based on this strategy SCR has been both proposed and established as BACT for oil fired combined cycle facilities with NO_x emission limits ranging from 11.7 to 25 ppmvd depending on the efficiency of control established.

The applicant has indicated that the total levelized annual operating cost to install SCR for this project at 100 percent capacity factor and burning natural gas is $3,364,400 for the PG7221FA. Taking into consideration the total annual cost, a cost/benefit analysis of using SCR can now be developed.

For this project, based on the information supplied by the applicant, it is estimated that the maximum annual NO_x emissions using dry low-NO_x (natural gas) and water injection (oil firing) will be 702.1 tons/year (at 72°F). Assuming that SCR would reduce the NO_x emissions by 65%, about 245.7 TPY would be emitted annually. When this reduction (456.4 TPY) is taken into consideration with the total levelized annual operating cost of $3,364,400; the cost per ton of controlling NO_x is $7,400. This calculated cost is higher than has previously been approved as BACT.

A review of the latest DER BACT determinations show limits of 15 ppmvd (natural gas) using low-NO_x burn technology for combined cycle turbines. General Electric is currently developing programs using both steam/water injection and dry low NO_x combustor to achieve NO_x emission control level of 9 ppm when firing natural gas. Therefore, since this technology will likely be available by

1997, the Department has accepted the water/steam injection (for distillate fuel oil firing), the dry low-NO_x burner design, and the 25 ppmvd (natural gas)/42 ppmvd (oil) at 15% O_2 as BACT for a limited time (up to 12/31/97).

BACT Determination by DER

NO_x Control

The information that the applicant presented and Department calculations indicates that the cost per ton of controlling NO_x for this turbine [$7,400 per ton (natural gas)] is high compared to other BACT determinations which require SCR. Based on the information presented by the applicant, the Department believes that the use of SCR for NO_x control is not justifiable as BACT at this time.

A review of the permitting activities for combined cycle proposals across the nation indicates that SCR has been required and most recently proposed for installations with a variety of operating conditions (i.e., natural gas, fuel oil, and various capacity factors). Although, the cost and other concerns expressed by the applicant are valid, the Department, in this case, is willing to accept water/steam injection and low NO_x burner design as BACT for this project for a limited time (up to 12/31/97).

It is the Department's understanding that General Electric is developing programs for the PG7221FA using either steam/water injection or dry low NO_x combustor technology to achieve a NO_x emission control level of 9 ppm when firing natural gas.

Based on this, the Department has determined to revise and lower the allowable BACT limit for this project to 15 ppmvd at 15% O_2 no later than 12/31/97. For this turbine, an even lower NO_x emission level than 15 (gas)/42 (oil) ppmvd, corrected to 15% O_2, may become a condition of the permit pursuant to F.A.C. Rule 17-4.080.

CO Control

Combustion control will be considered as BACT for CO and VOC when firing natural gas.

Other Emissions Control

The emission limitations for PM and PM_{10}, Be, Pb, and Hg are based on previous BACT determinations for similar facilities.

The emission limits for the Central Florida Power, L.P. project are thereby established as follows:

258 MW COMBINED CYCLE COMBUSTION TURBINE
100 MMBtu/hr Duct Burner

Pollutant	Emission Standards/Limitations[a] Oil[b]	Gas[c]	Method of Control
NO_x (CT)	42 ppmvd at 15% O_2; 362.2 lbs/hr	25 ppmvd at 15% O_2; 161.9 lbs/hr	Water Injection/ Dry Low-NO_x Combustor
		15 ppmvd at 15% O_2; 97.2 lbs/hr	Dry Low-NO_x Combustor or any other NO_x Control Technology
NO_x (DB)		0.1 lbs/MMBtu	
CO (CT)	98.4 lbs/hr	49 lbs/hr	Combustion
CO (DB)		10 lbs/hr	
PM/PM_{10} (CT)	17 lbs/hr	9 lbs/hr	Combustion
PM/PM_{10} (DB)		0.01 lbs/MMBtu	
SO_2 (CT)	99.7 lbs/hr	4.9 lbs/hr	Distillate Fuel Oil (0.05% S)
SO_2 (DB)		0.3 lbs/hr	
H_2SO_4 (CT)	1.2 lbs/hr	5.95×10^{-1} lbs/hr	Distillate Fuel Oil (0.05% S)
H_2SO_4 (DB)		3.7×10^{-2} lbs/hr	
VOC (CT)	7.5 lbs/hr	2.8 lbs/hr	Combustion
VOC (DB)		2.9 lbs/hr	
Hg	3.0×10^{-6} lbs/MMBtu (5.5×10^{-3} lbs/hr)		Fuel Quality
Pb	8.9×10^{-6} lbs/MMBtu (1.65×10^{-2} lbs/hr)		Fuel Quality
Be	2.5×10^{-6} lbs/MMBtu (4.62×10^{-3} lbs/hr)		Fuel Quality
As	4.2×10^{-6} lbs/MMBtu (7.77×10^{-3} lbs/hr)		Fuel Quality

ATTACHMENT 3 - 2

SPRAY DRYER AIR PERMIT (AO53-261950)

FLORIDA

Department of Environmental Protection

RECEIVED
DESTEC OPERATING CC
JAN 26 1995
TIGER BAY

Lawton Chiles
Governor

JAN 31 1995

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

NOTICE OF PERMIT ISSUANCE

CERTIFIED MAIL
In the Matter of an Application for permit by:

DER File No.: AO53-261950
County: Polk

Mr. J. D. Sellers, Plant Manager
Tiger Bay Limited Partnership
3219 County Road 630
Ft. Meade, Florida 33841
______________________________/

Enclosed is Permit Number AO53-261950 to operate the wastewater treatment system spray dryer at your facility located at the above address, issued pursuant to Section 403, Florida Statutes.

A person whose substantial interests are affected by this permit may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within 14 days of receipt of this permit. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under section 120.57 Florida Statutes.

The Petition shall contain the following information;

(a) The name, address, and the telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
(d) A statement of the material facts disputed by petitioner;

(e) A statement of facts which petitioner contends warrants reversal or modification of the Department's action or proposed action;
(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this permit. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this notice, in the Office of General Counsel at the above address of the Department. Failure to petition within the allotted time frame constitutes a waiver of any rights such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

This permit is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition and conforms to Rule 17-103.070, F.A.C. Upon timely filing of a petition or a request for an extension of time this permit will not be effective until further Order of the Department.

When the Order (Permit) is final, any party to the Order has the right to seek judicial review of the Order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Street Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date the Final Order is filed with the Clerk of the Department.

Executed in Tampa, Florida

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

David R. Zell

David R. Zell
Air Permitting Engineer
Phone (813) 744-6100 Ext. 118

DRZ/
Attachment

copies to:
KBN Engineering and Applied Sciences, Inc.

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT ISSUANCE and all copies were mailed by certified mail before the close of business on JAN 25 1995 to the listed persons.

FILING AND ACKNOWLEDGEMENT FILED, on this date, pursuant to Section 120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Marilyn Quispe JAN 25 1995
Clerk Date

Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

PERMITTEE:
Tiger Bay Limited Partnership
3219 County Road 630
Ft. Meade, Florida 33841

PERMIT/PROJECT:
Permit No: AO53-261950
County: Polk
Expiration Date: 01/31/96
Project: Wastewater Treatment System Spray Dryer w/Baghouse

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 62-200 through 297, and Chapter 62-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

For the operation of a natural gas fired spray dryer unit and baghouse associated with the wastewater treatment system for a cogeneration facility. This equipment is used to process the concentrated wastewater brine from two falling-film evaporator units. The effluent from the evaporators is pumped to the spray dryer module where it is atomized into a spray and contacted by heated air to evaporate the liquid, thus resulting in the formation of dry particles from the remaining solids. The exhaust gas stream from the spray dryer is sent through a baghouse dust collector where the particulate matter is removed with a removal efficiency of at least 99.9% (based on vendor's guarantee). Design gas flow rate to the baghouse is 5,050 acfm @ 340°F. The spray dryer air heater is fired with natural gas at a maximum heat input rate of 3.07 MMBtu/hr.

Location: Tiger Bay Cogeneration Facility
County 630 Road, 3 miles west of Ft. Meade

UTM: 17-416.3 E 3069.3 N **NEDS No:** 0223 **Point ID No:** 02
APIS ID: 40-TPA-53-0223

Replaces Permit No.: AC53-261950 (Issued under the name Central Florida Power Central Partnership)

PERMITTEE:
Tiger Bay Limited Partnership
Ft. Meade

PERMIT/PROJECT:
Permit No.: AO53-261950
Project: Spray Dryer

Specific Conditions:

1. A part of this permit is the attached 15 General Conditions. [Rule 62-4.160, F.A.C.]

2. Issuance of this permit does not relieve the permittee from complying with applicable emission limiting standards or other requirements of Chapters 62-200 through 62-297, or any other requirements under federal, state or local law.
[Rule 62-210.300, F.A.C.]

Operation and Emission Limitations

3. This source is permitted for continuous operation (8,760 hours/year).
[Construction permit AC53-230744]

4. The spray dryer unit air heater shall be fired with natural gas only at a maximum heat input rate not to exceed 3.07 MMBtu/hour.
[Construction permit AC53-230744]

5. Particulate matter emissions from the spray dryer unit baghouse exhaust shall not exceed 0.021 pounds per hour and 0.092 tons per year. (Note: on the basis of this limitation this source is exempted from the particulate matter RACT requirements of Rule 62-296.700, F.A.C.)
[Construction permit AC53-230744 and Rule 62-296.700(2)(b) and (c), F.A.C.]

6. Due to the expense and complexity of conducting a stack test on a minor source of particulate matter, and because this source is equipped with a baghouse control device, the Department, pursuant to the authority granted under Rule 62-297.620(4), F.A.C., hereby establishes a visible emission limitation not to exceed an opacity of 5% in lieu of a particulate stack test.

7. The permittee shall not cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor.
[Rule 62-296.320(2), F.A.C.]

8. All reasonable precautions shall be taken to prevent and control generation of unconfined emissions of particulate matter in accordance with the provisions in Rule 62-296.310(3)(c), F.A.C. These provisions are applicable to any source, including but not limited to, vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrial related activities such as loading, unloading, storing and handling.
[Rule 62-296.310(3)(b), F.A.C.]

PERMITTEE:
Tiger Bay Limited Partnership
Ft. Meade

PERMIT/PROJECT:
Permit No.: AO53-261950
Project: Spray Dryer

Specific Conditions:

Testing Requirements

9. The spray dryer unit baghouse exhaust stack shall be tested for visible emissions (VE) on or during the 60 day period prior to the date of September 27 of each year. A test report shall be submitted to the Air Compliance Section of the Southwest District Office of the Department within 45 days after the test is completed.
[Rules 62-297.340(d) and 62-297.570, F.A.C.]

10. Should the Department have reason to believe the particulate emission standard is not being met, the Department may require that compliance with the particulate emission standard be demonstrated by stack testing in accordance with Rule 62-297, F.A.C.
[Rule 62-297.620(4), F.A.C.]

11. Compliance with the visible emission limitation of Specific Condition No. 6 shall be determined using EPA Method 9 contained in 40 CFR 60, Appendix A and adopted by reference in Rule 62-297, F.A.C. The visible emissions test shall be conducted by a certified observer and be a minimum of 30 minutes in duration. The test observation period shall include the period during which the highest opacity can reasonably be expected to occur. The minimum requirements for stationary point source emission test procedures and reporting shall be in accordance with Rule 62-297, F.A.C. and 40 CFR 60 Appendix A.
[Rule 62-297.330(1)(b), F.A.C.]

12. Compliance testing shall be conducted during operation of the wastewater treatment system and spray dryer unit under conditions that could be reasonably expected to represent the worst case particulate loading to the baghouse. The test report shall include a description of the wastewater treatment system and spray dryer unit operating conditions during the test, including the following:

A. spray dryer wastewater brine feed rate (gal/min. or other appropriate units);
B. spray dryer air heater heat input rate (MMBtu/hr);
C. any other operating parameters (such as pressure drops, temperatures, baghouse gas flow rate (acfm), etc.) that the permittee feels are indicative of the operating conditions during the test.

Failure to submit the above operating information and or operating at conditions which do not reflect the normal operating conditions may invalidate the data and fail to provide reasonable assurance of compliance.
[Rule 62-4.070(3), F.A.C.]

PERMITTEE:
Tiger Bay Limited Partnership
Ft. Meade

PERMIT/PROJECT:
Permit No.: AO53-261950
Project: Spray Dryer

Specific Conditions:

13. The permittee shall notify the Air Compliance Section of the Southwest District Office of the Department at least 15 days prior to the date on which each formal compliance test is to begin of the date, time, and place of each such test, and the test contact person who will be responsible for coordinating and having such test conducted.
[Rule 62-297.340(1)(i), F.A.C.]

Reporting and Permit Requirements

14. The permittee shall submit to the Air Program of the Southwest District Office of the Department each calendar year on or before March 1, completed DER Form 62-210.900(5), "Annual Operating Report for Air Pollutant Emitting Facility," for the preceding calendar year.
[Rule 62-210.370(3), F.A.C.]

15. At least two applications to renew this operating permit shall be submitted to the Air Program of the Southwest District Office of the Department no later than November 30, 1995 (60 days prior to the expiration date of this permit). Submittal of a Title V operation permit application prior to the above date shall negate this requirement.
[Rule 62-4.090(1), F.A.C.]

FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

For Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

ATTACHMENT - GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

GENERAL CONDITIONS:

a. Have access to and copy any records that must be kept under the conditions of the permit;

b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

GENERAL CONDITIONS:

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

    ( ) Determination of Best Available Control Technology (BACT)
    ( ) Determination of Prevention of Significant Deterioration (PSD)
    ( ) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

    a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

    b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

    c. Records of monitoring information shall include:

        - the date, exact place, and time of sampling or measurements;
        - the person responsible for performing the sampling or measurements;
        - the dates analyses were performed;
        - the person responsible for performing the analyses;
        - the analytical techniques or methods used; and
        - the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

ATTACHMENT 3 - 3

INDUSTRIAL WASTEWATER EXEMPTION LETTER FROM FDEP AND INDUSTRIAL WASTEWATER PERMIT (IC53-221795A)

Department of
Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

March 17, 1997

Central Florida Power, L.P.
2500 City West Blvd., Suite 150
Houston, TX 77042

Attn: Mr. Robert I. Taylor
Business Development Manager

Re: Tiger Bay Cogeneration Facility; File No. IC53-221795A, Permit No. FLA013288
County Road 630 in Fort Meade, Polk County

Dear Mr. Taylor:

On January 6, 1997, the Department received your submittal, dated January 3, 1997, requesting an exemption from Industrial Wastewater permitting requirements for the above-referenced facility. Upon review of your submittal, it has been determined that no Industrial Wastewater permit is required for the operation of this facility's wastewater management system at this time. This finding is based upon our understanding of your operations as follows:

1. There will be no discharge of any wastewater generated in the system to surface or ground waters of the State.

2. The operation of this facility will be as described in the technical information and supporting documents.

3. The collection system will be kept in good working order during the life of the facility.

4. The owner/operator will notify the Department immediateiy of any problems that may seriously hinder compliance of this facility with the Department's rules and regulations.

5. This letter constitutes a determination that an Industrial Wastewater permit is not required at this time, however, it does not relieve the owner/operator from any other local, State or federal permitting requirements.

You are required to immediately report any deviation from 1. through 5. above or from the description of this operation on file with the Department to this office. Such may constitute grounds for withdrawal of this letter, thereby requiring a Department Industrial Wastewater permit to be received in order to continue operation of the wastewater management system.

For inquiries, you may contact Mr. Brett Gocka at (813) 744-6100 under extension 394.

Sincerely,

Henry B. Dominick

Henry B. Dominick, P.E.
Manager
Industrial Wastewater Program

HBD/bgc

cc: Robert Chatham
David T. Jones, P.E.

Florida Department of
Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619
813-744-6100

Virginia B. Wetherell
Secretary

PERMITTEE:
CENTRAL FLORIDA POWER, L.P.
2500 City West Blvd., Suite 150
Houston, Texas 77042

Attention:
Mr. Robert I. Taylor
Business Development Manager

PERMIT/CERTIFICATION
GMS ID Number: 4053P20345
Permit Number: IC53-221795A
Issue Date: April 8, 1994
Expiration Date: February 28, 1997
County: Polk
Latitude: 27° 44′ 52″
Longitude: 81° 50′ 59″
Processor: George Sharrock
Project: Construction of an Electric Cogeneration Facility With No Discharge of Industrial Wastewater to the Environment

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-301, 17-302, 17-4, 17-520, 17-522, 17-550, 17-650, 17-660, and 17-25. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

This permit is for the construction of a 258 MW cogeneration facility that will produce an average of 1,028,000 pounds per day of excess steam to be supplied to an adjacent industrial facility. The facility will be located on 6.2 acres of land. The cogeneration system will consist of one Gas Turbine Electrical Generating Unit, a Heat Recovery Boiler, one Steam Turbine Generator, and associated ancillary equipment.

The wastewater generated at this facility will consist of cooling tower blowdown, blowdown from the heat recovery boiler, condensate polisher wastewater, maintenance washwater, and impacted stormwater collected in the secondary containment areas within the complex grounds.

A wastewater holding tank with a total capacity of 1.4 MG will also be installed at the facility. The tank is designed to hold a minimum of five days of wastewater with appropriate freeboard to account for additional stormwater. The wastewater in this tank will eventually be utilized by U.S. Agri-Chemicals Corporation to replace well water being pumped out of the ground. U.S. Agri-Chemical will consume the wastewater in the chemical process; therefore, it will have no adverse effect on the effluent being discharged through their permitted outfalls.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

In the matter of an
Application for Permit by:

CENTRAL FLORIDA POWER, L.P.
2500 City West Blvd., Suite 150
Houston, Texas 77042

DER File No. IC53-221795
Polk County
Processor: George Sharrock

Attention:
Mr. Robert I. Taylor
Business Development Manager
_________________________________/

Enclosed is Permit Number IC53-221795 for the facility referenced above, issued pursuant to Sections 403.061(14), 403.087 and 403.088, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within thirty (30) days from the date this Notice is filed with the Clerk of the Department.

Executed in Tampa, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Southwest District Office
Industrial Waste Program
3804 Coconut Palm Drive
Tampa, Florida 33619-8318
813/744-6100

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on 5-7, 1993 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

J. Smyth 5-7-93
(Clerk) (Date)

cc: Guy T. Kaminski, P.E., ECT
Robert S. Chatham, P.E., DESTEC
Phillip M. Coram, P.E., FDER-IW/TLH
Donald S. Martin, Polk County Planning Division

Florida Department of Environmental Regulation

Southwest District • 3804 Coconut Palm • Tampa, Florida 33619
Lawton Chiles, Governor 813-744-6100 Virginia B. Wetherell, Secretary

PERMITTEE:
CENTRAL FLORIDA POWER, L.P.
2500 City West Blvd., Suite 150
Houston, Texas 77042

Attention:
Mr. Robert I. Taylor
Business Development Manager

PERMIT/CERTIFICATION
GMS ID Number: 4053P20345
Permit Number: IC53-221795
Issue Date: May 4, 1993
Expiration Date: February 28, 1997
County: Polk
Latitude: 27° 44' 52"
Longitude: 81° 50' 59"
Processor: George Sharrock
Project: Construction of an Electric Cogeneration Facility With No Discharge of Industrial Wastewater to the Environment

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-301, 17-302, 17-4, 17-520, 17-522, 17-550, 17-650, 17-660, and 17-25. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

This permit is for the construction of a 258 MW cogeneration facility that will produce an average of 1,028,000 pounds per day of excess steam to be supplied to an adjacent industrial facility. The facility will be located on 6.2 acres of land. The cogeneration system will consist of one Gas Turbine Electrical Generating Unit, a Heat Recovery Boiler, one Steam Turbine Generator, and associated ancillary equipment.

The wastewater generated at this facility will consist of cooling tower blowdown, blowdown from the heat recovery boiler, condensate polisher wastewater, maintenance washwater, and impacted stormwater collected in the secondary containment areas within the complex grounds.

The facility utilizes a Zero Liquid Discharge System that will distill the wastewater and recycle this water to be reused in the process water system. The solids accumulated by the Zero Liquid Discharge System will be disposed of in a Department approved manner.

All used and recovered oil will be disposed of off site by a licensed waste oil hauler.

There shall be no industrial wastewater discharged to surface waters or ground waters of the State under any circumstances, except for occasions when rainfall exceeds the 24-hour 25-year storm event. Stormwater generated by rainfall run-off will be routed to a lined detention pond and will be addressed in this permit.

Location: County Road 630, 2 miles west of Fort Meade in Central Polk County.

Replaces Permit: N/A

The terms, conditions, requirements, limitations, and restrictions set forth in the following "Specific Conditions" and in the "General Conditions" (Attachment A) are "Permit Conditions" and such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes.

SPECIFIC CONDITIONS:

1. Drawings, plans, documents or specifications submitted by the permittee, not attached hereto, but retained on file at the Southwest District Office, are made a part hereof.

2. The permittee shall not discharge to surface waters, wastes which are acutely toxic, or present in concentrations which are carcinogenic, mutagenic, or teratogenic to human beings or to significant locally occurring wildlife or aquatic species. The permittee shall not discharge to ground waters, wastes in concentrations which, alone or in combination with other substances, or components or discharges (whether thermal or non-thermal) are carcinogenic, mutagenic, teratogenic, or toxic to human beings (unless specific criteria are established for such components in Section 17-520.420, F.A.C.) or are acutely toxic to indigenous species of significance to the aquatic community within surface waters affected by the ground water at the point of contact with surface waters.

3. If historical or archaeological artifacts, such as Indian canoes, are discovered at any time within the project site, the permittee shall immediately notify the District Office and the Bureau of Historic Preservation, Division of Archives, History and Records Management, R. A. Gray Building, Tallahassee, Florida 32301.

SPECIFIC CONDITIONS: (cont'd.)

4. Where required by Chapter 471 (P.E.) or Chapter 492 (P.G.) Florida Statutes, applicable portions of permit applications and supporting documents which are submitted to the Department for public record, shall be signed and sealed by the professional(s) who prepared them.

5. The permittee shall ensure that the construction of this facility shall be as described in the application and supporting documents. Any change to this permit, shall be submitted in writing to the Industrial Waste Program Manager for review and clearance prior to implementation. Changes of negligible impact to the environment and staff time will be reviewed by the program manager, cleared when appropriate and incorporated into this permit. Changes or modifications other than those described above, will require submission of a completed application and appropriate processing fee as per Section 17-4.050, F.A.C.

6. The permittee shall report all critical (having potential to significantly pollute surface or ground waters) spills of liquid or liquid-solid materials, not confined to a building or similar containment structure, to the Department by phone immediately after the discovery and submit a written report within forty-eight hours, excluding weekends, from the original notification. The written report shall include, but not be limited to, a detailed description of how the spill occurred, the name and chemical make-up (include any MSDS sheets) of the substance, the amount spilled, the time and date of the spill, the name and title of the person who first reported the spill, the areal size of the spill and surface types (impervious, ground, water bodies, etc.) it impacted, the cleanup procedures taken and status of completion, and include a map or aerial photograph showing the extent and paths of the material flow. Any deviation from this requirement must receive prior approval from the Department.

7. The permittee shall ensure that all laboratory analytical data submitted to the Department, as required by this permit, must be from a laboratory which has a currently valid and Department approved comprehensive Quality Assurance Plan (QAP) [or a QAP pending approval] for all parameters being reported, as required by Chapter 17-160, Florida Administrative Code.

8. When a contract laboratory is used to analyze samples required pursuant to this permit, the permittee is required to have the samples taken by qualified personnel following EPA and Department approved sampling procedures and chain-of-custody requirements. All chain-of-custody records must be retained by the contract laboratory for at least five (5) years and made available to the Department immediately upon request.

SPECIFIC CONDITIONS: (cont'd.)

9. When an in-house laboratory is used to analyze samples required pursuant to this permit, the permittee is required to have the samples taken by a qualified technician following EPA and Department approved sampling procedures and chain-of-custody requirements. All chain-of-custody records must be retained on-site for at least five (5) years and made available to the Department immediately upon request.

10. This document satisfies Industrial Wastewater and stormwater permitting requirements only and does not authorize construction or operation of this facility prior to obtaining all other permits required by Local, State and Federal agencies.

11. The permittee shall ensure that all construction and subsequent operation of this facility shall not cause a pollution incident in violation of the Department's standards, rules and regulations as set forth in Chapters 17-301, 17-302, 17-4, 17-520, 17-522, 17-550, 17-650, 17-660, and 17-25 of the Florida Administrative Code.

12. The permittee shall notify the Department immediately of any problems that may seriously hinder compliance with this permit. The Department may require a detailed written report describing the problem, remedial measures taken to assure compliance and measures taken to prevent recurrence of the problem.

13. The permittee shall not allow any wastewater to deliberately bypass the existing pollution control facility without prior approval from the Department.

14. The stormwater management and control system as proposed in Department File No. RC53-221796 is incorporated by reference into this permit. All construction specified in the above referenced file shall be implemented and operation shall be in accordance with Chapter 17-25, Florida Administrative Code.

15. The permittee shall not discharge any industrial wastewater from this facility to the surface waters or ground waters of the State, except for occasions when rainfall exceeds the 24-hour 25-year storm event.

16. The permittee shall provide fourteen (14) days notice to the Department's Southwest District Office prior to initiation of commercial operations for the facility's wastewater treatment system so that Department officials may inspect the facility prior to and/or during the start-up procedure.

17. The permittee shall not land apply any waste sludge or solid waste onsite without obtaining prior approval from Department. All waste sludge and solid waste shall be disposed of by the permittee in a Department approved manner.

18. The permittee shall not allow any waste sludge or other solid waste to be discharged into the stormwater pond either directly or indirectly.

19. The permittee shall ensure that all discharges to State surface waters concerning the construction of this project and its subsequent operation shall be through the Department permitted outfall at the stormwater management pond.

20. A Best Management practices (BMP) Plan, shall be prepared, kept on-site, made available to the Department for review upon request, and be implemented by the permittee sixty (60) days after the start of commercial operations at the Tiger Bay Cogeneration Plant. The Plan shall include, but not be limited to:

1. An emergency notification procedure in case of the release or threatened release of any hazardous material or of any discharge of wastewater from the facility.

2. Emergency procedures in the event of such releases.

3. Preventive measures taken to prevent any potential release.

4. A training plan for employees and management personnel of the facility, and

5. Documentation of those plant personnel who have successfully completed the training program.

21. All documents submitted pursuant to the conditions of this permit shall be accompanied by a cover letter stating the name and date of the document submitted, the file number and project name of the permit involved, and the number(s) of the specific condition(s) affected. All submittals shall be signed by the permittee or the permittee's authorized representative whose name is on file with the Department.

22. The permittee shall submit to the Department within sixty (60) days from completion of construction of this project, a set of updated drawings of the previously submitted "record" drawings, signed and sealed by a professional engineer registered in the State of Florida, showing the construction details and any deviations from the approved preconstruction design. All deviations not previously reported to the Department shall be described in detail and the reasons therefore enumerated.

CENTRAL FLORIDA POWER, L.P.
TIGER BAY COGENERATION PLANT

GMS ID No.: 4053P20345
Permit No.: IC53-221795

SPECIFIC CONDITIONS: (cont'd.)

23. Upon completion of construction, the permittee shall submit to the Department's Southwest District Office a completed "Certification of Completion of Construction" form (Attachment B) signed and sealed by the engineer of record.

24. The permittee shall submit to the Department an application, including the appropriate fee, for a permit or a request for a de minimis exemption to operate the wastewater treatment facility at least sixty (60) days prior to the expiration of this permit.

Executed in Tampa, Florida.

FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

Bob Stetler
for Richard D. Garrity, Ph.D.
Director of District Management

ATTACHMENT 3 - 4

POLK COUNTY SEPTIC TANK PERMIT (53-0004-98I/M)

DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

OPERATING PERMIT

This permit is hereby issued to:

County: Polk

Permit Number: 53-0004-98I/M

Name: Florida Power Corporation

Address of System or Operation: 3912 S.R. 630 West Fort Meade, Fl 33841

Owner or Operator: Florida Power Corporation Ms. Jacqueline A. Foss

Mailing Address: Post Office Box 14042, MAC-H26 St. Petersburg, Fl 33733

This Permit Authorizes the Operation of a:

Septage Disposal Service: ——

Temporary System (Portable Toilet/Holding Tank) Service: ——

Individual Aerobic Treatment Unit: ——

Aerobic Treatment Unit Maintenance Service: ——

System Receiving Commercial Sewage Waste: ——

System Located in Industrial/Manufacturing Area: X

At the Above Referenced Location with the Following Conditions of Operation:

Domestic Waste Only

No Monitoring Required At This Time

No Toxic or Hazardous Waste

The facility shown above has been inspected by the undersigned, a duly authorized representative of the Department of Health and Rehabilitative Services, and was found in conformance with those rules promulgated by the department under the authority of Chapters 381, 386, and 489 Part III, Florida Statutes, and set forth in Rule Chapter 10D-6, Florida Administrative Code.

This permit grants authority to operate the above referenced facility, service, or system in conformance with department rules and the conditions of operation shown above. This permit is revokable, upon service of notice, when it is determined by the department that the operational conditions and department standards are not being maintained.

Granted this 14th day of July 1997

John H. Dame

Environmental Health Director/Administrator

Permit Expiration Date: July 14, 1998

HRS-H Form 4013, Jan 92 (Obsoletes previous editions which may not be used)
(Stock Number: 5744-000-4013-1)

UNIT	PERSON/BUSINESS	ACTIVITY TYPE	EQUIPMENT & COMPOUNDS	QTY
A	Administration	Office	Domestic Waste	0
B	Maintenance	Shop	Repair Waste	Min.
C	Electric	Control	Domestic Waste	0

Annual Inspection: Change of Ownership

The onsite sewage treatment and disposal system serving the establishment has been evaluated, is not expected to receive toxic or hazardous waste, and is adequately designed to meet the sewage treatment and disposal needs of the business.

Florida Power
CORPORATION

bcc: Jeffrey Fassett - DESTEC, Tiger Bay Facility
Jeanne Benadetti - DESTEC, Houston
Jeffrey Keenan - DESTEC, Houston
Robert W. Anderson
Jennifer L. Tillman
Jacqueline A. Foss

June 23, 1997

File:

Mr. Donald R. Guthrie, P.E.
Administrator, Environmental Engineering
Polk County Public Health Unit
2090 E. Clower Street
Bartow, Florida 33830-6741

Dear Mr. Guthrie:

RE: Florida Power Corporation
Tiger Bay Cogeneration Facility Acquisition
Permit No. 53-0004-96I/M

Florida Power Corporation (FPC) will be acquiring the Tiger Bay Cogeneration Facility from Tiger Bay Limited Partnership (formerly Central Florida Power Limited Partnership) on July 14, 1997. In preparation for the acquisition of this facility, FPC is submitting this correspondence to request a Change of Tenancy/Amendment to the above referenced permit.

Operational changes such as the number of employees that will use this facility or a change in licensed waste haulers removing wastes from the site will not result from the change in ownership. Enclosed is an application for an onsite sewage disposal system operating permit, a business survey and a check in the amount of Seventy Dollars ($70.00) in support of this request.

Florida Power Corporation will notify you if there is a change to the closing date of July 14. Should you have any questions or require additional information, please contact Jacqueline A. Foss of my staff at (813) 866-4863.

Sincerely,

W. Jeffrey Pardue, CEP
Director, Environmental Services

Enclosures
Overnight Mail

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STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
APPLICATION FOR ONSITE SEWAGE DISPOSAL SYSTEM OPERATING PERMIT

Authority: Chapter 381, F.S. & Chapter 10D-6, F.A.C. Application/Permit Number ________

New: X Amended: ____ Renewal: ____
Aerobic: ____ Commercial: ____ Industrial/Manufacturing: X

GENERAL INFORMATION

Property Owner: Florida Power Corporation
Work Telephone: (813) 866-4387 Home Phone: ________
Address of Owner: P.O. Box 14042; MAC H2G City: St. Petersburg State FL Zip 33733
Owner's Agent: W. Jeffrey Pardue, C.E.P., Director, Environmental Services
Agent's Address: P.O.Box 14042; MAC H2G City: St. Petersburg State FL Zip 33733
Agent's Phone: (813) 866-4387 Property Street Address: 3912 S.R. 630 West
City: Fort Meade State FL Zip 33841
Section: 31 Township: 31S Range: 25E Parcel: ____ Lot: ____ Block: ____ Subdivision: ____ Unit: ____

EXISTING SYSTEM INFORMATION

Please complete those items shown below which are applicable to the existing permitted onsite sewage disposal system servin the above referenced property: Onsite Sewage Disposal System Construction Permit Number (if known): 57037
Septic Tank(s)/Aerobic Unit 1350 gallons Grease Trap(s) ____ gallons Dosing Tank 300 gall
Drainfield size is 620 square feet installed in a: standard subsurface ____ filled ____ mound system X
The drainfield layout is in trenches X absorption bed ____ other ____ (describe) ____
Onsite Well? Yes X No ____ System Setback to Wells 216 ft. Lot Size ____ Square F
Estimated sewage flow into system 770 Gallons/Day Based on 22 @ 35 gpd
Number of businesses or dwellings (circle one) which are being served by this onsite sewage disposal system 1
Additional Comments: ________

COMMERCIAL/INDUSTRIAL/MANUFACTURING FACILITY

Please attach a business survey form for each business which is or will be served by the onsite sewage disposal system. Briefly describe the type of activities that will be supported by the onsite sewage system serving this property. Domestic sewage with an estimated flow of 770 gpd for employee use.
What is the zoning designation for the property? Rural Conservation Give a description of the zoning and examples of approved businesses in this type of zoning: The Tiger Bay facility had a CUP 92-17 approved in November 1992. U.S. Agri-Chemicals Corporation is adjacent to the property.

AEROBIC TREATMENT UNIT

Date of aerobic system installation approval: 02 / 01 / 94 Is the aerobic treatment unit still under manufacturer's initial two year warranty? Yes ____ No X Aerobic Unit Manufacturer: Averett Septic Tank Co.
Type of Aerobic Unit: Reinforced Concrete Class I: X Class II: ____ Above 1500 Gallon Capacity: No
Construction/Installation Permit Number: 57037 Are multiple aerobic units used on the site: Yes ____ No X
Is there an active service agreement on the aerobic treatment unit? Yes ____ No X Please Attach a Copy of the Agreem
If yes, when does the service agreement expire? ____/____/____
Who is the authorized service company providing maintenance to your unit?
Company Name Averett will most likely provide service Phone Number (813) 665-1748
Address ________ City ________ State ____ Zip ____

I hereby certify that the above information is accurate and a reflection of the actual conditions existing on the above referenced property. I understand that a change of occupancy or tenancy at the above location will require me to file an amendment to this operating permit.

Applicant's signature: [signature] Date 6 / 13 / 97

Application Status:
Disapproved: ____ Date ____/____/____ Reason: ________
By: ________ Title: ________ ________ CP
Approved: ____ Date ____/____/____
By: ________ Title: ________ ________ CP

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BUSINESS SURVEY
AN ATTACHMENT TO HRS-H FORM 4081
ASSESSMENT OF WASTE HANDLING AND BUSINESS ACTIVITIES

New: ______ Application/Permit Number ______
Renewal: ______
Change of Tenancy/Amendment: X

Please provide the following information regarding your business facilities and the activities which will take place on site.

Business Name Florida Power Corporation Occupational License #: ______
Business Owner's Name Same as above
Business Mailing Address P.O. Box 14042; MAC H2G Telephone (813) 866-4387
City St. Petersburg State FL Zip 33733
Street Address of Business 3912 S.R. 630 West Unit Number ______
City Fort Meade State FL Zip 33841

How many employees will use this facility 22 Hours of operation 8760 hrs/yr
What type and number of sanitary facilities will be available at this location: Anticipated flow: 770 gpd Based on 22
Toilets 6 Urinals 3 Hand Washing Sinks 5 Utility Sinks 2
Showers 3 Floor Drains ______ Equipment Drains(Describe) ______
2-Compartment Sinks ______ 3-Compartment Sinks ______
Laundry Facilities ______ Garbage Grinder/Disposal 2
Commercial Dish Machines (heat sanitizing) ______ (chemical sanitizing) ______
Can Washing Facilities ______ Other(Describe) ______

Completely describe the activities which will take place at your business location (ie. types of waste generated, volume of raw materials handled, amount of wastes generated, equipment used in the process):
Sewage waste: 770 gpd (domestic waste only).

List any chemical compounds routinely used in your business: Attach Material Safety Data Sheets for Compounds Used or Stoi

Name	Gal or lbs/Month	Amt on hand	Storage Method	Disposal Method	SIC Code
See Attachment B previously submitted by Tiger Bay Ltd. Partnership					

Please list licensed waste haulers removing wastes from your site.

Company Name	Type of Waste Removed
AAA Disposal	Domestic (i.e. office) waste and salt cake

Describe how emergencies, such as spills, will be handled at this site:
Plant staff would refer to FPC's Emergency Response Plan for any spill resulting in a release to the environment. Plan outlines notification procedures and steps to contain a spill.

As the ~~business~~ property owner, I understand that information contained in this application serves as a basis for determining the suitability of the onsite sewage dispc system to serve the business described above. Information contained herein is an accurate reflection of the activities which will be allowed on this site. I a agree to perform any testing as may be required by this permit, and collection & analysis of samples will be done at my own expense by a state certi laboratory. I also agree to notify the county public health unit of the change in any material fact used to determine the issuance of this permit

Business Owner or Agent's Signature: ______ Date ______
Property Owner or Agent's Signature: [signature] Date 6/13/97

TO BE COMPLETED BY COUNTY PUBLIC HEALTH UNIT:
Will monitoring be required: Yes ____ No ____ Sample location ______ Compounds to be examined: ______
Is DER/ County Haz Waste review required: Yes ____ No ____ Monitoring Frequency ______

y disapproved ______ Date: ___/___/___ Reason: ______

Survey approved: ______ By: ______ Title: ______ ______ CPHU Date: ___/___/___

ATTACHMENT 3 - 5

POLK COUNTY DRINKING WATER REGISTRATION APPLICATION

Florida Power
CORPORATION

July 7, 1997

CERTIFIED: P 372-130-622

Mr. Donald R. Guthrie, P.E.
Administrator, Environmental Engineering
Polk County Public Health Unit
2090 E. Clower Street
Bartow, Florida 33830-6741

Dear Mr. Guthrie:

RE: Florida Power Corporation
Tiger Bay Cogeneration Facility Acquisition
LUC/Central Florida Power Limited Partnership

Florida Power Corporation will be acquiring the Tiger Bay Cogeneration Facility from Tiger Bay Limited Partnership (formerly Central Florida Power Limited Partnership). The date of sale is scheduled for July 15, 1997. In preparation for the acquisition of this facility, FPC is submitting this correspondence to fulfill the conditions for registration of the drinking water system. Please find the following items enclosed in support of system registration:

- a copy of satisfactory bacteriological analysis results collected on two consecutive days from the water supply well, plus one collected from a drinking water tap;
- a satisfactory nitrate analysis and lead analysis;
- a completed registration form; and
- a check in the amount of Fifteen Dollars ($15.00).

Should you have any questions or require additional information, please contact Jacqueline A. Foss of my staff at (813) 866-4863.

Sincerely,

W. Jeffrey Pardue, CEP
Director, Environmental Services

Enclosures

STATE OF FLORIDA
DEPARTMENT OF HEALTH
CHAPTER 10D-4, FAC
APPLICATION FOR LIMITED USE COMMERCIAL WATER SYSTEM REGISTRATION

Authority: Chapters 381.0062, FS and 10D-4, FAC

System # | | 5 | | | | |
For office use only

System Name and Location:
Water System Name: Tiger Bay Cogeneration Facility
Physical Address of water plant: 3219 S.R. 630 West; Fort Meade

System Owner's Name, Addresses & Phone Numbers:
System Owner's Name: Florida Power Corporation
System Owner's Physical Address: 3201 34th Street South; St. Petersburg, FL 33711
System Owner's Mailing Address: P.O. Box 14042; MAC H2G; St. Petersburg, FL 33733
System Owner's Phone #'s: (home:) N/A (work) (813) 866-4387

[initials] (initial) I hereby declare that I do not make tap water available to the general public for public consumption.

[initials] (initial) I agree to test the system water quality annually for coliform bacteria; to submit satisfactory, HRS-certified laboratory test results annually to the local Environmental Health Unit of the department: and to operate the system otherwise in accordance with section 381.0062, Florida Statutes, and Rule Chapter 10D-4, Florida Administrative Code.

[initials] (initial) I understand that any misrepresentations of facts in this application or failure to comply with sanitary standards is grounds for revocation of the water system registration, consequently requiring an operating permit or connection to another approved public water supply.

[initials] (initial) I understand any modification to the structure, or of the use, of the water system requires prior approval by the local Environmental Health unit of the Department of Health and Rehabilitative Services. I understand that any change of ownership or business activity requires re-registration with the department.

Attachments:
X $15 Registration Application Fee
X Satisfactory Lead Test from Distribution System
X Satisfactory Coliform Bacteria Test { Well: 2 consecutive days; Distribution: 1
X Satisfactory Nitrate Test From Well

The information contained in this application and any attachments, all of which serve as the basis for permitting, is true and correct.

Authorized Applicant's Signature: [signature] Date 7/8/97

Name (print or type): W. Jeffrey Pardue, C.E.P., Director, Environmental Services

Florida
Power
CORPORATION

David L. Miller
Vice President
Corporate Services

March 7, 1997

TO WHOM IT MAY CONCERN:

Subject: Letter of Authorization

Please be advised that W. Jeffrey Pardue, Director, Environmental Services Department, Sharon K. Momberg, Manager of Waste Management Programs, Kent D. Hedrick, Manager of Water Programs, J. Michael Kennedy, Manager of Air Programs and Karen A. Johnston, Environmental Project Manager, are authorized to represent Florida Power Corporation in matters relating to necessary permits and reporting documentation required from regulatory authorities in the areas of air, water, power plant site certifications and transmission line certifications, or hazardous and solid materials issues.

Sincerely,

D. L. Miller

DLM:mlp

3201 Thirty-fourth Street South · P.O. Box 14042, St. Petersburg, Florida 33733 · (813) 866-5701
A Florida Progress Company

SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD OLDSMAR, FLORIDA 34677 813-855-1844

Florida Power Corp. CN77
15760 W. Powerline St.
Crystal River, Florida 34428

Project No. 10997
June 17, 1997

PUBLIC DRINKING WATER ANALYSIS REPORT

PUBLIC WATER SYSTEM INFORMATION (to be completed by system or lab)

System Name: Florida Power Corporation I.D. #: N/A - New
Address: 3219 SR 630, Fort Meade, FL 33841 Phone #: (941) 285-1200
Type (check one): ( ) Community (X) Nontransient Noncommunity ( ) Non-Community

SAMPLE INFORMATION (to be completed by sampler)

Sample Date (MMDDYY): 6/4/97 Sample Time: 1335
Sample Location (be specific): Entry to Distribution
Samper Name and Phone: Jim Stiteler (352) 563-2943x5170
Sampler's Signature: [signature] Title: CHEMIST

Check Type(s): ( ) Distribution ( ) Recheck of MCL ( ) Resample of Lab Invalidated Sample
( ) Clearance ( ) Thm Max Res Time ( ) Plant Tap
(X) Dist. entry pt ( ) Raw ( ) Composite of Multiple Sites--Attach a format for each site

LABORATORY CERTIFICATION INFROMATION (to be completed by lab) - **ATTACH HRS ANALYTE SHEET**

Lab Name: Southern Analytical Laboratories, Inc. HRS #: 84269 Expir. Date: 6/30/97
Address: 110 Bayview Blvd., Oldsmar, FL 34677 Phone #: (813) 855-1844

Subcontracted Lab HRS #: ____________ -- **ATTACH HRS ANALYTE SHEET FOR SUBCONTRACTED LAB**

ANALYSIS INFORMATION (to be completed by lab) -- **SAMPLE NUMBER:** 10997-02

Date Sample(s) Received: 6/4/97, 1545 Group(s) Analyzed & Results attached for compliance with 62-550, F.A.C.:

( ) Nitrate Only	( ) Nitrite Only	( ) Asbestos Only	( ) Trihalomethanes
Inorganics-- ( ) All 17 (X) Partial	Volatile Organics-- ( ) All 21 ( ) Partial	Secondaries-- ( ) All 14 ( ) Partial	Pesticides & PCBs-- ( ) All 30 ( ) Partial
Group I Unregulateds-- ( ) All 13 ( ) Partial	Group II Unregulateds-- ( ) All 23 ( ) Partial	Group III Unregulateds-- ( ) All 11 ( ) Partial	Radiochemicals-- ( ) Single Sample ( ) Qtly Composite*

*Provide radiochemical sample dates & locations for each quarter

I, Francis I. Daniels, do HEREBY CERTIFY that all attached analytical data are correct.
Signature [signature]
Title Laboratory Director Date: June 17, 1997

COMPLIANCE INFORMATION (to be completed by State)

Sample Collection Satisfactory: ____________ Sample Analysis Satisfactory: ____________
Resample Requested for: ____________ Reason: ____________
Person notified to resample: ____________ Date Notified: ____________
DER/ACPHU Reviewing Official: ____________

Southern Analytical
Project No. 10997
April 17, 1997

try to Distribution, Tiger Bay

INORGANIC ANALYSIS
62-550.310(1)
(PWS030)

Parameter ID	NAME (MCL mg/l)	Sample Number	Analysis Result (mg/l)	Analyt. Method	Analysis Date	MDL	Lab ID
1040	Nitrate (10)	10997-02	0.01 U	EPA 353.2	6/4/97	0.01	84269
1041	Nitrite (1)	10997-02	0.01 U	SM 4500-NO_2 B	6/6/97	0.01	84269

U - Analyte was not detected; indicated concentration is method detection limit.

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

DRINKING WATER BACTERIOLOGICAL ANALYSIS

System Name: Florida Power Corporation I. D. No. N/A - New Phone No. 941-285-1200
Address: 3219 SR 630, Fort Meade, FL 33841 County: Polk DEP District:
Collector: Jim Stiteler/Florida Power Corporation Phone No. 352-563-2943x5170
Sample Site (Locality or Subdivision): Tiger Bay Cogeneration Facility
Date and Time Collected: 6/4/97, 1320

Type of Supply: Community Water Noncommunity Water Nontrans.-Noncommunity Water
Private Well Swimming Pool Bottled Water Other Public Water

Type of Sample: Compliance (Check Box) [X] Distribution [ ] Raw
Repeat
Replacement (Check Box) [ ] TNTC or C [ ] Turbid
Main Clearance
Other ______ (Specify)
Well Survey

Remarks: Samples Received: 6/4/97, 1545 Analysis Date: 6/4/97, 1600

Analysis Method: MF MTF MMO-MUG PA

To Be Completed by Collector of Sample				To Be Completed By Lab				
Coll. No.	Sample Point (Specific Address)	Cl Res'd	pH	Sample No.	Non Coliform	Total	Confirm Total	Confirm Fecal(EColi)
	Distribution-Upstairs Ladies Locker Room Sink	0.15		10997-03		A		

U - Analyte was not detected; indicated concentration is method detection limit.
P - Coliforms are present C - Confluent growth TA - Turbid, Absence of gas or acid
A - Coliforms are absent TNTC - Too numerous to count

FHRS DW Lab No. 84269
SAL Project No. 10997
June 17, 1997

Francis I. Daniels
Laboratory Director

Name and Mailing Address of Person/Firm to Receive Report

Attn: Mr. Jim Stiteler
Florida Power Corp., MAC CN77
15760 W. Powerline St.
Crystal River, Florida 34428

( ) Satisfactory
( ) Incomplete Collection Information
( ) Repeat Samples
( ) Replacement Samples

Reviewing Official:______
Title:______

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

Florida Power Corp. CN77
15760 W. Powerline St.
Crystal River, Florida 34428

Project No. 10997
June 17, 1997

PUBLIC DRINKING WATER ANALYSIS REPORT

PUBLIC WATER SYSTEM INFORMATION (to be completed by system or lab)

System Name: Florida Power Corporation I.D. #: N/A - New
Address: 3219 SR 630, Fort Meade, FL 33841 Phone #: (941) 285-1200
Type (check one): ( ) Community (X) Nontransient Noncommunity ( ) Non-Community

SAMPLE INFORMATION (to be completed by sampler)

Sample Date (MMDDYY): 6/4/97 Sample Time: 1320
Sample Location (be specific): Distribution – Upstairs Ladies Locker Room Sink
Samper Name and Phone: Jim Stiteler (352) 563-2943x5170
Sampler's Signature: Jim Stiteler Title: Chemist

Check Type(s): (X) Distribution ( ) Recheck of MCL ( ) Resample of Lab Invalidated Sample
( ) Clearance ( ) Thm Max Res Time ( ) Plant Tap
( ) Dist. entry pt ( ) Raw ( ) Composite of Multiple Sites--Attach a format for each site

LABORATORY CERTIFICATION INFROMATION (to be completed by lab) - **ATTACH HRS ANALYTE SHEET**

Lab Name: Southern Analytical Laboratories, Inc. HRS #: 84269 Expir. Date: 6/30/97
Address: 110 Bayview Blvd., Oldsmar, FL 34677 Phone #: (813) 855-1844

Subcontracted Lab HRS #: ______________ -- **ATTACH HRS ANALYTE SHEET FOR SUBCONTRACTED LAB**

ANALYSIS INFORMATION (to be completed by lab) -- **SAMPLE NUMBER:** 10997-03

Date Sample(s) Received: 6/4/97, 1545 Group(s) Analyzed & Results attached for compliance with 62-550, F.A.C.:

( ) Nitrate Only	( ) Nitrite Only	( ) Asbestos Only	( ) Trihalomethanes
Inorganics-- ( ) All 17 (X) Partial	Volatile Organics-- ( ) All 21 ( ) Partial	Secondaries-- ( ) All 14 ( ) Partial	Pesticides & PCBs-- ( ) All 30 ( ) Partial
Group I Unregulateds-- ( ) All 13 ( ) Partial	Group II Unregulateds-- ( ) All 23 ( ) Partial	Group III Unregulateds-- ( ) All 11 ( ) Partial	Radiochemicals-- ( ) Single Sample ( ) Qtly Composite*

*Provide radiochemical sample dates & locations for each quarter

I, Francis I. Daniels, do HEREBY CERTIFY that all attached analytical data are correct.

Signature Francis I. Daniels

Title Laboratory Director Date: June 17, 1997

COMPLIANCE INFORMATION (to be completed by State)

Sample Collection Satisfactory: ______________ Sample Analysis Satisfactory: ______________

Resample Requested for: ______________ Reason: ______________

Person notified to resample: ______________ Date Notified: ______________

DER/ACPHU Reviewing Official: ______________

Southern Analytical
Project No. 10997
April 17, 1997

istribution - Upstairs Ladies Locker Room Sink, Tiger Bay

INORGANIC ANALYSIS
62-550.310(1)
(PWS030)

Parameter ID	NAME (MCL mg/l)	Sample Number	Analysis Result (mg/l)	Analyt. Method	Analysis Date	MDL	Lab ID
1030	Lead (0.015)	10997-03	0.0054	SM 3113 B	6/13/97	0.001	84269

CERTIFICATION OF LEAD AND COPPER TAP SAMPLE COLLECTION METHODS

Water System Name: Tiger Bay Cogeneration Facility

System Type (Circle One): CWS or (NTNC)

Identification Number (PWS-ID): N/A -- New

Population Served:

Contact Person: J. D. Fellers

Contact Phone Number: 941/285-1200

Mailing Address: 3219 S.R. 630
Ft. Meade, FL

I certify that:

Each first draw tap sample for lead and copper is one liter in volume and has stood motionless in the plumbing system of each sampling site for at least six hours.

Each first draw sample collected from a single-family residence has been collected from the cold water kitchen tap or bathroom sink tap or routine drinking water source

Each first draw sample collected from a non-residential building has been collected at an interior tap from which water is typically drawn for consumption.

Each first draw sample collected during an annual or triennial monitoring period has been collected in the months of June, July, August, or September.

Each resident who volunteered to collect tap water samples from his or her home has been properly instructed in the proper methods for collecting lead and copper samples. I do not challenge the accuracy of those sampling results. Enclosed is a copy of the material distributed to residents explaining the proper collection methods, and a list of the residents who performed sampling.

SIGNATURE OF AUTHORIZED PWS REPRESENTATIVE: J. L. Stiteler

NAME (Please Print): J. L. Stiteler

TITLE: Chemist

DATE: 6/4/97

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SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

CHAIN of CUSTODY RECORD
Pg._____ of _____

Client Name: FPC
Phone:

Project Name / Location: TIGER BAY
Client Proj. No.:

Samplers: (Signature) Jim Stith

SAL Use Only: 10997
Proj. No.

PARAMETER / CONTAINER DESCRIPTION

Sample Nos.	Sample Description	Date	Time	Matrix (Water, Soil, Other)	Grab or Composite	1: Total Coliform	2: NO2 1LP Cool	3: NO3 500ml P, H_2SO_4	4: Pb 1LP HNO_3	5	6	7	8	No. of Containers (Total each Location)
01	WELL	6/4/97	13:45	W	G	✓ (2)								2
02	ENTRY TO DISTRIBUTION	6/4/97	13:35	W	G		✓ (1)	✓ (1)						2
03	DISTRIBUTION - LOCKER ROOM SINK (UPSTAIRS LADIES)	6/4/97	13:20	W	G	✓ (2)			✓ (1)					3
	Number of Containers (Total each aliquot)													7
	Item No.					1	2	3	4	5	6	7	8	Total Number of Containers Rec'd.

Item No.	Relinquished	Received	Seal Intact?
	Prepared Containers Relinquished By: P. Anderson Date: 5/30/97 Time: 1500	Received: Date: Time:	Yes No N/A
	Relinquished: Jim Stith Date: 6/4/97 Time: 1545	Received: Jia Goudlert Date: 6/4/97 Time: 1545	Yes No N/A
	Relinquished: Date: Time:	Received: Date: Time:	Yes No N/A
	Relinquished: Date: Time:	Received: Date: Time:	Yes No N/A

Instructions / Remarks:
1 Coliform bag (10997-01) broke.

SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

DRINKING WATER BACTERIOLOGICAL ANALYSIS

System Name: Florida Power Corporation I. D. No. N/A - New Phone No. 941-285-1200
Address: 3219 SR 630, Fort Meade, FL 33841 County: Polk DEP District:
Collector: Jim Stiteler/Florida Power Corporation Phone No. 352-563-2943x5170
Sample Site (Locality or Subdivision): Tiger Bay Cogeneration Facility
Date and Time Collected: 6/4/97, 1345

Type of Supply: Community Water Noncommunity Water Nontrans.-Noncommunity Water
Private Well Swimming Pool Bottled Water Other Public Water

Type of Sample: Compliance Repeat Replacement Main Clearance Well Survey
(Check Box) (Check Box) Other ________
[ ] Distribution [ ] TNTC or C (Specify)
[X] Raw [ ] Turbid

Remarks: Samples Received: 6/4/97, 1545 Analysis Date: 6/4/97, 1600

Analysis Method: MF MTF MMO-MUG PA

To Be Completed by Collector of Sample				To Be Completed By Lab				
Coll. No.	Sample Point (Specific Address)	Cl Res'd	pH	Sample No.	Non Coliform	Total	Confirm Total	Confirm Fecal(EColi)
	Well	0.0		10997-01		A		

U - Analyte was not detected; indicated concentration is method detection limit.
P - Coliforms are present C - Confluent growth TA - Turbid, Absence of gas or acid
A - Coliforms are absent TNTC - Too numerous to count

FHRS DW Lab No. 84269
SAL Project No. 10997
June 17, 1997

Francis I. Daniels
Laboratory Director

Name and Mailing Address of Person/Firm to Receive Report

Attn: Mr. Jim Stiteler
Florida Power Corp., MAC CN77
15760 W. Powerline St.
Crystal River, Florida 34428

( ) Satisfactory
( ) Incomplete Collection Information
( ) Repeat Samples
( ) Replacement Samples

Reviewing Official: ________
Title: ________

SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 813-855-1844

DRINKING WATER BACTERIOLOGICAL ANALYSIS

System Name: Florida Power Corporation I. D. No. N/A - New Phone No. 941-285-1200
Address: 3219 SR 630, Fort Meade, FL 33841 County: Polk DEP District: ______
Collector: Jim Stiteler/Florida Power Corporation Phone No. 352-563-2943x5170
Sample Site (Locality or Subdivision): Tiger Bay Cogeneration Facility
Date and Time Collected: 6/5/97, 1255

Type of Supply: Community Water Noncommunity Water Nontrans.-Noncommunity Water
Private Well Swimming Pool Bottled Water Other Public Water

Type of Sample: Compliance Repeat Replacement Main Clearance Well Survey
(Check Box) (Check Box) Other ______
[ ] Distribution [ ] TNTC or C (Specify)
[X] Raw [ ] Turbid

Remarks: Samples Received: 6/5/97, 1440 Analysis Date: 6/5/97, 1700

Analysis Method: ME MTF MMO-MUG PA

To Be Completed by Collector of Sample				To Be Completed By Lab				
Coll. No.	Sample Point (Specific Address)	Cl Res'd	pH	Sample No.	Non Coliform	Total	Confirm Total	Confirm Fecal(EColi)
	Well	0.0		11012-01		1 U		

U - Analyte was not detected; indicated concentration is method detection limit.
P - Coliforms are present C - Confluent growth TA - Turbid, Absence of gas or acid
A - Coliforms are absent TNTC - Too numerous to count

FHRS DW Lab No. 84269
SAL Project No. 11012
June 10, 1997

Francis I. Daniels
Francis I. Daniels
Laboratory Director

Name and Mailing Address of Person/Firm to Receive Report

Attn: Mr. Jim Stiteler
Florida Power Corp., MAC CN77
[illegible]0 W. Powerline St.
[illegible]stal River, Florida 34428

( ) Satisfactory
( ) Incomplete Collection Information
( ) Repeat Samples
( ) Replacement Samples

Reviewing Official: ______
Title: ______

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SOUTHERN ANALYTICAL LABORATORIES, INC.
110 BAYVIEW BOULEVARD, OLDSMAR, FLORIDA 34677 8[illegible]-855-1844

CHAIN of CUSTODY RECORD
Pg.____ of ____

Client Name: FPC
Phone:
Project Name / Location: TIGER BAY
Client Proj. No.:
Samplers: (Signature) Jim Still

SAL Use Only: 11012
Proj. No.

PARAMETER / CONTAINER DESCRIPTION

Sample Nos.	Sample Description	Date	Time	Matrix (Water, Soil, Other)	Grab or Composite	1: TOTAL COLIFORM	2	3	4	5	6	7	8	No. of Containers (Total each Location)
01	WELL	6/5/97	12:55	W	G	✓								
Number of Containers (Total each aliquot)														
Item No.						1	2	3	4	5	6	7	8	Total Number of Containers Rec'd.

Item No.	Prepared Containers Relinquished By / Relinquished	Received	Seal Intact?	Instructions / Remarks
	Prepared Containers Relinquished By: Anderson Date: 5/30/97 Time: 1500	Received: Date: Time:	Seal Intact? Yes No N/A	
	Relinquished: Jim Still Date: 6/5/97 Time: 1440	Received: Anderson Date: 6/5/97 Time: 1440	Seal Intact? Yes No N/A	
	Relinquished: Date: Time:	Received: Date: Time:	Seal Intact? Yes No N/A	
	Relinquished: Date: Time:	Received: Date: Time:	Seal Intact? Yes No N/A	

Florida Power CORPORATION

P. O. BOX 14042
ST. PETERSBURG, FL 33733-4042
(813) 866-5257

REMITTANCE ADVICE

89

CHECK DATE 06/06/97 VENDOR POLK COUNTY PUBLIC HEALTH VENDOR NO. 699744 CHECK NO. 1895898

INVOICE NO.	DATE	OUR ORDER NO.	VOUCHER	GROSS AMOUNT	DISCOUNT	NET AMOUNT
CK127548	06/04/97		9706194153	15.00	.00	15.00
					TOTAL	15.00

THE ATTACHED REMITTANCE IS IN FULL SETTLEMENT OF ACCOUNT AS STATED. IF NOT CORRECT PLEASE RETURN TO ABOVE ADDRESS.

Accounts Payable Department C2N
P.O. Box 14042
St. Petersburg, Fl 33733-4042

Florida Power CORPORATION

63-115
631

DATE 06/06/97 CHECK NO. 1895898

PAY: $15*DOLLARS AND 00 CENTS $*********15.00

SunTrust / Mid-Florida

Void after 60 days

TO THE ORDER OF
POLK COUNTY PUBLIC HEALTH
UNIT
2090 EAST CLOWER ST
BARTOW FL 33830

J. V. Smallwood
Treasurer

⑈1001895898⑈ ⑆063101153⑆699003205273611⑈

ATTACHMENT 3 - 6

EPA HAZARDOUS WASTE STATUS APPLICATION

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

July 24, 1997

JEFF FASSETT, ENV ENG
FLORIDA POWER CORP
3912 CR 630 W
FORT MEADE, FL 33841

DEP/EPA ID: FL0000443176
Location: 3912 CR 630 W , FORT MEADE

Based on information supplied by you, we have processed and accepted your request for the facility identified with the above DEP/EPA identification number to receive the following name change under RCRA:

FLORIDA POWER CORP

The status of your facility is:

Conditionally Exempt SQG

Please notify us in writing if there is any change in your operations which would affect your status. For further assistance, please call the Hazardous Waste Notification Coordinator at (904) 488-0300.

Sincerely,

Michael X. Redig

Michael X. Redig
Environmental Manager
Hazardous Waste Regulation Section

Site: 71777

Previous Facility Name: TIGER BAY CO GENERATOR FACILITY

Florida Department of
Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

REQUEST FOR STATUS OR INFORMATION CHANGE FOR HAZARDOUS WASTE GENERATORS, TRANSPORTERS, FACILITIES

This form may be used by hazardous waste generators, transporters, or treatment, storage, or disposal facilities in Florida to request a change in their status. The request is subject to verification by the Department.

BUSINESS EPA/DEP ID NUMBER F L 0 0 0 0 4 4 3 1 7 6

Check below if information has changed

BUSINESS NAME Florida Power Corporation ☒

LOCATION ADDRESS CITY, STATE Tiger Bay Cogeneration Facility, 3912 SR 630 W, Fort Meade, FL 33841

MAILING ADDRESS CITY, STATE, ZIP Florida Power Corporation 15760 W. powerline St. Crystal River, FL 34428-6708 ☒

CONTACT PERSON Jeff Fassett ☐

CONTACT TITLE Environmental Engineer

PHONE NUMBER 941 / 285-1200 ☐

PREVIOUS STATUS: Small Quantity Generator

IF YOUR CURRENT FACILITY STATUS IS:

- ____ LARGE QUANTITY GENERATOR
- ____ SMALL QUANTITY GENERATOR (SQG)
- x CONDITIONALLY EXEMPT SQG
- ____ TRANSPORTER
- ____ HAZARDOUS WASTE FUEL MARKETER/BURNER
- ____ USED OIL MARKETER/BURNER
- ____ TREATMENT FACILITY
- ____ STORAGE FACILITY
- ____ DISPOSAL FACILITY
- ____ MOVED*

PLEASE COMPLETE THE ATTACHED EPA FORM 8700-12 (NOTIFICATION OF REGULATED WASTE ACTIVITY) TO NOTIFY THE DEPARTMENT OF YOUR CURRENT STATUS (FLORIDA ADMINISTRATIVE CODE 17-730.150(5)).

* IF BUSINESS HAS MOVED, SUBMIT FORM 8700-12 FOR THE NEW BUSINESS LOCATION IF THE NEW LOCATION WILL BE INVOLVED IN HAZARDOUS WASTE MANAGEMENT ACTIVITIES.

OUT OF BUSINESS:

_____ Business closed on ___________ (Date)

NON-HANDLER STATUS

This status change is requested because:

__X__ Business no longer generates, transports, treats, stores, or disposes of hazardous waste.

_____ Waste generated by business has been delisted.

__X__ Other; explain: Transfer of facility operation to Florida Power Corporation

HAZARDOUS WASTE TRANSFER FACILITY STATUS

_____ Hazardous waste transfer facilities must also notify as a hazardous waste transporter and must comply with FAC 17-730.170 and 17-730.171.

Please attach any documentation or additional explanations and justification to support your request for a status change. You may be asked to submit additional infcmation.

I HEREBY CERTIFY THAT UNDER PENALTY OF LAW I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ATTACHMENTS AND THAT, BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE INFORMATION IS TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

W. Jeffrey Pardue, CEP — Director, Environmental Services Department

NAME — TITLE

WJPardue — 7/16/97

SIGNATURE — DATE

Please mail completed forms to :

Hazardous Waste Regulation Section
Florida DEP
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attachment: EPA Form 8700-12 and instructions

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved. OMB No. 2050-0028 Expires 9-30-96
GSA No. 0246-EPA-OT

Please refer to the Instructions for Filling Notification before completing this form. The information requested here is required by law (Section 3010 of the Resource Conservation and Recovery Act).

EPA

Notification of Regulated Waste Activity

United States Environmental Protection Agency

Date Received (For Official Use Only)

I. Installation's EPA ID Number *(Mark 'X' in the appropriate box)*

A. First Notification [ ]

B. Subsequent Notification *(Complete item C)* [x]

C. Installation's EPA ID Number: F L 0 0 0 0 4 4 3 1 7 6

II. Name of Installation *(Include company and specific site name)*

FLORIDA POWER CORP TIGER BAY

III. Location of Installation *(Physical address not P.O. Box or Route Number)*

Street: 3912 SR 630 WEST

Street *(Continued)*:

City or Town	State	Zip Code
FORT MEADE	FL	33841 -

County Code	County Name
	POLK

IV. Installation Mailing Address *(See Instructions)*

Street or P.O. Box: 15760 WEST POWERLINE STREET

City or Town	State	Zip Code
CRYSTAL RIVER	FL	34428 - 6708

V. Installation Contact *(Person to be contacted regarding waste activities at site)*

Name *(Last)*	*(First)*
FASSETT	JEFF

Job Title	Phone Number *(Area Code and Number)*
ENVIRON. ENGINEE	941 - 285 - 1200

VI. Installation Contact Address *(See Instructions)*

A. Contact Address: Location	Mailing	Other	B. Street or P.O. Box
x			3912 SR 630 WEST

City or Town	State	Zip Code
FORT MEADE	FL	33841 -

VII. Ownership *(See Instructions)*

A. Name of Installation's Legal Owner: FLORIDA POWER CORPORATION

Street, P.O. Box, of Route Number: P.O. BOX 14042

City or Town	State	Zip Code
ST PETERSBURG	FL	33733 -

Phone Number *(Area Code and Number)*	B. Land Type	C. Owner Type	D. Change of Owner Indicator: Yes	No	(Date Changed) Month	Day	Year
813 - 866 - 5151	P	P	x		07	15	97

EPA Form 8700-12 (Rev. 11-30-93) Previous edition is obsolete.

Continued on Reverse

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved, OMB No. 2050-0028 Expires 9-30-96
GSA No. 0246-EPA-OT

ID - For Official Use Only

VIII. Type of Regulated Waste Activity *(Mark 'X' in the appropriate boxes; Refer to instructions)*

A. Hazardous Waste Activity

1. Generator (See Instructions)
   - [ ] a. Greater than 1000kg/mo (2,200 lbs.)
   - [ ] b. 100 to 1000 kg/mo (200-2,200 lbs.)
   - [x] c. Less than 100 kg/mo (220 lbs)
2. Transporter (Indicate Mode in boxes 1-5 below)
   - [ ] a. For own waste only
   - [ ] b. For commercial purposes

Mode of Transportation
- [ ] 1. Air
- [ ] 2. Rail
- [ ] 3. Highway
- [ ] 4. Water
- [ ] *5. Other - specify*

- [ ] 3. Treater, Storer, Disposer (at Installation) Note: A permit is required for this activity; see instructions.

4. Hazardous Waste Fuel
   - [ ] a. Generator Marketing to Burner
   - [ ] b. Other Marketers
   - [ ] c. Boiler and/or Industrial Furnace
     - [ ] 1. Smelter Deferral
     - [ ] 2. Small Quantity Exemption

   Indicate Type of Combustion Device(s)
   - [ ] 1. Utility Boiler
   - [ ] 2. Industrial Boiler
   - [ ] 3. Industrial Furnace
- [ ] 5. Underground Injection Control

B. Used Oil Recycling Activities

1. Used Oil Fuel Marketer
   - [ ] a. Marketer Directs Shipment of Used Oil to Off-Specification Burner
   - [ ] b. Marketer Who First Claims the Used Oil Meets the Specifications
2. Used Oil Burner - Indicate Type(s) of Combustion Device(s)
   - [ ] a. Utility Boiler
   - [ ] b. Industrial Boiler
   - [ ] c. Industrial Furnace
3. Used Oil Transporter - Indicate Type(s) of Activity(ies)
   - [ ] a. Transporter
   - [ ] b. Transfer Facility
4. Used Oil Processor/Re-refiner - Indicate Type(s) of Activity(ies)
   - [ ] a. Process
   - [ ] b. Re-refine

IX. Description of Hazardous Wastes *(Use additional sheets if necessary)*

A. Characteristics of Nonlisted Hazardous Wastes. *(Mark 'X' in the boxes corresponding to the characteristics of nonlisted hazardous wastes your installation handles; See 40 CFR Parts 261.20 - 261.24)*

1. Ignitable *(D001)*	2. Corrosive *(D002)*	3. Reactive *(D003)*	4. Toxicity Characteristic	(List specific EPA hazardous waste number(s) for the Toxicity characteristic contaminant(s))

B. Listed Hazardous Wastes. *(See 40 CFR 261.31 - 33; See instructions if you need to list more than 12 waste codes.)*

1	2	3	4	5	6
7	8	9	10	11	12

C. Other Wastes. *(State or other wastes requiring a handler to have an I.D. number; See instructions.)*

1	2	3	4	5	6

X. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature	Name and Official Title *(Type or print)*	Date Signed
JH Pardue	W. Jeffrey Pardue, CEP Director, Environmental Services	7/16/97

XI. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. *(See Section III of the booklet for addresses.)*

ATTACHMENT 5 - 1

FDEP PSD APPLICATION

DESTEC ENGINEERING

HOUSTON, TEXAS

June 12, 1992

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)

12018C1/NKC1

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL 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.

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 Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
	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] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/hr	Potential[4] Emission T/yr	Relate to Flow Diagram
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.

BEST AVAILABLE COPY

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.

er 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 0 (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. ______

ufacturer ______

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 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.

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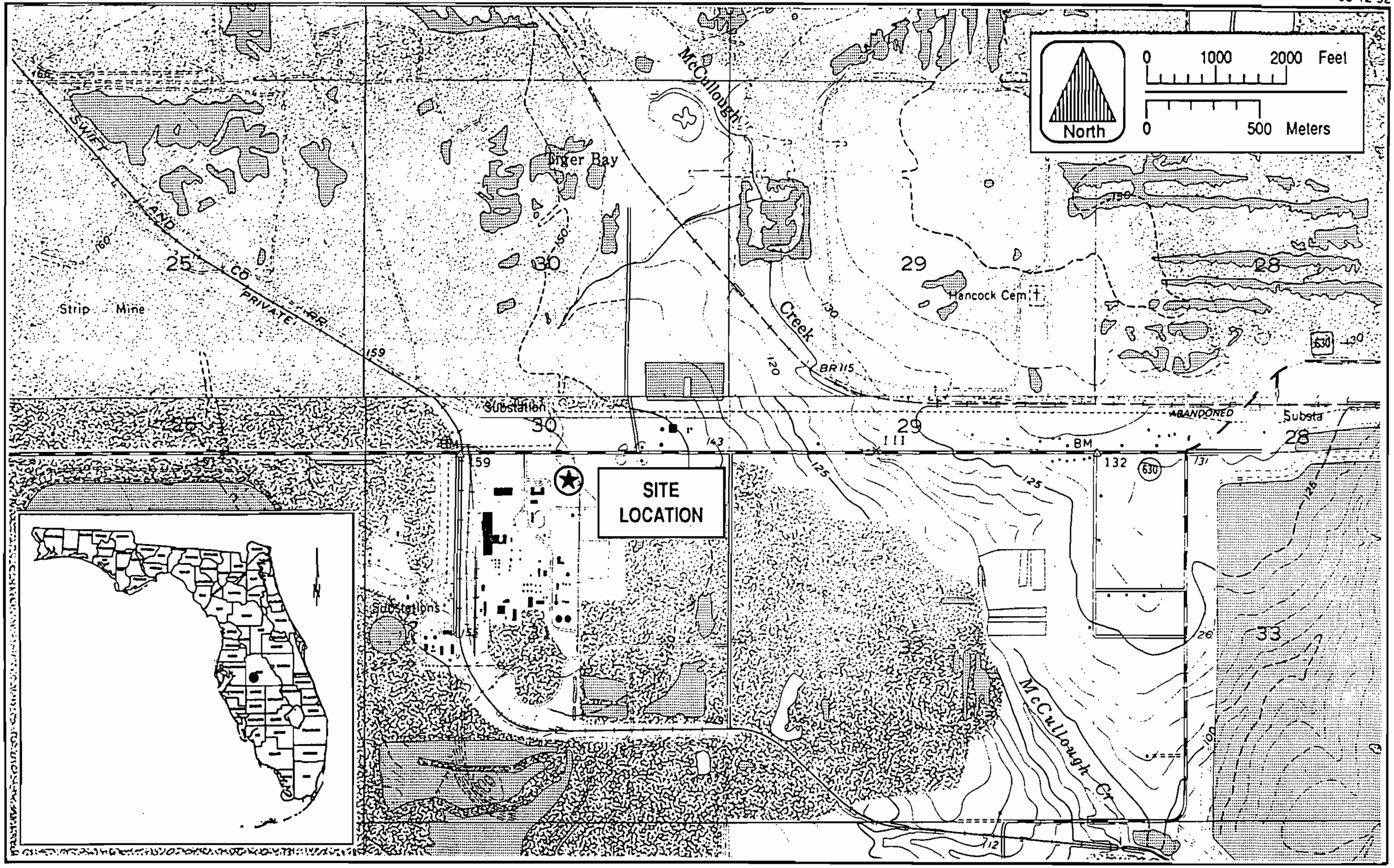


Figure 1-1 CENTRAL FLORIDA LIMITED PROJECT LOCATION MAP

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

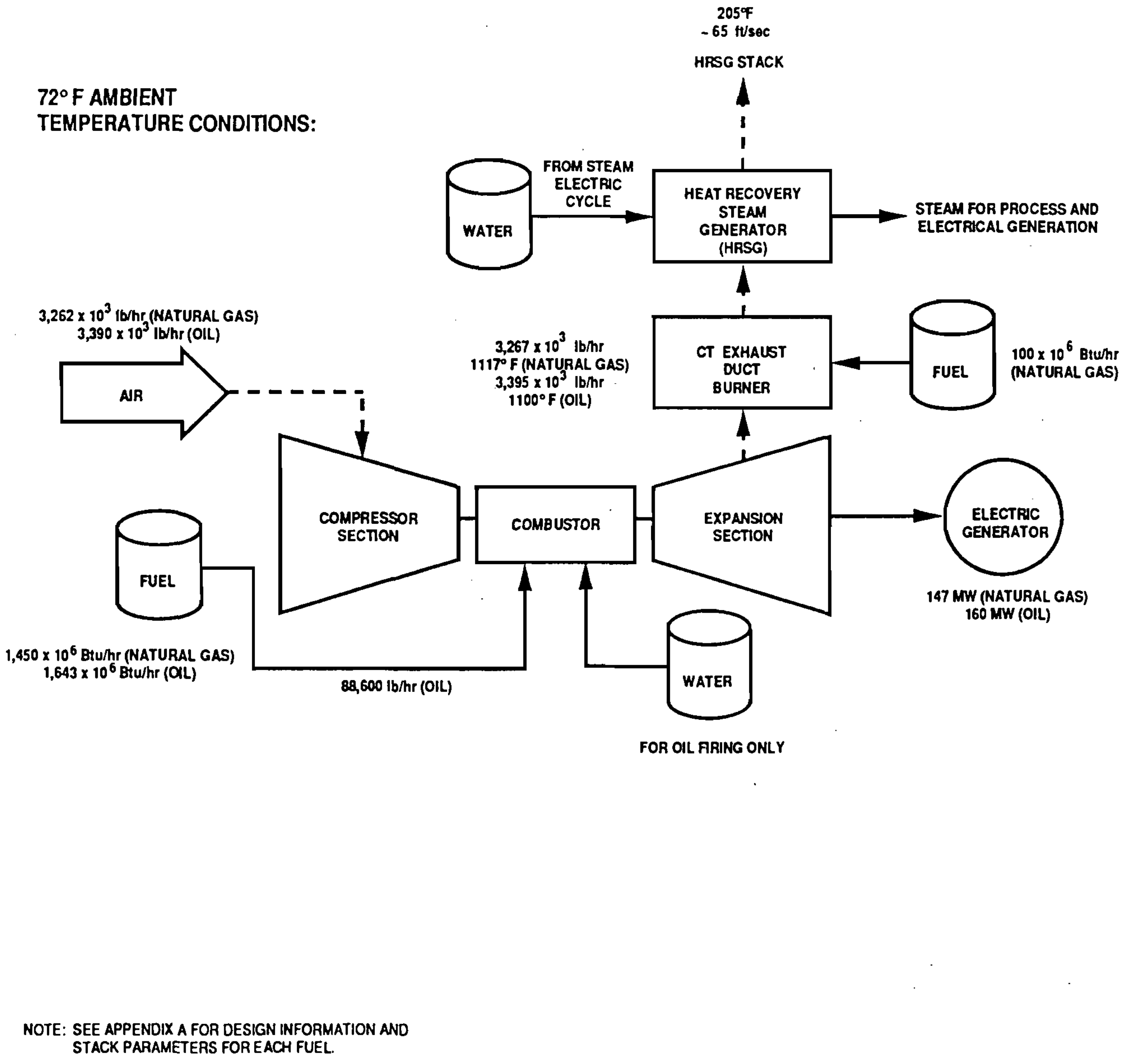


Figure 2-1 SIMPLIFIED FLOW DIAGRAM OF PROPOSED CENTRAL FLORIDA COGENERATION POWER PLANT

KBN

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

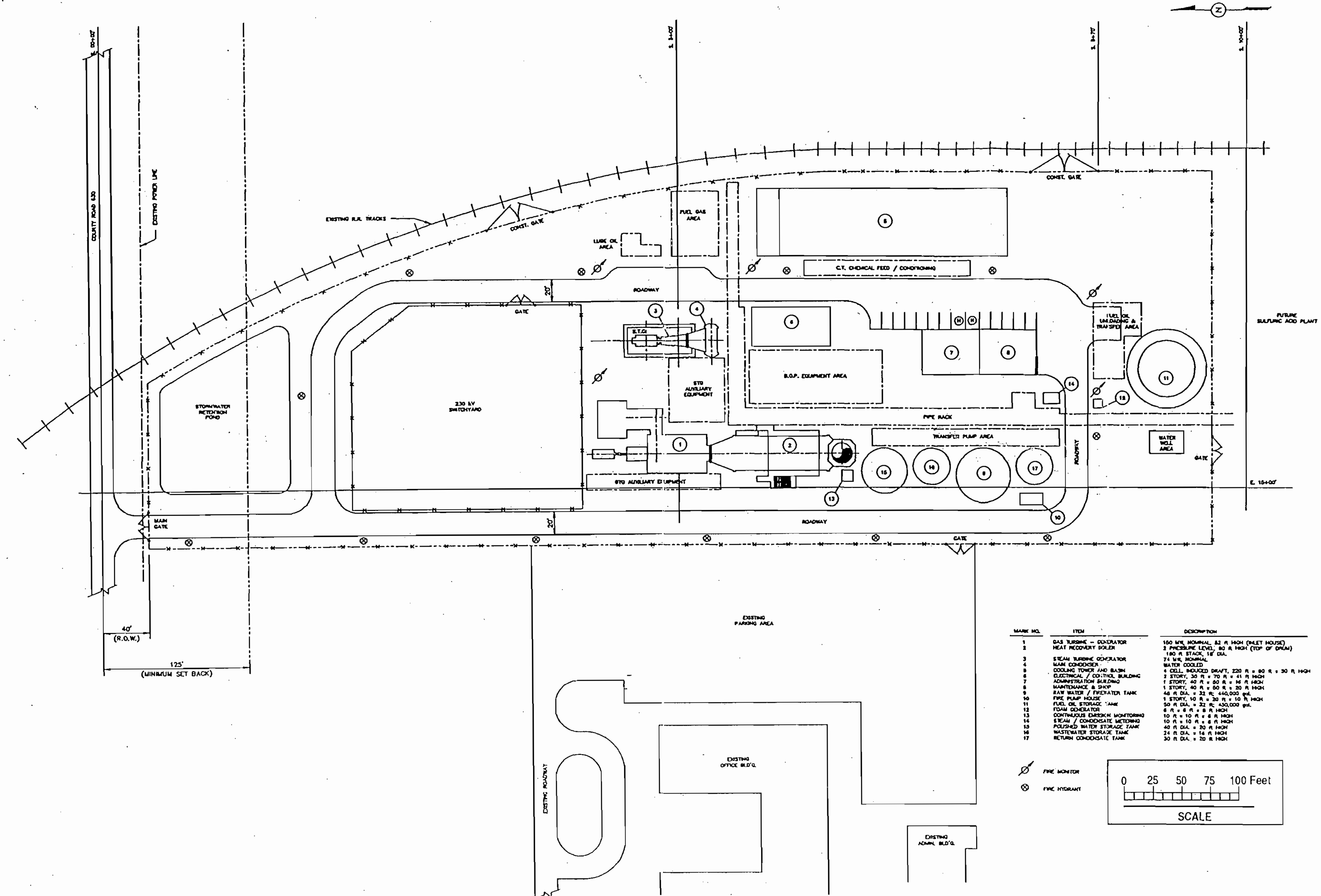
	Emissions[a] (Natural Gas Firing Only)
Maximum Hourly Emissions (lb/hr)[c]:	
SO_2	0.30
PM	1.00
NO_x	10.0
CO	10.0
VOC	2.90
Pb	Neg.
Sulfuric Acid Mist	0.0388
F	Neg.
Be	Neg.
Hg	Neg.
As	Neg.
Maximum Annual Emissions (TPY)[c]:	
SO_2	1.32
PM	4.38
NO_x	43.8
CO	43.8
VOC	12.7
Pb	Neg.
Sulfuric Acid Mist	0.170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



MARK NO.	ITEM	DESCRIPTION
1	GAS TURBINE – GENERATOR	160 MW, NOMINAL, 82 ft HIGH (INLET HOUSE)
2	HEAT RECOVERY BOILER	2 PRESSURE LEVEL, 80 ft HIGH (TOP OF DRUM) 180 ft STACK, 18' DIA.
3	STEAM TURBINE GENERATOR	74 MW, NOMINAL
4	MAIN CONDENSER	WATER COOLED
5	COOLING TOWER AND BASIN	4 CELL, INDUCED DRAFT, 220 ft x 60 ft x 30 ft HIGH
6	ELECTRICAL / CONTROL BUILDING	2 STORY, 35 ft x 70 ft x 41 ft HIGH
7	ADMINISTRATION BUILDING	1 STORY, 40 ft x 60 ft x 16 ft HIGH
8	MAINTENANCE & SHOP	1 STORY, 40 ft x 60 ft x 20 ft HIGH
9	RAW WATER / FIREWATER TANK	48 ft DIA. x 32 ft; 440,000 gal.
10	FIRE PUMP HOUSE	1 STORY, 10 ft x 20 ft x 10 ft HIGH
11	FUEL OIL STORAGE TANK	50 ft DIA. x 32 ft; 430,000 gal.
12	FOAM GENERATOR	6 ft x 6 ft x 8 ft HIGH
13	CONTINUOUS EMISSION MONITORING	10 ft x 10 ft x 6 ft HIGH
14	STEAM / CONDENSATE METERING	10 ft x 10 ft x 6 ft HIGH
15	POLISHED WATER STORAGE TANK	40 ft DIA. x 20 ft HIGH
16	WASTEWATER STORAGE TANK	24 ft DIA. x 14 ft HIGH
17	RETURN CONDENSATE TANK	30 ft DIA. x 20 ft HIGH

Figure 2-2 PLOT PLAN

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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

	Concentration ($\mu g/m^3$)	
Pollutant	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 ($\mu g/m^3$) 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/10^6Btu (HHV) heat input and CO emission rates will not exceed 0.1 lb/10^6Btu. 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 Impacts Analysis

Economic--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.

Environmental--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			Project Without SCR	
	Primary	Secondary[a]	Total	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	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 x 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

	Maximum Emission Rate (lb/hr)[a]			
	100% Load		70% Load	
Parameter	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

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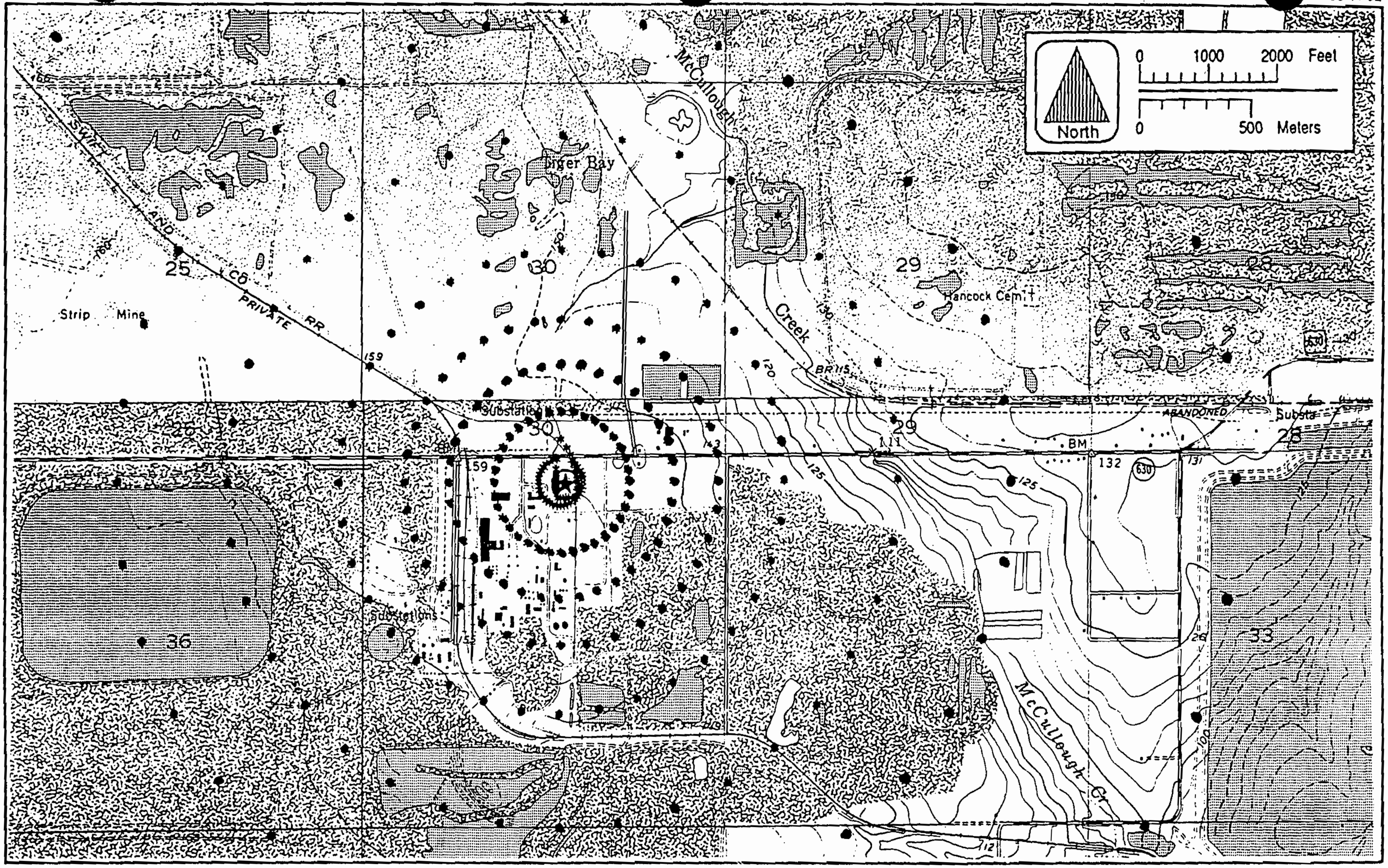

Figure 6-1 RECEPTOR LOCATIONS USED IN THE AIR QUALITY IMPACT ANALYSIS NEAR THE PROPOSED FACILITY

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.

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

Operating Load (Percent)	Ambient Temperature (°F)	Exit Velocity (ft/s)	Averaging Period	Generic Concentration ($\mu g/m^3$)[a]	Location and Time Period of Maximum Concentration: Receptor Location		Time Period			
					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 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

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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APPENDIX A

EMISSION CALCULATIONS

Table A-1. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, Base Load

Data	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A	B	C	D	E	F
General:					
Power (kW)	183,700.0		159,200.0		142,500.0
Heat Rate (Btu/kwh)	10,070.0		10,320.0		10,650.0
Heat Input (mmBtu/hr)	1,849.9		1,642.9		1,517.6
Fuel Oil (lb/hr)	99,722.9		88,568.4		81,812.7
Fuel:					
Heat Content,LHV (Btu/lb)	18,550		18,550		18,550
CT Exhaust:					
Volume Flow (acfm)	2,450,287		2,288,314		2,190,589
Volume Flow (scfm)	851,152		773,514		728,816
Mass Flow (lb/hr)	3,743,000		3,390,000		3,189,000
Temperature (oF)	1,060		1,102		1,127
Moisture (% Vol.)	11.59		12.40		12.71
Oxygen (% Vol.)	10.96		10.95		11.03
Molecular Weight	28.25		28.15		28.10
Water Injected (lb/hr)	135,390		107,070		92,890
HRSG Stack (without duct burner):					
Volume Flow (acfm)	1,072,001		974,218		917,922
Temperature (oF)	205		205		205
Diameter (ft)	18.0		18.0		18.0
Velocity (ft/sec)	70.2		63.8		60.1
Stack Height (ft)	180		180		180

Source: General Electric, 1992.

Table A-2. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, Base Load

Pollutant	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
Hours of Operation	300		300		300
Particulate					
Basis, lb/hr (1)	17.0		17.0		17.0
lb/hr	17.0		17.0		17.0
TPY	2.6		2.6		2.6
Sulfur Dioxide					
Basis, % sulfur	0.05		0.05		0.05
lb/hr	99.72		88.57		81.81
TPY	15.0		13.3		12.3
Nitrogen Oxides					
Basis, ppm* (1)	42.0		42.0		42.0
lb/hr	326.2		290.2		268.0
TPY	48.9		43.5		40.2
Carbon Monoxide					
Basis, ppm+ (1)	30.0		30.0		30.0
lb/hr	98.4		88.6		83.2
TPY	14.8		13.3		12.5
VOCs (as methane)					
Basis, ppm+ (1)	4.0		3.9		4.1
lb/hr	7.50		6.58		6.50
TPY	1.1		1.0		1.0
Lead					
Basis, lb/10E+12 Btu (2)	8.9		8.9		8.9
lb/hr	1.65E-02		1.46E-02		1.35E-02
TPY	2.47E-03		2.19E-03		2.03E-03

* corrected to 15% O2 dry conditions
\+ corrected to dry conditions

Source: (1) General Electric, 1992; (2) EPA, 1990

Table A-3. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, Base Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Arsenic	lb/10E+12 Btu (1)	4.2		4.2		4.2
	lb/hr	7.77E-03		6.90E-03		6.37E-03
	TPY	1.17E-03		1.04E-03		9.56E-04
Beryllium	lb/10E+12 Btu (1)	2.5		2.5		2.5
	lb/hr	4.62E-03		4.11E-03		3.79E-03
	TPY	6.94E-04		6.16E-04		5.69E-04
Mercury	lb/10E+12 Btu (1)	3		3		3
	lb/hr	5.55E-03		4.93E-03		4.55E-03
	TPY	8.32E-04		7.39E-04		6.83E-04
Fluoride	pg/J (2)	14		14		14
	lb/hr	6.02E-02		5.35E-02		4.94E-02
	TPY	9.03E-03		8.02E-03		7.41E-03
Sulfuric Acid	% of SO2	8		8		8
Mist	lb/hr	1.22E+01		1.08E+01		1.00E+01
	TPY	1.83E+00		1.63E+00		1.50E+00

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1990; (2) EPA, 1981

Table A-4. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, Base Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Manganese	lb/10E+12 Btu (1)	14		14		14
	lb/hr	2.59E-02		2.30E-02		2.12E-02
	TPY	3.88E-03		3.45E-03		3.19E-03
Nickel	lb/10E+12 Btu (1)	170		170		170
	lb/hr	3.14E-01		2.79E-01		2.58E-01
	TPY	4.72E-02		4.19E-02		3.87E-02
Cadmium	lb/10E+12 Btu (1)	10.5		10.5		10.5
	lb/hr	1.94E-02		1.73E-02		1.59E-02
	TPY	2.91E-03		2.59E-03		2.39E-03
Chromium	lb/10E+12 Btu (1)	47.5		47.5		47.5
	lb/hr	8.79E-02		7.80E-02		7.21E-02
	TPY	1.32E-02		1.17E-02		1.08E-02
Copper	lb/10E+12 Btu (1)	280		280		280
	lb/hr	5.18E-01		4.60E-01		4.25E-01
	TPY	7.77E-02		6.90E-02		6.37E-02
Vanadium	lb/10E+12 Btu (1)	69.5		69.5		69.5
	lb/hr	1.29E-01		1.14E-01		1.05E-01
	TPY	1.93E-02		1.71E-02		1.58E-02
Selenium	lb/10E+12 Btu (1)	23.42		23.42		23.42
	lb/hr	4.33E-02		3.85E-02		3.55E-02
	TPY	6.50E-03		5.77E-03		5.33E-03
Polycyclic	lb/10E+12 Btu (1)	0.278		0.278		0.278
Organic	lb/hr	5.14E-04		4.57E-04		4.22E-04
Matter	TPY	7.71E-05		6.85E-05		6.33E-05
Formaldehyde	lb/10E+12 Btu (1)	405		405		405
	lb/hr	7.49E-01		6.65E-01		6.15E-01
	TPY	1.12E-01		9.98E-02		9.22E-02
Carbon	% Exhaust Gas	5.32		5.21		5.11
Dioxide	lb/hr	3.10E+05		2.76E+05		2.55E+05
	TPY	4.65E+04		4.14E+04		3.83E+04

Source: (1) EPA, 1990

Table A-5. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, Base Load

Pollutant		Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Antimony	pg/J (1)	9.4		9.4		9.4
	lb/hr	4.04E-02		3.59E-02		3.32E-02
	TPY	6.06E-03		5.38E-03		4.97E-03
Barium	pg/J (1)	8.4		8.4		8.4
	lb/hr	3.61E-02		3.21E-02		2.96E-02
	TPY	5.42E-03		4.81E-03		4.44E-03
Cobalt	pg/J (1)	3.9		3.9		3.9
	lb/hr	1.68E-02		1.49E-02		1.38E-02
	TPY	2.51E-03		2.23E-03		2.06E-03
Zinc	pg/J (1)	294		294		294
	lb/hr	1.26E+00		1.12E+00		1.04E+00
	TPY	1.90E-01		1.68E-01		1.56E-01
Chlorine	ppm	0.5		0.5		0.5
	lb/hr	4.99E-02		4.43E-02		4.09E-02
	TPY	7.48E-03		6.64E-03		6.14E-03

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1979

Table A-6. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, Base Load

Data	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	170,700.0	151,900.0	147,100.0	142,700.0	131,800.0
Heat Rate (Btu/kwh)	9,460.0	9,750.0	9,860.0	9,970.0	10,230.0
Heat Input (mmBtu/hr)	1,614.8	1,481.0	1,450.4	1,422.7	1,348.3
Natural Gas (lb/hr)	75,055.6	68,836.9	67,413.7	66,126.8	62,668.6
(cf/hr)	1,699,813	1,558,974	1,526,743	1,497,599	1,419,278
Fuel:					
Heat Content, LHV (Btu/lb)	21,515	21,515	21,515	21,515	21,515
(Btu/cf)	950	950	950	950	950
CT Exhaust:					
Volume Flow (acfm)	2,354,349	2,239,805	2,212,530	2,188,744	2,123,643
Volume Flow (scfm)	808,255	753,259	740,784	729,581	700,802
Mass Flow (lb/hr)	3,582,000	3,322,000	3,262,000	3,202,000	3,077,000
Temperature (oF)	1,078	1,110	1,117	1,124	1,140
Moisture (% Vol.)	7.61	8.83	9.21	10.05	9.91
Oxygen (% Vol.)	12.71	12.56	12.51	12.36	12.48
Molecular Weight	28.46	28.33	28.28	28.19	28.20
HRSG Stack (without duct burner):					
Volume Flow (acfm)	1,017,973	948,707	932,995	918,885	882,639
Temperature (oF)	205	205	205	205	205
Diameter (ft)	18.0	18.0	18.0	18.0	18.0
Velocity (ft/sec)	66.7	62.1	61.1	60.2	57.8
Stack Height (ft)	180	180	180	180	180

Source: General Electric, 1992.

Table A-7. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, Base Load

Pollutant	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
Hours of Operation	8460	8460	8460	8460	8460
Particulate					
Basis, lb/hr (1)	9.00	9.00	9.00	9.00	9.00
lb/hr	9.00	9.00	9.00	9.00	9.00
TPY	38.07	38.07	38.07	38.07	38.07
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	4.86	4.45	4.36	4.28	4.06
TPY	20.54	18.84	18.45	18.10	17.15
Nitrogen Oxides					
Basis, ppm* (1)	25.0	25.0	25.0	25.0	25.0
lb/hr	161.9	148.5	145.3	142.6	135.0
TPY	684.72	627.98	614.78	603.09	571.14
Carbon Monoxide					
Basis, ppm+ (1)	15.0	15.0	15.0	15.0	15.0
lb/hr	48.8	44.9	44.0	42.9	41.3
TPY	206.55	189.96	186.03	181.52	174.63
VOCs (as methane)					
Basis, ppm+ (1)	1.5	1.5	1.5	1.6	1.5
lb/hr	2.79	2.57	2.55	2.62	2.36
TPY	11.80	10.85	10.77	11.06	9.98
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

* corrected to 15% O2 dry conditions
\+ corrected to dry conditions

Source: General Electric, 1992.

Table A-8. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, Base Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	6.26E-01	5.74E-01	5.62E-01	5.52E-01	5.23E-01
	TPY	2.65E+00	2.43E+00	2.38E+00	2.33E+00	2.21E+00

Source: EPA, 1990

Table A-9. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, Base Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.80E-03	1.65E-03	1.61E-03	1.58E-03	1.50E-03
Matter	TPY	7.60E-03	6.97E-03	6.83E-03	6.70E-03	6.35E-03
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	1.42E-01	1.31E-01	1.28E-01	1.25E-01	1.19E-01
	TPY	6.02E-01	5.52E-01	5.41E-01	5.30E-01	5.03E-01
Carbon	% Exhaust Gas	3.74	3.68	3.66	3.65	3.6
Dioxide	lb/hr	2.07E+05	1.90E+05	1.86E+05	1.82E+05	1.73E+05
	TPY	8.76E+05	8.03E+05	7.86E+05	7.72E+05	7.31E+05

Source: (1) EPA, 1990

Table A-10. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, Base Load

Pollutant		Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Antimony	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Barium	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cobalt	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Zinc	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chlorine	ppm	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.

Table A-11. Design Information for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Data	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	NA	NA	NA	NA	NA
Heat Rate (Btu/kwh)	NA	NA	NA	NA	NA
Heat Input (mmBtu/hr)	100.0	100.0	100.0	100.0	100.0
Natural Gas (lb/hr)	4,194.8	4,194.8	4,194.8	4,194.8	4,194.8
(cf/hr)	105,263	105,263	105,263	105,263	105,263
Fuel:					
Heat Content, LHV (Btu/lb)	23,839	23,839	23,839	23,839	23,839
(Btu/cf)	950	950	950	950	950
DB Exhaust:					
Volume Flow (acfm)	1,515	1,515	1,515	1,515	1,515
Volume Flow (scfm)	1,203	1,203	1,203	1,203	1,203
Mass Flow (lb/hr)	5,244	5,244	5,244	5,244	5,244
Temperature (oF)	205	205	205	205	205
Moisture (% Vol.)					
Oxygen (% Vol.)					
Molecular Weight	28.00	28.00	28.00	28.00	28.00
HRSG Stack:					
Volume Flow (acfm)	NA	NA	NA	NA	NA
Temperature (oF)	NA	NA	NA	NA	NA
Diameter (ft)	NA	NA	NA	NA	NA
Velocity (ft/sec)	NA	NA	NA	NA	NA
Stack Height (ft)	NA	NA	NA	NA	NA

Source: Destec Engineering, Inc., 1992

Table A-12. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
Hours of Operation	8760	8760	8760	8760	8760
Particulate					
Basis, lb/MMBtu	0.01	0.01	0.01	0.01	0.01
lb/hr	1.00	1.00	1.00	1.00	1.00
TPY	4.38	4.38	4.38	4.38	4.38
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	0.30	0.30	0.30	0.30	0.30
TPY	1.32	1.32	1.32	1.32	1.32
Nitrogen Oxides					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
Carbon Monoxide					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
VOCs					
Basis, lb/MMBtu	0.029	0.029	0.029	0.029	0.029
lb/hr	2.90	2.90	2.90	2.90	2.90
TPY	12.70	12.70	12.70	12.70	12.70
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

Table A-13. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02
	TPY	1.70E-01	1.70E-01	1.70E-01	1.70E-01	1.70E-01

Source: EPA, 1990

Table A-14. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.11E-04	1.11E-04	1.11E-04	1.11E-04	1.11E-04
Matter	TPY	4.87E-04	4.87E-04	4.87E-04	4.87E-04	4.87E-04
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
	TPY	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
Carbon	% Exhaust Gas	3.74	3.68	3.66	3.65	3.6
Dioxide	lb/hr	3.08E+02	3.03E+02	3.02E+02	3.01E+02	2.97E+02
	TPY	1.35E+03	1.33E+03	1.32E+03	1.32E+03	1.30E+03

Source: (1) EPA, 1990

Table A-15. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility- GE PG7221(FA), Dry Low NOx II Combustion System, Base Load and Duct Burner

Pollutant	Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Hours of Operation		300			8460			8760				
Particulate:												
lb/hr	17.00	17.00	17.00	9.00	9.00	9.00	1.00	1.00	1.00	18.00	18.00	18.00
TPY	2.55	2.55	2.55	38.07	38.07	38.07	4.38	4.38	4.38	45.00	45.00	45.00
Sulfur Dioxide:												
lb/hr	99.72	88.57	81.81	4.86	4.36	4.06	0.30	0.30	0.30	100.02	88.87	82.11
TPY	14.96	13.29	12.27	20.54	18.45	17.15	1.32	1.32	1.32	36.82	33.05	30.74
Nitrogen Oxides:												
lb/hr	326.22	290.19	268.04	161.87	145.34	135.02	10.00	10.00	10.00	336.22	300.19	278.04
TPY	48.93	43.53	40.21	684.72	614.78	571.14	43.80	43.80	43.80	777.46	702.11	655.15
Carbon Monoxide:												
lb/hr	98.41	88.62	83.20	48.83	43.98	41.28	10.00	10.00	10.00	108.41	98.62	93.20
TPY	14.76	13.29	12.48	206.55	186.03	174.63	43.80	43.80	43.80	265.12	243.12	230.91
VOCs (as methane):												
lb/hr	7.50	6.58	6.50	2.79	2.55	2.36	2.90	2.90	2.90	10.40	9.48	9.40
TPY	1.12	0.99	0.97	11.80	10.77	9.98	12.70	12.70	12.70	25.63	24.46	23.66
Lead:												
lb/hr	1.65E-02	1.46E-02	1.35E-02	NA	NA	NA	NA	NA	NA	1.65E-02	1.46E-02	1.35E-02
TPY	2.47E-03	2.19E-03	2.03E-03	NA	NA	NA	NA	NA	NA	2.47E-03	2.19E-03	2.03E-03

Table A-16. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
GE PG7221(FA), Dry Low NOx II Combustion System, Base Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Arsenic													
	lb/hr	7.77E-03	6.90E-03	6.37E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.77E-03	6.90E-03	6.37E-03
	TPY	1.17E-03	1.04E-03	9.56E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.17E-03	1.04E-03	9.56E-04
Beryllium													
	lb/hr	4.62E-03	4.11E-03	3.79E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.62E-03	4.11E-03	3.79E-03
	TPY	6.94E-04	6.16E-04	5.69E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.94E-04	6.16E-04	5.69E-04
Mercury													
	lb/hr	5.55E-03	4.93E-03	4.55E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.55E-03	4.93E-03	4.55E-03
	TPY	8.32E-04	7.39E-04	6.83E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	8.32E-04	7.39E-04	6.83E-04
Fluoride													
	lb/hr	6.02E-02	5.35E-02	4.94E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.02E-02	5.35E-02	4.94E-02
	TPY	9.03E-03	8.02E-03	7.41E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	9.03E-03	8.02E-03	7.41E-03
Sulfuric Acid Mist	lb/hr	1.22E+01	1.08E+01	1.00E+01	6.26E-01	5.62E-01	5.23E-01	3.88E-02	3.88E-02	3.88E-02	1.23E+01	1.09E+01	1.01E+01
	TPY	1.83E+00	1.63E+00	1.50E+00	2.65E+00	2.38E+00	2.21E+00	1.70E-01	1.70E-01	1.70E-01	4.65E+00	4.18E+00	3.89E+00

Table A-17. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Base Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Manganese	lb/hr	2.59E-02	2.30E-02	2.12E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.59E-02	2.30E-02	2.12E-02
	TPY	3.88E-03	3.45E-03	3.19E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.88E-03	3.45E-03	3.19E-03
Nickel	lb/hr	3.14E-01	2.79E-01	2.58E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.14E-01	2.79E-01	2.58E-01
	TPY	4.72E-02	4.19E-02	3.87E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.72E-02	4.19E-02	3.87E-02
Cadmium	lb/hr	1.94E-02	1.73E-02	1.59E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.94E-02	1.73E-02	1.59E-02
	TPY	2.91E-03	2.59E-03	2.39E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.91E-03	2.59E-03	2.39E-03
Chromium	lb/hr	8.79E-02	7.80E-02	7.21E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	8.79E-02	7.80E-02	7.21E-02
	TPY	1.32E-02	1.17E-02	1.08E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.32E-02	1.17E-02	1.08E-02
Copper	lb/hr	5.18E-01	4.60E-01	4.25E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.18E-01	4.60E-01	4.25E-01
	TPY	7.77E-02	6.90E-02	6.37E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.77E-02	6.90E-02	6.37E-02
Vanadium	lb/hr	1.29E-01	1.14E-01	1.05E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.29E-01	1.14E-01	1.05E-01
	TPY	1.93E-02	1.71E-02	1.58E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.93E-02	1.71E-02	1.58E-02
Selenium	lb/hr	4.33E-02	3.85E-02	3.55E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.33E-02	3.85E-02	3.55E-02
	TPY	6.50E-03	5.77E-03	5.33E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.50E-03	5.77E-03	5.33E-03
Polycyclic Organic Matter	lb/hr	5.14E-04	4.57E-04	4.22E-04	1.80E-03	1.61E-03	1.50E-03	1.11E-04	1.11E-04	1.11E-04	1.91E-03	1.73E-03	1.61E-03
	TPY	7.71E-05	6.85E-05	6.33E-05	7.60E-03	6.83E-03	6.35E-03	4.87E-04	4.87E-04	4.87E-04	8.17E-03	7.38E-03	6.90E-03
Formaldehyde	lb/hr	7.49E-01	6.65E-01	6.15E-01	1.42E-01	1.28E-01	1.19E-01	8.81E-03	8.81E-03	8.81E-03	7.58E-01	6.74E-01	6.23E-01
	TPY	1.12E-01	9.98E-02	9.22E-02	6.02E-01	5.41E-01	5.03E-01	3.86E-02	3.86E-02	3.86E-02	7.53E-01	6.79E-01	6.33E-01
Carbon Dioxide	lb/hr	3.10E+05	2.76E+05	2.55E+05	2.07E+05	1.86E+05	1.73E+05	3.08E+02	3.02E+02	2.97E+02	3.11E+05	2.76E+05	2.55E+05
	TPY	4.65E+04	4.14E+04	3.83E+04	8.76E+05	7.86E+05	7.31E+05	1.35E+03	1.32E+03	1.30E+03	9.24E+05	8.29E+05	7.71E+05

Table A-18. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- GE PG7221(FA), Dry Low NOx II Combustion System, Base Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Antimony													
	lb/hr	4.04E-02	3.59E-02	3.32E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	4.04E-02	3.59E-02	3.32E-02
	TPY	6.06E-03	5.38E-03	4.97E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	6.06E-03	5.38E-03	4.97E-03
Barium													
	lb/hr	3.61E-02	3.21E-02	2.96E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	3.61E-02	3.21E-02	2.96E-02
	TPY	5.42E-03	4.81E-03	4.44E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	5.42E-03	4.81E-03	4.44E-03
Cobalt													
	lb/hr	1.68E-02	1.49E-02	1.38E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.68E-02	1.49E-02	1.38E-02
	TPY	2.51E-03	2.23E-03	2.06E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	2.51E-03	2.23E-03	2.06E-03
Zinc													
	lb/hr	1.26E+00	1.12E+00	1.04E+00	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.26E+00	1.12E+00	1.04E+00
	TPY	1.90E-01	1.68E-01	1.56E-01	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.90E-01	1.68E-01	1.56E-01
Chlorine													
	lb/hr	4.99E-02	4.43E-02	4.09E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	4.99E-02	4.43E-02	4.09E-02
	TPY	7.48E-03	6.64E-03	6.14E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	7.48E-03	6.64E-03	6.14E-03

Table A-1A. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, 70 Percent Load

Data	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A	B	C	D	E	F
General:					
Power (kW)	129,200.0		111,000.0		98,500.0
Heat Rate (Btu/kwh)	11,430.0		11,800.0		12,280.0
Heat Input (mmBtu/hr)	1,476.8		1,309.8		1,209.6
Fuel Oil (lb/hr)	79,609.5		70,609.2		65,206.5
Fuel:					
Heat Content,LHV (Btu/lb)	18,550		18,550		18,550
CT Exhaust:					
Volume Flow (acfm)	1,988,010		1,869,045		1,802,083
Volume Flow (scfm)	645,553		597,370		573,193
Mass Flow (lb/hr)	2,837,000		2,619,000		2,510,000
Temperature (oF)	1,166		1,192		1,200
Moisture (% Vol.)	11.96		12.40		12.48
Oxygen (% Vol.)	10.57		10.81		11.07
Molecular Weight	28.23		28.16		28.13
Water Injected (lb/hr)	105,120		80,490		68,760
HRSG Stack (without duct burner):					
Volume Flow (acfm)	806,941		746,713		716,491
Temperature (oF)	200		200		200
Diameter (ft)	18.0		18.0		18.0
Velocity (ft/sec)	52.9		48.9		46.9
Stack Height (ft)	180		180		180

Source: General Electric, 1992.

Table A-2A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, 70 Percent Load

Pollutant	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
Hours of Operation	300		300		300
Particulate					
Basis, lb/hr (1)	17.0		17.0		17.0
lb/hr	17.0		17.0		17.0
TPY	2.6		2.6		2.6
Sulfur Dioxide					
Basis, % sulfur	0.05		0.05		0.05
lb/hr	79.61		70.61		65.21
TPY	11.9		10.6		9.8
Nitrogen Oxides					
Basis, ppm* (1)	42.0		42.0		42.0
lb/hr	257.7		228.4		211.0
TPY	38.7		34.3		31.7
Carbon Monoxide					
Basis, ppm+ (1)	30.0		30.0		30.0
lb/hr	74.3		68.4		65.6
TPY	11.1		10.3		9.8
VOCs (as methane)					
Basis, ppm+ (1)	4.0		4.0		4.1
lb/hr	5.66		5.21		5.12
TPY	0.8		0.8		0.8
Lead					
Basis, lb/10E+12 Btu (2)	8.9		8.9		8.9
lb/hr	1.31E-02		1.17E-02		1.08E-02
TPY	1.97E-03		1.75E-03		1.61E-03

* corrected to 15% O2 dry conditions
+ corrected to dry conditions

Source: (1) General Electric, 1992; (2) EPA, 1990

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Table A-3A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, 70 Percent Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Arsenic	lb/10E+12 Btu (1)	4.2		4.2		4.2
	lb/hr	6.20E-03		5.50E-03		5.08E-03
	TPY	9.30E-04		8.25E-04		7.62E-04
Beryllium	lb/10E+12 Btu (1)	2.5		2.5		2.5
	lb/hr	3.69E-03		3.27E-03		3.02E-03
	TPY	5.54E-04		4.91E-04		4.54E-04
Mercury	lb/10E+12 Btu (1)	3		3		3
	lb/hr	4.43E-03		3.93E-03		3.63E-03
	TPY	6.65E-04		5.89E-04		5.44E-04
Fluoride	pg/J (2)	14		14		14
	lb/hr	4.80E-02		4.26E-02		3.94E-02
	TPY	7.21E-03		6.39E-03		5.90E-03
Sulfuric Acid Mist	% of SO2	8		8		8
	lb/hr	9.75E+00		8.65E+00		7.99E+00
	TPY	1.46E+00		1.30E+00		1.20E+00

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1990; (2) EPA, 1981

Table A-4A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, 70 Percent Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Manganese	lb/10E+12 Btu (1)	14		14		14
	lb/hr	2.07E-02		1.83E-02		1.69E-02
	TPY	3.10E-03		2.75E-03		2.54E-03
Nickel	lb/10E+12 Btu (1)	170		170		170
	lb/hr	2.51E-01		2.23E-01		2.06E-01
	TPY	3.77E-02		3.34E-02		3.08E-02
Cadmium	lb/10E+12 Btu (1)	10.5		10.5		10.5
	lb/hr	1.55E-02		1.38E-02		1.27E-02
	TPY	2.33E-03		2.06E-03		1.91E-03
Chromium	lb/10E+12 Btu (1)	47.5		47.5		47.5
	lb/hr	7.01E-02		6.22E-02		5.75E-02
	TPY	1.05E-02		9.33E-03		8.62E-03
Copper	lb/10E+12 Btu (1)	280		280		280
	lb/hr	4.13E-01		3.67E-01		3.39E-01
	TPY	6.20E-02		5.50E-02		5.08E-02
Vanadium	lb/10E+12 Btu (1)	69.5		69.5		69.5
	lb/hr	1.03E-01		9.10E-02		8.41E-02
	TPY	1.54E-02		1.37E-02		1.26E-02
Selenium	lb/10E+12 Btu (1)	23.42		23.42		23.42
	lb/hr	3.46E-02		3.07E-02		2.83E-02
	TPY	5.19E-03		4.60E-03		4.25E-03
Polycyclic Organic Matter	lb/10E+12 Btu (1)	0.278		0.278		0.278
	lb/hr	4.11E-04		3.64E-04		3.36E-04
	TPY	6.16E-05		5.46E-05		5.04E-05
Formaldehyde	lb/10E+12 Btu (1)	405		405		405
	lb/hr	5.98E-01		5.30E-01		4.90E-01
	TPY	8.97E-02		7.96E-02		7.35E-02
Carbon Dioxide	% Exhaust Gas	5.54		5.31		5.11
	lb/hr	2.45E+05		2.17E+05		2.01E+05
	TPY	3.68E+04		3.26E+04		3.01E+04

Source: (1) EPA, 1990

Table A-5A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- GE PG7221(FA), Dry Low NOx II Combustion System, Distillate Oil, 70 Percent Load

Pollutant		Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Antimony	pg/J (1)	9.4		9.4		9.4
	lb/hr	3.23E-02		2.86E-02		2.64E-02
	TPY	4.84E-03		4.29E-03		3.96E-03
Barium	pg/J (1)	8.4		8.4		8.4
	lb/hr	2.88E-02		2.56E-02		2.36E-02
	TPY	4.32E-03		3.84E-03		3.54E-03
Cobalt	pg/J (1)	3.9		3.9		3.9
	lb/hr	1.34E-02		1.19E-02		1.10E-02
	TPY	2.01E-03		1.78E-03		1.64E-03
Zinc	pg/J (1)	294		294		294
	lb/hr	1.01E+00		8.95E-01		8.26E-01
	TPY	1.51E-01		1.34E-01		1.24E-01
Chlorine	ppm	0.5		0.5		0.5
	lb/hr	3.98E-02		3.53E-02		3.26E-02
	TPY	5.97E-03		5.30E-03		4.89E-03

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1979

Table A-6A. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, 70 Percent Load

Data	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	119,900.0	106,500.0	103,100.0	99,500.0	90,900.0
Heat Rate (Btu/kwh)	10,770.0	11,070.0	11,340.0	11,510.0	11,890.0
Heat Input (mmBtu/hr)	1,291.3	1,179.0	1,169.2	1,145.2	1,080.8
Natural Gas (lb/hr)	60,019.7	54,796.9	54,341.3	53,230.1	50,234.8
(cf/hr)	1,359,287	1,241,005	1,230,688	1,205,521	1,137,685
Fuel:					
Heat Content, LHV (Btu/lb)	21,515	21,515	21,515	21,515	21,515
(Btu/cf)	950	950	950	950	950
CT Exhaust:					
Volume Flow (acfm)	1,920,685	1,845,077	1,827,352	1,808,470	1,757,157
Volume Flow (scfm)	619,500	588,641	581,580	575,224	558,903
Mass Flow (lb/hr)	2,744,000	2,595,000	2,560,000	2,524,000	2,454,000
Temperature (oF)	1,177	1,195	1,199	1,200	1,200
Moisture (% Vol.)	7.84	8.98	9.34	10.14	9.89
Oxygen (% Vol.)	12.46	12.41	12.39	12.28	12.52
Molecular Weight	28.45	28.32	28.27	28.18	28.20
Water Injected (lb/hr)	0	0	0	0	0
HRSG Stack (without duct burner):					
Volume Flow (acfm)	774,375	735,801	726,975	719,030	698,629
Temperature (oF)	200	200	200	200	200
Diameter (ft)	18.0	18.0	18.0	18.0	18.0
Velocity (ft/sec)	50.7	48.2	47.6	47.1	45.8
Stack Height (ft)	180	180	180	180	180

Source: General Electric, 1992.

Table A-7A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility- GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, 70 Percent Load

Pollutant	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
Hours of Operation	8460	8460	8460	8460	8460
Particulate					
Basis, lb/hr (1)	9.00	9.00	9.00	9.00	9.00
lb/hr	9.00	9.00	9.00	9.00	9.00
TPY	38.07	38.07	38.07	38.07	38.07
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	3.88	3.55	3.52	3.44	3.25
TPY	16.43	15.00	14.87	14.57	13.75
Nitrogen Oxides					
Basis, ppm* (1)	25.0	25.0	25.0	25.0	25.0
lb/hr	127.9	118.1	115.7	113.5	107.1
TPY	540.88	499.71	489.59	480.01	452.93
Carbon Monoxide					
Basis, ppm+ (1)	15.0	15.0	15.0	15.0	15.0
lb/hr	37.3	35.0	34.5	33.8	32.9
TPY	157.92	148.20	145.84	142.98	139.31
VOCs (as methane)					
Basis, ppm+ (1)	1.5	1.5	1.5	1.6	1.5
lb/hr	2.13	2.00	2.00	2.06	1.88
TPY	9.02	8.47	8.44	8.71	7.96
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

* corrected to 15% O2 dry conditions
\+ corrected to dry conditions

Source: General Electric, 1992.

Table A-8A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, 70 Percent Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	5.01E-01	4.57E-01	4.53E-01	4.44E-01	4.19E-01
	TPY	2.12E+00	1.93E+00	1.92E+00	1.88E+00	1.77E+00

Source: EPA, 1990

Table A-9A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, 70 Percent Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.44E-03	1.31E-03	1.30E-03	1.27E-03	1.20E-03
Matter	TPY	6.08E-03	5.55E-03	5.50E-03	5.39E-03	5.09E-03
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	1.14E-01	1.04E-01	1.03E-01	1.01E-01	9.52E-02
	TPY	4.81E-01	4.39E-01	4.36E-01	4.27E-01	4.03E-01
Carbon	% Exhaust Gas	3.85	3.75	3.72	3.68	3.58
Dioxide	lb/hr	1.63E+05	1.51E+05	1.48E+05	1.45E+05	1.37E+05
	TPY	6.91E+05	6.40E+05	6.27E+05	6.14E+05	5.80E+05

Source: (1) EPA, 1990

Table A-10A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility-GE PG7221(FA), Dry Low NOx II Combustion System, Natural Gas, 70 Percent Load

Pollutant		Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Antimony	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Barium	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cobalt	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Zinc	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chlorine	ppm	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.

Table A-11A. Design Information for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Data	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	NA	NA	NA	NA	NA
Heat Rate (Btu/kwh)	NA	NA	NA	NA	NA
Heat Input (mmBtu/hr)	100.0	100.0	100.0	100.0	100.0
Natural Gas (lb/hr)	4,194.8	4,194.8	4,194.8	4,194.8	4,194.8
(cf/hr)	105,263	105,263	105,263	105,263	105,263
Fuel:					
Heat Content, LHV (Btu/lb)	23,839	23,839	23,839	23,839	23,839
(Btu/cf)	950	950	950	950	950
DB Exhaust:					
Volume Flow (acfm)	1,504	1,504	1,504	1,504	1,504
Volume Flow (scfm)	1,203	1,203	1,203	1,203	1,203
Mass Flow (lb/hr)	5,244	5,244	5,244	5,244	5,244
Temperature (oF)	200	200	200	200	200
Moisture (% Vol.)					
Oxygen (% Vol.)					
Molecular Weight	28.00	28.00	28.00	28.00	28.00
HRSG Stack:					
Volume Flow (acfm)	NA	NA	NA	NA	NA
Temperature (oF)	NA	NA	NA	NA	NA
Diameter (ft)	NA	NA	NA	NA	NA
Velocity (ft/sec)	NA	NA	NA	NA	NA
Stack Height (ft)	NA	NA	NA	NA	NA

Source: Destec Engineering, Inc., 1992

Table A-12A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
Hours of Operation	8760	8760	8760	8760	8760
Particulate					
Basis, lb/MMBtu	0.01	0.01	0.01	0.01	0.01
lb/hr	1.00	1.00	1.00	1.00	1.00
TPY	4.38	4.38	4.38	4.38	4.38
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	0.30	0.30	0.30	0.30	0.30
TPY	1.32	1.32	1.32	1.32	1.32
Nitrogen Oxides					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
Carbon Monoxide					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
VOCs					
Basis, lb/MMBtu	0.029	0.029	0.029	0.029	0.029
lb/hr	2.90	2.90	2.90	2.90	2.90
TPY	12.70	12.70	12.70	12.70	12.70
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

Table A-13A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid Mist	% of SO2	8	8	8	8	8
	lb/hr	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02
	TPY	1.70E-01	1.70E-01	1.70E-01	1.70E-01	1.70E-01

Source: EPA, 1990

Table A-14A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.11E-04	1.11E-04	1.11E-04	1.11E-04	1.11E-04
Matter	TPY	4.87E-04	4.87E-04	4.87E-04	4.87E-04	4.87E-04
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
	TPY	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
Carbon	% Exhaust Gas	3.74	3.68	3.66	3.65	3.6
Dioxide	lb/hr	3.08E+02	3.03E+02	3.02E+02	3.01E+02	2.97E+02
	TPY	1.35E+03	1.33E+03	1.32E+03	1.32E+03	1.30E+03

Source: (1) EPA, 1990

Table A-15A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, 70 Percent Load and Duct Burner

Pollutant	Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Hours of Operation		300			8460			8760				
Particulate:												
lb/hr	17.00	17.00	17.00	9.00	9.00	9.00	1.00	1.00	1.00	18.00	18.00	18.00
TPY	2.55	2.55	2.55	38.07	38.07	38.07	4.38	4.38	4.38	45.00	45.00	45.00
Sulfur Dioxide:												
lb/hr	79.61	70.61	65.21	3.88	3.52	3.25	0.30	0.30	0.30	79.91	70.91	65.51
TPY	11.94	10.59	9.78	16.43	14.87	13.75	1.32	1.32	1.32	29.69	26.78	24.85
Nitrogen Oxides:												
lb/hr	257.71	228.37	211.04	127.87	115.74	107.07	10.00	10.00	10.00	267.71	238.37	221.04
TPY	38.66	34.26	31.66	540.88	489.59	452.93	43.80	43.80	43.80	623.33	567.64	528.38
Carbon Monoxide:												
lb/hr	74.33	68.44	65.61	37.33	34.48	32.93	10.00	10.00	10.00	84.33	78.44	75.61
TPY	11.15	10.27	9.84	157.92	145.84	139.31	43.80	43.80	43.80	212.87	199.91	192.95
VOCs (as methane):												
lb/hr	5.66	5.21	5.12	2.13	2.00	1.88	2.90	2.90	2.90	8.56	8.11	8.02
TPY	0.85	0.78	0.77	9.02	8.44	7.96	12.70	12.70	12.70	22.58	21.93	21.43
Lead:												
lb/hr	1.31E-02	1.17E-02	1.08E-02	NA	NA	NA	NA	NA	NA	1.31E-02	1.17E-02	1.08E-02
TPY	1.97E-03	1.75E-03	1.61E-03	NA	NA	NA	NA	NA	NA	1.97E-03	1.75E-03	1.61E-03

Table A-16A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
GE PG7221(FA), Dry Low NOx II Combustion System, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Arsenic	lb/hr	6.20E-03	5.50E-03	5.08E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.20E-03	5.50E-03	5.08E-03
	TPY	9.30E-04	8.25E-04	7.62E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	9.30E-04	8.25E-04	7.62E-04
Beryllium	lb/hr	3.69E-03	3.27E-03	3.02E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.69E-03	3.27E-03	3.02E-03
	TPY	5.54E-04	4.91E-04	4.54E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.54E-04	4.91E-04	4.54E-04
Mercury	lb/hr	4.43E-03	3.93E-03	3.63E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.43E-03	3.93E-03	3.63E-03
	TPY	6.65E-04	5.89E-04	5.44E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.65E-04	5.89E-04	5.44E-04
Fluoride	lb/hr	4.80E-02	4.26E-02	3.94E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.80E-02	4.26E-02	3.94E-02
	TPY	7.21E-03	6.39E-03	5.90E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.21E-03	6.39E-03	5.90E-03
Sulfuric Acid Mist	lb/hr	9.75E+00	8.65E+00	7.99E+00	5.01E-01	4.53E-01	4.19E-01	3.88E-02	3.88E-02	3.88E-02	9.79E+00	8.69E+00	8.03E+00
	TPY	1.46E+00	1.30E+00	1.20E+00	2.12E+00	1.92E+00	1.77E+00	1.70E-01	1.70E-01	1.70E-01	3.75E+00	3.39E+00	3.14E+00

Table A-17A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Manganese	lb/hr	2.07E-02	1.83E-02	1.69E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.07E-02	1.83E-02	1.69E-02
	TPY	3.10E-03	2.75E-03	2.54E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.10E-03	2.75E-03	2.54E-03
Nickel	lb/hr	2.51E-01	2.23E-01	2.06E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.51E-01	2.23E-01	2.06E-01
	TPY	3.77E-02	3.34E-02	3.08E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.77E-02	3.34E-02	3.08E-02
Cadmium	lb/hr	1.55E-02	1.38E-02	1.27E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.55E-02	1.38E-02	1.27E-02
	TPY	2.33E-03	2.06E-03	1.91E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.33E-03	2.06E-03	1.91E-03
Chromium	lb/hr	7.01E-02	6.22E-02	5.75E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.01E-02	6.22E-02	5.75E-02
	TPY	1.05E-02	9.33E-03	8.62E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.05E-02	9.33E-03	8.62E-03
Copper	lb/hr	4.13E-01	3.67E-01	3.39E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.13E-01	3.67E-01	3.39E-01
	TPY	6.20E-02	5.50E-02	5.08E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.20E-02	5.50E-02	5.08E-02
Vanadium	lb/hr	1.03E-01	9.10E-02	8.41E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.03E-01	9.10E-02	8.41E-02
	TPY	1.54E-02	1.37E-02	1.26E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.54E-02	1.37E-02	1.26E-02
Selenium	lb/hr	3.46E-02	3.07E-02	2.83E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.46E-02	3.07E-02	2.83E-02
	TPY	5.19E-03	4.60E-03	4.25E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.19E-03	4.60E-03	4.25E-03
Polycyclic Organic Matter	lb/hr	4.11E-04	3.64E-04	3.36E-04	1.44E-03	1.30E-03	1.20E-03	1.11E-04	1.11E-04	1.11E-04	1.55E-03	1.41E-03	1.31E-03
	TPY	6.16E-05	5.46E-05	5.04E-05	6.08E-03	5.50E-03	5.09E-03	4.87E-04	4.87E-04	4.87E-04	6.63E-03	6.05E-03	5.63E-03
Formaldehyde	lb/hr	5.98E-01	5.30E-01	4.90E-01	1.14E-01	1.03E-01	9.52E-02	8.81E-03	8.81E-03	8.81E-03	6.07E-01	5.39E-01	4.99E-01
	TPY	8.97E-02	7.96E-02	7.35E-02	4.81E-01	4.36E-01	4.03E-01	3.86E-02	3.86E-02	3.86E-02	6.10E-01	5.54E-01	5.15E-01
Carbon Dioxide	lb/hr	2.45E+05	2.17E+05	2.01E+05	1.63E+05	1.48E+05	1.37E+05	3.08E+02	3.02E+02	2.97E+02	2.45E+05	2.18E+05	2.01E+05
	TPY	3.68E+04	3.26E+04	3.01E+04	6.91E+05	6.27E+05	5.80E+05	1.35E+03	1.32E+03	1.30E+03	7.29E+05	6.61E+05	6.11E+05

Table A-18A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility-
GE PG7221(FA), Dry Low NOx II Combustion System, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Antimony													
	lb/hr	3.23E-02	2.86E-02	2.64E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	3.23E-02	2.86E-02	2.64E-02
	TPY	4.84E-03	4.29E-03	3.96E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	4.84E-03	4.29E-03	3.96E-03
Barium													
	lb/hr	2.88E-02	2.56E-02	2.36E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	2.88E-02	2.56E-02	2.36E-02
	TPY	4.32E-03	3.84E-03	3.54E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	4.32E-03	3.84E-03	3.54E-03
Cobalt													
	lb/hr	1.34E-02	1.19E-02	1.10E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.34E-02	1.19E-02	1.10E-02
	TPY	2.01E-03	1.78E-03	1.64E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	2.01E-03	1.78E-03	1.64E-03
Zinc													
	lb/hr	1.01E+00	8.95E-01	8.26E-01	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.01E+00	8.95E-01	8.26E-01
	TPY	1.51E-01	1.34E-01	1.24E-01	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.51E-01	1.34E-01	1.24E-01
Chlorine													
	lb/hr	3.98E-02	3.53E-02	3.26E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	3.98E-02	3.53E-02	3.26E-02
	TPY	5.97E-03	5.30E-03	4.89E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	5.97E-03	5.30E-03	4.89E-03

Table A-19. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, Base Load

Data	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A	B	C	D	E	F
General:					
Power (kW)	171,730.0		160,550.0		145,180.0
Heat Rate (Btu/kwh)	9,290.0		9,570.0		9,880.0
Heat Input (mmBtu/hr)	1,595.4		1,536.5		1,434.4
Fuel Oil (lb/hr)	88,142.1		84,887.5		79,247.4
Fuel:					
Heat Content,LHV (Btu/lb)	18,100		18,100		18,100
CT Exhaust:					
Volume Flow (acfm)	2,378,254		2,347,829		2,246,134
Volume Flow (scfm)	817,525		792,111		749,184
Mass Flow (lb/hr)	3,590,650		3,479,030		3,281,070
Temperature (oF)	1,076		1,105		1,123
Moisture (% Vol.)	11.78		11.78		12.44
Oxygen (% Vol.)	11.85		11.85		11.79
Molecular Weight	28.21		28.21		28.13
Water Injected (lb/hr)	132,210		127,340		118,880
HRSG Stack (without duct burner):					
Volume Flow (acfm)	1,029,648		997,640		943,575
Temperature (oF)	205		205		205
Diameter (ft)	18.0		18.0		18.0
Velocity (ft/sec)	67.4		65.3		61.8
Stack Height (ft)	180		180		180

Source: Westinghouse, 1992.

Table A-20. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, Base Load

Pollutant	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
Hours of Operation	300		300		300
Particulate					
Basis, lb/hr (1)	40.4		39.1		36.7
lb/hr	40.4		39.1		36.7
TPY	6.1		5.9		5.5
Sulfur Dioxide					
Basis, % sulfur	0.05		0.05		0.05
lb/hr	91.05		87.01		82.02
TPY	13.7		13.1		12.3
Nitrogen Oxides					
Basis, ppm* (1)	44.5		42.0		42.0
lb/hr	290.9		266.0		248.7
TPY	43.6		39.9		37.3
Carbon Monoxide					
Basis, ppm+ (1)	52.0		51.6		51.4
lb/hr	163.5		157.0		147.0
TPY	24.5		23.6		22.0
VOCs (as methane)					
Basis, ppm+ (1)	10.5		10.5		10.5
lb/hr	18.86		18.28		17.16
TPY	2.8		2.7		2.6
Lead					
Basis, lb/10E+12 Btu (2)	8.9		8.9		8.9
lb/hr	1.42E-02		1.37E-02		1.28E-02
TPY	2.13E-03		2.05E-03		1.91E-03

* corrected to 15% O2 dry conditions
+ corrected to dry conditions

Source: (1) Westinghouse, 1992; (2) EPA, 1990

Table A-21. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
Westinghouse 501F, Conventional Combustor, Distillate Oil, Base Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Arsenic	lb/10E+12 Btu (1)	4.2		4.2		4.2
	lb/hr	6.70E-03		6.45E-03		6.02E-03
	TPY	1.01E-03		9.68E-04		9.04E-04
Beryllium	lb/10E+12 Btu (1)	2.5		2.5		2.5
	lb/hr	3.99E-03		3.84E-03		3.59E-03
	TPY	5.98E-04		5.76E-04		5.38E-04
Mercury	lb/10E+12 Btu (1)	3		3		3
	lb/hr	4.79E-03		4.61E-03		4.30E-03
	TPY	7.18E-04		6.91E-04		6.45E-04
Fluoride	pg/J (2)	14		14		14
	lb/hr	5.19E-02		5.00E-02		4.67E-02
	TPY	7.79E-03		7.50E-03		7.00E-03
Sulfuric Acid Mist	% of SO2	8		8		8
	lb/hr	1.12E+01		1.07E+01		1.00E+01
	TPY	1.67E+00		1.60E+00		1.51E+00

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1990; (2) EPA, 1981

Table A-22. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, Base Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Manganese	lb/10E+12 Btu (1)	14		14		14
	lb/hr	2.23E-02		2.15E-02		2.01E-02
	TPY	3.35E-03		3.23E-03		3.01E-03
Nickel	lb/10E+12 Btu (1)	170		170		170
	lb/hr	2.71E-01		2.61E-01		2.44E-01
	TPY	4.07E-02		3.92E-02		3.66E-02
Cadmium	lb/10E+12 Btu (1)	10.5		10.5		10.5
	lb/hr	1.68E-02		1.61E-02		1.51E-02
	TPY	2.51E-03		2.42E-03		2.26E-03
Chromium	lb/10E+12 Btu (1)	47.5		47.5		47.5
	lb/hr	7.58E-02		7.30E-02		6.81E-02
	TPY	1.14E-02		1.09E-02		1.02E-02
Copper	lb/10E+12 Btu (1)	280		280		280
	lb/hr	4.47E-01		4.30E-01		4.02E-01
	TPY	6.70E-02		6.45E-02		6.02E-02
Vanadium	lb/10E+12 Btu (1)	69.5		69.5		69.5
	lb/hr	1.11E-01		1.07E-01		9.97E-02
	TPY	1.66E-02		1.60E-02		1.50E-02
Selenium	lb/10E+12 Btu (1)	23.42		23.42		23.42
	lb/hr	3.74E-02		3.60E-02		3.36E-02
	TPY	5.60E-03		5.40E-03		5.04E-03
Polycyclic	lb/10E+12 Btu (1)	0.278		0.278		0.278
Organic	lb/hr	4.44E-04		4.27E-04		3.99E-04
Matter	TPY	6.65E-05		6.41E-05		5.98E-05
Formaldehyde	lb/10E+12 Btu (1)	405		405		405
	lb/hr	6.46E-01		6.22E-01		5.81E-01
	TPY	9.69E-02		9.33E-02		8.71E-02
Carbon	% Exhaust Gas	5.00		5.00		4.94
Dioxide	lb/hr	2.80E+05		2.71E+05		2.54E+05
	TPY	4.20E+04		4.07E+04		3.80E+04

Source: (1) EPA, 1990

Table A-23. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- Westinghouse 501F, Conventional Combustor, Distillate Oil, Base Load

Pollutant		Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Antimony	pg/J (1)	9.4		9.4		9.4
	lb/hr	3.49E-02		3.36E-02		3.13E-02
	TPY	5.23E-03		5.03E-03		4.70E-03
Barium	pg/J (1)	8.4		8.4		8.4
	lb/hr	3.11E-02		3.00E-02		2.80E-02
	TPY	4.67E-03		4.50E-03		4.20E-03
Cobalt	pg/J (1)	3.9		3.9		3.9
	lb/hr	1.45E-02		1.39E-02		1.30E-02
	TPY	2.17E-03		2.09E-03		1.95E-03
Zinc	pg/J (1)	294		294		294
	lb/hr	1.09E+00		1.05E+00		9.80E-01
	TPY	1.64E-01		1.57E-01		1.47E-01
Chlorine	ppm	0.5		0.5		0.5
	lb/hr	4.41E-02		4.24E-02		3.96E-02
	TPY	6.61E-03		6.37E-03		5.94E-03

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1979

Table A-24. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, Base Load

Data	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	168,010.0	146,540.0	141,910.0	138,110.0	127,710.0
Heat Rate (Btu/kwh)	9,480.0	9,910.0	10,020.0	10,120.0	10,400.0
Heat Input (mmBtu/hr)	1,592.7	1,452.2	1,421.9	1,397.7	1,328.2
Natural Gas (lb/hr)	80,849.5	73,716.3	72,179.6	70,947.9	67,420.5
(cf/hr)	1,676,563	1,528,644	1,496,777	1,471,235	1,398,088
Fuel:					
Heat Content, LHV (Btu/lb)	19,700	19,700	19,700	19,700	19,700
(Btu/cf)	950	950	950	950	950
CT Exhaust:					
Volume Flow (acfm)	2,386,805	2,256,129	2,226,061	2,203,500	2,134,002
Volume Flow (scfm)	828,011	770,528	757,320	745,800	716,764
Mass Flow (lb/hr)	3,673,720	3,402,010	3,339,570	3,276,980	3,150,780
Temperature (oF)	1,062	1,086	1,092	1,100	1,112
Moisture (% Vol.)	7.23	8.42	8.79	9.65	9.53
Oxygen (% Vol.)	13.04	12.92	12.87	12.69	12.79
Molecular Weight	28.50	28.36	28.32	28.22	28.23
Water Injected (lb/hr)	0	0	0	0	0
HRSG Stack (without duct burner):					
Volume Flow (acfm)	1,042,855	970,456	953,821	939,313	902,743
Temperature (oF)	205	205	205	205	205
Diameter (ft)	18.0	18.0	18.0	18.0	18.0
Velocity (ft/sec)	68.3	63.6	62.5	61.5	59.1
Stack Height (ft)	180	180	180	180	180

Source: Westinghouse, 1992.

Table A-25. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility- Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, Base Load

Pollutant	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
Hours of Operation	8460	8460	8460	8460	8460
Particulate					
Basis, lb/hr (1)	6.40	6.00	5.90	5.80	5.60
lb/hr	6.40	6.00	5.90	5.80	5.60
TPY	27.07	25.38	24.96	24.53	23.69
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	4.79	4.37	4.28	4.20	3.99
TPY	20.26	18.47	18.09	17.78	16.90
Nitrogen Oxides					
Basis, ppm* (1)	26.5	25.0	25.0	25.0	25.0
lb/hr	169.0	145.4	142.3	140.2	133.1
TPY	715.05	615.25	602.04	592.91	562.93
Carbon Monoxide					
Basis, ppm+ (1)	10.0	10.4	10.3	10.2	10.2
lb/hr	33.5	32.0	31.0	30.0	28.8
TPY	141.65	135.33	131.20	126.74	121.97
VOCs (as methane)					
Basis, ppm+ (1)	4.2	4.1	4.1	4.2	4.3
lb/hr	8.04	7.21	7.05	7.05	6.95
TPY	34.00	30.49	29.84	29.82	29.38
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

* corrected to 15% O2 dry conditions
+ corrected to dry conditions

Source: Westinghouse, 1992.

Table A-26. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, Base Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	6.18E-01	5.63E-01	5.51E-01	5.42E-01	5.15E-01
	TPY	2.61E+00	2.38E+00	2.33E+00	2.29E+00	2.18E+00

Source: EPA, 1990

Table A-27. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, Base Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.77E-03	1.62E-03	1.58E-03	1.56E-03	1.48E-03
Matter	TPY	7.50E-03	6.84E-03	6.69E-03	6.58E-03	6.25E-03
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	1.40E-01	1.28E-01	1.25E-01	1.23E-01	1.17E-01
	TPY	5.94E-01	5.41E-01	5.30E-01	5.21E-01	4.95E-01
Carbon	% Exhaust Gas	3.61	3.54	3.53	3.52	3.48
Dioxide	lb/hr	2.05E+05	1.87E+05	1.83E+05	1.80E+05	1.71E+05
	TPY	8.66E+05	7.91E+05	7.75E+05	7.61E+05	7.23E+05

Source: (1) EPA, 1990

Table A-28. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, Base Load

Pollutant		Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Antimony	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Barium	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cobalt	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Zinc	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chlorine	ppm	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.

Table A-29. Design Information for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Data	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	NA	NA	NA	NA	NA
Heat Rate (Btu/kwh)	NA	NA	NA	NA	NA
Heat Input (mmBtu/hr)	100.0	100.0	100.0	100.0	100.0
Natural Gas (lb/hr)	4,194.8	4,194.8	4,194.8	4,194.8	4,194.8
(cf/hr)	105,263	105,263	105,263	105,263	105,263
Fuel:					
Heat Content, LHV (Btu/lb)	23,839	23,839	23,839	23,839	23,839
(Btu/cf)	950	950	950	950	950
DB Exhaust:					
Volume Flow (acfm)	1,515	1,515	1,515	1,515	1,515
Volume Flow (scfm)	1,203	1,203	1,203	1,203	1,203
Mass Flow (lb/hr)	5,244	5,244	5,244	5,244	5,244
Temperature (oF)	205	205	205	205	205
Moisture (% Vol.)					
Oxygen (% Vol.)					
Molecular Weight	28.00	28.00	28.00	28.00	28.00
HRSG Stack:					
Volume Flow (acfm)	NA	NA	NA	NA	NA
Temperature (oF)	NA	NA	NA	NA	NA
Diameter (ft)	NA	NA	NA	NA	NA
Velocity (ft/sec)	NA	NA	NA	NA	NA
Stack Height (ft)	NA	NA	NA	NA	NA

Source: Destec Engineering, Inc., 1992

Table A-30. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
Hours of Operation	8760	8760	8760	8760	8760
Particulate					
Basis, lb/MMBtu	0.01	0.01	0.01	0.01	0.01
lb/hr	1.00	1.00	1.00	1.00	1.00
TPY	4.38	4.38	4.38	4.38	4.38
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	0.30	0.30	0.30	0.30	0.30
TPY	1.32	1.32	1.32	1.32	1.32
Nitrogen Oxides					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
Carbon Monoxide					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
VOCs					
Basis, lb/MMBtu	0.029	0.029	0.029	0.029	0.029
lb/hr	2.90	2.90	2.90	2.90	2.90
TPY	12.70	12.70	12.70	12.70	12.70
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

Table A-31. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02
	TPY	1.70E-01	1.70E-01	1.70E-01	1.70E-01	1.70E-01

Source: EPA, 1990

Table A-32. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.11E-04	1.11E-04	1.11E-04	1.11E-04	1.11E-04
Matter	TPY	4.87E-04	4.87E-04	4.87E-04	4.87E-04	4.87E-04
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
	TPY	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
Carbon	% Exhaust Gas	3.74	3.68	3.66	3.65	3.6
Dioxide	lb/hr	3.08E+02	3.03E+02	3.02E+02	3.01E+02	2.97E+02
	TPY	1.35E+03	1.33E+03	1.32E+03	1.32E+03	1.30E+03

Source: (1) EPA, 1990

Table A-33. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
Westinghouse 501F, Dry Low NOx Combustor, Base Load and Duct Burner

Pollutant	Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Hours of Operation		300			8460			8760				
Particulate:												
lb/hr	40.40	39.10	36.70	6.40	5.90	5.60	1.00	1.00	1.00	41.40	40.10	37.70
TPY	6.06	5.87	5.51	27.07	24.96	23.69	4.38	4.38	4.38	37.51	35.20	33.57
Sulfur Dioxide:												
lb/hr	91.05	87.01	82.02	4.79	4.28	3.99	0.30	0.30	0.30	91.35	87.31	82.32
TPY	13.66	13.05	12.30	20.26	18.09	16.90	1.32	1.32	1.32	35.24	32.46	30.52
Nitrogen Oxides:												
lb/hr	290.93	266.05	248.65	169.04	142.33	133.08	10.00	10.00	10.00	300.93	276.05	258.65
TPY	43.64	39.91	37.30	715.05	602.04	562.93	43.80	43.80	43.80	802.48	685.75	644.03
Carbon Monoxide:												
lb/hr	163.49	157.04	146.99	33.49	31.02	28.83	10.00	10.00	10.00	173.49	167.04	156.99
TPY	24.52	23.56	22.05	141.65	131.20	121.97	43.80	43.80	43.80	209.97	198.55	187.82
VOCs (as methane):												
lb/hr	18.86	18.28	17.16	8.04	7.05	6.95	2.90	2.90	2.90	21.76	21.18	20.06
TPY	2.83	2.74	2.57	34.00	29.84	29.38	12.70	12.70	12.70	49.53	45.29	44.66
Lead:												
lb/hr	1.42E-02	1.37E-02	1.28E-02	NA	NA	NA	NA	NA	NA	1.42E-02	1.37E-02	1.28E-02
TPY	2.13E-03	2.05E-03	1.91E-03	NA	NA	NA	NA	NA	NA	2.13E-03	2.05E-03	1.91E-03

Table A-34. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
Westinghouse 501F, Dry Low NOx Combustor, Base Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Arsenic													
	lb/hr	6.70E-03	6.45E-03	6.02E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.70E-03	6.45E-03	6.02E-03
	TPY	1.01E-03	9.68E-04	9.04E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.01E-03	9.68E-04	9.04E-04
Beryllium													
	lb/hr	3.99E-03	3.84E-03	3.59E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.99E-03	3.84E-03	3.59E-03
	TPY	5.98E-04	5.76E-04	5.38E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.98E-04	5.76E-04	5.38E-04
Mercury													
	lb/hr	4.79E-03	4.61E-03	4.30E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.79E-03	4.61E-03	4.30E-03
	TPY	7.18E-04	6.91E-04	6.45E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.18E-04	6.91E-04	6.45E-04
Fluoride													
	lb/hr	5.19E-02	5.00E-02	4.67E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.19E-02	5.00E-02	4.67E-02
	TPY	7.79E-03	7.50E-03	7.00E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.79E-03	7.50E-03	7.00E-03
Sulfuric Acid Mist	lb/hr	1.12E+01	1.07E+01	1.00E+01	6.18E-01	5.51E-01	5.15E-01	3.88E-02	3.88E-02	3.88E-02	1.12E+01	1.07E+01	1.01E+01
	TPY	1.67E+00	1.60E+00	1.51E+00	2.61E+00	2.33E+00	2.18E+00	1.70E-01	1.70E-01	1.70E-01	4.46E+00	4.10E+00	3.86E+00

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Table A-35. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
Westinghouse 501F, Dry Low NOx Combustor, Base Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Manganese	lb/hr	2.23E-02	2.15E-02	2.01E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.23E-02	2.15E-02	2.01E-02
	TPY	3.35E-03	3.23E-03	3.01E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.35E-03	3.23E-03	3.01E-03
Nickel	lb/hr	2.71E-01	2.61E-01	2.44E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.71E-01	2.61E-01	2.44E-01
	TPY	4.07E-02	3.92E-02	3.66E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.07E-02	3.92E-02	3.66E-02
Cadmium	lb/hr	1.68E-02	1.61E-02	1.51E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.68E-02	1.61E-02	1.51E-02
	TPY	2.51E-03	2.42E-03	2.26E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.51E-03	2.42E-03	2.26E-03
Chromium	lb/hr	7.58E-02	7.30E-02	6.81E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	7.58E-02	7.30E-02	6.81E-02
	TPY	1.14E-02	1.09E-02	1.02E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.14E-02	1.09E-02	1.02E-02
Copper	lb/hr	4.47E-01	4.30E-01	4.02E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.47E-01	4.30E-01	4.02E-01
	TPY	6.70E-02	6.45E-02	6.02E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.70E-02	6.45E-02	6.02E-02
Vanadium	lb/hr	1.11E-01	1.07E-01	9.97E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.11E-01	1.07E-01	9.97E-02
	TPY	1.66E-02	1.60E-02	1.50E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.66E-02	1.60E-02	1.50E-02
Selenium	lb/hr	3.74E-02	3.60E-02	3.36E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.74E-02	3.60E-02	3.36E-02
	TPY	5.60E-03	5.40E-03	5.04E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.60E-03	5.40E-03	5.04E-03
Polycyclic Organic Matter	lb/hr	4.44E-04	4.27E-04	3.99E-04	1.77E-03	1.58E-03	1.48E-03	1.11E-04	1.11E-04	1.11E-04	1.88E-03	1.69E-03	1.59E-03
	TPY	6.65E-05	6.41E-05	5.98E-05	7.50E-03	6.69E-03	6.25E-03	4.87E-04	4.87E-04	4.87E-04	8.05E-03	7.25E-03	6.80E-03
Formaldehyde	lb/hr	6.46E-01	6.22E-01	5.81E-01	1.40E-01	1.25E-01	1.17E-01	8.81E-03	8.81E-03	8.81E-03	6.55E-01	6.31E-01	5.90E-01
	TPY	9.69E-02	9.33E-02	8.71E-02	5.94E-01	5.30E-01	4.95E-01	3.86E-02	3.86E-02	3.86E-02	7.29E-01	6.62E-01	6.21E-01
Carbon Dioxide	lb/hr	2.80E+05	2.71E+05	2.54E+05	2.05E+05	1.83E+05	1.71E+05	3.08E+02	3.02E+02	2.97E+02	2.80E+05	2.72E+05	2.54E+05
	TPY	4.20E+04	4.07E+04	3.80E+04	8.66E+05	7.75E+05	7.23E+05	1.35E+03	1.32E+03	1.30E+03	9.10E+05	8.17E+05	7.62E+05

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Table A-19A. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, 70 Percent Load

Data	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A	B	C	D	E	F
General:					
Power (kW)	134,010.0		112,180.0		101,370.0
Heat Rate (Btu/kwh)	9,940.0		10,590.0		11,010.0
Heat Input (mmBtu/hr)	1,332.1		1,188.0		1,116.1
Fuel Oil (lb/hr)	73,594.4		65,634.6		61,662.1
Fuel:					
Heat Content,LHV (Btu/lb)	18,100		18,100		18,100
CT Exhaust:					
Volume Flow (acfm)	2,038,400		1,904,295		1,835,565
Volume Flow (scfm)	700,700		642,471		612,241
Mass Flow (lb/hr)	3,099,150		2,824,930		2,684,120
Temperature (oF)	1,076		1,105		1,123
Moisture (% Vol.)	9.79		11.19		11.87
Oxygen (% Vol.)	12.48		12.36		12.30
Molecular Weight	28.41		28.24		28.16
Water Injected (lb/hr)	110,400		98,460		92,490
HRSG Stack (without duct burner):					
Volume Flow (acfm)	875,875		803,089		765,302
Temperature (oF)	200		200		200
Diameter (ft)	18.0		18.0		18.0
Velocity (ft/sec)	57.4		52.6		50.1
Stack Height (ft)	180		180		180

Source: Westinghouse, 1992.

Table A-20A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, 70 Percent Load

Pollutant	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
Hours of Operation	300		300		300
Particulate					
Basis, lb/hr (1)	34.2		30.8		29.2
lb/hr	34.2		30.8		29.2
TPY	5.1		4.6		4.4
Sulfur Dioxide					
Basis, % sulfur	0.05		0.05		0.05
lb/hr	75.95		68.00		64.01
TPY	11.4		10.2		9.6
Nitrogen Oxides					
Basis, ppm* (1)	44.3		42.0		42.0
lb/hr	240.0		203.1		191.0
TPY	36.0		30.5		28.7
Carbon Monoxide					
Basis, ppm+ (1)	51.5		51.5		51.5
lb/hr	142.0		128.0		121.0
TPY	21.3		19.2		18.2
VOCs (as methane)					
Basis, ppm+ (1)	10.2		10.6		10.5
lb/hr	16.06		15.07		14.11
TPY	2.4		2.3		2.1
Lead					
Basis, lb/10E+12 Btu (2)	8.9		8.9		8.9
lb/hr	1.19E-02		1.06E-02		9.93E-03
TPY	1.78E-03		1.59E-03		1.49E-03

* corrected to 15% O2 dry conditions
+ corrected to dry conditions

Source: (1) Westinghouse, 1992; (2) EPA, 1990

Table A-21A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility Westinghouse 501F, Conventional Combustor, Distillate Oil, 70 Percent Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Arsenic	lb/10E+12 Btu (1)	4.2		4.2		4.2
	lb/hr	5.59E-03		4.99E-03		4.69E-03
	TPY	8.39E-04		7.48E-04		7.03E-04
Beryllium	lb/10E+12 Btu (1)	2.5		2.5		2.5
	lb/hr	3.33E-03		2.97E-03		2.79E-03
	TPY	5.00E-04		4.45E-04		4.19E-04
Mercury	lb/10E+12 Btu (1)	3		3		3
	lb/hr	4.00E-03		3.56E-03		3.35E-03
	TPY	5.99E-04		5.35E-04		5.02E-04
Fluoride	pg/J (2)	14		14		14
	lb/hr	4.33E-02		3.87E-02		3.63E-02
	TPY	6.50E-03		5.80E-03		5.45E-03
Sulfuric Acid Mist	% of SO2	8		8		8
	lb/hr	9.30E+00		8.33E+00		7.84E+00
	TPY	1.40E+00		1.25E+00		1.18E+00

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1990; (2) EPA, 1981

Table A-22A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, 70 Percent Load

Pollutant	Units	Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Manganese	lb/10E+12 Btu (1)	14		14		14
	lb/hr	1.86E-02		1.66E-02		1.56E-02
	TPY	2.80E-03		2.49E-03		2.34E-03
Nickel	lb/10E+12 Btu (1)	170		170		170
	lb/hr	2.26E-01		2.02E-01		1.90E-01
	TPY	3.40E-02		3.03E-02		2.85E-02
Cadmium	lb/10E+12 Btu (1)	10.5		10.5		10.5
	lb/hr	1.40E-02		1.25E-02		1.17E-02
	TPY	2.10E-03		1.87E-03		1.76E-03
Chromium	lb/10E+12 Btu (1)	47.5		47.5		47.5
	lb/hr	6.33E-02		5.64E-02		5.30E-02
	TPY	9.49E-03		8.46E-03		7.95E-03
Copper	lb/10E+12 Btu (1)	280		280		280
	lb/hr	3.73E-01		3.33E-01		3.13E-01
	TPY	5.59E-02		4.99E-02		4.69E-02
Vanadium	lb/10E+12 Btu (1)	69.5		69.5		69.5
	lb/hr	9.26E-02		8.26E-02		7.76E-02
	TPY	1.39E-02		1.24E-02		1.16E-02
Selenium	lb/10E+12 Btu (1)	23.42		23.42		23.42
	lb/hr	3.12E-02		2.78E-02		2.61E-02
	TPY	4.68E-03		4.17E-03		3.92E-03
Polycyclic	lb/10E+12 Btu (1)	0.278		0.278		0.278
Organic	lb/hr	3.70E-04		3.30E-04		3.10E-04
Matter	TPY	5.55E-05		4.95E-05		4.65E-05
Formaldehyde	lb/10E+12 Btu (1)	405		405		405
	lb/hr	5.39E-01		4.81E-01		4.52E-01
	TPY	8.09E-02		7.22E-02		6.78E-02
Carbon	% Exhaust Gas	4.84		4.71		4.64
Dioxide	lb/hr	2.32E+05		2.07E+05		1.95E+05
	TPY	3.49E+04		3.11E+04		2.92E+04

Source: (1) EPA, 1990

Table A-23A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Conventional Combustor, Distillate Oil, 70 Percent Load

Pollutant		Gas Turbine Fuel Oil 27oF	* Not Available * Gas Turbine Fuel Oil 64oF	Gas Turbine Fuel Oil 72oF	* Not Available * Gas Turbine Fuel Oil 79oF	Gas Turbine Fuel Oil 97oF
A		B	C	D	E	F
Antimony	pg/J (1)	9.4		9.4		9.4
	lb/hr	2.91E-02		2.60E-02		2.44E-02
	TPY	4.36E-03		3.89E-03		3.66E-03
Barium	pg/J (1)	8.4		8.4		8.4
	lb/hr	2.60E-02		2.32E-02		2.18E-02
	TPY	3.90E-03		3.48E-03		3.27E-03
Cobalt	pg/J (1)	3.9		3.9		3.9
	lb/hr	1.21E-02		1.08E-02		1.01E-02
	TPY	1.81E-03		1.62E-03		1.52E-03
Zinc	pg/J (1)	294		294		294
	lb/hr	9.10E-01		8.12E-01		7.63E-01
	TPY	1.37E-01		1.22E-01		1.14E-01
Chlorine	ppm	0.5		0.5		0.5
	lb/hr	3.68E-02		3.28E-02		3.08E-02
	TPY	5.52E-03		4.92E-03		4.62E-03

Note: Multiply by 2.324 to convert picogram/Joule (pg/J) to lb/10E+12 Btu.

Source: (1) EPA, 1979

Table A-24A. Design Information and Stack Parameters for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 Percent Load

Data	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	117,480.0	102,390.0	99,140.0	96,460.0	89,150.0
Heat Rate (Btu/kwh)	10,540.0	11,100.0	11,240.0	11,370.0	11,720.0
Heat Input (mmBtu/hr)	1,238.2	1,136.5	1,114.3	1,096.8	1,044.8
Natural Gas (lb/hr)	62,854.8	57,691.8	56,565.2	55,672.6	53,037.5
(cf/hr)	1,303,410	1,196,346	1,172,983	1,154,474	1,099,829
Fuel:					
Heat Content, LHV (Btu/lb)	19,700	19,700	19,700	19,700	19,700
(Btu/cf)	950	950	950	950	950
CT Exhaust:					
Volume Flow (acfm)	1,913,170	1,830,092	1,811,447	1,796,734	1,752,347
Volume Flow (scfm)	635,317	607,729	601,537	596,651	581,911
Mass Flow (lb/hr)	2,818,340	2,684,320	2,652,890	2,623,320	2,559,380
Temperature (oF)	1,130	1,130	1,130	1,130	1,130
Moisture (% Vol.)	7.25	8.28	8.62	9.42	9.24
Oxygen (% Vol.)	13.01	13.07	13.06	12.94	13.12
Molecular Weight	28.49	28.37	28.33	28.24	28.25
Water Injected (lb/hr)	0	0	0	0	0
HRSG Stack (without duct burner):					
Volume Flow (acfm)	794,146	759,661	751,922	745,814	727,389
Temperature (oF)	200	200	200	200	200
Diameter (ft)	18.0	18.0	18.0	18.0	18.0
Velocity (ft/sec)	52.0	49.8	49.2	48.8	47.6
Stack Height (ft)	180	180	180	180	180

Source: Westinghouse, 1992.

Table A-25A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 Percent Load

Pollutant	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
Hours of Operation	8460	8460	8460	8460	8460
Particulate					
Basis, lb/hr (1)	4.90	4.70	4.70	4.60	4.50
lb/hr	4.90	4.70	4.70	4.60	4.50
TPY	20.73	19.88	19.88	19.46	19.04
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	3.72	3.42	3.35	3.30	3.14
TPY	15.75	14.46	14.18	13.95	13.29
Nitrogen Oxides					
Basis, ppm* (1)	26.5	25.0	25.0	25.0	25.0
lb/hr	130.0	112.5	110.2	108.5	103.3
TPY	550.04	475.84	466.27	458.87	436.90
Carbon Monoxide					
Basis, ppm+ (1)	10.0	10.3	10.4	10.2	10.2
lb/hr	25.7	25.0	25.0	24.0	23.5
TPY	108.66	105.87	105.72	101.65	99.34
VOCs (as methane)					
Basis, ppm+ (1)	4.1	4.3	4.4	4.5	4.0
lb/hr	6.02	5.97	6.02	6.06	5.26
TPY	25.46	25.26	25.49	25.63	22.26
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

* corrected to 15% O2 dry conditions
\+ corrected to dry conditions

Source: Westinghouse, 1992.

Table A-26A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 Percent Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	4.80E-01	4.41E-01	4.32E-01	4.25E-01	4.05E-01
	TPY	2.03E+00	1.86E+00	1.83E+00	1.80E+00	1.71E+00

Source: EPA, 1990

Table A-27A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 Percent Load

Pollutant	Units	Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.38E-03	1.26E-03	1.24E-03	1.22E-03	1.16E-03
Matter	TPY	5.83E-03	5.35E-03	5.25E-03	5.16E-03	4.92E-03
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	1.09E-01	1.00E-01	9.82E-02	9.66E-02	9.21E-02
	TPY	4.62E-01	4.24E-01	4.15E-01	4.09E-01	3.89E-01
Carbon	% Exhaust Gas	3.62	3.47	3.43	3.41	3.33
Dioxide	lb/hr	1.58E+05	1.44E+05	1.41E+05	1.39E+05	1.33E+05
	TPY	6.67E+05	6.11E+05	5.98E+05	5.90E+05	5.62E+05

Source: (1) EPA, 1990

Table A-28A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 70 Percent Load

Pollutant		Gas Turbine Natural Gas 27oF	Gas Turbine Natural Gas 64oF	Gas Turbine Natural Gas 72oF	Gas Turbine Natural Gas 79oF	Gas Turbine Natural Gas 97oF
A		B	C	D	E	F
Antimony	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Barium	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cobalt	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Zinc	pg/J	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chlorine	ppm	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.

Table A-29A. Design Information for DESTEC Central Florida Cogeneration Facility-
Duct Burner, Supplemental Firing, Natural Gas

Data	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A	B	C	D	E	F
General:					
Power (kW)	NA	NA	NA	NA	NA
Heat Rate (Btu/kwh)	NA	NA	NA	NA	NA
Heat Input (mmBtu/hr)	100.0	100.0	100.0	100.0	100.0
Natural Gas (lb/hr)	4,194.8	4,194.8	4,194.8	4,194.8	4,194.8
(cf/hr)	105,263	105,263	105,263	105,263	105,263
Fuel:					
Heat Content, LHV (Btu/lb)	23,839	23,839	23,839	23,839	23,839
(Btu/cf)	950	950	950	950	950
DB Exhaust:					
Volume Flow (acfm)	1,504	1,504	1,504	1,504	1,504
Volume Flow (scfm)	1,203	1,203	1,203	1,203	1,203
Mass Flow (lb/hr)	5,244	5,244	5,244	5,244	5,244
Temperature (oF)	200	200	200	200	200
Moisture (% Vol.)					
Oxygen (% Vol.)					
Molecular Weight	28.00	28.00	28.00	28.00	28.00
HRSG Stack:					
Volume Flow (acfm)	NA	NA	NA	NA	NA
Temperature (oF)	NA	NA	NA	NA	NA
Diameter (ft)	NA	NA	NA	NA	NA
Velocity (ft/sec)	NA	NA	NA	NA	NA
Stack Height (ft)	NA	NA	NA	NA	NA

Source: Destec Engineering, Inc., 1992

Table A-30A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
Hours of Operation	8760	8760	8760	8760	8760
Particulate					
Basis, lb/MMBtu	0.01	0.01	0.01	0.01	0.01
lb/hr	1.00	1.00	1.00	1.00	1.00
TPY	4.38	4.38	4.38	4.38	4.38
Sulfur Dioxide					
Basis, gr S/100 cf	1.0	1.0	1.0	1.0	1.0
lb/hr	0.30	0.30	0.30	0.30	0.30
TPY	1.32	1.32	1.32	1.32	1.32
Nitrogen Oxides					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
Carbon Monoxide					
Basis, lb/MMBtu	0.10	0.10	0.10	0.10	0.10
lb/hr	10.00	10.00	10.00	10.00	10.00
TPY	43.80	43.80	43.80	43.80	43.80
VOCs					
Basis, lb/MMBtu	0.029	0.029	0.029	0.029	0.029
lb/hr	2.90	2.90	2.90	2.90	2.90
TPY	12.70	12.70	12.70	12.70	12.70
Lead					
Basis	NA	NA	NA	NA	NA
lb/hr	NA	NA	NA	NA	NA
TPY	NA	NA	NA	NA	NA

Table A-31A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Arsenic	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Beryllium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Mercury	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Fluoride	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Sulfuric Acid	% of SO2	8	8	8	8	8
Mist	lb/hr	3.88E-02	3.88E-02	3.88E-02	3.88E-02	3.88E-02
	TPY	1.70E-01	1.70E-01	1.70E-01	1.70E-01	1.70E-01

Source: EPA, 1990

Table A-32A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-Duct Burner, Supplemental Firing, Natural Gas

Pollutant	Units	Natural Gas 27oF	Natural Gas 64oF	Natural Gas 72oF	Natural Gas 79oF	Natural Gas 97oF
A		B	C	D	E	F
Manganese	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Nickel	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Cadmium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Chromium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Copper	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Vanadium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Selenium	--	--	--	--	--	--
	lb/hr	NEG.	NEG.	NEG.	NEG.	NEG.
	TPY	NEG.	NEG.	NEG.	NEG.	NEG.
Polycyclic	lb/10E+12 Btu (1)	1.113	1.113	1.113	1.113	1.113
Organic	lb/hr	1.11E-04	1.11E-04	1.11E-04	1.11E-04	1.11E-04
Matter	TPY	4.87E-04	4.87E-04	4.87E-04	4.87E-04	4.87E-04
Formaldehyde	lb/10E+12 Btu (1)	88.12	88.12	88.12	88.12	88.12
	lb/hr	8.81E-03	8.81E-03	8.81E-03	8.81E-03	8.81E-03
	TPY	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
Carbon	% Exhaust Gas	3.74	3.68	3.66	3.65	3.6
Dioxide	lb/hr	3.08E+02	3.03E+02	3.02E+02	3.01E+02	2.97E+02
	TPY	1.35E+03	1.33E+03	1.32E+03	1.32E+03	1.30E+03

Source: (1) EPA, 1990

Table A-33A. Maximum Emissions for Criteria Pollutants for DESTEC Central Florida Cogeneration Facility-
Westinghouse 501F, Dry Low NOx Combustor, 70 Percent Load and Duct Burner

Pollutant	Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Hours of Operation		300			8460			8760				
Particulate:												
lb/hr	34.20	30.80	29.20	4.90	4.70	4.50	1.00	1.00	1.00	35.20	31.80	30.20
TPY	5.13	4.62	4.38	20.73	19.88	19.04	4.38	4.38	4.38	30.24	28.88	27.80
Sulfur Dioxide:												
lb/hr	75.95	68.00	64.01	3.72	3.35	3.14	0.30	0.30	0.30	76.25	68.30	64.31
TPY	11.39	10.20	9.60	15.75	14.18	13.29	1.32	1.32	1.32	28.46	25.69	24.21
Nitrogen Oxides:												
lb/hr	240.01	203.12	191.00	130.03	110.23	103.29	10.00	10.00	10.00	250.01	213.12	201.00
TPY	36.00	30.47	28.65	550.04	466.27	436.90	43.80	43.80	43.80	629.84	540.54	509.35
Carbon Monoxide:												
lb/hr	141.97	127.98	121.02	25.69	24.99	23.48	10.00	10.00	10.00	151.97	137.98	131.02
TPY	21.30	19.20	18.15	108.66	105.72	99.34	43.80	43.80	43.80	173.76	168.72	161.29
VOCs (as methane):												
lb/hr	16.06	15.07	14.11	6.02	6.02	5.26	2.90	2.90	2.90	18.96	17.97	17.01
TPY	2.41	2.26	2.12	25.46	25.49	22.26	12.70	12.70	12.70	40.57	40.45	37.08
Lead:												
lb/hr	1.19E-02	1.06E-02	9.93E-03	NA	NA	NA	NA	NA	NA	1.19E-02	1.06E-02	9.93E-03
TPY	1.78E-03	1.59E-03	1.49E-03	NA	NA	NA	NA	NA	NA	1.78E-03	1.59E-03	1.49E-03

Table A-34A. Maximum Emissions of Other Regulated Pollutants for DETEC Central Florida Cogeneration Facility
Westinghouse 501F, Dry Low NOx Combustor, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Arsenic													
	lb/hr	5.59E-03	4.99E-03	4.69E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.59E-03	4.99E-03	4.69E-03
	TPY	8.39E-04	7.48E-04	7.03E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	8.39E-04	7.48E-04	7.03E-04
Beryllium													
	lb/hr	3.33E-03	2.97E-03	2.79E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.33E-03	2.97E-03	2.79E-03
	TPY	5.00E-04	4.45E-04	4.19E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.00E-04	4.45E-04	4.19E-04
Mercury													
	lb/hr	4.00E-03	3.56E-03	3.35E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.00E-03	3.56E-03	3.35E-03
	TPY	5.99E-04	5.35E-04	5.02E-04	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.99E-04	5.35E-04	5.02E-04
Fluoride													
	lb/hr	4.33E-02	3.87E-02	3.63E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.33E-02	3.87E-02	3.63E-02
	TPY	6.50E-03	5.80E-03	5.45E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.50E-03	5.80E-03	5.45E-03
Sulfuric Acid Mist	lb/hr	9.30E+00	8.33E+00	7.84E+00	4.80E-01	4.32E-01	4.05E-01	3.88E-02	3.88E-02	3.88E-02	9.34E+00	8.37E+00	7.88E+00
	TPY	1.40E+00	1.25E+00	1.18E+00	2.03E+00	1.83E+00	1.71E+00	1.70E-01	1.70E-01	1.70E-01	3.60E+00	3.25E+00	3.06E+00

W501FTOT
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Table A-35A. Maximum Emissions of Non-Regulated Pollutants for DESTEC Central Florida Cogeneration Facility-
Westinghouse 501F, Dry Low NOx Combustor, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Manganese	lb/hr	1.86E-02	1.66E-02	1.56E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.86E-02	1.66E-02	1.56E-02
	TPY	2.80E-03	2.49E-03	2.34E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.80E-03	2.49E-03	2.34E-03
Nickel	lb/hr	2.26E-01	2.02E-01	1.90E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.26E-01	2.02E-01	1.90E-01
	TPY	3.40E-02	3.03E-02	2.85E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.40E-02	3.03E-02	2.85E-02
Cadmium	lb/hr	1.40E-02	1.25E-02	1.17E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.40E-02	1.25E-02	1.17E-02
	TPY	2.10E-03	1.87E-03	1.76E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	2.10E-03	1.87E-03	1.76E-03
Chromium	lb/hr	6.33E-02	5.64E-02	5.30E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	6.33E-02	5.64E-02	5.30E-02
	TPY	9.49E-03	8.46E-03	7.95E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	9.49E-03	8.46E-03	7.95E-03
Copper	lb/hr	3.73E-01	3.33E-01	3.13E-01	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.73E-01	3.33E-01	3.13E-01
	TPY	5.59E-02	4.99E-02	4.69E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	5.59E-02	4.99E-02	4.69E-02
Vanadium	lb/hr	9.26E-02	8.26E-02	7.76E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	9.26E-02	8.26E-02	7.76E-02
	TPY	1.39E-02	1.24E-02	1.16E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	1.39E-02	1.24E-02	1.16E-02
Selenium	lb/hr	3.12E-02	2.78E-02	2.61E-02	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	3.12E-02	2.78E-02	2.61E-02
	TPY	4.68E-03	4.17E-03	3.92E-03	NEG.	NEG.	NEG.	NEG.	NEG.	NEG.	4.68E-03	4.17E-03	3.92E-03
Polycyclic Organic Matter	lb/hr	3.70E-04	3.30E-04	3.10E-04	1.38E-03	1.24E-03	1.16E-03	1.11E-04	1.11E-04	1.11E-04	1.49E-03	1.35E-03	1.27E-03
	TPY	5.55E-05	4.95E-05	4.65E-05	5.83E-03	5.25E-03	4.92E-03	4.87E-04	4.87E-04	4.87E-04	6.37E-03	5.78E-03	5.45E-03
Formaldehyde	lb/hr	5.39E-01	4.81E-01	4.52E-01	1.09E-01	9.82E-02	9.21E-02	8.81E-03	8.81E-03	8.81E-03	5.48E-01	4.90E-01	4.61E-01
	TPY	8.09E-02	7.22E-02	6.78E-02	4.62E-01	4.15E-01	3.89E-01	3.86E-02	3.86E-02	3.86E-02	5.81E-01	5.26E-01	4.96E-01
Carbon Dioxide	lb/hr	2.32E+05	2.07E+05	1.95E+05	1.58E+05	1.41E+05	1.33E+05	3.08E+02	3.02E+02	2.97E+02	2.33E+05	2.08E+05	1.95E+05
	TPY	3.49E+04	3.11E+04	2.92E+04	6.67E+05	5.98E+05	5.62E+05	1.35E+03	1.32E+03	1.30E+03	7.03E+05	6.30E+05	5.92E+05

Table A-36A. Maximum Emissions for Additional Non-Regulated Pollutant for DESTEC Central Florida Cogeneration Facility- Westinghouse 501F, Dry Low NOx Combustor, 70 Percent Load and Duct Burner

Pollutant		Gas Turbine- Distillate Oil			Gas Turbine- Natural Gas			Duct Burner- Natural Gas			Maximum Emissions		
		27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF	27 oF	72 oF	97 oF
Antimony													
	lb/hr	2.91E-02	2.60E-02	2.44E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	2.91E-02	2.60E-02	2.44E-02
	TPY	4.36E-03	3.89E-03	3.66E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	4.36E-03	3.89E-03	3.66E-03
Barium													
	lb/hr	2.60E-02	2.32E-02	2.18E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	2.60E-02	2.32E-02	2.18E-02
	TPY	3.90E-03	3.48E-03	3.27E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	3.90E-03	3.48E-03	3.27E-03
Cobalt													
	lb/hr	1.21E-02	1.08E-02	1.01E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.21E-02	1.08E-02	1.01E-02
	TPY	1.81E-03	1.62E-03	1.52E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.81E-03	1.62E-03	1.52E-03
Zinc													
	lb/hr	9.10E-01	8.12E-01	7.63E-01	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	9.10E-01	8.12E-01	7.63E-01
	TPY	1.37E-01	1.22E-01	1.14E-01	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	1.37E-01	1.22E-01	1.14E-01
Chlorine													
	lb/hr	3.68E-02	3.28E-02	3.08E-02	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	3.68E-02	3.28E-02	3.08E-02
	TPY	5.52E-03	4.92E-03	4.62E-03	NEG.	NEG.	NEG.	0.00E+00	0.00E+00	0.00E+00	5.52E-03	4.92E-03	4.62E-03

EXAMPLE CALCULATIONS

DESTEC CENTRAL FLORIDA COGENERATION PROJECT

EXAMPLE CALCULATIONS - 27°F CONDITIONS

(From Table A-1 On Distillate Oil;

All Other Calculations on Spreadsheet are Identical.)

<u>Table A-1</u>: (Note: all other data not calculated but supplied by Manufacturer)

Heat Input (10^6 Btu/hr):

Power (kW) x Heat Rate (10^6 Btu/kWh)

183,700 x 10,070/10^6 = 1,849.9 x 10^6 Btu/hr

Fuel Oil (lb/hr):

Heat Input (10^6 Btu/hr) ÷ Fuel Heat Content (Btu/lb)

1,849.9 x 10^6 ÷ 18,550 = 99,723 lb/hr

Volume Flow (acfm) - See Note A:

V = mRT/PM

3,743,000 lb/hr x 1,545 x (1,060°F + 460°F) ÷ (28.25 x 2,116.8 lb/ft^2)

÷ 60(min/hr)

= 2,450,287 acfm

Volume Flow (scfm) - See Note A:

Same as volume flow (acfm) except adjusted for standard temperature of 68°F

3,743,000 lb/hr x 1,545 x (68°F + 460°F) ÷ (28.25 x 2,116.8) ÷ 60

= 851,152 scfm

Volume Flow from HRSG (acfm):

CT Exhaust adjusted for temperature

2,450,287 acfm x (205°F + 460°F) ÷ (1,060°F ÷ 460°F)

= 1,072,001 acfm

Velocity (ft/sec):

Volume Flow (ft^3/min) ÷ Area (ft^2) ÷ 60 sec/min

1,072,001 ft^3/min ÷ 60 ÷ (18.0^2 ÷ 4 x 3.14159)

= 70.2 ft/sec

<u>Table A-2</u>:

PM emissions in tons per year

17 lb/hr x 300 hr/yr ÷ 2,000 lb/ton

= 2.6 ton/yr

SO_2 Emissions--Oil (lb/hr)

99,722.9 lb/hr x 0.0005 lb S/lb x 2 lb SO_2/lb S

= 99.72 lb/hr

NO_x Emissions (lb/hr) - See Note B:

42 ppm x [20.9 x (1 - 11.59/100) - 10.96] x 2,116.8 lb/ft^2
x 2,450,287 ft^3/min

x 46 (molecular wgt NO_2) x 60 min/hr ÷ [1,545 x (1,060°F + 460°F)
x 5.9 x 10^6 (adjust for ppm)]

= 326.2 lb/hr

CO Emissions (lb/hr) - See Note C:

30 ppm x (1 - 11.59/100) x 2,450,287 acfm x 2,116.8 lb/ft^2 x 28 (molecular wgt. of carbon)

x 60 min/hr ÷ (1,545 x (1,060°F + 460°F) x 10^6)

= 98.4 lb/hr

VOC Emissions (lb/hr) - See Note C:

3.5 ppm x (1-11.59/100) x 2,450,287 acfm x 2,116.8 lb/ft^2 x 16 (molecular wgt. of methane)

x 60 min/hr ÷ (1,545 x (1,060°F + 460°F) x 10^6)

= 6.56 lb/hr

Lead Emissions (lb/hr):

8.9 lb/10^{12} Btu x 1,849.9 x 10^6 Btu/hr = 1.65 x 10^{-2} lb/hr

Table A-3:

H_2SO_4 Mist Emissions (lb/hr):

Based on 8 percent of sulfur converted to acid mist

99,722.9 lb/hr x 0.0005 lb S/lb x 3.06 lb H_2SO_4/lb S x 0.05 (converted)

= 12.2 lb/hr

Tables A-4 and A-5:

EPA emission factor as noted in printout; example for manganese:

1,849.9 (MMBtu) x 14 lb/10^{12} Btu

= 2.59 x 10^{-2} lb/hr

NOTE A

Volume is calculated based on ideal gas law:

$$PV = mRT/M$$

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

NOTE B

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

Oxygen correction:

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

(From 40 CFR Part 60; Appendix A, Method 20, Equation 20-4)

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

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

(From Method 20; Equation 20-1)

$$V_{NOx\ Act} = V_{NOx\ Dry}\ (1 - \%H_2O);\ \text{(From Method 20; Equation 20-1)}$$

Substituting:

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

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

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

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

NOTE C

Same as D except only moisture correction is used:

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

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

EMISSION FACTORS

PB91-126003

United States Environmental Protection Agency

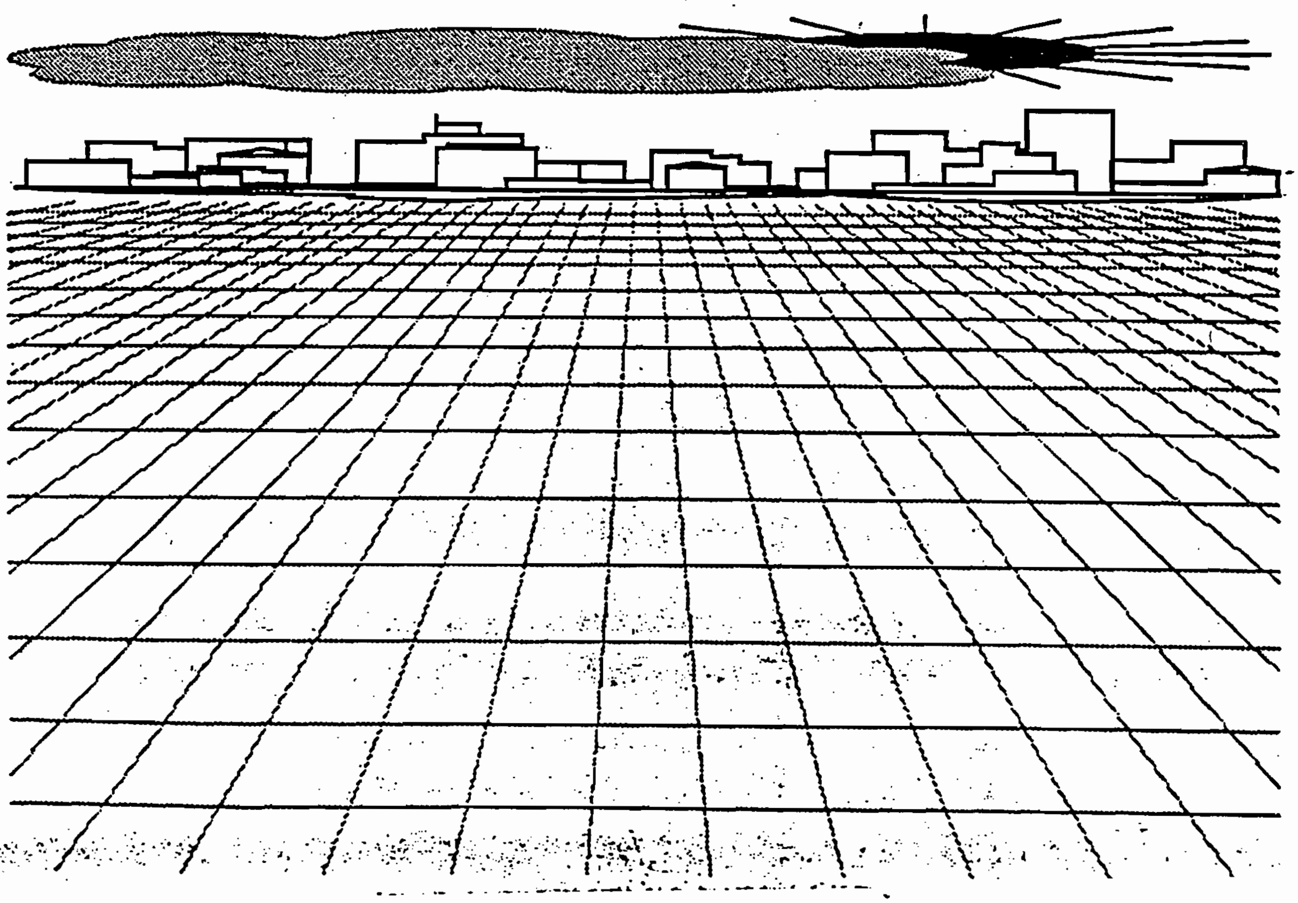
Office of Air Quality Planning And Standards Research Triangle Park, NC 27711

EPA-450/2-90-011
October 1990

AIR

EPA

TOXIC AIR POLLUTANT EMISSION FACTORS - A COMPILATION FOR SELECTED AIR TOXIC COMPOUNDS AND SOURCES, SECOND EDITION



INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Nonferrous metals production	3341	Melt furnace at permanent magnet alloy facility	304	Nickel	7440020	2 lb/ton of nickel charged	Controlled by fabric filter, based on engineering judgement	110
Nonferrous metals production	3341	Melt furnace at superalloy facility	304	Nickel	7440020	2 lb/ton of nickel charged	Controlled by fabric filter, based on engineering judgement	110
Nonylphenol production	2869	Fugitive emissions	301	Phenol	108952	0.38 lb/ton used	From engineering estimates	13
Nonylphenol production	2869	General emissions	301	Phenol	108952	1.6 lb/ton used	From engineering estimates	13
Nonylphenol production	2869	Storage	407084	Phenol	108952	0.02 lb/ton used	From engineering estimates	13
Oil and coal combustion	49	Stack - particulate	102	Polychlorinated dibenzo-p-dioxins, total		1.34 x 10E-4 lb/ton	No penta homologue included, one location, TCDD detection = 4 x 10E-5 lb/ton	119
Oil and coal combustion	49	Stack - particulate	102	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	Not detectable	One location, detection limit = 2 x 10E-8 lb/ton	119
Oil combustion		Fuel oil		Ammonia	7664417	0.8 lb/1000 gallons fuel oil burned	Sources emitting > 100 tons NH3/year	179
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	4.2 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	2.04 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	0.80 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	0.42 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	19 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	9.31 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	2.28 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Arsenic	7440382	1.90 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	2.8 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	1.58 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	0.35 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	0.15 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	4.2 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	2.45 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	0.59 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Beryllium	7440417	0.25 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	10.5 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34

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[illegible]TRIAL/PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	[illegible]BER	EMISSION FACTOR	NOTES	[illegible]DEX
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	7.45 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	1.58 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	0.63 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	15.7 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	44.84 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	9.90 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Cadmium	7440439	3.96 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	47.8 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	27.8 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	13.92 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	3.84 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	21 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	12.18 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	6.09 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Chromium	7440473	1.68 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	290 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	165.2 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	42 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	25.2 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	278 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	165.2 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired	1	Copper	7440508	[illegible]	Controlled with ESP, calculat...	[illegible]

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Copper	7440508	25.2 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Oil-fired boiler or furnace, util/commerc/industr/residential	1	Formaldehyde	50000	405 lb/10E12 Btu	Uncontrolled, based on emissions testing	34
Oil combustion		Industrial, commercial, and residential boilers	1	Lead	7439921	8.9 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement, assumed use distillate oil	34
Oil combustion		Utility boiler	101004	Lead	7439921	28 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement, assumed use residual oil	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	14 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	6.44 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	3.08 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	1.54 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	26 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	11.96 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	5.72 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	34

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Manganese	7439965	2.84 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	3.0 lb/10E12 Btu	Uncontrolled, based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	3.0 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	2.25 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	0.78 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	3.2 lb/10E12 Btu	Uncontrolled, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	3.2 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	2.4 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Mercury	7439976	0.83 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	170 lb/10E12 Btu	Uncontrolled, based on engineering judgement	34
Oil combustion		Distillate oil-fired	1	Nickel	7440020	86.7 lb/10E12 Btu	Controlled by multiclone, based on engineering	[illegible]

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	47.6 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	34
Oil combustion		Distillate oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	6.8 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	1260 lb/10E12 Btu	Uncontrolled, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	642.6 lb/10E12 Btu	Controlled by multiclone, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	352.8 lb/10E12 Btu	Controlled by ESP, based on engineering judgement	34
Oil combustion		Residual oil-fired boiler, util/commerc/industr/residential	1	Nickel	7440020	50.4 lb/10E12 Btu	Controlled by scrubber, based on engineering judgement	34
Oil combustion		Cast iron sectional boilers, distillate oil	10300501	Polycyclic organic matter		34.8 lb/10E12 Btu	Uncontrolled, home heating application	114
Oil combustion		Distillate watertube boilers	10300501	Polycyclic organic matter		0.278 lb/10E12 Btu heat input	Uncontrolldd	114
Oil combustion		Hot air furnace, distillate oil	10300501	Polycyclic organic matter		0.324 lb/10E12 Btu	Uncontrolled, same reference also lists <18.4 for same boiler/fuel type	114
Oil combustion		Scotch marine boilers, distillate oil	10300501	Polycyclic organic matter		41.04 lb/10E12 Btu	Uncontrolled	114
Oil combustion	49	Flue gas	1	2,3,7,8-Tetrachlorodibenzofuran		Not detectable	Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<0.67-<1.3ng/m3	119
Oil combustion	49	Boiler flue gas	1	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	Not detectable	Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<4.2-<7.9 ng/m3	119
Oil combustion, commercial		Scotch marine boilers, residual oil	10300401	Polycyclic organic matter		2.203 lb/10E12 Btu heat input	Uncontrolled, represents benzo(a)pyrene only	114

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion, commercial		Tangential furnace, distillate oil	103005	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Tangential furnace, residual oil	103004	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Wall furnace, distillate oil	103005	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Wall furnace, residual oil	103004	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Distillate oil-fired tangential furnaces	103005	Vanadium	7440622	69.8 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Distillate oil-fired wall furnaces	103005	Vanadium	7440622	69.8 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, commercial		Residual oil-fired tangential furnaces	103004	Vanadium	7440622	8487 lb/10E12 Btu	Uncontrolled, based on reported emissions and engineering judgement	84
Oil combustion, commercial		Residual oil-fired wall furnaces	103004	Vanadium	7440622	8487 lb/10E12 Btu	Uncontrolled, based on reported emissions and engineering judgement	84
Oil combustion, industrial		Oil-fired boiler	102005	Lead	7439921	0.00015 lbs/10E6 BTU heat input	Uncontrolled emissions, based on 1 test	189
Oil combustion, industrial		Steam atomized watertube, residual oil	10200401	Polycyclic organic matter		5.33 lb/10E12 Btu heat input	Uncontrolled, represents mostly particulate POM	114
Oil combustion, industrial		Watertube, residual oil	10200401	Polycyclic organic matter		1.46 lb/10E12 Btu heat input	Uncontrolled, represents both gaseous and particulate POM	114
Oil combustion, industrial		Tangential furnace	102	Selenium	7782492	4.63 lb/10E12 Btu	Controlled by scrubber, based on reported emissions data and engineering judgement	84
Oil combustion, industrial		Tangential furnace	102	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, industrial		Wall furnace	102	Selenium	7782492	4.63 lb/10E12 Btu	Controlled by scrubber, based on reported emissions data and engineering judgement	84
Oil combustion, industrial		Wall furnace	102	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	84
Oil combustion, industrial		Tangential furnace	102	Vanadium	7440622	602.9 lb/10E12 Btu	Controlled by scrubber, based on reported emissions and engineering judgement	84

INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil combustion, industrial		Wall furnace	102	Vanadium	7440422	602.9 lb/10E12 Btu	Controlled by scrubber, based on reported emissions and engineering judgement	54
Oil combustion, industrial		Wall furnace	102	Vanadium	7440422	3014 lb/10E12 Btu	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, residential		Distillate oil-fired furnaces		Selenium	7782492	4.72 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, residential		Distillate oil-fired boiler, util/commerc/industr/residential		Vanadium	7440422	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, utility		Face-fired, residual oil	10100401	Polycyclic organic matter		0.858 lb/10E12 Btu heat input	Uncontrolled, represents both gaseous and particulate POM	114
Oil combustion, utility		Tangential-fired, residual oil	10100404	Polycyclic organic matter		8.79 lb/10E12 Btu heat input	Cyclone controls, represents both gaseous and particulate POM	114
Oil combustion, utility		Wall-fired, residual oil	10100401	Polycyclic organic matter		9.04 lb/10E12 Btu heat input	Uncontrolled, ave. of 4 values ranging from 0.45-12.3 pg/J, represents gaseous & particulate POM	114
Oil combustion, utility	491	Oil-fired utility boiler	101004	Sulfuric acid	7664939	8.8 x % sulfur in fuel ng/J	Controlled emissions, FGD system with 50% efficiency for sulfuric acid mist	213
Oil combustion, utility	491	Oil-fired utility boiler	101004	Sulfuric acid	7664939	16.9 x % sulfur in fuel ng/J	Uncontrolled emissions	213
Oil combustion, utility	4911	Tangential-fired, residual oil	101004	Selenium	7782492	4.638 lb/10E12 Btu	Controlled by ESP, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Tangential-fired, residual oil	101004	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Wall furnace, residual oil	101004	Selenium	7782492	4.638 lb/10E12 Btu	Controlled by ESP, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Wall furnace, residual oil	101004	Selenium	7782492	23.42 lb/10E12 Btu	Uncontrolled, based on reported emissions data and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired tangential furnaces	101004	Vanadium	7440422	702.6 lb/10E12 Btu	Controlled by ESP, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired tangential furnaces	101004	Vanadium	7440422	3515 lb/10E12 Btu	Uncontrolled, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired wall furnaces	101004	Vanadium	7440422	702.6 lb/10E12 Btu	Controlled by ESP, based on reported emissions and engineering judgement	54
Oil combustion, utility	4911	Residual oil-fired wall furnaces	101004	Vanadium	7440422	3515 lb/10E12 Btu	Uncontrolled, based on reported emissions and engineering judgement	54

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Oil shale retorting	1311	Entire process		Mercury	7439976	2.2 x 10E-4 lbs/barrel oil produced	Includes Hg compound form, assumes fac. using 13,000 tons/day raw shale to prod. 12,000 bbl/day oil	40
Oil shale retorting	1311	Modified in situ retort		Polycyclic organic matter		0.0073 lb/hr	Based on offgas concentration and flow rate	114
Open burning		Area source	50300201	Acetaldehyde	75070	0.72 - 1.46 lb/ton wood burned	Estimated from a total aldehyde value of 10.4 lb/ton	130
Open burning		Automobile body burning	50300203	Polycyclic organic matter		0.22 lb/ton waste	Based on concentration measured in smoke plume	114
Open burning		Automobile tire burning	50300203	Polycyclic organic matter		0.48 lb/ton waste	Based on concentration measured in smoke plume	114
Open burning		Grass, leaves, branches	50300201	Polycyclic organic matter		0.005 - 0.0184 lb/ton waste	Based on concentration measured in smoke plume	114
Open burning		Leaf burning	50300201	Polycyclic organic matter		0.02 - 0.044 lb/ton leaves	Based on lab tests	114
Open burning		Municipal refuse open burning	50300202	Polycyclic organic matter		0.001 - 0.0094 lb/ton waste	Based on concentration measured in smoke plume	114
Oxybisphenoxarsine and 1,3-diisocyanate production	2899	Desorption of aqueous waste		Chloroform	67663	0.0022 lb/s	Uncontrolled	160
Oxybisphenoxarsine production	2899	Plantwide emissions		Chloroform	67663	0.0018 lb/s	Carbon adsorption	160
Paint and coating application		Entire process	402	Tetrachloroethylene	127184	2000 lb/ton PCE in paint or coating appl	Uncontrolled, based on engineering judgement	68
Paint and coating application		Entire process	40200101	Toluene	108883	2000 lb/ton used	Assume all toluene is eventually released to atmosphere	13
Paint and coating application		Entire process	402	Trichloroethylene	79016	2000 lb/ton TCE in paint or coating appl	Uncontrolled, based on engineering judgement	105
Paint and coating application	1721	End use	402	Xylenes (mixed isomers)	1330207	2000 lb/ton xylene consumed	Engineering judgement	77
Paint and coating manufacture	28	Xylene solvent	301014	Xylenes (mixed isomers)	1330207	40.4 lb/ton xylene consumed		67
Paint application		Entire process	402	Mercury	7439976	1310 lb/ton of contained Hg	Uncontrolled, based on engineering judgement	113
Paint application		Coating application of solvent-based paints	40200101	Xylenes (mixed isomers)	1330207	1740 lb/ton xylene used	Estimated	13

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Municipal waste combustion	4953	Mass burn waterwall combustor, small size new model to any age medium	501001	Tetrachlorodibenzo-p-dioxins, total		3.2 x 10E-8 lb/ton feed	Capacity < 600 tons/day, ESP control only, overall average of several source averages, range is 1.26 x 10E-8 - 8.2 x 10E-8 lb/ton	180
Municipal waste combustion	4953	Mass burn waterwall combustor, small size new model to any age medium	501001	Tetrachlorodibenzo-p-dioxins, total		0.74 ug/Mg feed	Capacity < 600 tons/day, spray drying after acid gas and PM control, one data point only	180
Municipal waste combustion	4953	Mass burn waterwall combustor, small size new model to any age medium	501001	Tetrachlorodibenzo-p-dioxins, total		2.0 x 10E-8 lb/ton feed	Capacity < 600 tons/day, dry sorbent injection after acid gas and PM control, range is 1.08 x 10E-8 - 2.4 x 10E-8 lb/ton	180
Municipal waste combustion	4953	Mass burn waterwall combustor, built before 1980	501001	Tetrachlorodibenzo-p-dioxins, total		2.8 x 10E-6 lb/ton feed	ESP control only, overall average of several source averages, range is 6.4 x 10E-8 - 6.0 x 10E-6 lb/ton	180
Municipal waste combustion	4953	Mass burn, refractory facility	501001	Tetrachlorodibenzo-p-dioxins, total		3.4 x 10E-6 lb/ton feed	ESP control only, overall average of several source averages, range is 3.0 x 10E-6 - 3.6 x 10E-6 lb/ton	180
Municipal waste combustion	4953	Incinerator stack	501001	Zinc	7440666	1.0 lb/ton munic. solid waste-dry wt.	Controlled by spray-baffle scrubber, based on material balance for model incinerator	95
Naphthalene production		Process emissions		Naphthalene	91203	0.478 lb/ton naphthalene produced	Based on POM emissions and 87% naphthalene	99
Naphthalene production		Storage		Naphthalene	91203	0.0454 lb/ton produced	Based on data from State files and engineering judgement	99
Natural gas combustion		Commercial boiler	10300601	Ammonia	7664417	0.49 lb/10E6 cubic feet gas burned	Sources emitting > 100 tons NH3/year	179
Natural gas combustion		Industrial boilers	10200601	Ammonia	7664417	3.2 lbs/10E6 cubic feet gas burned	Sources emitting > 100 tons NH3/year	179
Natural gas combustion		Boilers, exhaust system	102006	Benzene	71432	1.18% by vol (or 4% by wt) of total VOC	South Coast study, California, engineering judgement	132
Natural gas combustion		Commercial/Institutional	103006	Formaldehyde	50000	220.3 lb/10E12 Btu heat input	Control status unspecified, based on source tests	106
Natural gas combustion		Domestic		Formaldehyde	50000	997 lb/10E12 Btu heat input	Control status unspecified, based on source tests	106
Natural gas combustion		Industrial	102006	Formaldehyde	50000	88.12 lb/10E12 Btu heat input	Control status unspecified, based on source tests	106
Natural gas combustion		Double shell boilers, home heating		Polycyclic organic matter		1.113 lb/10E12 Btu heat input	Represents primarily particulate POM, uncontrolled	114
Natural gas combustion		Firetube boiler, process heater	10200401	Polycyclic organic matter		0.449 lb/10E12 Btu heat input	Represents primarily particulate POM, uncontrolled	114

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INDUSTRIAL PROCESS	SIC CODE	EMISSION SOURCE	SCC CODE	POLLUTANT	CAS NUMBER	EMISSION FACTOR	NOTES	REFERENCE
Natural gas combustion		Hot air furnace, home heating		Polycyclic organic matter		0.748 lb/10E12 Btu heat input	Represents primarily particulate POM, uncontrolled	114
Natural gas combustion		Scotch marine, hospital heating	10200401	Polycyclic organic matter		43.8 lb/10E12 Btu heat input	Represents primarily particulate POM, uncontrolled	114
Natural gas combustion		Wall space heater, home heating		Polycyclic organic matter		43.77 lb/10E12 Btu heat input	Represents primarily particulate POM, uncontrolled	114
Natural gas combustion	49	Utility boiler	10100401	Ammonia	7664417	3.2 lbs/10E6 cubic feet gas burned	Sources emitting > 100 tons NH3/year, emission factor rating C	179
Natural gas combustion - commercial/institutional		Tangential or wall-fired boiler	103006	Mercury	7439976	11.343 lb/10E12 Btu	Uncontrolled emissions	213
Natural gas combustion - utility	491	Tangential-fired boiler	10100404	Mercury	7439976	2.27 lb/10E12 Btu	Controlled emissions, wet scrubber at 80% efficiency for Hg	213
Natural gas combustion - utility	491	Wall-fired boiler	10100401	Mercury	7439976	2.272 lb/10E12 Btu	Controlled emissions, wet scrubber at 80% efficiency for Hg	213
Natural gas combustion - utility	491	Tangential-fired boiler	10100404	Mercury	7439976	11.363 lb/10E12 Btu	Uncontrolled emissions, based on stack tests	213
Natural gas combustion - utility	491	Wall-fired boiler	10100401	Mercury	7439976	11.343 lb/10E12 Btu	Uncontrolled emissions, based on stack tests	213
Neoprene manufacture	2822	Dichlorobutene refining	301	1,3-Butadiene	106990	3.12 lb/ton neoprene produced	Calculated from national emissions and national capacity, mostly controlled	78
Neoprene manufacture	2822	Dichlorobutene synthesis	301	1,3-Butadiene	106990	0.6 lb/ton neoprene produced	Calculated from national emissions and national capacity, mostly controlled	78
Neoprene manufacture	2822	Equipment leak	301	1,3-Butadiene	106990	2.2 lb/ton neoprene produced	Uncontrolled, calculated from national emissions and national capacity	78
Neoprene manufacture	2822	Jet vent scrubber	301026	1,3-Butadiene	106990	0.094 lb/ton neoprene produced	Engineering Judgement	123
Neoprene manufacture	2822	Equipment leak	301018	1,3-Butadiene	106990	2.954 tons/yr	Uncontrolled, average emission factor based on 2 facilities	166
Neoprene manufacture	2822	Process vents	301018	1,3-Butadiene	106990	2.226 tons/yr	Controlled (unspecified), average emission factor based on 2 facilities	166
Neoprene manufacture	2822	Process vents	301018	1,3-Butadiene	106990	12.280 lb/ton	Uncontrolled, average emission factor based on 2 facilities	166
Neoprene manufacture	2822	Batch polykettles	301026	Chloroprene	126998	2.2 lb/ton neoprene	Engineering Judgement	123
Neoprene manufacture	2822	Blend tanks	30102614	Chloroprene	126998	0.32 lb/ton neoprene	Engineering Judgement	123

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

TRW, Inc.
Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

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

	Distillate oil-fired boilers			Residual oil-fired boilers			
		Existing data			Existing data		
Element	Current study	Ref. 42	Ref. 43	Current study	Ref. 42	Ref. 21	Ref. 28
Aluminum (Al)	178	15	250	177	156	87	132
Arsenic (As)	3.5	1.3	1.5	1.2	9.1	18	12
Barium (Ba)	1.2	8.4	16	3.3	9.5	29	31
Calcium (Ca)	75	845	450	229	780	320	1428
Cadmium (Cd)	1.3	2.5	11	0.66	0.2	52	6.9
Cobalt (Co)	3.8	2.3	1.0	11	23	50	10
Chromium (Cr)	24	36	29	29	50	30	21
Copper (Cu)	37	205	160	10	93	64	350
Fluorine (F)	—	$\boxed{14}$	—	—	1.0	2.7	149
Iron (Fe)	363	545	140	83	379	411	453
Mercury (Hg)	—	1.7	1.2	—	1.9	0.9	1.5
Potassium (K)	85	60	230	261	213	777	392
Lithium (Li)	0.5	1.5	1.2	1.1	1.0	1.4	1.7
Magnesium (Mg)	42	40	210	24	111	297	2384
Nickel (Ni)	255	112	230	728	804	964	433
Lead (Pb)	24	48	42	2	7	80	34
Antimony (Sb)	—	1.7	5.7	—	21	10	25
Silicon (Si)	735	173	—	8655	1610	400	595
Vanadium (V)	195	30	2.9	366	250	3656	714
Zinc (Zn)	42	40	110	33	46	29	66

Ave. 50.9

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-296 390

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

TRW, Inc, Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab, Research Triangle Park, NC

Feb 1979

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

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

REFERENCE : MEAD, R.L. et al, Radian Corp
Summary of Trace Emissions from ~~and~~
Risk Assessment Methodologies for
Coal and Oil
Combustion Sources
EPA, 1986

PB89-194229

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United States
Environmental Protection
Agency

Office of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-450/2-89-001
April 1989

AIR

EPA

ESTIMATING AIR TOXICS EMISSIONS FROM COAL AND OIL COMBUSTION SOURCES

TABLE 4-1. SUMMARY OF TOXIC POLLUTANT EMISSION FACTORS FOR OIL COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^{12}$ Btu) Residual Oil	Distillate Oil
Arsenic	19	4.2
Beryllium	4.2	2.5
Cadmium	15.7	10.5
Chromium	21	48
Copper	280	280
Lead	28[c]	8.9[d]
Mercury	3.2	3.0
Manganese	26	14
Nickel	1260	170
POM	8.4[b]	22.5
Formaldehyde	405[e]	405[e]

[a]All emission factors are uncontrolled, and are applicable to oil-fired boilers and furnaces in all combustion sectors unless otherwise noted.

[b]This value was calculated using all available residual oil data given in Table 4-35. If the upper end of the range of available data is excluded when calculating an average value (which could be used in this table), the average factor for POM from residual oil combustion becomes 4.1 $lb/10^{12}$ BTU.

[c]Applicable to utility boilers only.

[d]Applicable to industrial, commercial, and residential boilers.

[e]The formaldehyde factors are based on very limited and relatively old data. Consult Table 4-37 and accompanying discussion for more detailed information.

APPENDIX B
CONTROL TECHNOLOGY REVIEW

B.1 NEW SOURCE PERFORMANCE STANDARDS

The NSPS regulations applicable to gas turbines apply to:

1. Electric utility stationary gas turbines with a heat input at peak load of greater than 100 x 10^6 Btu/hr [40 CFR 60.332 (b)];
2. Stationary gas turbines with a heat input at peak load between 10 and 100 x 10^6 Btu/hr [40 CFR 60.332 (c)]; or
3. Stationary gas turbines with a manufacturer's rate base load at ISO conditions of 30 MW or less [40 CFR 60.332 (d)].

The electric utility stationary gas turbine provisions apply to stationary gas turbines constructed for the purpose of supplying more than one-third of their potential electric output capacity for sale to any utility power distribution system [40 CFR 60.331 (q)]. The requirements for electric utility stationary gas turbines are applicable to the proposed project and are the most stringent provision of the NSPS. These requirements are summarized in Table B-1 and were considered in the BACT analysis.

As noted from Table B-1, the NSPS NO_x emission limit can be adjusted upward to allow for fuel-bound nitrogen (FBN). For a fuel-bound nitrogen concentration of 0.015 percent or less, no increase in the NSPS is provided; for a fuel-bound nitrogen concentration of 0.06 percent, the NSPS is increased by 0.0024 percent or 24 parts per million (ppm).

The applicable NSPS for the duct burner is codified in 40 CFR Part 60 Subpart Dc. Table B-2 presents a summary of the NSPS limits. There are no quantifiable emission limits for natural gas firing.

Table B-1. Federal NSPS for Electric Utility Stationary Gas Turbines

Pollutant	Emission Limitation[a]
Nitrogen Oxides[b]	0.0075 percent by volume (75 ppm) at 15 percent O_2 on a dry basis adjusted for heat rate and fuel nitrogen

[a] Applicable to electric utility gas turbines with a heat input at peak load of greater than 100 x 10^6 Btu/hr.

[b] Standard is multiplied by 14.4/Y; where Y is the manufacturer's rated heat rate in kilojoules per watt at rated load or actual measured heat rate based on the lower heating value of fuel measured at actual peak load; Y cannot be greater than 14.4. Standard is adjusted upward (additive) by the percent of nitrogen in the fuel:

Fuel-bound nitrogen (percent by weight)	Allowed Increase NO_x percent by volume
$N \leq 0.015$	0
$0.015 < N \leq 0.1$	0.04(N)
$0.1 < N \leq 0.25$	0.004+0.0067(N-0.1)
$N > 0.25$	0.005

where:

N = the nitrogen content of the fuel (percent by weight).

Source: 40 CFR 60 Subpart GG.

Table B-2. Summary of NSPS for Small Industrial-Commercial-Institutional Steam Generating Units

Unit Size (heat input)	Fuel	Annual Capacity Factor	Emission Standard
		PARTICULATE MATTER	
30-100 MMBtu/hr	Coal; Coal w/other fuels	>90% on coal	0.05 lb/MMBtu
		<90% on coal	0.10 lb/MMBtu
	Wood; Wood w/other fuels (except coal)	>30% on wood	0.10 lb/MMBtu
		<30% on wood	0.30 lb/MMBtu
	Oil	No limitation	No emission limit
		OPACITY	
30-100 MMBtu/hr	All fuels	No limitation	20% opacity
		SULFUR DIOXIDE	
>75 MMBtu/hr	Coal	>55% on coal	1.2 lb/MMBtu; 90% reduction
	Coal	<55% on coal	1.2 lb/MMBtu
	Coal w/emerging SO_2 control technology	>55% on coal	0.6 lb/MMBtu; 50% reduction
	Coal in duct burner of combined cycle system	No limitation	1.2 lb/MMBtu
	Oil	No limitation	0.5 lb/MMBtu or 0.5% S fuel
	Coal refuse in fluidized bed combustor	No limitation	1.2 lb/MMBtu; 80% reduction
30-75 MMBtu/hr	Coal	No limitation	1.2 lb/MMBtu
	Coal w/emerging SO_2 control technology	No limitation	0.6 lb/MMBtu
	Coal in duct burner of combined cycle system	No limitation	0.6 lb/MMBtu
	Oil	No limitation	0.5 lb/MMBtu or 0.5% S fuel
	Coal refuse in fluidized bed combustor	No limitation	1.2 lb/MMBtu

Source: 40 CFR Part 60 Subpart Dc.

B.2 BEST AVAILABLE CONTROL TECHNOLOGY

B.2.1 NITROGEN OXIDES

Advanced dry low-NO_x combustion alone has increasingly been approved by regulatory agencies as BACT and is technically feasible for the proposed project. The available information suggests that SCR with dry low-NO_x combustor technology or with wet injection is also technically feasible. Central Florida Power Limited Partnership believes that the advanced dry low-NO_x combustor is equivalent to the SCR technology and has several important advantages.

B.2.1.1 Identification of NO_x Control Technologies

NO_x emissions from combustion of fossil fuels consist of thermal NO_x and fuel-bound NO_x. Thermal NO_x is formed from the reaction of oxygen and nitrogen in the combustion air at combustion temperatures. Formation of thermal NO_x depends on the flame temperature, residence time, combustion pressure, and air-to-fuel ratios in the primary combustion zone. The design and operation of the combustion chamber dictates these conditions. Fuel-bound NO_x is created by the oxidation of volatilized nitrogen in the fuel. Nitrogen content in the fuel is the primary factor in its formation.

Table B-3 presents a listing of the lowest achievable emission rates/best available control technology (LAER/BACT) decisions made by state environmental agencies and EPA regional offices for gas turbines. This table was developed from the information contained in the LAER/BACT clearinghouse documents (EPA, 1985b, 1986, 1987c, 1988c, 1989) and by contacting state agencies, such as the California Air Control Board, the South Coast Air Quality Management District, the New Jersey Department of Environmental Protection, and the Rhode Island Department of Environmental Management.

Historically, the most stringent NO_x controls for GTs established as LAER/BACT by state agencies were selective catalytic reduction (SCR) with wet injection and wet injection alone. When SCR has been employed, wet

Table B-3. Summary of BACT Determinations for NOx from Gas-fired Turbines (Page 1 of 3)

Company Name	State	Date of Permit	Unit/Process Description	Capacity (Size)	NO_x Emission Limit (lb/MMBtu)	(lb/hr)	(TPY)	(ppmvd basis)	Control Method	Efficiency (%)
Lake Cogen	FL	Nov-91	Combined Cycle	120 MW	--	--	--	25 @ 15% O_2	Steam Injection	--
Pasco Cogen	FL	Nov-91	Combined Cycle	120 MW	--	--	--	25 @ 15% O_2	Steam Injection	--
Florida Power Corporation	FL	Sep-91	Simple Cycle	552 MW	--	--	--	42 @ 15% O_2	Dry Low NO_x Combustor	--
Enron Louisana Energy Co	LA	Aug-91	Gas Turbines (2)	78.2 MMBtu/hr	--	6.3	--	40 ppmv @ 15% O_2	Water Inject 0.67 lb/lb	71.00%
City of Lakeland	FL	Jul-91	Combined Cycle	120 MW	--	--	--	25 @ 15% O_2	Dry Low NO_x Combustor	--
Sumas Energy, Inc.	WA	Jun-91	Gas Turbine	80 MW	--	--	--	6 @ 15% O_2	SCR	90.00%
Florida P&L Co. (Martin)	FL	Jun-91	Combined Cycle	860 MW	--	--	--	25 @ 15% O_2	Dry Low NO_x Combustor	--
Commonwealth Atlantic LTD Partn.	VA	Mar-91	Gas Turbine	1533 MMBtu/hr	--	139	--	25	H2o Injection & Low NO_x Comb.	--
Commonwealth Atlantic LTD Partn.	VA	Mar-91	Gas Turbine	1400 MMBtu/hr	--	--	1032	42	Water Injection	--
Florida P&L Co. (Ft. Lauderdale)	FL	Mar-91	Combined Cycle	860 MW	--	--	--	42 @ 15% O_2	Steam Injection	--
Hardee Power Station	FL	Dec-90	Combined Cycle	660 MW	--	--	--	42 @ 15% O_2	Wet Injection	--
Salinas River Cogen	CA	Nov-90	Gas Turbine	43.2 MW	--	10	--	6 @ 15% O_2	Dry Low NO_x Comb. & SCR	--
Sargent Canyon Cogen Co	CA	Nov-90	Gas Turbine	42.5 MW	--	10	--	6 @ 15% O_2	Dry Low NO_x Comb. & SCR	--
March Point Cogen	WA	Oct-90	Turbine	80 MW	--	--	--	25 @ 15% O_2	Massive Steam Injection	80.00%
Las Vegas Cogen	NV	Oct-90	Turbine, Peaking	397 MMBtu/hr	--	--	--	10 ppm	Water Injection & SCR	--
Delmarva Power Corporation	DE	Sep-90	Combined Cycle	450 MW	0.10	--	--	25 @ 15% O_2	Dry Low NO_x Combustor	--
Doswell Limited Partnership	VA	May-90	Turbine	1,261 MMBtu/hr	--	--	--	9	Dry Comb. to 25 ppm, SCR to 9 ppm	--
Fulton Cogeneration Assoc.	NY	Jan-90	GE LM5000	500 MMBtu/hr	--	--	--	36	Water Injection	--
O'Brian California Cogen II	CA	Jan-90	Gas Turbine	49.50 MW	--	114.6	--	--	SCR	--
Arrowhead Cogeneration	VT	Dec-89	Gas Turbine	282.0 MMBtu/hr	--	--	--	9 @ 15% O_2, 1H Avg	Water Injection & SCR	80.00%
Richmond Power Enterprise Partn.	VA	Dec-89	Gas Turbine	1,163.5 MMBtu/hr	--	--	--	8.2 @ 15% O_2	Steam Inj. & SCR	--
JMC Selkirk, Inc.	NY	Nov-89	GE Frame 7	80 MW	--	--	--	25 ppm	Steam Injection	--
Badger Creek Limited	CA	Oct-89	GT-Cogen	457.8 MMBtu/hr	0.0135	--	--	--	Steam Injection & SCR	--
Capitol District NRG Ctr	CT	Oct-89	Gas Turbine	738.8 MMBtu/hr	--	--	--	42 @ 15% O_2	Steam Injection	--
City of Anaheim GT Proj.	CA	Sep-89	Gas Turbine	442 MMBtu/hr	--	3.75	--	--	Steam Injection & SCR	69.60%
Panda-Rosemary Corp.	NC	Sep-89	GE Frame 6	499 MMBtu/hr	0.17	83	--	--	Water Injection	--
Kamine Syracuse Cogen	NY	Sep-89	Turbine	79 MW	--	--	--	36 ppm	Water Injection	--
Cimarron Chemical Co.	CO	Aug-89	Turbines (2)	271.0 MMBtu/hr	--	--	--	65 ppmv @ 15% O_2	Steam Injection	--
Tropicana Products, Inc.	FL	May-89	Gas Turbine	45.40 MW	--	--	--	42 @ 15% O_2	Steam Injection	--
Empire Energy - Niagara Cogen	NY	May-89	GE Frame 6 (3)	1,248 MMBtu/hr	--	--	--	42 ppm	Steam Injection	--
Megan-Racine Assoc.	NY	Mar-89	GE LM 5000	430 MMBtu/hr	--	--	--	42 ppm	Water Injection	--
Potomac Electric Power Company	MD	Mar-89	Combined Cycle	860 MW	--	--	--	42 @ 15% O_2	Steam Injection	--
Indec/Oswego Hill Cogen	NY	Feb-89	GE Frame 6	40 MW	--	--	--	42 @ 15% O_2	Water Injection	--

Table B-3. Summary of BACT Determinations for NOx from Gas-fired Turbines (Page 2 of 3)

Company Name	State	Date of Permit	Unit/Process Description	Capacity (Size)	NO_x Emission Limit (lb/MMBtu)	(lb/hr)	(TPY)	(ppmvd basis)	Control Method	Efficiency (%)
Pawtucket Power	RI	Jan-89	Turbine	58 MW	--	--	--	9 @ 15% O_2	SCR	--
L&J Energy System Cogen	NY	Jan-89	GE LM 5000	40 MW	--	--	--	42 ppm	Steam Injection	--
Mojave Cogen	CA	Jan-89	Turbine	490 MMBtu/hr	0.031	--	--	--	--	--
Ocean State Power	RI	Jan-89	Combine Cycle	500 MW	--	--	--	9 @ 15% O_2	Water Injection & SCR	--
Mojave Cogen	CA	Dec-88	Turbine	45 MW	--	--	--	10 ppm	Steam Injection & SCR	--
Champion International	AL	Nov-88	Gas Turbine	35 MW	--	--	--	42 @ 15% O_2	Steam Injection	70.00%
Indeck-Yerkes Energy Services	NY	Nov-88	GE Frame 6	40 MW	--	--	--	42 @ 15% O_2	Steam Injection	--
Long Island Lighting Co	NY	Nov-88	Peaking Units (3)	75 MW	--	--	--	55 ppm	Water Injection	--
Amtrak	PA	Oct-88	Turbine (2)	20 MW	--	--	--	42 @ 15% O_2	H_2O Injection	--
Mobile Oil	CA	Sep-88	Turbine (2)	81.40 MMBtu/hr	0.047	3.78	--	--	Water Inj. & SCR	--
Kamine South Glens Falls	NY	Sep-88	GE Frame 6	40 MW	--	--	--	42 ppm	Steam Injection	--
Orlando Utilities	FL	Sep-88	Gas Turbine (2)	35 MW	--	--	--	42 @ 15% O_2	Steam Injection	--
Delmarva Power Corporation	DE	Aug-88	Turbine (2)	200 MW	--	--	--	42 ppm	Low NO_x Burners & Water Inj.	--
O'Brien Cogen	CT	Aug-88	Gas Turbine (2)	499.9 MMBtu/hr	--	--	--	39 @ 15% O_2	Water Injection	--
Kamine Carthage	NY	Jul-88	GE Frame 6	40 MW	--	--	--	42 ppm	Steam Injection	--
ADA Cogeneration	MI	Jun-88	Turbine	245.0 MMBtu/hr	--	--	--	42 @ 15% O_2, 1H Avg	H20 Injection	59.00%
CCF-1 Jefferson Station	CT	May-88	Gas Turbines (2)	110 MMBtu/hr	--	--	--	36 @ 15% O_2	Water Injection	--
Merck Sharp & Pohme	PA	May-88	Turbine	310 MMBTU/hr	--	--	--	42 @ 15% O_2	Steam Injection	--
Virginia Power	VA	Apr-88	GE Turbine	1,875 MMBTU/hr	--	490		42 @ 15% O_2	Steam Injection	--
TBG/Grumman	NY	Mar-88	Gas Turbine	16 MW	0.2	--	--	75 ppm	H_2O Inj. & Combustion Controls	--
Combined Energy Resources	CA	Feb-88	Gas Turbine	25.94 MW	--	199.0	--	--	H_2O Injection & SCR	81.00%
Texas Gas Transmission Corp.	KY	Feb-88	Gas Turbine	14300 HP	--	--	--	--	NO_x 0.015 % by Volume	--
Midland Cogeneration Venture	MI	Feb-88	Turbines (12)	984.2 MMBTU/hr	--	--	--	42 @ 15% O_2	Steam Injection	--
Midway-Sunset Cogen	CA	Jan-88	GE Frame 7 (3)	75 MW	--	85	--	--	Water Inj. & Quiet Combustion	--
Downtown Cogeneration Assoc.	LA	Aug-87	Gas Turbine	71.9 MMBtu/hr	--	--	--	42 @ 15% O_2	Water Injection	--
BAF Energy	CA	Jul-87	Turbine, Generator	887.2 MMBTU/hr	--	30.1	--	9 ppm @ 15% O_2	Steam Injection & SCR	80.00%
AES Placerita, Inc.	CA	Jul-87	Turbine	530 MMBTU/hr	--	14.2	--	9 @ 15% O_2	St./F Ratio 2.2:1 & SCR	--
AES Placerita, Inc.	CA	Jul-87	Gas Turbine	530	--	12.0	--	9 @ 15% O_2	St./F Ratio 2.2:1 & SCR	--
Simpson Paper Co.	CA	Jun-87	Gas Turbine	49.50 MW	--	9.71	--	6 @ 15% O_2	Steam Injection & SCR	--
Power Development Co.	CA	Jun-87	Gas Turbine	49 MMBTU/H	--	1.5	--	9 @ 15% O_2	H_2O Injection & SCR	--
San Joaquin Cogen Limited	CA	Jun-87	Gas Turbine	48.6 MW	--	10.4	--	6 @ 15% O_2	H_2O Injection & SCR	76.00%
Cogen Technologies	NJ	Jun-87	GE Frame 6 (3)	40 MW	--	--	--	9.6 @ 15% O_2	H^2O Injection & SCR	95.00%
Trunkline LNG	LA	May-87	Gas Turbine	147,102 SCF/hr	--	59	--	--	--	

Table B-3. Summary of BACT Determinations for NOx from Gas-fired Turbines (Page 3 of 3)

Company Name	State	Date of Permit	Unit/Process Description	Capacity (Size)	NO_x Emission Limit (lb/MMBtu)	(lb/hr)	(TPY)	(ppmvd basis)	Control Method	Efficiency (%)
Pacific Gas Transmission	OR	May-87	Gas Turbine	14,000 HP	--	50.3	--	154 Combustion Control	--	
Anheuser-Busch	FL	Apr-87	Gas Turbine	95.7 MMBTU/hr	0.10	--	--	--	--	--
Alaska Elect. Gen. & Trans.	AK	Mar-87	Gas Turbine	80 MW	--	--	--	75 @ 15% O_2	H_2O Injection	--
Sycamore Cogen	CA	Mar-87	Gas Turbine	75 MW	--	--	--	--	--	--
U.S. Borax & Chemical Corp.	CA	Feb-87	Gas Turbine	45 MW	--	40	--	25 ppm @ 15% O_2	Proper Combust. Techniques	--
Sierra LTD.	CA	Feb-87	GE Gas Turbine	11.34 MMCF/D	0.016	4.04	--	--	Steam Injection & SCR	95.86%
Midway-Sunset Project	CA	Jan-87	Gas Turbines (3)	973 MMBTU/hr	--	113.4	--	16.31 ppmv	H_2O Injection	73.00%
City of Santa Clara	CA	Jan-87	Gas Turbine	--	--	--	--	42 @ 15% O_2	Water Injection	--
O'Brien NRG Systems/Merchants Refrig	CA	Dec-86	Gas Turbine	359.5 MMBtu/hr	--	30.3	--	15 @ 15% O_2	Water Injection & SCR	--
California Dept. of Corr.	CA	Dec-86	Gas Turbine	5.1 MW	--	--	--	38 @ 15% O_2	1:1 H_2O Injection	--
Double 'C' Limited	CA	Nov-86	Gas Turbine	25 MW	--	8.08	--	--	H_2O Inj. & Selected Catalytic Red.	--
Kern Front Limited	CA	Nov-86	Gas Turbine (2)	50 MW	--	8.08	--	4.5 @ 15% O_2	Water Injection & SCR	95.80%
PG&E, Station T	CA	Aug-86	GE LM5000	396 MMBTU/hr	--	63	--	25 ppm @ 15% O_2	Steam Injection @ St/F Ratio of 1.7/1	75.00%
Wichita Falls E. I., I.	TX	Jun-86	Gas Turbine	20 MW	--	--	684	--	Steam Injection	--
Formosa Plastic Corp.	TX	May-86	GE MS 6001	38.4 MW	--	--	640	--	Steam Injection	--
Kern Energy Corp.	CA	Apr-86	Gas Turbine	8.8 MMCF/D	0.023	8.29	--	--	Steam Inj., Low NO_x Config. & SCR	87.00%
Monarch Cogen	CA	Apr-86	Combined Cycle	92.20 MMBtu/hr	--	8.02	--	22 @ 15% O_2	SCR	--
Moran Power, Inc.	CA	Apr-86	Gas Turbine	8.0 MMCF/D	0.02	8.29	--	--	Steam Inj., Low NO_x Config. & SCR	87.00%
Southeast Energy, Inc.	CA	Apr-86	Gas Turbine	8.0 MMCF/D	0.023	8.29	--	--	Steam Inj., Low NO_x Config. & SCR	87.00%
Western Power System, Inc	CA	Mar-86	GE Gas Turbine	26.5 MW	--	--	--	9 @ 15% O_2	H_2O Injection & SCR	80.00%
AES Placerita, Inc.	CA	Mar-86	Turbine	519 MMBTU/hr	--	26.2	--	7 @ 15% O_2	H_2O Injection & SCR	--
OLS Energy	CA	Jan-86	GE Gas Turbine	256 MMBTU/hr	--	--	--	9 @ 15% O_2	H_2O Injection & Scrubber	80.00%
Union Cogeneration	CA	Jan-86	Gas Turbine	16 MW	--	--	--	25 @ 15% O_2	H_2O Injection & Scrubber	--

injection is used initially to reduce NO_x emissions. However, advanced dry low-NO_x technology has only recently been developed and made available for gas turbines. SCR is a post-combustion control, while advanced dry low-NO_x combustors minimize the formation of NO_x in the combustion process.

SCR has been installed or permitted in about 132 projects. The majority of these projects (more than 90 percent) are cogeneration facilities with capacities of 50 MW or less. About 83 percent (i.e., 109) of the projects have been in California. Of these 109 projects that have either installed SCR or have been permitted with SCR, 43 percent have been in the Southern California NO_2 nonattainment area where SCR was required not as BACT but as LAER, a more stringent requirement. LAER is distinctly different from BACT in that there is no consideration of economic, energy, or environmental impacts; if a control technology has previously been installed, it must be required as LAER. LAER is defined as follows:

> Lowest achievable emission rate means, for any source, the more stringent rate of emissions based on the following: (i) The most stringent emissions limitation which is contained in the implementation plan of any State of such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or (ii) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within the stationary source. In no event shall the application of this term permit a proposed new modified stationary source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance (40 CFR 51, Appendix S.II, A.18).

As noted previously, there are distinct regulatory and policy differences between LAER and BACT.

All the projects in California have natural gas as the primary fuel, and only 15 of the SCR applications in California have distillate fuel as backup.

The remaining projects with SCR (i.e., 23 projects) are located in the eastern United States. These projects are located in Vermont, Massachusetts, Connecticut, New Jersey, New York, Rhode Island, and Virginia. A majority of these projects are cogenerators or independent power producers. The size of these projects ranges from 22 MW to 450 MW, with 87 percent less than 100 MW in size. While almost all of the facilities have distillate oil as backup fuel, distillate oil generally is restricted by permit to 1,000 hours or less per GT.

Reported and permitted NO_x removal efficiencies of SCR range from 40 to 80 percent. The most stringent emission limiting standards associated with SCR are approximately 9 ppm for natural gas firing. However, two facilities have reported emission limits of about 4.5 ppm. These emission limits were clearly determined to be LAER on GTs using water injection with uncontrolled NO_x levels below 42 ppm. SCR has not been installed or permitted on simple cycle GTs.

Wet injection has been the primary method of reducing NO_x emissions from GTs. This method of control was first mandated by the NSPS to reduce NO_x levels to 75 parts per million by volume, dry (ppmvd) (corrected to 15 percent O_2 and heat rate). Development of improved wet injection combustors reduced NO_x concentrations to 25 ppmvd (corrected to 15 percent O_2) when burning natural gas. More recently, GT manufacturers have developed dry low-NO_x combustors that can reduce NO_x concentrations to 25 ppmvd (corrected to 15 percent O_2) when firing natural gas.

In Florida, a majority of the most recent PSD permits and BACT determinations for gas turbines have required either wet injection or dry low-NO_x technology for NO_x control. The emission limits included in these permits and BACT determinations are 25 ppm (corrected to 15 percent O_2, dry conditions) for natural-gas firing.

B.2.1.2 <u>Technology Description and Feasibility</u>

<u>Wet Injection</u>--The injection of water or steam in the combustion zone of GTs reduces the flame temperature with a corresponding decrease of NO_x emissions. The amount of NO_x reduction possible depends on the combustor

design and the water-to-fuel ratio employed. An increase in the water-to-fuel ratio will cause a concomitant decrease in NO_x emissions until flame instability occurs. At this point, operation of the GT becomes inefficient and unreliable, and significant increases in products of incomplete combustion will occur (i.e., CO and VOC emissions).

Dry Low-NO_x Combustor--In the past several years, GT manufacturers have offered and installed machines with dry low-NO_x combustors. These combustors, which are offered on conventional machines manufactured by GE, Kraftwork Union, and ABB, can achieve NO_x concentrations of 25 ppmvd or less when firing natural gas. GE and Westinghouse have offered dry low-NO_x combustors on advanced heavy-duty industrial machines. Thermal NO_x formation is inhibited by using combustion techniques where the natural gas and combustion air are premixed before ignition. For the GT being considered for the project, the combustion chamber design includes the use of dry low-NO_x combustor technology. The NO_x emission level guaranteed by the proposed vendors for the project is 25 ppmvd (corrected to 15 percent O_2) when firing natural gas.

Selective Catalytic Reduction (SCR)--SCR uses ammonia (NH_3) to react with NO_x in the gas stream in the presence of a catalyst. NH_3, which is diluted with air to about 5 percent by volume, is introduced into the gas stream at reaction temperatures between 600°F and 750°F. The reactions are as follows:

$$4NH_3 + 4NO + O_2 = 4N_2 + 6H_2O$$
$$4NH_3 + 2NO_2 + O_2 = 3N_2 + 6H_2O$$

SCR operating experience, as applied to gas turbines, consists primarily of baseload natural-gas-fired installations either of cogeneration or combined cycle configuration; no simple cycle facilities have SCR. Exhaust gas temperatures of simple cycle GTs generally are in the range of 1,000°F, which exceeds the optimum range for SCR. All current SCR applications have the catalyst placed in the HRSG to achieve proper reaction conditions.

This allows a relatively constant temperature for the reaction of NH_3 and NO_x on the catalyst surface.

The use of SCR has been limited to facilities that burn natural gas or small amounts of fuel oil since SCR catalysts are contaminated by sulfur-containing fuels (i.e., fuel oil). For most fuel-oil-burning facilities, catalyst operation is discontinued, or the exhaust bypasses the SCR system. While the operating experience has not been extensive, certain cost, technical, and environmental considerations have surfaced. These considerations are summarized in Table B-4.

As presented in Table B-4, ammonium salts (ammonium sulfate and bisulfate) are formed by the reaction of NH_3 and sulfur combustion products. Ammonium bisulfate can be corrosive and could cause damage to the HRSG surfaces that follow the catalyst, as well as to the stack. Corrosion protection for these areas would be required. Ammonium sulfate is emitted as particulate matter. While the formation of ammonium salts is primarily associated with oil firing, sulfur combustion products from natural gas also could form small amounts of ammonium salts.

Zeolite catalysts, which are reported to be capable of operating in temperature ranges from 600°F to 950°F, have been available commercially only recently. Their application with SCR primarily has been limited to internal combustion engines. Optimum performance of an SCR system using a zeolite catalyst is reported to range from about 800°F to 900°F. At temperatures of 1,000°F and above, the zeolite catalyst will be irreparably damaged. Therefore, application of an SCR system using a zeolite catalyst on a simple cycle operation is technically infeasible without exhaust gas cooling. Moreover, since zeolite catalysts have not been operated continuously in combustion exhausts greater than 900°F, the cooling system would have to reduce turbine exhaust temperatures about 200°F (i.e., to around 800°F).

Table B-4. Cost, Technical, and Environmental Considerations of SCR Used on Combustion Turbines (Page 1 of 2)

Consideration	Description
COST:	
Catalyst Replacement	Catalyst life varies depending on the application. Cost ranges from 20 to 40 percent of total capital cost and is the dominant annual cost factor.
Ammonia	Ratio of at least 1:1 NH_3 to NO_x generally needed to obtain high removal efficiencies. Special storage and handling equipment required.
Space Requirements	For new installations, space in the catalyst is needed for replacement layers. Additional space is also required for catalyst maintenance and replacement.
Backup Equipment	Reliability requirements necessitate redundant systems, such as ammonia control and vaporization equipment.
Catalyst Back Pressure Heat Rate Reduction	Addition of catalyst creates backpressure on the turbine, which reduces overall heat rate.
Electrical	Additional usage of energy to operate ammonia pumps and dilution fans.
TECHNICAL:	
Ammonia Flow Distribution	NH_3 must be uniformly distributed in the exhaust stream to assure optimum mixing with NO_x before to reaching the catalyst.
Temperature	The narrow temperature range that SCR systems operate within (i.e., about 100°F) must be maintained even during load changes. Operational problems could occur if this range is not maintained. HRSG duct firing requires careful monitoring.

Table B-4. Cost, Technical, and Environmental Considerations of SCR Used on Combustion Turbines (Page 2 of 2)

Consideration	Description
Ammonia Control	Quantity of NH_3 introduced must be carefully controlled. With too little NH_3, the desired control efficiency is not reached; with too much NH_3, NH_3 emissions (referred to as slip) occur.
Flow Control	The velocity through the catalyst must be within a range to assure satisfactory residence time.
ENVIRONMENTAL:	
Ammonia Slip	NH_3 slip (NH_3 that passes unreacted through the catalyst and into the atmosphere) can occur if 1) too much ammonia is added, 2) the flow distribution is not uniform, 3) the velocity is not within the optimum range, or 4) the proper temperature is not maintained.
Ammonium Salts	Ammonium salts (ammonium sulfate and bisulfate) can lead to increased corrosion. These salts can occur when firing natural gas. These compounds are emitted as particulates.
Ammonia Transportation and Storage	Storage and handling of anhydrous ammonia produces additional environmental risks. Appropriate controls and contingency plans in the event of a release is required.

<u>NO_xOUT Process</u>--The NO_xOUT process originated from the initial research by the Electric Power Research Institute (EPRI) in 1976 on the use of urea to reduce NO_x. EPRI licensed the proprietary process to Fuel Tech, Inc., for commercialization. In the NO_xOUT process, aqueous urea is injected into the flue gas stream ideally within a temperature range of 1,600°F to 1,900°F. In the presence of oxygen, the following reaction results:

$$CO(NH_2)_2 + 2NO + 1/2\ O_2 \text{ --> } 2N_2 + CO_2 + 2H_2O$$

The amount of urea required is most cost-effective when the treatment rate is 0.5 to 2 moles of urea per mole of NO_x. In addition to the original EPRI urea patents, Fuel Tech claims to have a number of proprietary catalysts capable of expanding the effective temperature range of the reaction to between 1,600°F and 1,950°F. Advantages of the system are as follows:

1. Low capital and operating costs as a result of use of urea injection, and
2. The proprietary catalysts used are nontoxic and nonhazardous, thus eliminating potential disposal problems.

Disadvantages of the system are as follows:

1. Formation of ammonia from excess urea treatment rates and/or improper use of reagent catalysts, and
2. Sulfur trioxide (SO_3), if present, will react with ammonia created from the urea to form ammonium bisulfate, potentially plugging the cold end equipment downstream.

Commercial application of the NO_xOUT system is limited to three reported cases:

1. Trial demonstration on a 62.5-ton-per-hour (TPH) stoker-fired wood waste boiler with 60 to 65 percent NO_x reduction,
2. A 600 x 10^6 Btu CO boiler with 60 to 70 percent NO_x reduction, and
3. A 75-MW pulverized coal-fired unit with 65 percent NO_x reduction.

The NO_xOUT system has not been demonstrated on any combustion turbine/HRSG unit.

The NO_xOUT process is not technically feasible for the proposed project because of the high application temperature of 1,600°F to 1,950°F. The maximum exhaust gas temperature of the GT is about 1,000°F. Raising the exhaust temperature the required amount essentially would require installation of a heater. This would be economically prohibitive and would result in an increase in fuel consumption, an increase in the volume of gases that must be treated by the control system, and an increase in uncontrolled air emissions, including NO_x.

<u>Thermal $DeNO_x$</u>--Thermal $DeNO_x$ is Exxon Research and Engineering Company's patented process for NO_x reduction. The process is a high temperature selective noncatalytic reduction (SNCR) of NO_x using ammonia as the reducing agent. Thermal $DeNO_x$ requires the exhaust gas temperature to be above 1,800°F. However, use of ammonia plus hydrogen lowers the temperature requirement to about 1,000°F. For some applications, this must be achieved by additional firing in the exhaust stream before ammonia injection.

The only known commercial applications of Thermal $DeNO_x$ are on heavy industrial boilers, large furnaces, and incinerators that consistently produce exhaust gas temperatures above 1,800°F. There are no known applications on or experience with GTs. Temperatures of 1,800°F require alloy materials constructed with very large piping and components since the exhaust gas volume would be increased by several times. As with the NO_xOUT process, high capital, operating, and maintenance costs are expected because of construction-specified material, an additional duct burner system, and fuel consumption. Uncontrolled emissions would increase because of the additional fuel burning.

Thus, the Thermal $DeNO_x$ process will not be considered for the proposed project since its high application temperature makes it technically infeasible. The maximum exhaust gas temperature of a combustion turbine is typically about 1,000°F; the cost to raise the exhaust gas to such a high temperature is prohibitively expensive.

Nonselective Catalytic Reduction--Certain manufacturers, such as Engelhard, market a nonselective catalytic reduction system (NSCR) for NO_x control on reciprocating engines. The NSCR process requires a low oxygen content in the exhaust gas stream and high temperature (700°F to 1,400°F) in order to be effective. GTs have the required temperature but also have high oxygen levels (greater than 12 percent) and, therefore, cannot use the NSCR process. As a result, NSCR is not a technically feasible add-on NO_x control device for GTs.

Control Technologies for Duct Firing--The proposed control technology for duct firing in the HRSG will be the use of combustion controls that will limit the emissions to 0.1 lb/10^6 Btu heat input.

The applicable NSPS for the secondary HRSG are the standards promulgated for industrial-commercial-institutional steam generating units contained in 40 CFR Part 60 Subpart Db. These NSPS, for steam generators with a heat input greater than 100x10^6 Btu/hr, limit NO_x emissions from natural gas firing to 0.2 lb NO_x per 10^6 Btu heat input. BACT emission limits for duct burners located in HRSGs associated with combined cycle power plants are typically 0.1 lb NO_x per 10^6 Btu heat input.

Technology Determination--A technical evaluation of other tail gas controls (i.e., NO_xOUT, Thermal DeNO_x, and NSCR) indicates that these processes have not been applied to GT/HRSG and are technically infeasible for the project because of process constraints (e.g., temperature).

For the BACT analysis, the advanced dry low-NO_x combustor alone can achieve 25 ppm (corrected) and the SCR with dry low-NO_x combustor is capable of achieving a NO_x emission level of 9 ppm when firing natural gas (corrected to 15 percent O_2 dry conditions). When firing oil, the emissions with SCR and wet injection would be about 15 ppm (corrected), whereas emissions with SCR and wet injection would be about 15 ppm (corrected), whereas emissions with wet injection alone would be 42 ppm (corrected). However, the SCR has an associated ammonia slip (i.e., 10 ppm).

B.2.1.3 <u>SCR Cost Estimates</u>

Tables B-5 and B-6 present the total capital and annualized cost for SCR, respectively.

B.2.2 CARBON MONOXIDE

B.2.2.1 <u>Identification of CO Control Technologies</u>

CO emissions are a result of incomplete or partial combustion of fossil fuel. Combustion design and catalytic oxidation are the control alternatives that are viable for the project. Table B-7 presents a listing of LAER/BACT decisions for CO emissions from combustion turbines. Combustion design is the more common control technique used in GTs. Sufficient time, temperature, and turbulence is required within the combustion zone to maximize combustion efficiency and minimize the emissions of CO. Combustion efficiency is dependent upon combustor design. For the GTs being evaluated, CO emissions will not exceed 15 ppmvd, corrected to dry conditions when firing natural gas under full load conditions and 50 ppmvd when firing distillate oil.

Catalytic oxidation is a post-combustion control that has been employed in CO nonattainment areas where regulations have required CO emission levels to be less than those associated with wet injection. These installations have been required to use LAER technology and typically have CO limits in the 10 ppm range (corrected to dry conditions).

For duct firing, the specific burner design to control NO_x emissions has commonly established the ability of the burner to meet CO limits. Recent BACT decisions for duct firing have ranged from 0.14 lb/10^6 Btu for Tropicana Products, Inc. to 0.2 lb/10^6 Btu for the Lake and Pasco Cogen

Table B-5. Direct and Indirect Capital Cost for Selective Catalytic Reduction (SCR) (Page 1 of 4)

Cost Component	Estimated Cost ($)	Basis for Cost Estimate
Direct Capital Costs		
SCR Associated Equipment	725,000	Developed from manufacturer budget quotations[a]
Ammonia Storage Tank	250,000	Developed from manufacturer budget quotations[b]
HRSG Modification	440,000	Developed from manufacturer budget quotations[c]
Indirect Capital Costs		
Installation and Foundation (Includes Contractor Fee)	1,298,300	45% of SCR associated equipment and catalyst[d]
Engineering, Erection Supervision, Startup, and O&M Training	487,300	10% SCR equipment and catalyst with contingency, ammonia storage tank, HRSG costs, installation labor.[e]
Project Support	268,000	5% SCR equipment and catalyst with contingency, ammonia storage tank, HRSG engineering costs, and installation labor.[f]
Ammonia Emergency Prepardness Program	20,300	Engineering estimate
Liability Insurance	26,800	0.5% SCR equipment and catalyst with contingency, ammonia storage tank, HRSG engineering costs and installation labor.
Interest During Construction	851,300	15% of all direct and indirect capital costs, including catalyst cost[g]
Contingency	929,800	25% of all capital costs[h]
Total Capital Costs	5,296,800	Sum of all capital costs

Table B-5. Direct and Indirect Capital Cost for Selective Catalytic Reduction (SCR) (Page 2 of 4)

Cost Component	Estimated Cost ($)	Basis for Cost Estimate
Annualized Capital Costs	622,200	Capital recovery of 10% over 20 years, 11.74% per year[i]
Recurring Capital Costs		
SCR Catalyst (Materials and Labor)	2,160,000	Developed from manufacturer budget quotations[j]
Contingency	540,000	25% of recurring capital costs[k]
Total Recurring Capital Costs	2,700,000	Sum of recurring capital costs
Annualized Recurring Capital Costs	1,085,700	Capital recovery of 10% over 3 years, 40.21% per year[l]

Note: HRSG = heat recovery steam generators.
SCR = selective catalytic reduction.

Footnotes for Table B-5

Note: All calculations rounded to nearest 100.

a. Developed from various vendor data as an algorithim to account for mass flow (lb/hr) through HRSG.

The SCR associated cost is made up of 2 factors:

1. Catalyst Housing, vaporizer, and HRSG wash system is $100.7 per 1,000 lb/hr mass flow at normal operating conditions (i.e., ~3,600,000 lb/hr).

   $100.7 x 3,600 10^3 lb/hr = $362,500

2. Control system costs = $362,500

   Total is $725,000

Table B-5. Direct and Indirect Capital Cost for Selective Catalytic Reduction (SCR) (Page 3 of 4)

Footnotes for Table B-5 (continued)

b. Ammonia tank size is based on SCR size as follows:

$69.45/1,000 lb mass flow x 3,600 x 10^3 lb/hr = $250,000

c. HRSG modifications based on mass flow at $122.2 per 1,000 lb mass flow.

$122.22/$10^3$ lb x 3,600 x 10^3 lb/hr = $440,000

d. From EPA OAQPS cost control manual

($725,000 + $2,160,000) x 0.45 = $1,298,300

e. From EPA OAQPS cost control manual

($725,000 + $250,000 + $2,160,000 + $440,000 + $1,298,300) x 0.10

= $487,300

f. Engineering estimate; same as engineering costs except use 0.005.

g. From OAQPS cost control manual and engineering estimate.

0.15 x ($725,000 + $250,000 + $440,000 + $1,298,300 + $487,300

+ $268,000 + $20,300 + $26,800 + $2,160,000) = $851,300

h. From EPA OAQPS cost control manual and engineering estimate

0.20 x ($725,000 + $250,000 + $440,000 + $1,298,300 + $487,300

+ $268,000 + $20,300 + $26,800 + $851,300) - (0.25 x 0.30

x $2,160,000)

= $929,800; note that the (0.25 x 0.30 x $2,160,000)

removes contingency for catalyst.

i. OAQPS cost control manual; standard statistical tables for 10% interest over 20 years

$5,296,800 x 0.1174 = $622,200

j. Developed from manufacturer data at $0.6/lb mass flow:

$0.6 x 3,600,000 = $2,160,000

Table B-5. Direct and Indirect Capital Cost for Selective Catalytic Reduction (SCR) (Page 4 of 4)

Footnotes for Table B-5 (continued)

k. Same rationale as h:

0.25 x $2,160,000 = $622,200

l. Manufacturer guarantees of 3 years life or catalyst. Used OAQPS cost control manual interest of 10 percent over 3 years (40.21 percent per year):

0.4021 x $2,700,000 = $1,085,700

Table B-6. Annualized Cost for Selective Catalytic Reduction (SCR) (Page 1 of 4)

Cost Component	Estimated Cost ($)	Basis for Cost Estimate
Direct Annual Costs		
Operating Personnel	31,200	16 hours/week @ $25/hour[a]
Ammonia	51,500	$300/ton; $NH_3:NO_x$ = 1:1 volume[b]
Accident/Emergency Response Plan	8,100	Consultant estimate, 80 hours/year @ $75/hour plus expenses @ 35% labor[c]
Inventory Cost	84,600	Capital recovery (11.74%/year) for 1/3 of catalyst cost[d]
Catalyst Disposal Cost	100,000	Engineering estimate[e]
Contingency	83,100	25% of indirect costs[f]
Energy Costs		
Electrical	35,000	80 kWh/hr; $0.05/kWh[g]
Heat Rate Penalty	321,900	4" back pressure, heat rate reduction of 0.5%, energy loss at $0.05/kWh[h]
MW Loss Penalty	432,000	207 MW lost for 3 days; lost capacity @ $0.05/kW; cost of natural gas @ $3/MMBtu subtracted[i]
Fuel Escalation Costs	162,300	Real cost increase of fuel[j]
Contingency	129,800	25% of energy costs; excludes fuel escalation[k]
Total Direct Annual Costs	1,439,500	Sum of all direct annual costs

Table B-6. Annualized Cost for Selective Catalytic Reduction (SCR) (Page 2 of 4)

Cost Component	Estimated Cost ($)	Basis for Cost Estimate
<u>Indirect Annual Costs</u>		
Overhead	57,100	60% of ammonia and 115% of O&M labor, and 15% of O&M labor (OAQPS Cost Control Manual)[l]
Property Taxes and Insurance	159,900	2% of total capital costs[m]
Annualized Capital Costs	622,200	Capital recovery of 10% over 20 years, 11.74% per year (from Table B-5)
Recurring Capital Costs	1,085,700	Capital recovery of 10% over 3 years, 40.21% per year (from Table B-5)
<u>Total Indirect Annual Costs</u>	1,924,900	Sum of all indirect annual costs
<u>Total Annual Costs</u>	3,364,400	Total annualized cost[n]
<u>Cost Effectiveness</u> ($/ton NO_x)	7,370	Total annual costs divided by tons NO_x removed[o]

Note: All calculations rounded to the nearest $100.

kW = kilowatt.
kWh = kilowatt-hour.
kWh/hr = kilowatt-hour per hour.
MM/Btu = million British thermal units.
NH_3 = ammonia.
NO_x = nitrogen oxides.
O&M = operation and maintenance.

Table B-6. Annualized Cost for Selective Catalytic Reduction (SCR) (Page 3 of 4)

Footnotes for Table B-6

Note: all calculations rounded to nearest 100

a. Engineering Estimate:

24 hours/week x 52 weeks/year x $25/hour = $31,200

b. Delivered cost of ammonia at $300/ton

464 TPY removed x $300 x 17/46 (molecular weight of ammonia to NO_x)

= 51,500

c. 80 hours/yr x $75 x 1.35 = $8,100

d. Required to purchase and store 1/3 of a catalyst for replacement or required.

$2,160,000 x 0.1174 (20 years @ 10 percent) ÷ 3 = $84,600

e. Estimated as $27.77/1,000 lb mass flow; based on catalyst volume.

$27.77 x 3,600 (1,000 lb mass flow) = $100,000

f. OAQPS cost control manual background documents

0.25 x ($31,200 + $51,500 + $8,100 + $84,600 + $100,000) = $83,100

g. 80 kWh/hr from SCR manufacturer; $0.05/kWh is cost of estimated energy:

80 kWh/hr x $8,760 hr/yr x $0.08/kWh = $35,000

h. 4" back pressure from SCR manufacturer; 0.8 percent energy loses from general CT performance curver; 147 MW power rating at ISO (59°F) conditions.

147 MW x 0.005 x 8,760 hrs/yr x 1,000 kW/mw x $0.05/kWh = $321,900

i. 3 days required to change catalyst or maintenance; saving in gas usage subtracted

207 MW x 3 days x 24 hours x $0.05/kWh x 1,000 mwh - (1,450 x 10^6 Btu/hr

x 3 days x 24 hours x $3/$10^6$ Btu) = $432,000

Table B-6. Annualized Cost for Selective Catalytic Reduction (SCR) (Page 4 of 4)

Footnotes for Table B-6 (continued)

j. Escalation of fuel costs over inflation; 3 percent over 20 years; factor calculated as 0.454565; applies to electrical and heat rate costs only:

0.454565 x ($35,000 + $321,900) = $162,300

k. OAQPS cost control manual background documents

0.25 x ($35,000 + $321,900 + $162,300) = $129,800

l. 0.6 ($51,500 + 1.15 x $31,200) + 0.15 x $31,200 = $57,100

m. From OAQPS cost control manual

0.02 x ($5,296,800 + $2,700,000) = $159,900

n. Total direct annual costs plus total indirect annual costs:

$1,439,500 + $1,924,900 = $3,364,400

o. Cost effectiveness is total annual costs divided by the tons removed (702.11 tons/yr x 0.65 = 456.4 tons/yr):

$3,364,400 + 456.4 = $7,370/ton of NO_x removed

Table B-7. Summary of BACT Determinations for CO from Gas-fired Turbines (Page 1 of 2)

Company Name	State	Date of Permit	Unit/Process Description	Capacity (Size)	CO Emission Limit (lb/MMBtu)	(lb/hr)	(TPY)	(ppmvd basis)	Control Method	Efficiency (%)
Lake Cogen	FL	Nov-91	Combined Cycle	120 MW	--	--	--	42	78 ppmvd for oil firing	--
Pasco Cogen	FL	Nov-91	Combined Cycle	120 MW	--	--	--	42	78 ppmvd for oil firing	--
Florida Power Corporation	FL	Sep-91	Simple Cycle	552 MW	--	--	--	--	25 ppmvd for oil firing	--
Enron Louisana Energy Co	LA	Aug-91	Gas Turbines (2)	78.2 MMBtu/hr	--	5.8	--	60 @ 15% O_2	Base Case, No Additional Control	--
Sumas Energy, Inc.	WA	Jun-91	Gas Turbine	80 MW	--	--	--	6 @ 15% O_2	CO Catalyst	80.00%
Florida P&L Co. (Martin)	FL	Jun-91	Combined Cycle	860 MW	--	--	--	30	33 ppmvd for oil firing	--
Commonwealth Atlantic LTD Partn.	VA	Mar-91	Gas Turbine	1400 MMBtu/hr	--	--	261	30	Combustion control	--
Commonwealth Atlantic LTD Partn.	VA	Mar-91	Gas Turbine	1533 MMBtu/hr	--	--	261	30	Combustion control	--
Florida P&L Co. (Ft. Lauderdale)	FL	Mar-91	Combined Cycle	860 MW	--	--	--	30	33 ppmvd for oil firing	--
Hardee Power Station	FL	Dec-90	Combined Cycle	660 MW	--	--	--	10	26 ppmvd for oil firing	--
March Point Cogen	WA	Oct-90	Turbine	80 MW	--	--	--	37 @ 15% O_2	Combustion Control	--
Delmarva Power Corporation	DE	Sep-90	Combined Cycle	450 MW	--	--	--	15 ppm	Good Combustion	--
Doswell Limited Partnership	VA	May-90	Turbine	1,261 MMBtu/hr	--	25	--	--	Combustor Design & Operation	--
Fulton Cogeneration Assoc.	NY	Jan-90	GE LM5000	500 MMBtu/hr	0.02	--	--	--	--	--
Arrowhead Cogeneration	VT	Dec-89	Gas Turbine	282.0 MMBtu/hr	--	--	--	50 @ ISO Cond & 12% O_2	Design & Good Combustion Techniques	--
JMC Selkirk, Inc.	NY	Nov-89	GE Frame 7	80 MW	--	--	--	25 ppm	Combustion Control	--
Capitol District NRG Ctr	CT	Oct-89	Gas Turbine	738.8 MMBtu/hr	0.112	--	--	--	--	--
Panda-Rosemary Corp.	NC	Sep-89	GE Frame 6	499 MMBtu/hr	0.022	10.8	--	--	Combustion Control	--
Kamine Syracuse Cogen	NY	Sep-89	Turbine	79 MW	0.028	--	--	--	Combustion Control	--
Tropicana Products, Inc.	FL	May-89	Gas Turbine	45.40 MW	--	--	--	10 @ 15% O_2	--	--
Empire Energy - Niagara Cogen	NY	May-89	GE Frame 6 (3)	1,248 MMBtu/hr	0.024	--	--	--	Combustion Control	--
Megan-Racine Assoc.	NY	Mar-89	GE LM 5000	430 MMBtu/hr	0.026	--	--	--	Combustion Control	--
Indec/Oswego Hill Cogen	NY	Feb-89	GE Frame 6	40 MW	0.022	--	--	--	Combustion Control	--
Pawtucket Power	RI	Jan-89	Turbine	58 MW	--	--	--	23 @ 15% O_2	--	--
Ocean State Power	RI	Jan-89	Combine Cycle	500 MW	--	--	--	25 @ 15% O_2	--	--
Champion International	AL	Nov-88	Gas Turbine	35 MW	--	9	--	--	--	--
Long Island Lighting Co	NY	Nov-88	Peaking Units (3)	75 MW	--	--	--	10 ppm	Combustion Control	--
Amtrak	PA	Oct-88	Turbine (2)	20 MW	--	30.76	--	--	--	--
Kamine South Glens Falls	NY	Sep-88	GE Frame 6	40 MW	0.021	--	--	--	Combustion Control	--
Orlando Utilities	FL	Sep-88	Gas Turbine (2)	35 MW	--	--	--	10 @ 15% O_2	Combustion Control	--
Delmarva Power Corporation	DE	Aug-88	Turbine (2)	200 MW	--	--	--	15 ppm	Good Combustion	--
Kamine Carthage	NY	Jul-88	GE Frame 6	40 MW	0.022	--	--	--	Combustion Control	--
ADA Cogeneration	MI	Jun-88	Turbine	245.0 MMBtu/hr	0.1	--		--	Combustion Control	--

Table B-7. Summary of BACT Determinations for CO from Gas-fired Turbines (Page 2 of 2)

Company Name	State	Date of Permit	Unit/Process Description	Capacity (Size)	CO Emission Limit (lb/MMBtu)	(lb/hr)	(TPY)	(ppmvd basis)	Control Method	Efficiency (%)
CCF-1 Jefferson Station	CT	May-88	Gas Turbines (2)	110 MMBtu/hr	0.605	--	--	--	--	--
TBG/Grumman	NY	Mar-88	Gas Turbine	16 MW	0.181	--	--	--	CO Catalyst	80.00%
Midland Cogeneration Venture	MI	Feb-88	Turbines (12)	984.2 MMBTU/hr	--	26	--	--	Turbine Design	--
Midway-Sunset Cogen	CA	Jan-88	GE Frame 7 (3)	75 MW	--	94	--	--	Proper Combustion	--
Downtown Cogeneration Assoc.	LA	Aug-87	Gas Turbine	71.9 MMBtu/hr	0.048	--	--	--	--	--
Simpson Paper Co.	CA	Jun-87	Gas Turbine	49.50 MW	--	54.25	--	55 @ 15% O_2	Combustion Controls	--
San Joaquin Cogen Limited	CA	Jun-87	Gas Turbine	48.6 MW	--	55.25	--	55 @ 15% O_2	Combustion Control	--
Cogen Technologies	NJ	Jun-87	GE Frame 6 (3)	40 MW	--	--	--	50 @ 15% O_2	--	--
Pacific Gas Transmission	OR	May-87	Gas Turbine	14,000 HP	--	6	25	--	--	--
Alaska Elect. Gen. & Trans.	AK	Mar-87	Gas Turbine	80 MW				109 lb/scf fuel	Combustion Control	--
Sycamore Cogen	CA	Mar-87	Gas Turbine	75 MW	--	--	--	10 @ 15% O_2	CO Catalyst & Comb. Control	--
PG&E, Station T	CA	Aug-86	GE LM5000	396 MMBTU/hr	--	--	--	--	CO Catalyst (No limit indicated)	--
Formosa Plastic Corp.	TX	May-86	GE MS 6001	38.4 MW	--	--	32.4	--	--	--

Limited projects. The proposed CO BACT emission limit for the project is 0.1 $lb/10^6$ Btu.

B.2.2.2 Technology Description

In an oxidation catalyst control system, CO emissions are reduced by allowing unburned CO to react with oxygen at the surface of a precious metal catalyst, such as platinum. Combustion of CO starts at about 300°F, with efficiencies above 90 percent occurring at temperatures above 600°F. Catalytic oxidation occurs at temperatures 50 percent lower than that of thermal oxidation, which reduces the amount of thermal energy required.

For GTs, the oxidation catalyst can be located directly after the GT. Catalyst size depends upon the exhaust flow, temperature, and desired efficiency. The existing oxidation catalyst applications primarily have been limited to smaller cogeneration facilities burning natural gas.

Oxidation catalysts have not been used on fuel-oil-fired GTs or combined cycle facilities. The use of sulfur-containing fuels in an oxidation catalyst system would result in an increase of SO_3 emissions and concomitant corrosive effects to the stack. In addition, trace metals in the fuel could result in catalyst poisoning during prolonged periods of operation.

Since the units likely will require numerous startups, variations in exhaust conditions will influence catalyst life and performance. Very little technical data exist to demonstrate the effect of such cycling.

The lack of demonstrated operation with oil firing suggests rejection of catalytic oxidation as a technically feasible alternative. However, the advent of a second generation catalyst suggests that an oxidation catalyst could be used.

B.2.2.3 Oxidation Catalyst Costs

Table B-8 presents the capital and annualized cost for an oxidation catalyst.

Table B-8. Capital and Annualized Cost for Oxidation Catalyst

Cost Component	Cost ($)	Basis
I. CAPITAL COSTS		
A. DIRECT:		
1. Associated Equipment for Catalyst	138,750	Manufacture Estimate - $257 per lb/hr mass flow; 15% for equipment
2. Exhaust Modification	250,000	Engineering Estimate
3. Installation	293,750	25% of Equipment Costs (I.A.1. & 2., and II.A.)
B. INDIRECT:		
1. Engineering & Supervision	88,125	7.5% of Equipment Costs (I.A.1. & 2., and II.A.)
2. Construction and Field Expense	117,500	10% of Equipment Costs (I.A.1. & 2., and II.A.)
3. Construction Contractor Fee	58,750	5% of Equipment Costs (I.A.1. & 2., and II.A.)
4. Startup & Testing	23,500	2% of Equipment Costs (I.A.1. & 2., and II.A.)
5. Contingency	242,590	25% of Direct and Indirect Capital Costs (I.A, and I.B.1-4)
6. Interest During Construction	299,880	15% of Direct and Indirect Capital Costs, and Recurring Capital Costs (I.A., I.B.1.-4 and II.A.)
TOTAL CAPITAL COSTS	1,512,850	Sum of Direct and Indirect Capital Costs
ANNUALIZED CAPITAL COSTS	177,700	Capital Recovery of 10% over 20 years
II. RECURRING CAPITAL COSTS		
A. Catalyst	786,250	Manufacture Estimate - $257 per lb/hr mass flow; 85% of catalyst
B. Contingency	196,560	25% of Recurring Capital Costs (II.A)
TOTAL RECURRING CAPITAL COSTS	982,810	Sum of Recurring Capital Costs
ANNUALIZED RECURRING CAPITAL COSTS	395,200	Capital Recovery of 10% over 20 years
III. ANNUALIZED COST		
A. DIRECT:		
1. Labor - Operator & Supervisor	5,980	4 hours/week, 52 weeks/year, $25/hour and 15% supervisor cost
2. Maintenance	12,480	0.5% of Total and Recurring Capital Costs
3. Inventory Cost	30,280	Capital Carrying cost (10% over 20 years) for catalyst for 1 CT
B. ENERGY COSTS		
1. Heat Rate Penalty	128,800	0.2% heat rate penalty. $50/MW energy loss
2. MW Loss Penalty (catalyst changeout)	63,000	Loss of 147 MW for one day; cost of natural gas at $3/10^6$ Btu deducted from cost
3. Fuel Escalation Costs	58,500	Fuel escalation of 3% over inflation; annualized over 20 years
4. Contingency	62,600	25% of energy costs
C. INDIRECT:		
1. Overhead	11,080	60% of Labor and Maintenance Costs (III.A.1. and 2.)
2. Property Taxes	24,960	1% of Total and Recurring Capital Cost
3. Insurance	24,960	1% of Total and Recurring Capital Cost
4. Administration	49,910	2% of Total and Recurring Capital Cost
Annualized Capital Costs	177,700	
Annualized Recurring Capital Costs	395,200	
TOTAL ANNUALIZED COSTS	1,045,936	Sum of Operating and Maintenance and Annualized Capital Costs
Cost Effectiveness ($/ton NO_x removed)	14,756	Total annualized cost divided by CO removal (71 TPY; gas and oil to 10 ppmvd)

Note: All calculations using machine performance were based on 72°F conditions.
Assumptions based on percentage of costs were adapted from EPA OAQPS Control Cost Manual (1990).

APPENDIX C

SUMMARY OF GENERIC MODELING IMPACTS

ISCST2 OUTPUT FILE NUMBER 1 :DTGEN180.082
ISCST2 OUTPUT FILE NUMBER 2 :DTGEN180.083
ISCST2 OUTPUT FILE NUMBER 3 :DTGEN180.084
ISCST2 OUTPUT FILE NUMBER 4 :DTGEN180.085
ISCST2 OUTPUT FILE NUMBER 5 :DTGEN180.086
First title for last output file is: 1986 DESTEC / GENERIC / 10 G/S / NAT GAS VELOCITIES
Second title for last output file is: RUN 180 FOOT STACK / 70,100% LOADS; 27, 97 oF

AVERAGING TIME	YEAR	CONC (ug/m3)	DIR (deg) or X (m)	DIST (m) or Y (m)	PERIOD ENDING (YYMMDDHH)
SOURCE GROUP ID: G10027					
Annual					
	1982	0.0824	240.	4000.	--
	1983	0.0661	70.	2000.	--
	1984	0.0824	240.	4000.	--
	1985	0.0977	70.	2000.	--
	1986	0.1144	90.	2000.	--
HIGH 1-Hour					
	1982	9.8350	120.	300.	82011413
	1983	10.3219	300.	300.	83022713
	1984	11.7771	100.	300.	84032908
	1985	9.8844	130.	1000.	85060311
	1986	7.4769	90.	1000.	86080111
HSH 1-Hour					
	1982	9.6327	120.	300.	82011415
	1983	7.9956	70.	1000.	83081011
	1984	6.6240	10.	1000.	84090511
	1985	6.6217	250.	1000.	85090812
	1986	6.6470	50.	1000.	86090712
HIGH 3-Hour					
	1982	6.4892	120.	300.	82011415
	1983	4.4990	260.	1000.	83081912
	1984	4.5660	270.	1000.	84072512
	1985	4.4667	80.	2000.	85101315
	1986	4.6515	90.	1000.	86080112
HSH 3-Hour					
	1982	3.5158	250.	2000.	82090612
	1983	3.8249	40.	1500.	83090515
	1984	3.7363	260.	1000.	84072512
	1985	4.0633	80.	2000.	85042415
	1986	4.4275	90.	1000.	86071315
HIGH 8-Hour					
	1982	2.6729	240.	3000.	82050316
	1983	2.6045	50.	2000.	83083016
	1984	2.9070	250.	2000.	84061216
	1985	2.7723	90.	3000.	85060216
	1986	2.7357	90.	2000.	86100516
HSH 8-Hour					
	1982	2.2784	0.	2000.	82082716
	1983	2.2837	240.	3000.	83101616
	1984	2.1577	90.	2000.	84061916
	1985	2.3292	90.	2000.	85062816
	1986	2.7190	90.	2000.	86081816
HIGH 24-Hour					
	1982	1.1386	240.	2000.	82082924
	1983	1.1048	50.	2000.	83083024
	1984	1.0539	90.	2000.	84060224
	1985	1.0958	90.	3000.	85060224
	1986	1.2084	90.	2000.	86081824
HSH 24-Hour					
	1982	1.0150	0.	2000.	82082724
	1983	0.8381	240.	3000.	83101624
	1984	0.8568	90.	2000.	84083124

	1985	0.8568	80.	2000.	85060424
	1986	1.0071	90.	2000.	86072024
SOURCE GROUP ID: G10097					
Annual					
	1982	0.0969	240.	4000.	--
	1983	0.0758	70.	2000.	--
	1984	0.0935	240.	4000.	--
	1985	0.1130	70.	2000.	--
	1986	0.1330	90.	2000.	--
HIGH 1-Hour					
	1982	13.3253	130.	300.	82011414
	1983	12.8410	290.	300.	83022712
	1984	15.0724	220.	300.	84081704
	1985	10.8222	120.	300.	85021217
	1986	9.0647	10.	2000.	86121212
HSH 1-Hour					
	1982	11.8295	120.	300.	82011415
	1983	8.6258	290.	300.	83022709
	1984	12.5402	130.	300.	84022811
	1985	10.6668	120.	300.	85021214
	1986	7.1840	350.	1000.	86082212
HIGH 3-Hour					
	1982	8.1956	120.	300.	82011415
	1983	4.7802	260.	1000.	83081912
	1984	8.1705	120.	300.	84032912
	1985	6.8721	120.	300.	85021215
	1986	4.8852	90.	1000.	86080112
HSH 3-Hour					
	1982	3.9824	250.	2000.	82090612
	1983	4.0280	330.	2000.	83090412
	1984	6.0423	120.	300.	84032915
	1985	4.6637	80.	2000.	85042415
	1986	4.8608	90.	1000.	86071315
8-Hour					
	1982	3.0734	120.	300.	82011416
	1983	3.0577	290.	300.	83022716
	1984	5.3298	120.	300.	84032916
	1985	3.1103	90.	2000.	85060216
	1986	3.1567	90.	2000.	86100516
HSH 8-Hour					
	1982	2.6291	0.	2000.	82082716
	1983	2.5936	240.	3000.	83061016
	1984	2.4770	90.	2000.	84061916
	1985	2.6613	90.	2000.	85062816
	1986	3.0679	90.	2000.	86081816
HIGH 24-Hour					
	1982	1.3406	240.	3000.	82050324
	1983	1.2329	50.	2000.	83083024
	1984	1.8636	130.	300.	84022824
	1985	1.5056	120.	300.	85021224
	1986	1.3635	90.	2000.	86081824
HSH 24-Hour					
	1982	1.1973	240.	2000.	82050324
	1983	0.9731	240.	3000.	83101624
	1984	0.9955	90.	2000.	84083124
	1985	0.9538	90.	3000.	85042824
	1986	1.1184	90.	2000.	86072024
SOURCE GROUP ID: G7027					
Annual					
	1982	0.1116	240.	4000.	--
	1983	0.0883	70.	2000.	--
	1984	0.1092	240.	3000.	--
	1985	0.1323	70.	2000.	--
	1986	0.1571	90.	2000.	--
HIGH 1-Hour					
	1982	16.1083	130.	300.	82011414

	1983	15.7330	290.	300.	83022712
	1984	17.9262	220.	300.	84081704
	1985	13.4108	120.	300.	85021217
	1986	10.9461	120.	300.	86012714
[illegible]1-Hour					
	1982	14.1934	120.	300.	82011415
	1983	11.8351	110.	300.	83032416
	1984	15.3055	130.	300.	84022811
	1985	13.3936	120.	300.	85021214
	1986	8.0409	230.	700.	86082313
HIGH 3-Hour					
	1982	9.8242	120.	300.	82011415
	1983	7.3016	110.	300.	83032418
	1984	14.0222	120.	300.	84032912
	1985	9.4742	120.	300.	85021215
	1986	5.6045	10.	1500.	86063012
HSH 3-Hour					
	1982	6.5808	120.	300.	82011418
	1983	6.9996	110.	300.	83020315
	1984	7.7288	120.	300.	84032915
	1985	5.4027	80.	2000.	85042415
	1986	5.1673	90.	1000.	86080112
HIGH 8-Hour					
	1982	4.7554	120.	300.	82011416
	1983	4.5340	110.	300.	83020316
	1984	10.1898	120.	300.	84032916
	1985	4.4556	120.	300.	85021216
	1986	3.6719	90.	2000.	86100516
HSH 8-Hour					
	1982	3.3172	0.	2000.	82060616
	1983	2.8566	240.	3000.	83061016
	1984	3.0867	130.	300.	84032916
	1985	3.0749	90.	2000.	85062816
	1986	3.4962	90.	2000.	86081816
H[illegible] 24-Hour					
	1982	2.0506	120.	300.	82011424
	1983	1.5113	110.	300.	83020324
	1984	3.5757	120.	300.	84032924
	1985	2.3133	120.	300.	85021224
	1986	1.5674	90.	1500.	86081824
HSH 24-Hour					
	1982	1.4350	240.	2000.	82050324
	1983	1.1894	110.	300.	83032424
	1984	1.8546	120.	300.	84022824
	1985	1.1567	80.	1500.	85101124
	1986	1.2771	90.	2000.	86072024
SOURCE GROUP ID:	G7097				
Annual					
	1982	0.1217	240.	3000.	--
	1983	0.0972	90.	2000.	--
	1984	0.1192	240.	3000.	--
	1985	0.1440	70.	2000.	--
	1986	0.1734	90.	2000.	--
HIGH 1-Hour					
	1982	18.1638	130.	300.	82011414
	1983	17.8869	290.	300.	83022712
	1984	19.9664	220.	300.	84081704
	1985	15.4725	120.	300.	85021214
	1986	12.6341	120.	300.	86012714
HSH 1-Hour					
	1982	15.9307	120.	300.	82011415
	1983	13.9038	110.	300.	83031015
	1984	17.3627	130.	300.	84022811
	1985	15.3647	120.	300.	85021217
	1986	9.0998	230.	700.	86082313
HIGH 3-Hour					

	1982	11.0181	120.	300.	82011415
	1983	8.4475	110.	300.	83032418
	1984	16.1132	120.	300.	84032912
	1985	10.9431	120.	300.	85021215
	1986	6.1693	10.	1500.	86063012
3-Hour					
	1982	7.6627	120.	300.	82011418
	1983	8.2503	110.	300.	83020315
	1984	12.7449	130.	300.	84022806
	1985	8.3035	120.	300.	85021218
	1986	5.3299	90.	1000.	86080112
HIGH 8-Hour					
	1982	5.3772	120.	300.	82011416
	1983	5.3570	110.	300.	83020316
	1984	11.7426	120.	300.	84032916
	1985	5.8617	110.	300.	85021208
	1986	3.9786	90.	2000.	86100516
HSH 8-Hour					
	1982	3.5715	0.	2000.	82060616
	1983	3.0326	240.	2000.	83101616
	1984	6.1273	130.	300.	84022808
	1985	3.3268	90.	2000.	85062816
	1986	3.8359	90.	1500.	86100516
HIGH 24-Hour					
	1982	2.3351	120.	300.	82011424
	1983	1.7857	110.	300.	83020324
	1984	5.0949	130.	300.	84022824
	1985	3.5979	120.	300.	85021224
	1986	1.7314	90.	1500.	86081824
HSH 24-Hour					
	1982	1.5969	240.	2000.	82050324
	1983	1.3793	110.	300.	83032424
	1984	2.4163	120.	300.	84022824
	1985	1.2621	80.	1500.	85060424
	1986	1.3808	90.	2000.	86072024

BEST AVAILABLE COPY

ISCST2 OUTPUT FILE NUMBER 1 :DTCLASS1.082
ISCST2 OUTPUT FILE NUMBER 2 :DTCLASS1.083
ISCST2 OUTPUT FILE NUMBER 3 :DTCLASS1.084
ISCST2 OUTPUT FILE NUMBER 4 :DTCLASS1.085
ISCST2 OUTPUT FILE NUMBER 5 :DTCLASS1.086
First title for last output file is: 1986 DESTEC / CLASS 1 / 10 G/S / NAT GAS VELOCITIES
Second title for last output file is: RUN 180 FOOT STACK / 70,100% LOADS; 27, 97 oF

AVERAGING TIME	YEAR	CONC (ug/m3)	DIR (deg) or X (m)	DIST (m) or Y (m)	PERIOD ENDING (YYMMDDHH)
SOURCE GROUP ID: G10027					
Annual					
	1982	0.00590	340300.	3165700.	--
	1983	0.00440	340300.	3165700.	--
	1984	0.00260	340300.	3165700.	--
	1985	0.00380	343700.	3178300.	--
	1986	0.00400	343700.	3178300.	--
HIGH 24-Hour					
	1982	0.06808	340300.	3165700.	82072924
	1983	0.07004	340300.	3165700.	83090424
	1984	0.06539	342000.	3174000.	84041924
	1985	0.06348	341100.	3183400.	85110724
	1986	0.08764	340700.	3171900.	86121024
HSH 24-Hour					
	1982	0.06578	340300.	3165700.	82062524
	1983	0.06355	340300.	3165700.	83051524
	1984	0.04801	334000.	3183400.	84052424
	1985	0.04837	343700.	3178300.	85032924
	1986	0.07127	340300.	3169800.	86031124
SOURCE GROUP ID: G10097					
[illegible]					
	1982	0.00600	340300.	3165700.	--
	1983	0.00450	340300.	3165700.	--
	1984	0.00260	340300.	3165700.	--
	1985	0.00400	343700.	3178300.	--
	1986	0.00420	343700.	3178300.	--
HIGH 24-Hour					
	1982	0.07222	340300.	3165700.	82072924
	1983	0.07289	340300.	3165700.	83090424
	1984	0.06954	342000.	3174000.	84041924
	1985	0.07250	343700.	3178300.	85011924
	1986	0.08982	340700.	3171900.	86121024
HSH 24-Hour					
	1982	0.06999	340300.	3165700.	82062524
	1983	0.06648	340300.	3167700.	83120224
	1984	0.05030	334000.	3183400.	84052424
	1985	0.06653	341100.	3183400.	85011924
	1986	0.07392	340300.	3169800.	86031124
SOURCE GROUP ID: G7027					
Annual					
	1982	0.00630	340300.	3165700.	--
	1983	0.00470	340300.	3165700.	--
	1984	0.00290	340300.	3165700.	--
	1985	0.00420	343700.	3178300.	--
	1986	0.00430	340300.	3165700.	--
HIGH 24-Hour					
	1982	0.07699	340300.	3165700.	82072924
	1983	0.07614	340300.	3165700.	83090424
	1984	0.07388	342000.	3174000.	84041924
	1985	0.07551	343700.	3178300.	85011924
	1986	0.09225	340700.	3171900.	86121024
HSH 24-Hour					
	1982	0.07486	340300.	3165700.	82062524

	1983	0.07023	340300.	3167700.	83120224
	1984	0.05291	334000.	3183400.	84052424
	1985	0.06909	341100.	3183400.	85011924
	1986	0.07686	340300.	3169800.	86031124
CE GROUP ID:	G7097				
	1982	0.00640	340300.	3165700.	--
	1983	0.00480	340300.	3165700.	--
	1984	0.00300	340300.	3165700.	--
	1985	0.00430	343700.	3178300.	--
	1986	0.00450	340300.	3165700.	--
HIGH 24-Hour					
	1982	0.07987	340300.	3165700.	82072924
	1983	0.07879	340300.	3165700.	83090424
	1984	0.07656	342000.	3174000.	84041924
	1985	0.07748	343700.	3178300.	85011924
	1986	0.09369	340700.	3171900.	86121024
HSH 24-Hour					
	1982	0.07781	340300.	3165700.	82062524
	1983	0.07274	340300.	3167700.	83120224
	1984	0.05448	334000.	3183400.	84052424
	1985	0.07076	341100.	3183400.	85011924
	1986	0.07864	340300.	3169800.	86031124