

In the folder labeled as follows there are documents, listed below, which were not reproduced in this electronic file. That folder can be found in the supplementary documents file drawer. Folders in that drawer are arranged alphabetically, then by permit number.

**Folder Name:** Florida Gas Transmission Company

**Permit(s) Numbered:**

AC 56 -230129
---------------

Documents:

<u>Period during which document was received</u>	<u>Detailed Description</u>
--	-----------------------------

Application	1. 22" x 32" B&W Drawing: Appendix B Plot Plan COMPRESSOR STATION NO. 20 PERMIT SITE PLAN (Drawing Number: 102-50-605) **Received a duplicate on 11/22/93
-------------	---



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

RECEIVED  
SEP 13 1995  
Bureau of  
Air Regulation

September 1, 1995

See AC62-229319  
for original request.

Mr. C. H. Fancy, P.E., Chief  
Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

RE: Air Permit No. AC 62-229319/PSD-FL-202  
FGT Compressor Station No. 15, Taylor County

Air Permit No. AC 05-229322  
FGT Compressor Station No. 19, Brevard County

Air Permit No. AC 56-230129/PSD-FL-203  
FGT Compressor Station No. 20, St. Lucie County

Dear Mr. Fancy:

**Subject: Expiration of Construction Permits**

Florida Gas Transmission Company (FGT) respectfully requests clarification of the future status of the construction permits referenced above.

These permits were recently extended so that they expire after September 1, 1995. Changes are being made to F.A.C. 62-213.420(1)(a)4 that will extend the expiration date of these permits until September 1, 1996.

We have been informed by one of the District Offices that permit issuance for the Title V permits may take the full three years allowed. Please advise us as to what the status will be or what procedures need to be followed for construction permits that expire on September 1, 1996, but have not received a Title V Operating Permit by that date.

Florida Gas Transmission Company  
September 1, 1995  
Construction Permit Expirations  
page 2

Your consideration and response to this question is greatly appreciated. If you need any clarification or require further information, please call me at (713) 373-5365 or Mr. Allan Weatherford at (407) 875-5816.

Sincerely,

A handwritten signature in cursive script, appearing to read "V. Duane Pierce".

V. Duane Pierce, Ph.D.

cc: Allan Weatherford - FGT

FILE: fdcpvext.doc



R. File

# Department of Environmental Protection

Lawton Chiles  
Governor

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

Virginia B. Wetherell  
Secretary

May 30, 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. V. Duane Pierce  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company  
Post Office Box 1188  
Houston, Texas 77251-1188

Dear Mr. Pierce:

Re: Request for Extensions to Air Construction Permits  
AC 62-229319/PSD-FL-202-Taylor County  
AC 05-229322-Brevard County  
AC 56-230129/PSD-FL-203-St. Lucie County  
AC 50-229440-Palm Beach County  
AC 09-229441-Citrus County  
AC 29-228821-Hillsborough

The Department is in receipt of your letter dated April 20, requesting to extend the expiration date of the above mentioned permits. The Bureau has evaluated your request and agrees to extend the expiration date of the permits as follows:

Expiration Date:

From: July 30, 1995  
To: January 30, 1996

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

Mr. V. Duane Pierce  
May 30, 1995  
Page Two

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:

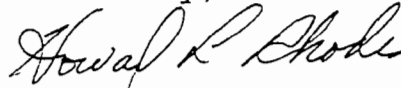
- (a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) 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.

Mr. V. Duane Pierce  
May 30, 1995  
Page Three

A copy of this letter shall be filed with the referenced permits and become a part of the permits.

Sincerely,



Howard L. Rhodes, Director  
Division of Air Resources  
Management

HLR/th/t

Enclosure: Mr. V. Duane Pierce's letter of April 20, 1995

cc: Ed Middleswart, NWD  
Robert Leetch, NED  
Charles Collins, CD  
Isidore Goldman, SED  
Jerry Campbell, EPCHC  
Alan Weatherford, FGTC  
Barry Andrews, ENRS  
Jim Stormer, PBCHU



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

RECEIVED

APR 20 1995

April 20, 1995

Mr. C. H. Fancy, P.E., Chief  
Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blairstone Road  
Tallahassee, Florida 32399-2400

Bureau of  
Air Regulation

RE: Extension of Construction Permits

Air Permit No. AC 62-229319/PSD-FL-202  
FGT Compressor Station No. 15, Taylor County

Air Permit No. AC 05-229322  
FGT Compressor Station No. 19, Brevard County

Air Permit No. AC 56-230129/PSD-FL-203  
FGT Compressor Station No. 20, St. Lucie County

Air Permit No. AC 50-229440  
FGT Compressor Station No. 21, Palm Beach County

Air Permit No. AC 09-229441  
FGT Compressor Station No. 26, Citrus County

Air Permit No. AC 29-228821  
FGT Compressor Station No. 30, Hillsborough County

Dear Mr. Fancy:

Florida Gas Transmission Company (FGT) requests an extension for each of the above referenced air construction permits to a date 60 days after the due date for the Title V permit application for the facility. A non-Title V operating permit application for each of the facilities was submitted on 31 March 1995.

If you have any questions or need additional information, please call me at (713) 646-7323 or Mr. Allan Weatherford at (407) 875/5816.

Sincerely,

V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

March 31, 1995

Mr. Tom Tittle  
Florida Department of Environmental Protection  
Southeast District  
P.O. Box 15425  
West Palm Beach, Florida 33416

COPY

RE: Air Permit No. AC 56-230129/PSD-FL-203  
FGT Compressor Station No. 20, St. Lucie County  
Operating Permit Application

Dear Mr. Tittle:

Enclosed is one application for an air operating permit for the facilities constructed under the above referenced Air Construction Permit. This application is for a state operating permit only. It is not an application for a Title V permit. A Title V permit application for the entire facility will be submitted by the required submittal date for a Title V permit application.

The short form has been used for this application. This was chosen based on discussions with several Florida Department of Environmental Protection District offices and local program offices. There were differences of opinions as to which form was the appropriate form. The majority of opinions were for the short form. Our analysis of the regulations, the forms and the directions to the forms lead us to conclude that the short form is the most appropriate.

Emissions testing was performed on February 1, 1995, and the test report was submitted to your office on March 15, 1995, by Cubix Corporation.

We understand that a fee is not required since we have paid an annual operating fee for this facility.

We will be requesting an extension for our construction permit to a date 60 days past the due date for our Title V permit application. This will be done through the Department of Environmental Protection in Tallahassee since they issued the Construction Permit. We will copy you on this request.



If you have any questions or need further information, please call me at (713) 646-7323 or Mr. Allan Weatherford at (407) 875-5816.

Sincerely,

A handwritten signature in black ink, reading "V. Duane Pierce". The signature is fluid and cursive, with the first name "V." and last name "Pierce" clearly legible.

V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project

cc: Clair Fancy - FDEP - Tallahassee

William Rome - FGT - w/o attachments

Allan Weatherford - FGT

FGT Fort Pierce Compressor Station No. 20 File

FILE: 20opapp.doc

COPY

**STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF AIR RESOURCES MANAGEMENT  
APPLICATION FOR AIR PERMIT - SHORT FORM**

**I. APPLICATION INFORMATION**

**Identification of Facility Addressed in This Application**

Compressor Station No. 20  
Florida Gas Transmission Company  
St. Lucie County, Florida

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official :

Name : William E. Rome  
Title : Vice President, Operations

2. Owner or Authorized Representative or Responsible Official Mailing Address :

Organization/Firm : Florida Gas Transmission Company  
Street Address : 1400 Smith Street  
City : Houston  
State : TX Zip Code : 77002-\_\_\_\_

3. Owner/Authorized Representative or Responsible Official Telephone Numbers :

Telephone : 7138536071 Fax :

4. Owner/Authorized Representative or Responsible Official Statement :

*I, the undersigned, am the owner or authorized representative\* of the facility (non-Title V source) addressed in this Application for Air Permit or the responsible official, as defined in Chapter 62-213, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. Further, I agree to operate and maintain the air pollutant emissions units and air pollution control equipment described in this application so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. If the purpose of this application is to obtain an air operation permit or operation permit revision for one or more emissions units which have undergone construction or modification, I certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*

  
Signature

3/31/95  
Date

**Scope of Application**

<b>Emissions Unit ID</b>	<b>Description of Emissions Unit</b>
05	Compressor Engine No. 2005
Unknown	Emergency Generator
Unknown	Fugitive Emissions

**Purpose of Application**

**Category I : All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.**

This Application for Air Permit is submitted to obtain :

[ ] Initial air operation permit for one or more existing, but previously unpermitted, emissions units.

[ X ] Initial air operation permit for one or more newly constructed or modified emissions units.

Current construction permit number :  
AC 56-230129

[ ] Air operation permit revision to address one or more newly constructed or modified emissions units.

Current construction permit number :

Operation permit to be revised :

[ ] Air operation permit renewal.

Operation permit to be renewed :

**Application Processing Fee**

Attached - Amount :           NA          

**Construction/Modification Information**

1. Description of Alterations :

No Alterations

2. Date of Commencement of Construction :   2/15/94

**Professional Engineer Certification**

1. Professional Engineer Name : Jimmy D. Harp

Registration Number : 17362

2. Professional Engineer Mailing Address :

Organization/Firm : Florida Gas Transmission Company

Street Address : 1400 Smith Street

City : Houston

State : TX

Zip Code : 77002-\_\_\_\_

3. Professional Engineer Telephone Numbers :

Telephone : 7138531619

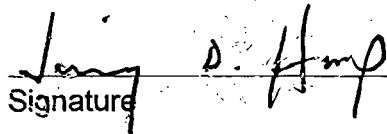
Fax : 7136462723

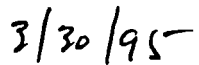
4. Professional Engineer Statement :

*I, the undersigned, hereby certified, except as particularly noted herein\*, that :*

*(1) To the best of my knowledge, there is reasonable assurance (a) that the air pollutant emissions unit(s) and the air pollutant control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

  
Signature

  
Date

**Application Contact**

<p>1. Name and Title of Application Contact :</p> <p style="text-align: center;">Name : Allan Weatherford Title : Division Environmental Specialist</p>
<p>2. Application Contact Mailing Address :</p> <p style="text-align: center;">Organization/Firm : Florida Gas Transmission Company Street Address : 601 South Lake Destiny Drive City : Maitland State : FL                      Zip Code : 32751-____</p>
<p>3. Application Contact Telephone Numbers :</p> <p style="text-align: center;">Telephone : 4078755816                      Fax : 4078755896</p>

**Application Comment**

This application is for a non-Title V operating permit for new sources. A Title V application will be submitted for this facility by the appropriate due date.



## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Name, Location, and Type

1. Facility Owner or Operator : Florida Gas Transmission Company			
2. Facility Name : Compressor Station No. 20			
3. Facility Identification Number : 50WPB56006			
4. Facility Location Information :  Compressor Station No. 20 Florida Gas Transmission Company St. Lucie County, Florida  Facility Street Address : 8701 Orange Avenue City : Fort Pierce County : St. Lucie Zip Code : 34945-____			
5. Facility UTM Coordinates :  Zone : 17 East (km) : 558.01 North (km) : 3035.68			
6. Facility Latitude/Longitude :  Latitude (DD/MM/SS) : 27 26 43 Longitude (DD/MM/SS) : 80 24 47			
7. Governmental Facility Code :  0	8. Facility Status Code :  A	9. Relocatable Facility ?  N	10. Facility Major Group SIC Code :  49
11. Facility Comment :			



**Facility Contact**

**1. Name and Title of Facility Contact :**

Name : Allan Vollmer  
Title : Area Leader

**2. Facility Contact Mailing Address :**

Organization/Firm : Florida Gas Transmission Company  
Street Address : 8701 Orange Avenue  
City : Fort Pierce  
State : FL                      Zip Code : 34945-\_\_\_\_

**3. Facility Contact Telephone Numbers :**

Telephone : 4074666277                      Fax : 4074649859

**Facility Regulatory Classifications**

1. Small Business Stationary Source?	N
2. Title V Source?	
3. Synthetic Non-Title V Source by Virtue of Previous Air Construction Permit?	N
Construction Permit Number/Issue Date : AC 56-230129 09/23/93	
4. Facility Regulatory Classifications Comment :	
Facility is a Title V facility. This application is for a non-Title V operating permit.	

## D. FACILITY SUPPLEMENTAL INFORMATION

### Supplemental Requirements for All Applications

1. Area Map Showing Facility Location :	Attachment 1
2. Facility Plot Plan :	Attachment 2
3. Process Flow Diagram(s) :	Attachment 3
4. Precautions to Prevent Emissions of Unconfined Particulate Matter :	NA

### III. EMISSIONS UNIT INFORMATION

#### A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Information Section 1

**Type of Emissions Unit Addressed in This Section**

- ☒ [ X ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).
  
- ☐ [ ] This Emissions Unit Information Section addresses, as a single emissions unit, an individually-regulated emission point (stack or vent) serving a single process or production unit, or activity, which also has other individually-regulated emission points.
  
- ☐ [ ] This Emissions Unit Information Section addresses, as a single emissions unit, a collectively-regulated group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions only.
  
- ☐ [ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

**Emissions Unit Description and Status**

1. Description of Emissions Unit Addressed in This Section :  Compressor Engine No. 2005	
2. ARMS Identification Number : 05	
3. Emissions Unit Status Code :  A	4. Emissions Unit Major Group SIC Code :  49
5. Initial Startup Date : 1/15/95	
6. Long-term Reserve Shutdown Date :	
7. Package Unit :  Manufacturer : Cooper-Bessemer Model Number : 10V-275C	
8. Generator Nameplate Rating : MW	
9. Incinerator Information :  Dwell Temperature : °F Dwell Time : seconds Incinerator Afterburner Temperature : °F	
10. Emissions Unit Comment :	

**Emissions Unit Information Section**      1

**Emissions Unit Control Equipment**      1

1. Description :

Lean burn engine.

2. Control Device or Method Code :



**Emissions Unit Information Section**      1

**Emissions Unit Operating Capacity**

1. Maximum Heat Input Rate :	33 mmBtu/hr
2. Maximum Incinerator Rate :	lb/hr                      tons/day
3. Maximum Process or Throughput Rate : Units :	
4. Maximum Production Rate : Units :	
5. Operating Capacity Comment :	Manufacturer rated at 4000 bhp.

**Emissions Unit Operating Schedule**

Requested Maximum Operating Schedule :

24 hours/day

7 days/week

52 weeks/year

8760 hours/year

## I. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Emissions Unit Information Section 1

### Supplemental Requirements for All Applications

1. Process Flow Diagram :	Attachment 3
2. Fuel Analysis or Specification :	Attachment 4
3. Detailed Description of Control Equipment :	NA
4. Description of Stack Sampling Facilities :	Attachment 5
5. Compliance Test Report :	03/16/95
6. Procedures for Startup and Shutdown :	NA
7. Operation and Maintenance Plan :	NA
8. Other Information Required by Rule or Statute :	NA

### III. EMISSIONS UNIT INFORMATION

#### A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Information Section 2

**Type of Emissions Unit Addressed in This Section**

- ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).
- ☐ This Emissions Unit Information Section addresses, as a single emissions unit, an individually-regulated emission point (stack or vent) serving a single process or production unit, or activity, which also has other individually-regulated emission points.
- ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a collectively-regulated group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions only.
- ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

**Emissions Unit Description and Status**

1. Description of Emissions Unit Addressed in This Section :  Emergency Generator	
2. ARMS Identification Number :      Unknown	
3. Emissions Unit Status Code :  A	4. Emissions Unit Major Group SIC Code :  49
5. Initial Startup Date :      1/15/95	
6. Long-term Reserve Shutdown Date :	
7. Package Unit :  Manufacturer : Cummins-Onan Model Number : GTA-19	
8. Generator Nameplate Rating :      0 MW	
9. Incinerator Information :  Dwell Temperature :      °F Dwell Time :      seconds Incinerator Afterburner Temperature :      °F	
10. Emissions Unit Comment :  The emergency generator will operate no more than 400 hours per year.	

**Emissions Unit Information Section** \_\_\_\_\_

**Emissions Unit Control Equipment** \_\_\_\_\_

1. Description :

2. Control Device or Method Code :

**Emissions Unit Information Section      2**

**Emissions Unit Operating Capacity**

1. Maximum Heat Input Rate :	5 mmBtu/hr
2. Maximum Incinerator Rate :	lb/hr                      tons/day
3. Maximum Process or Throughput Rate : Units :	
4. Maximum Production Rate : Units :	
5. Operating Capacity Comment :	

**Emissions Unit Operating Schedule**

Requested Maximum Operating Schedule :

hours/day

days/week

weeks/year

400 hours/year



## I. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Emissions Unit Information Section 2

### Supplemental Requirements for All Applications

1. Process Flow Diagram :	Attachment 3
2. Fuel Analysis or Specification :	Attachment 4
3. Detailed Description of Control Equipment :	NA
4. Description of Stack Sampling Facilities :	NA
5. Compliance Test Report :	NA
6. Procedures for Startup and Shutdown :	NA
7. Operation and Maintenance Plan :	NA
8. Other Information Required by Rule or Statute :	NA

### III. EMISSIONS UNIT INFORMATION

#### A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Information Section 3

**Type of Emissions Unit Addressed in This Section**

- ☐ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).
- ☐ ] This Emissions Unit Information Section addresses, as a single emissions unit, an individually-regulated emission point (stack or vent) serving a single process or production unit, or activity, which also has other individually-regulated emission points.
- ☐ ] This Emissions Unit Information Section addresses, as a single emissions unit, a collectively-regulated group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions only.
- ☒ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

1. Description of Emissions Unit Addressed in This Section :					
Fugitive Emissions					
2. ARMS Identification Number :           Unknown					
3. Emissions Unit Status Code :			4. Emissions Unit Major Group SIC Code :		
A			49		
5. Initial Startup Date :                         1/15/95					
6. Long-term Reserve Shutdown Date :					
7. Package Unit :					
Manufacturer :   Various Model Number :   Various					
8. Generator Nameplate Rating :                         MW					
9. Incinerator Information :					
Dwell Temperature :                         °F					
Dwell Time :                                 seconds					
Incinerator Afterburner Temperature :                         °F					
10. Emissions Unit Comment :					
Potential fugitive emissions from Compressor Station No. 20 include fugitive emissions from the new valves and flanges that are in gas service.					

**Emissions Unit Information Section** \_\_\_\_\_

**Emissions Unit Control Equipment** \_\_\_\_\_

1. Description :

2. Control Device or Method Code :

**Emissions Unit Operating Capacity**

1. Maximum Heat Input Rate :	mmBtu/hr	
2. Maximum Incinerator Rate :	lb/hr	tons/day
3. Maximum Process or Throughput Rate : Units :		
4. Maximum Production Rate : Units :		
5. Operating Capacity Comment :	This section is not applicable to fugitive emissions.	

**Emissions Unit Operating Schedule**

Requested Maximum Operating Schedule :

24 hours/day

7 days/week

52 weeks/year

8760 hours/year

## I. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Emissions Unit Information Section 3

### Supplemental Requirements for All Applications

1. Process Flow Diagram :	Attachment 3
2. Fuel Analysis or Specification :	NA
3. Detailed Description of Control Equipment :	NA
4. Description of Stack Sampling Facilities :	NA
5. Compliance Test Report :	NA
6. Procedures for Startup and Shutdown :	NA
7. Operation and Maintenance Plan :	NA
8. Other Information Required by Rule or Statute :	NA

# **ATTACHMENT 1**

## **Area Map**



60 0 60  
APPROXIMATE  
SCALE IN MILES

**ENSR**<sup>TM</sup>

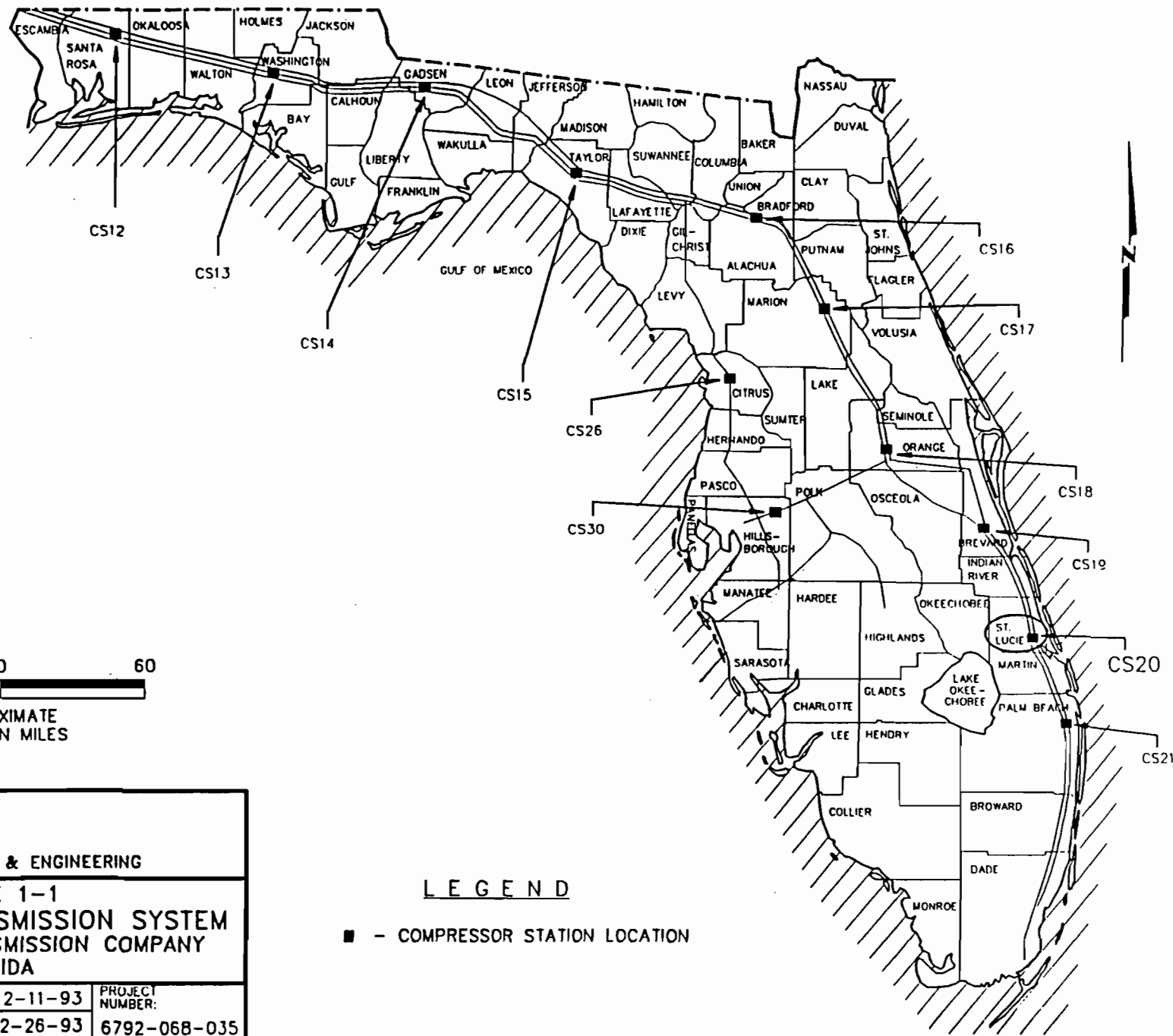
ENSR CONSULTING & ENGINEERING

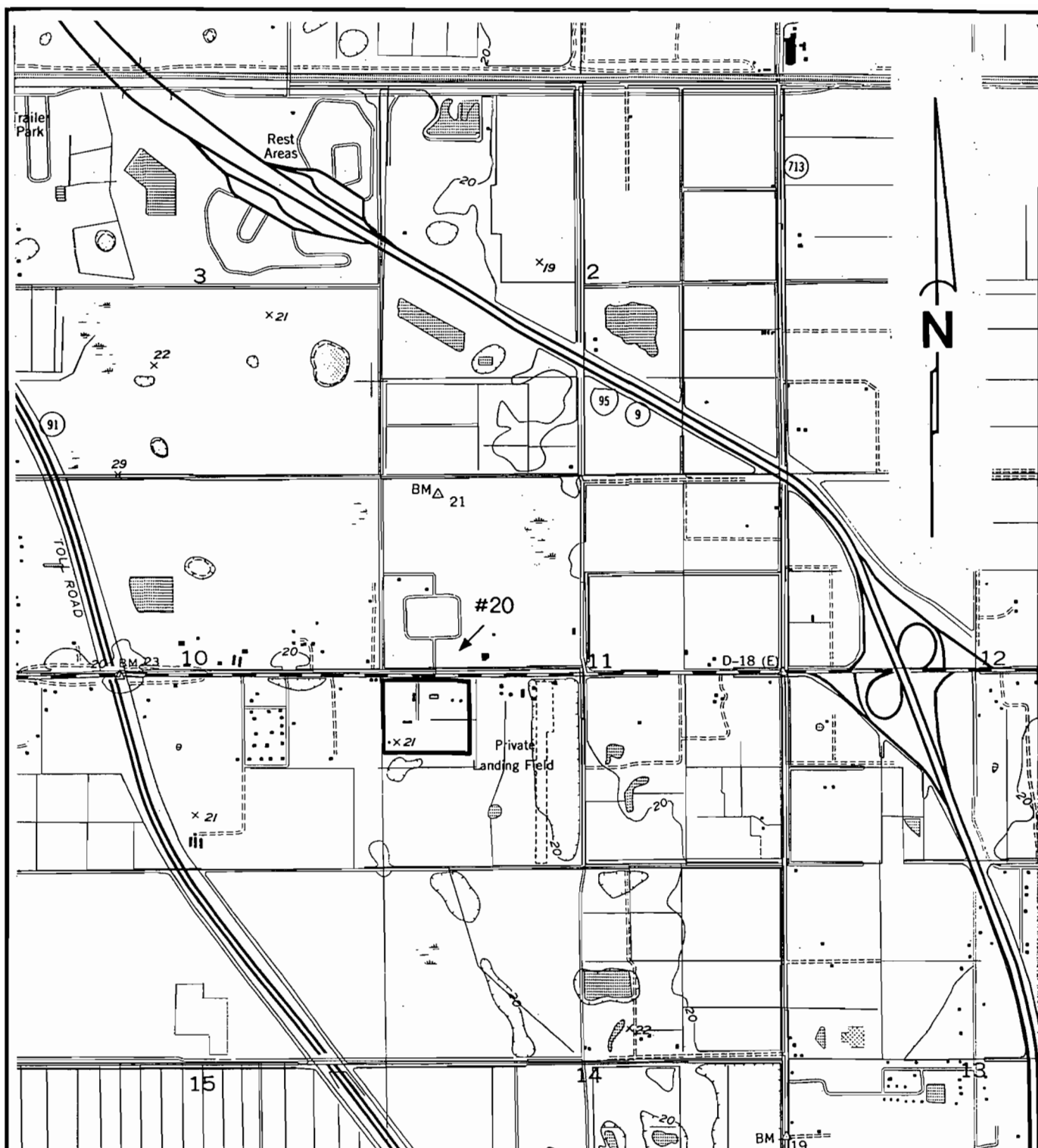
FIGURE 1-1  
FGTC'S GAS TRANSMISSION SYSTEM  
FLORIDA GAS TRANSMISSION COMPANY  
FLORIDA

DRAWN: SJF/SH	DATE: 2-11-93	PROJECT NUMBER:
APP'VD:	REVISED: 2-26-93	6792-068-035

LEGEND

■ - COMPRESSOR STATION LOCATION



**ENSR™**

ENSR CONSULTING AND ENGINEERING

FIGURE 1-2  
SITE LOCATION MAP  
**COMPRESSOR STATION #20**  
FLORIDA GAS TRANSMISSION COMPANY  
FT. PIERCE, FLORIDA

DRAWN BY: SJF/SH

DATE: 12-16-92

PROJECT  
NUMBER:

NUMBER:  
6792-068-035

CHK'D BY:

REVISÉ:

0 2000 4000

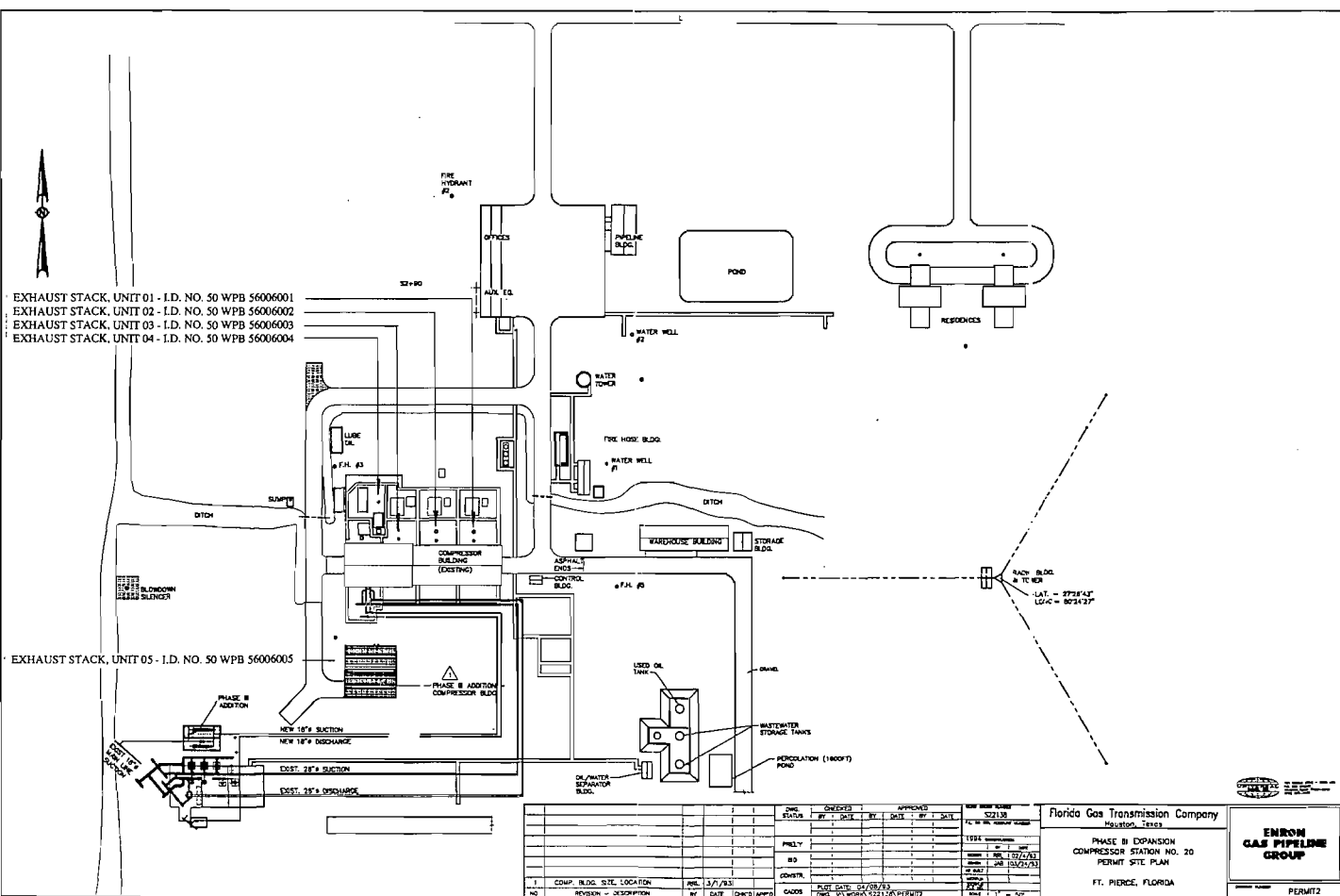
SCALE IN FEET

REFERENCE: U.S.G.S. Quadrangle Map for  
Fort Pierce NW,  
Florida, 1983.

## **ATTACHMENT 2**

### **Plot Plan**

AIR EMISSIONS PLOT PLAN C/S 20  
Source I.D. No. 50 WPB 56006001 through 56006005



## **ATTACHMENT 3**

### **Process Flow Diagrams**

5OWPB560060-01  
5OWPB560060-02  
5OWPB560060-03  
5OWPB560060-04  
5OWPB560060-05

ATMOSPHERE

S  
T  
A  
C  
K  
S

EXHAUST

ENGINES  
NOs. 2001  
-2005

COMPRESSORS

SUCTION LINE

DISCHARGE LINE

MAIN NATURAL GAS PIPELINE

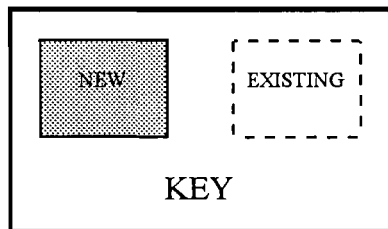
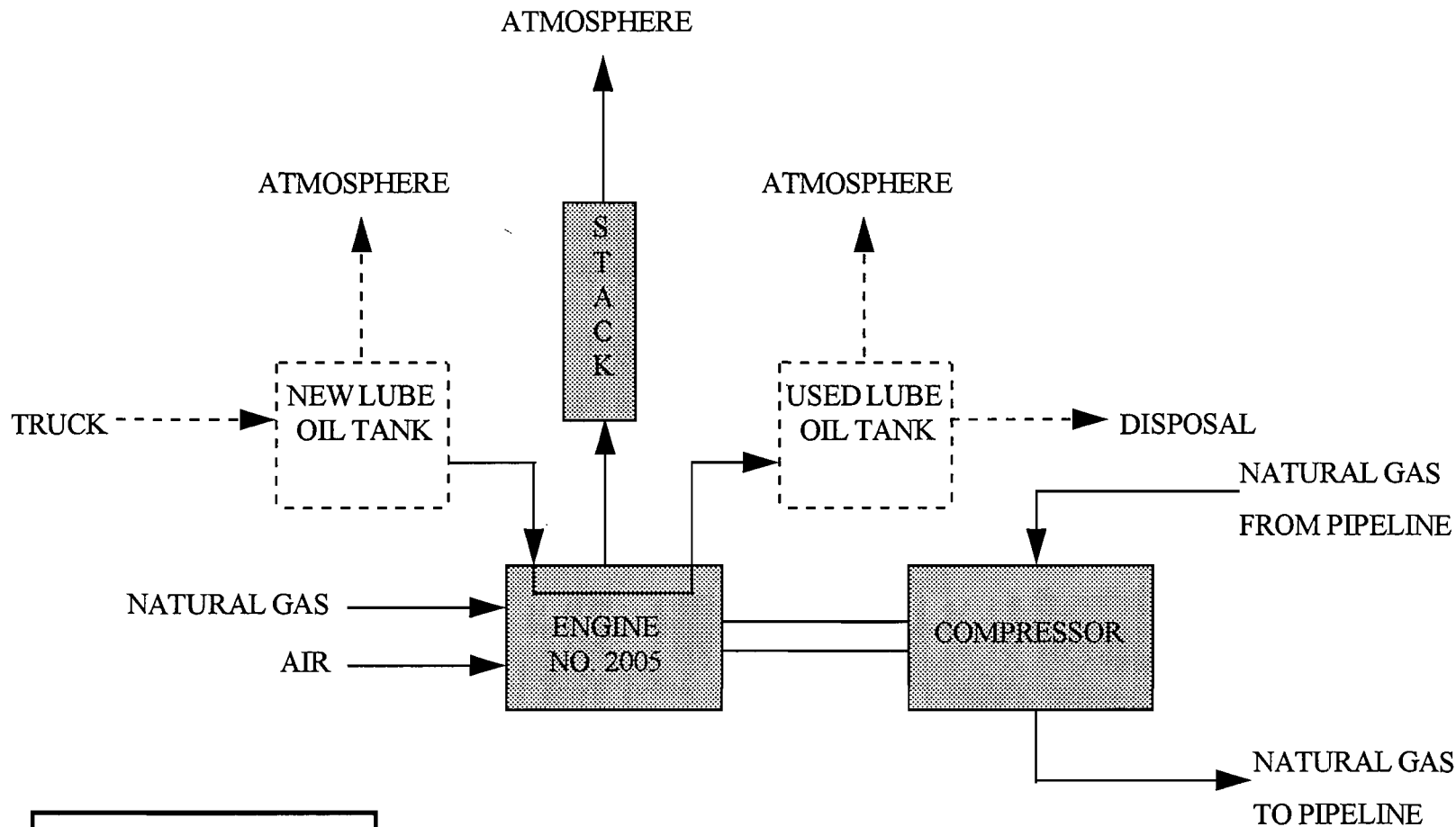
AQM<sub>CS</sub>

DATE: 29 MAR 95

VDP

PROCESS FLOW DIAGRAM FOR STATION 20

5OWPB560060-05

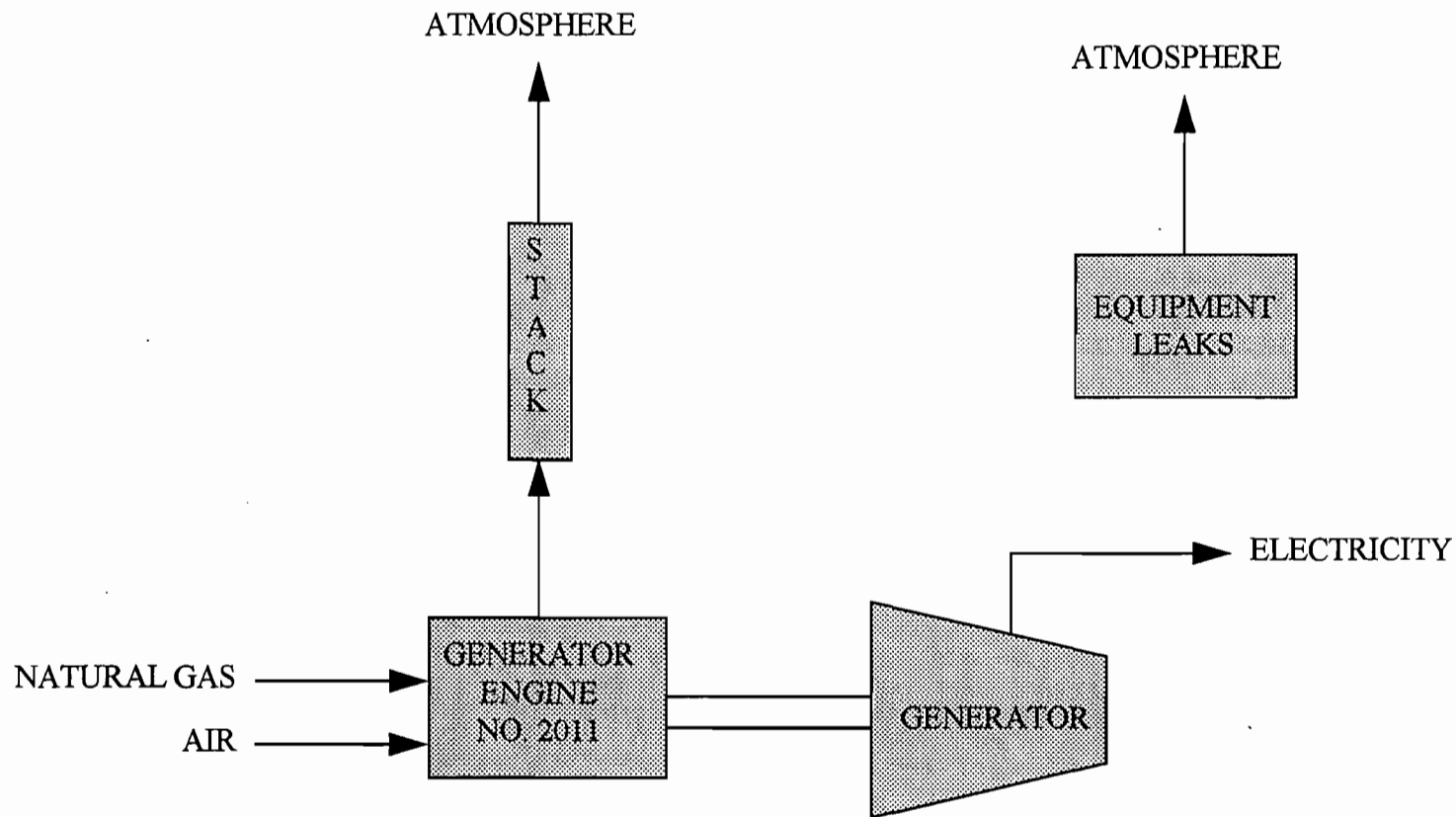


AQM<sub>CS</sub>

DATE: 27 MAR 95

VDP

PROCESS FLOW DIAGRAM FOR UNIT 2005



**AQM<sub>CS</sub>**

DATE: 27 MAR 95

**VDP**

PROCESS FLOW DIAGRAM FOR UNIT 2005 UTILITIES



## **ATTACHMENT 4**

### **Typical Fuel Analyses**

## ANALYSIS

DATE: 05/03/94 ANALYSIS TIME: 345 STREAM SEQUENCE: 1  
 TIME: 11:07 CYCLE TIME: 360 STREAM#: 1  
 ANALYZER#: 1 MODE: RUN CYCLE START TIME: 11:01

COMP NAME	COMP CODE	MOLE %	GAL/MCF**	B.T.U.*	REL DEN*
HEXANE +	151	0.087	0.0381	4.49	0.0028
PROPANE	152	0.437	0.1204	11.02	0.0087
I-BUTANE	153	0.101	0.0331	3.30	0.0020
N-BUTANE	154	0.092	0.0291	3.02	0.0019
IPENTANE	155	0.040	0.0147	1.61	0.0010
NPENTANE	156	0.025	0.0091	1.01	0.0008
NITROGEN	157	0.385	0.0421	0.00	0.0037
METHANE	158	95.242	16.1435	964.13	0.5275
CO2	159	0.742	0.1285	0.00	0.0113
ETHANE	160	2.848	0.7618	50.52	0.0298
TOTALS		100.000	17.3185	1038.10	0.5871

\* @ 14.730 PSIA & UNCORRECTED FOR COMPRESSIBILITY

\*\* @ 14.730 & 60 DEG. F

COMPRESSIBILITY FACTOR (1/Z) = 1.0022  
 DRY B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 1041.4  
 REAL RELATIVE DENSITY = 0.5881  
 UNNORMALIZED TOTAL = 100.00  
 ANALOG INPUT CHANNEL 1 = H 2 S 140 = .15023  
 ANALOG INPUT CHANNEL 2 = WATER 144 = 3.7802

## ACTIVE ALARMS

NONE

FLORIDA GAS TRANSMISSION CO.

BROOKER LAB- Main Line

STANDARD GAS 1041.8 / 0.5939

CERTIFIED VALUE BTU 1041.7 GRAV. 0.5939

TOTAL SULFUR 0.03 GR/CCF H<sub>2</sub>S 0.02 GR/CCF

H<sub>2</sub>O 2.6 #/MMCF BY Ron S. [Signature]

## ANALYSIS

DATE: 12/01/93 ANALYSIS TIME: 345 STREAM SEQUENCE: 12  
 TIME: 12:38 CYCLE TIME: 360 STREAM#: 1  
 ANALYZER#: 1 MODE: RUN CYCLE START TIME: 12:32

COMP NAME	COMP CODE	MOLE %	GAL/MCF**	B.T.U.*	REL DEN*
HEXANE +	151	0.076	0.0333	3.92	0.0025
PROPANE	152	0.580	0.1599	14.64	0.0088
I-BUTANE	153	0.119	0.0388	3.87	0.0024
N-BUTANE	154	0.126	0.0398	4.12	0.0025
IPENTANE	155	0.041	0.0150	1.64	0.0010
NPENTANE	156	0.026	0.0094	1.04	0.0006
NITROGEN	157	0.460	0.0504	0.00	0.0044
METHANE	158	94.190	15.9651	953.48	0.5217
CO2	159	0.747	0.1273	0.00	0.0114
ETHANE	160	3.635	0.9724	64.48	0.0377
TOTALS		100.000	17.4114	1047.20	0.5931

\* @ 14.730 PSIA & UNCORRECTED FOR COMPRESSIBILITY

\*\* @ 14.730 & 60 DEG. F

COMPRESSIBILITY FACTOR (1/Z) = 1.0023  
 DRY B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 1049.6  
 REAL RELATIVE DENSITY = 0.5942  
 UNNORMALIZED TOTAL = 99.97

## ACTIVE ALARMS

NONE

FLORIDA GAS TRANSMISSION CO.

BROOKER LAB- WET  
 STANDARD GAS 1041.9 0.5940  
 CERTIFIED VALUE BTU 1042.0 GRAY. 0.5940  
 TOTAL SULFUR 0.15 GR/CCF H<sub>2</sub>S 0.08 GR/CCF  
 H<sub>2</sub>O 28 #/MMCF BY Carbach

## ANALYSIS.

DATE: 01/12/93 ANALYSIS TIME: 345 STREAM SEQUENCE: 12  
 TIME: 12:32 CYCLE TIME: 360 STREAM#: 1  
 ANALYZER#: 1 MODE: RUN CYCLE START TIME: 12:26

COMP NAME	COMP CODE	MOLE %	GAL/MCF**	B.T.U.*	SP. GR.*
HEXANE +	151	0.073	0.0319	3.76	0.0024
PROPANE	152	0.930	0.2561	23.44	0.0142
I-BUTANE	153	0.189	0.0618	6.16	0.0038
N-BUTANE	154	0.228	0.0718	7.45	0.0046
IPENTANE	155	0.057	0.0210	2.31	0.0014
NPENTANE	156	0.040	0.0144	1.60	0.0010
NITROGEN	157	0.810	0.0000	0.00	0.0078
METHANE	158	93.511	0.0000	946.61	0.5180
CO2	159	0.774	0.0000	0.00	0.0118
ETHANE	160	3.388	0.9064	60.10	0.0352
<i>note</i>		<i>4.905</i>			
TOTALS		100.000	1.3634	1051.41	0.6000

\* @ 14.730 PSIA DRY & UNCORRECTED FOR COMPRESSIBILITY

\*\* @ 14.730 & 60 DEG. F

COMPRESSIBILITY FACTOR (1/Z) = 1.0023  
 DRY B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 1053.8  
 SAT B.T.U. @ 14.730 PSIA & 60 DEG. F CORRECTED FOR (1/Z) = 1035.5  
 REAL SPECIFIC GRAVITY = 0.6011  
 UNNORMALIZED TOTAL = 100.17

## ACTIVE ALARMS

NONE

FLORIDA GAS TRANSMISSION CO.

BROOKER LAB- WET

STANDARD GAS 1041.9 / 0.5940

CERTIFIED VALUE BTU 1042.0 GRAV. 0.5940

TOTAL SULFUR 0.48 GR/CCF H<sub>2</sub>S 0.03 GR/CCF

H<sub>2</sub>O 2.7 #/MMCF BY Bill Stinson

RECEIVED  
 JAN 14 1993  
 TECH OPERATIONS

## **ATTACHMENT 5**

### **Sampling Facility Drawings**

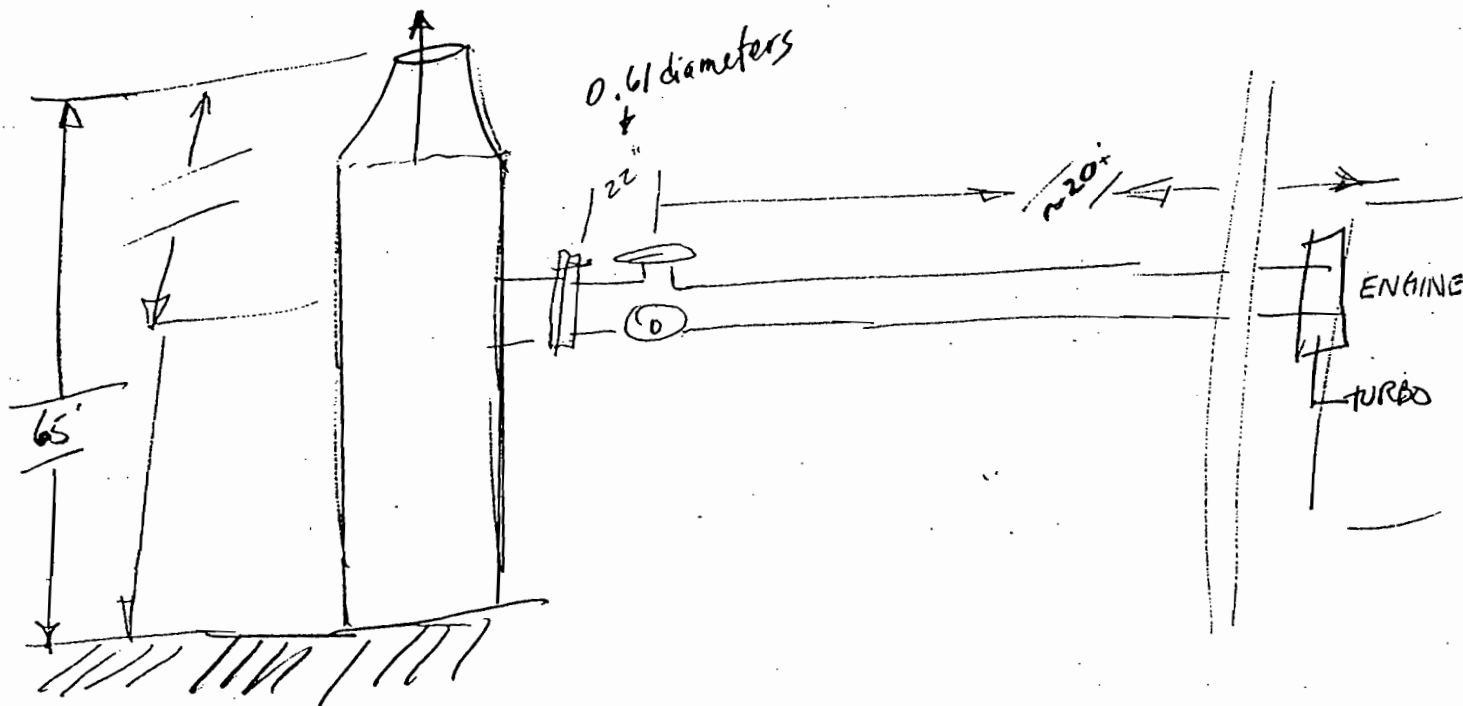


# Circular Stack Sampling Traverse Point Layout (EPA Method 1)

Date: 1-31  
 Plant: #20  
 Source: Copper River  
 Technician(s): CE / MH / LB

Port + Stack ID: 48.75 in.  
 Port Extension 13.25 in.  
 Stack ID: 35.5 in.  
 Stack Area 6.87 ft<sup>2</sup>  
 Total Req'd Traverse Pts. 16  
 No. of Traverse Pts. 8 /diam.  
 No. of Traverse Pts. 8 /port

**Stack Diagram** (Side View showing major unit components, dimensions and nearest upstream & downstream flow disturbances)



Traverse Point Number	Length Factor (% of diameter)			
	Number of traverse pts./diameter			
	4	6	8	12
1	6.7	4.4	3.2	2.1
2	25.0	14.6	10.5	8.2
3	75.0	29.6	19.4	11.8
4	93.3	70.4	32.3	17.7
5		85.4	67.7	25.0
6		95.6	80.6	35.6
7			89.5	64.4
8			96.8	75.0
9				82.3
10				88.2
11				93.3
12				97.9

Distance from Reference Point (inches)	
+ Port Ext =	
<u>1.14</u>	<u>14.89</u>
<u>3.73</u>	<u>16.98</u>
<u>6.89</u>	<u>20.23</u>
<u>11.47</u>	<u>24.72</u>
<u>24.03</u>	<u>37.28</u>
<u>28.61</u>	<u>41.86</u>
<u>31.77</u>	<u>44.96</u>
<u>34.36</u>	<u>47.01</u>
<del> </del>	<del> </del>
<del> </del>	<del> </del>
<del> </del>	<del> </del>
<del> </del>	<del> </del>



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

March 3, 1994

RECEIVED  
MAR 4 1994  
Bureau of  
Air Regulation

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

Dear Mr. Fancy:

Florida Gas Transmission Company invites you to attend a meeting March 22 and 23 in Tallahassee, Florida concerning the Phase III Expansion project. The purpose of the meeting is to review the environmental requirements included in the Environmental Impact Statement. The development of coordinating and reporting systems is another topic which will be discussed. Finally, the meeting will provide a forum for round table exchange of information, including opportunities for questions and discussion.

The Federal Energy Regulatory Commission will present an overview of the Environmental Impact Statement mitigation measures related to the Phase III construction. Other federal and state agencies also will make presentations. The Florida Department of Environmental Protection will be allotted up to 30 minutes to make a presentation.

Virginia Wetherell, Janet Lewellyn and Connie Bersock from your organization also have been invited. From each of your areas, one additional person who has been involved in the Phase III project also is invited.

A Florida Gas Transmission Company representative will contact you to get your input on this meeting and to find out who from your organization will attend.

The meeting will be held at the Sheraton Tallahassee Hotel at 101 South Adams Street, and will begin with a get-acquainted reception the evening of March 22. Rooms will be reserved and detailed information will be sent to you as soon as possible. I look forward to seeing you.

Sincerely,

Carl D. Schulz  
Vice President  
Project Management Services  
FGT Phase III Expansion

Enclosure



**FLORIDA GAS TRANSMISSION COMPANY/AGENCY/CONTRACTOR MEETING**

**March 22-23, 1994**

**Sheraton Tallahassee Hotel**

**Invitation List**

**Enron/Sonat/FGT Personnel**

Tom White – Enron Operations Corp. – Chairman and CEO

Stan Horton – Enron Operations Corp. – President & COO/CEO – Interstate Pipelines

Jim Moylan – Sonat Inc. – Vice President and Controller

Jim Prentice – Enron Operations Corp. – Senior Vice President & Chief Technical Officer

Bill Allison – Florida Gas Transmission Company – President

Carl Schulz – FGT Phase III – Vice President of Project Management Services

Bill Rome – FGT – Vice President of Operations

Bill Osborne – FGT Phase III – Director–Environmental

Steve Veatch – FGT – Manager of Certificates and Regulatory Reporting

Kevin McGlynn – FGT Phase III – Director–Pipeline Construction

Carlton Nelson – FGT Phase III – Director–Compression Construction

Jerry Murphy – FGT Phase III – Director–Compression Construction

Tilford Vik – FGT Phase III – Assistant to the Vice President

Christie Patrick – Enron Corp. – Senior Counsel

Don Templeton – FGT Phase III – Manager–Pipeline Construction

Lindy Wickstrom – FGT Phase III – Manager–Pipeline Construction

Albert Hughes – FGT Phase III – Technical Support Manager

Ray Stephenson – FGT Phase III – Pipeline Consultant

## **Invitation List – Page 3**

### **Other Agencies**

Florida Division of Forestry – W.R. Helm, Jr. – Chief, Forest Management Bureau, and one staff member

Florida Game and Fresh Water Fish Commission – Brad Hartman – Director of the Office of Environmental Services, and one staff member

U.S. Forest Service – Marvin Meier – Regional Forester, and one staff member

U.S. Fish and Wildlife Service – Don Palmer – Wildlife Biologist, and one staff member

### **Contractors**

W.H.C., Inc. – George Crain, Jr., president, and all field superintendents

Ranger Plant Constructional Company, Inc. – Wayne Stringer, president, and all field superintendents

Bluewater Constructors, Inc. – John Welkey, president, and all field superintendents

Piute Contractors, Inc. – Don Loncarich, president, and all field superintendents

H.C. Price Co. – Tom White, president, and all field spread superintendents

Murphy Bros., Inc. – William Murphy, president, and all field spread superintendents

Latex Construction Company – W.E. Honey, Jr., and all field spread superintendents

## **Invitation List – Page 2**

### **Federal Energy Regulatory Commission**

Kevin Madden – Director–Office of Pipeline and Producer Regulation

Mark Jensen – Project Manager – Environmental Policy and Project Analysis Branch

Rich Hoffman – Chief–Environmental Policy and Project Analysis Branch

Randy Mathura – Deputy Director–Division of Market and Engineering Environmental Analysis

Pat Patterson – Project Manager–EBASCO Environmental

### **Florida Department of Environmental Protection**

Virginia Wetherell – Secretary–Florida DEP

Clair Fancy – Chief, Bureau of Air Regulation

Janet Lewellyn – Chief, Bureau of Wetland Resource Management

Connie Bersock – Environmental Administrator, Bureau of Wetland Resource Management

### **U.S. Army Corps of Engineers**

Col. Michael Diffley – District Engineer, New Orleans District and one staff member

Col. Stanley Phernambucq – District Engineer, Vicksburg District and one staff member

Col. Robert Griffin – District Engineer, Mobile District and one staff member

Col. Terrence Salt – District Engineer, Jacksonville District and one staff member

John Hall – Chief of Regulatory Division, Jacksonville District



Lawton Chiles  
Governor

# Florida Department of Environmental Protection

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

Virginia B. Wetherell  
Secretary

December 16, 1993

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

Mr. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company  
P.O. Box 1188  
Houston, Texas 77251-1188

Dear Mr. Pierce:

RE: Request for Permit Amendments  
AC 09-229441 Natural Gas Compressor Station No. 26, Citrus  
County  
AC 50-229440 Natural Gas Compressor Station No. 21, Palm Beach  
County  
AC 62-229319/PSD-FL-202 Compressor Station No. 15, Taylor  
County  
AC 56-230129/PSD-FL-203 Compressor Station No. 20, St. Lucie  
County

The Department has reviewed your November 24, 1993, letter requesting some minor changes from the design submitted in the original application. As stated in your letter, these proposed changes do not involve increases of any air emissions from the turbines covered by these permits. Air dispersion modeling of NO<sub>x</sub> emissions has been performed using the U.S. EPA's ISCALT2 model to evaluate the relative effect on air quality impacts of these proposed changes. No adverse air quality impacts will occur with these. The Department has evaluated these requests and has agreed to the changes as proposed.

**Attachment to be Incorporated:**

Mr. Duane Pierce's letter dated November 23, 1993.

Mr. Duane Pierce  
December 16, 1993  
Page Two

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. 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, Florida Statutes.

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;
- (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 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

Mr. Duane Pierce  
December 16, 1993  
Page Three

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, F.A.C.

This letter amendment must be attached to construction Permit No. AC 09-229441 and AC 50-229440 and shall become a part of each permit.

Sincerely,



Howard L. Rhodes  
Director  
Division of Air Resources  
Management

HLR/TH/bjb

Attachment to be Incorporated:

Mr. Duane Pierce's letter of November 23, 1993.

cc: Isidore Goldman - SED  
Bill Thomas - SWD

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 12/22/93 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.

 12/22/93  
Clerk Date



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

November 18, 1993

RECEIVED

NOV 22 1993

Division of Air  
Resources Management

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

RE: Air Permit AC 56-230129 / PSD-FL-203  
Natural Gas Compressor Station No. 20, St. Lucie County

Dear Mr. Fancy:

As discussed in a telephone conversation with Ms. Teresa Heron of your staff on November 17, Florida Gas Transmission Company's (FGT) Phase III Expansion Engineering Group has refined the design of the Phase III expansion for Compressor Station No. 20 and FGT proposes to make some desirable minor changes from the original design submitted in the original air permit application. FGT understands that these changes are minor and of an administrative nature and that they do not require public notice or a lengthy review period.

It is extremely important to FGT that the start of construction not be delayed. If the FDEP should decide that either a public notice or lengthy review is required for these proposed changes, then FGT will not make them.

These proposed changes do not involve increases in any air emissions or air quality impacts from the engine covered by this permit. Additionally, air dispersion modeling of NO<sub>x</sub> emissions has been performed using the U.S. EPA's ISCLT2 model to evaluate the relative effect on air quality impacts of these proposed changes. The modeling demonstrates that these proposed changes will result in an improvement in the already minimal air quality impacts of this project.

### CHANGES

The proposed changes are described below.

1. The new Compressor Building will have an increased width and a decreased length. The original and new dimensions are given in the table below.

**New Compressor Building Dimension Changes**

BUILDING DIMENSION	ORIGINAL	NEW
HEIGHT	41' (12.5 m)	NO CHANGE
LENGTH	72' (21.94 m)	63.5' (19.35 m)
WIDTH	60' (18.29 m)	62.25' (18.97 m)

2. The Emergency Generator size requirement has been decreased and will be changed from a 625 hp unit to 457 hp unit. The unit will still not be operated more than 400 hours per year. NO<sub>x</sub>, CO and VOC lb/hr emission rates will all decrease and some other parameters will be changed. Some of these changes have the potential to change impacts, therefore the stack height has been increased. The changes are summarized in the table below. Vendor information is provided in Attachment A.

**Revised Emergency Generator Parameters**

PARAMETER	ORIGINAL	NEW
Size (hp)	625	457
Stack Height (ft)	22 (6.71 m)	26 (7.92 m)
Stack Diameter (ft)	0.5 (0.15 m)	NO CHANGE
Exhaust Flow Rate (acfm)	3043 (86.16 m <sup>3</sup> )	2341 (66.28 m <sup>3</sup> )
Exhaust Temperature (° F)	1112 (600° C)	1050 (566° C)
NO <sub>x</sub> Emissions (lb/hr)	1.35	0.99
CO Emissions (lb/hr)	2.95	2.16
VOC Emissions (lb/hr)	0.055	0.04

3. Minor changes have been made to the original plot plan. A new one is provided in Attachment B.



## DISPERSION MODELING

Air dispersion modeling was performed using ISCLT2 to compare the relative effects on air quality impacts of these changes. The same meteorology used in the original application (West Palm Beach, upper and surface data, 1982-1986) was used for this dispersion modeling. The model input files used in the original application were modified to reflect the proposed changes as follows:

- 1) Downwash parameters were changed to reflect the new Compressor Building dimensions, the new Emergency Generator stack height and the new configuration shown in the plot plan. The same input file and downwash program (Bowman Engineering's GEP Program) that were used in the original application were used to generate downwash parameters for the modeling of these proposed changes.
- 2) Stack coordinates and Emergency Generator stack parameters were changed to reflect the new values.
- 3) The receptor grids were revised to meet the limitations of the ISCLT2 version used. This version limits the number of receptors to 500. Since the original modeling used receptor grids larger than 500, the grid sizes had to be reduced. The reduced grid sizes were located so that they included the receptors with the highest impacts in the original application modeling.

The maximum concentration resulting from the ISCLT2 modeling decreased from 1.842 ug/m<sup>3</sup> with our permitted parameters to 1.832 ug/m<sup>3</sup> with the new parameters. Modeling was repeated for the PSD increment analysis and the National Ambient Air Quality Standard (NAAQS) analysis. Both analyses indicated a decreased impact with the new parameters. The results are summarized below.

As stated above, this indicates that the proposed changes should result in even lower ambient air quality impacts than the already predicted low impacts. The output from the modeling runs and the downwash program and a computer disk with both input and output files have been sent to Mr. Cleveland Holladay of the FDEP under separate cover.

**NO<sub>x</sub> Air Dispersion Modeling Results**

PARAMETERS	MAXIMUM OFFSITE CONCENTRATION (ug/m³)	YEAR	RECEPTOR LOCATION	
			East meters	North meters
New Sources				
Original	1.842	1986	-200	0
Proposed	1.833	1986	-200	0
PSD Increment Analysis				
Original	2.316	1986	557700	3035725
Proposed	2.107	1986	557200	3035725
NAAQS Analysis (Without O <sub>3</sub> Limiting Analysis)				
Original	286.54	1982	557800	3035725
Proposed	285.99	1982	557800	3035725

In summary, the changes in the Emergency Generator stack parameters and the Compressor Building dimensions should result in improved air quality impacts compared to what was proposed in FGT's original application.

Again, FGT would like to restate that it is extremely important that these proposed changes do not delay start of construction for this project and that FGT will not make these changes if that is the case.

Should you have any questions concerning these changes or need additional information, please do not hesitate to call me at (713) 853-3569.

Sincerely,



V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company

Florida Gas Transmission Company  
Compressor Station No. 20  
November 18, 1993

Page 5

cc: Carlon Nelson  
William Osborne  
Allan Weatherford  
Files

FILE: 20FDER01.LTR



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

November 18, 1993

RECEIVED

NOV 22 1993

Division of Air  
Resources Management

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

RE: Air Permit AC 56-230129 / PSD-FL-203  
Natural Gas Compressor Station No. 20, St. Lucie County

Dear Mr. Fancy:

As discussed in a telephone conversation with Ms. Teresa Heron of your staff on November 17, Florida Gas Transmission Company's (FGT) Phase III Expansion Engineering Group has refined the design of the Phase III expansion for Compressor Station No. 20 and FGT proposes to make some desirable minor changes from the original design submitted in the original air permit application. FGT understands that these changes are minor and of an administrative nature and that they do not require public notice or a lengthy review period.

It is extremely important to FGT that the start of construction not be delayed. If the FDEP should decide that either a public notice or lengthy review is required for these proposed changes, then FGT will not make them.

These proposed changes do not involve increases in any air emissions or air quality impacts from the engine covered by this permit. Additionally, air dispersion modeling of NO<sub>x</sub> emissions has been performed using the U.S. EPA's ISCLT2 model to evaluate the relative effect on air quality impacts of these proposed changes. The modeling demonstrates that these proposed changes will result in an improvement in the already minimal air quality impacts of this project.

### CHANGES

The proposed changes are described below.

1. The new Compressor Building will have an increased width and a decreased length. The original and new dimensions are given in the table below.

**New Compressor Building Dimension Changes**

<b>BUILDING DIMENSION</b>	<b>ORIGINAL</b>	<b>NEW</b>
<b>HEIGHT</b>	41' (12.5 m)	NO CHANGE
<b>LENGTH</b>	72' (21.94 m)	63.5' (19.35 m)
<b>WIDTH</b>	60' (18.29 m)	62.25' (18.97 m)

2. The Emergency Generator size requirement has been decreased and will be changed from a 625 hp unit to 457 hp unit. The unit will still not be operated more than 400 hours per year. NO<sub>x</sub>, CO and VOC lb/hr emission rates will all decrease and some other parameters will be changed. Some of these changes have the potential to change impacts, therefore the stack height has been increased. The changes are summarized in the table below. Vendor information is provided in Attachment A.

**Revised Emergency Generator Parameters**

<b>PARAMETER</b>	<b>ORIGINAL</b>	<b>NEW</b>
Size (hp)	625	457
Stack Height (ft)	22 (6.71 m)	26 (7.92 m)
Stack Diameter (ft)	0.5 (0.15 m)	NO CHANGE
Exhaust Flow Rate (acfm)	3043 (86.16 m <sup>3</sup> )	2341 (66.28 m <sup>3</sup> )
Exhaust Temperature (° F)	1112 (600° C)	1050 (566° C)
NO <sub>x</sub> Emissions (lb/hr)	1.35	0.99
CO Emissions (lb/hr)	2.95	2.16
VOC Emissions (lb/hr)	0.055	0.04

3. Minor changes have been made to the original plot plan. A new one is provided in Attachment B.

## DISPERSION MODELING

Air dispersion modeling was performed using ISCLT2 to compare the relative effects on air quality impacts of these changes. The same meteorology used in the original application (West Palm Beach, upper and surface data, 1982-1986) was used for this dispersion modeling. The model input files used in the original application were modified to reflect the proposed changes as follows:

- 1) Downwash parameters were changed to reflect the new Compressor Building dimensions, the new Emergency Generator stack height and the new configuration shown in the plot plan. The same input file and downwash program (Bowman Engineering's GEP Program) that were used in the original application were used to generate downwash parameters for the modeling of these proposed changes.
- 2) Stack coordinates and Emergency Generator stack parameters were changed to reflect the new values.
- 3) The receptor grids were revised to meet the limitations of the ISCLT2 version used. This version limits the number of receptors to 500. Since the original modeling used receptor grids larger than 500, the grid sizes had to be reduced. The reduced grid sizes were located so that they included the receptors with the highest impacts in the original application modeling.

The maximum concentration resulting from the ISCLT2 modeling decreased from 1.842 ug/m<sup>3</sup> with our permitted parameters to 1.832 ug/m<sup>3</sup> with the new parameters. Modeling was repeated for the PSD increment analysis and the National Ambient Air Quality Standard (NAAQS) analysis. Both analyses indicated a decreased impact with the new parameters. The results are summarized below.

As stated above, this indicates that the proposed changes should result in even lower ambient air quality impacts than the already predicted low impacts. The output from the modeling runs and the downwash program and a computer disk with both input and output files have been sent to Mr. Cleveland Holladay of the FDEP under separate cover.

**NO<sub>x</sub> Air Dispersion Modeling Results**

PARAMETERS	MAXIMUM OFFSITE CONCENTRATION (ug/m³)	YEAR	RECEPTOR LOCATION	
			East meters	North meters
New Sources				
Original	1.842	1986	-200	0
Proposed	1.833	1986	-200	0
PSD Increment Analysis				
Original	2.316	1986	557700	3035725
Proposed	2.107	1986	557200	3035725
NAAQS Analysis (Without O <sub>3</sub> Limiting Analysis)				
Original	286.54	1982	557800	3035725
Proposed	285.99	1982	557800	3035725

In summary, the changes in the Emergency Generator stack parameters and the Compressor Building dimensions should result in improved air quality impacts compared to what was proposed in FGT's original application.

Again, FGT would like to restate that it is extremely important that these proposed changes do not delay start of construction for this project and that FGT will not make these changes if that is the case.

Should you have any questions concerning these changes or need additional information, please do not hesitate to call me at (713) 853-3569.

Sincerely,



V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company

Florida Gas Transmission Company  
Compressor Station No. 20  
November 18, 1993

Page 5

cc: Carlon Nelson  
William Osborne  
Allan Weatherford  
Files

FILE: 20FDER01.LTR



**ATTACHMENT A**

**EMERGENCY GENERATOR  
VENDOR INFORMATION**

# Engine: Cummins GTA19 in-line, 6-cylinder

## Turbocharged and Aftercooled

### POWER RATINGS (without fan)

<b>COMPRESSION RATIO</b>	8.5:1	10:1
Bore: 6 1/4" (159 mm)	(See Note 1)	(See Note 2)
Stroke: 6 1/4" (159 mm)	Propane	Nat. Gas
<b>STANDBY POWER (ENGINE OUTPUT POWER) RATING - HP (Kw) - WITHOUT FAN</b>		
RPM	1800	430(321) 457(341)

<b>Cooling</b>	
Heat Rejection To Coolant	17366 Btu/Min
Coolant Capacity(with radiator)	34 US Gal
Coolant Flow Rate	189 Gal/Min
Maximum Coolant Friction Head	5.0 psi
Maximum Coolant Static Head	60 ft
Radiator Fan Load	25 HP
<b>Air</b>	
Combustion Air	755 cfm
Maximum Air Cleaner Restriction	10 in H <sub>2</sub> O
Alternator Cooling Air	1770 cfm
Radiator Cooling Air	42218 cfm
Minimum Air Opening to Room	56 sq ft
Minimum Discharge Opening	28 sq ft
Maximum Restriction at Radiator Discharge (static)	0.5 in H <sub>2</sub> O
<b>Exhaust</b>	
Gas Flow (Full Load)	2341 cfm
Gas Temperature	1100 °F
Maximum Back Pressure	27 in H <sub>2</sub> O

Data shown above represents gross engine performance capabilities obtained and corrected in accordance with SAE J1349 conditions of 29.61 in. Hg. (100kPa) barometric pressure [300 ft. (91m) altitude], 77° F (25° C) inlet air temperature, and 0.30 in. Hg. (1kPa) water vapor pressure using dry processed natural gas fuel with 905 BTU per standard cubic foot (33.72 k J/l) lower heating value.

**Cooling System:** High flow centrifugal pump with spin-on corrosion resistor/additive filter. Aftercooled model includes an air to air separate low temperature cooling system. High ambient 110° F radiator cooling system.

**Exhaust System:** High performance turbocharger and watercooled exhaust manifold that improves flow and lowers the exhaust temperature.

#### Notes:

- 54° C (130° F) or lower water temperature to the aftercooler or air to air aftercooler W/130° F or lower air temperature to the radiator.
- 32° C (90° F) or lower water temperature to the aftercooler or use of air to air aftercooler W/100° F or lower air temperature to the radiator.

**Fuel System:** Balanced air-cooled intake manifold for even fuel distribution. Impco carburetor developed for high altitude application.

**Ignition System:** Highly reliable, solid state, breakerless, low tension system. Low cranking speed firing from a magneto-type power source for easy starting. Long spark plug life and fully sealed modular-type electronics for low maintenance.

**Lubrication:** Positive pressure feed to all bearings and wear surfaces. Includes large tubular oil cooler and high capacity oil pan for extended service intervals. Pistons receive additional cooling from oil spray located below each cylinder. The lube oil capacity is 48 US quarts and the oil that is required is API CD 15W-40. The lube oil filter is the canister type.

**Valve Train:** Specifically designed for natural gas. Includes hard, high alloy valves, valve inserts, and positive action rotators on intake and exhaust ports.

**Speed Control:** Adjustable hydraulic governor provides stable RPM control under all load conditions.

### EMERGENCY STANDBY RATING

Emergency Standby Rating is applicable for supplying emergency electric power for the duration of the utility power outage. NO OVERLOAD capability is available for this rating.

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and muffler; not included are alternator, compressor, fan, optional equipment, driven components or installation of a catalytic converter.

### Altitude and Ambient Temperature Requirements:

The generator set may be operated at the STANDBY RATING up to 3000 ft. (914m) altitude and 100° F (38° C) inlet air temperature. For sustained operation at high load factors at higher altitudes and temperatures, see Southern Plains Power or your distributor.

### FUEL APPLICATION GUIDE

<b>COMPRESSION RATIO</b>	10:1	8.5:1
Dry, Processed, Natural Gas	X	X
Propane (HD-5)	—	X

All other gases, such as field gas and digester/sewage gas, will require an analysis and pre-approval from SPP. Consult your Cummins Distributor for details.

STA 19  
 REV. (A) 12/19

**FGT PHASE III RECIPROCATING COMPRESSION EXPANSION**

**ENGINE DRIVEN GENERATOR SET**

**EMISSIONS DATA**

Location: Station 20, Ft. Pierce, Florida

Project No.: W.O. S22138

**1.0 MAXIMUM EMISSION DATA**

The following emission data is the maximum allowable for EPA compliance.

NOx, Grams/HP-Hour (NOTE 1)	0.98
CO, Grams/HP-Hour (NOTE 1)	2.14
HC, Grams/HP-Hour	0.8
NMHC, Grams/HP-Hour (NOTE 1)	0.04
O <sub>2</sub> , % Observed Dry	0.5
Volume Air/Fuel Ratio	9.5:1
Stack Temp., °F	1112
Exhaust Flow, CFM	3043
Airflow, KG/Hour	1929
BSFC, BTU/HP-Hour	8387

NOTE 1: The data for NOx, CO, and NMHC includes the reduction by the catalytic muffler, which should reduce the emissions by 90%, 80%, and 50%, respectively, to the above.

**2.0 ACTUAL ENGINE EMISSION LEVEL DATA**

2.1 The vendor shall provide the following emission quantities and guarantee that they will not be exceeded over the entire power range:

NOx, Grams/HP-Hour:	0.98
CO, Grams/HP-Hour:	2.14
CO <sub>2</sub> , Grams/HP-Hour:	N/A
Total HC, Grams/HP-Hour:	0.8
NMHC, Grams/HP-Hour:	0.04
H <sub>2</sub> O, Grams/HP-Hour:	N/A
N <sub>2</sub> , Grams/HP-Hour:	N/A
O <sub>2</sub> , Grams/HP-Hour:	N/A

(A)

SMITH 10  
REV. (A) 10/19/93

## FGT PHASE III RECIPROCATING COMPRESSION EXPANSION

ENGINE DRIVEN GENERATOR SET  
EMISSIONS DATA

- 2.2 The vendor shall provide the following engine parameters at the above guaranteed emission rates:

Air/Fuel Ratio:	10.5:1	
Exhaust Mass Flow:	(2341 ACFM)	3602 lb./hr.
Ignition Timing:	26	° BTDC
Air Manifold Pressure:	7.4	psia
Maximum Ambient Air Temperature:	110	°F
Exhaust Temperature:	1120	°F
at Engine or Turbo Outlet	(1050 max at turbo outlet)	
Maximum Allowable Backpressure:	27.2	" W.C.
Fuel Consumption:	3.838	MCFH
	7600	BTU/BHP-Hr

- 2.3 The vendor shall provide a description of the emission control system supplied with the engine generator set.

See Attached.



**MECHANICAL EQUIPMENT**

**INC.**

October 19, 1993

Southern Plains Power  
P.O. Box 2088  
Houston, Texas 77252

Attention: Mr. Jim Huhn

Reference: MEI Quote # 93-07-1695  
MEI Quote # 93-07-1696  
MEI Quote # 93-07-1703

*App I  
p. 1*

Gentlemen:

In response to your fax of 10-15-93, following are the NEW conditions for which the emissions equipment quoted is to perform. Further, please note the qualifying conditions:

Quote # 93-07-1695      GTA-28  
Enron's Station 10

NOx = 0.98 gm/BHP-HR  
CO = 2.14 gm/BHP-HR  
NMHC = 0.04 gm/BHP-HR

Quote # 93-07-1696      GTA-19  
Enron's Station 20

NOx = 0.98 gm/BHP-HR  
CO = 2.14 gm/BHP-HR  
NMHC = 0.04 gm/BHP-HR

**ATTACHMENT B**  
**REVISED PLOT PLAN**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

OCT 15 1993

4APT-AEB

DEPARTMENT OF  
ENVIRONMENTAL PROTECTION

OCT 18 1993

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

OFFICE OF THE SECRETARY

RE: Florida Gas Transmission Company, Compressor Station  
Number 20, St. Lucie County, FL (PSD-FL-203)

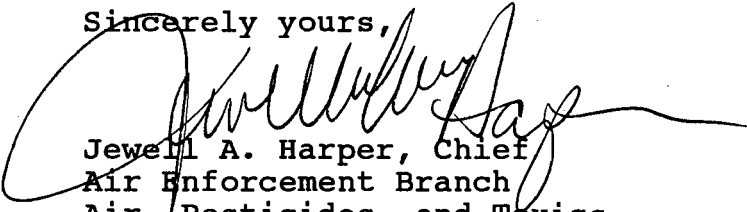
Dear Mr. Fancy:

This is to acknowledge receipt of your final determination and Prevention of Significant Deterioration (PSD) permit for the above referenced facility, dated September 28, 1993. The proposed expansion to the existing facility will be the addition of one Cooper-Bessemer 10V-275C natural gas fired, reciprocating, internal combustion engine, equipped with lean-burn technology. The proposed engine is rated at 4,000 brake horsepower and will be used to drive gas compressors for transporting natural gas by pipeline for distribution to markets in the Gulf Coast region. The proposed modification is subject to PSD review on the basis of significant NO<sub>x</sub> emissions.

Your determination proposes to limit NO<sub>x</sub> emissions from the combustion engine through lean-burn technology.

We have reviewed the package as submitted and have no adverse comments. Thank you for the opportunity to review and comment on the package. If you have any questions or comments, please contact Mr. Scott Davis of my staff at (404) 347-5014.

Sincerely yours,

  
Jewell A. Harper, Chief  
Air Enforcement Branch  
Air, Pesticides, and Toxics  
Management Division

cc: J. Alton  
C. Halladay  
J. Goldmann, S.E. Dist.  
D. Bunnell, NPS  
B. Andrews, ENSR

RECEIVED

OCT 19 1993

Division of Air  
Resources Management

P 230 524 291



# Receipt for Certified Mail

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

PS Form 3800, June 1991

Sent to <i>Carl Schulz</i>	
Street and No. <i>FIA GAS TRANS.</i>	
P.O. State and ZIP Code <i>HOUSTON, TX</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	<i>Taylor</i>
Return Receipt Showing to Whom, Date, and Addressee's Address	<i>St. Lucio</i>
TOTAL Postage & Fees	\$
Postmark or Date <i>9-28-93</i> <i>AC 62-229319-PSD- FI-202</i> <i>AC 56-230129- PSD-FI-203</i>	

Is your RETURN ADDRESS completed on the reverse side?

## SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

### 3. Article Addressed to:

*Carl D. Schulz, VP*  
*FIA Gas Transmission*  
*P.O. BOX 1188*  
*Houston, TX*  
*77251-1188*

### 4a. Article Number

*P 230 524 291*

### 4b. Service Type

- |   |   |
|---|---|
| <input type="checkbox"/> Registered           | <input type="checkbox"/> Insured                        |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD                            |
| <input type="checkbox"/> Express Mail         | <input type="checkbox"/> Return Receipt for Merchandise |

### 7. Date of Delivery

*SEP 30 1993*

### 5. Signature (Addressee)

### 6. Signature (Agent)

*TRAVIS HENRY*

### 8. Addressee's Address (Only if requested and fee is paid)

Thank you for using Return Receipt Service.

PS Form 3811, December 1991

★U.S. GPO: 1992-323-402

DOMESTIC RETURN RECEIPT



STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF PERMIT

In the matter of an  
Application for Permit by:

DER File No. AC 56-230129  
St. Lucie County  
PSD-FL-203

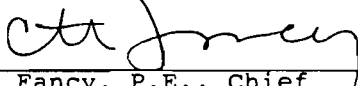
Mr. Carl D. Schulz, Vice President  
Florida Gas Transmission Company  
P. O. Box 1188  
Houston, Texas 77251-1188

Enclosed is Permit Number AC 56-230129 to construct a 4,000 bhp reciprocating engine at the Florida Gas Transmission Company's facility located at 8701 Orange Avenue in Fort Pierce, St. Lucie 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 PROTECTION

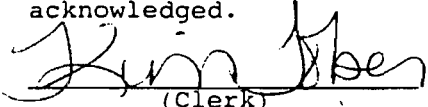
  
C. H. Fancy, P.E., Chief  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400  
904-488-1344

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 9-28-93 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)

9-28-93  
(Date)

Copies furnished to:  
I. Goldman, SE District  
B. Andrews, P.E., ENSR  
J. Harper, EPA  
J. Bunyak, NPS

Final Determination

Florida Gas Transmission Company  
St. Lucie County  
Fort Pierce, Florida  
Station No. 20

Natural Gas Compressor Engine  
Permit No. AC 56-230129  
PSD-FL-203

Department of Environmental Protection  
Division of Air Resources Management  
Bureau of Air Regulation

September 23, 1993

## FINAL DETERMINATION

The Technical Evaluation and Preliminary Determination for the permit to construct a 4,000 bhp reciprocating engine at the Florida Gas Transmission Company located at 8701 Orange Avenue in Fort Pierce, St. Lucie County, Florida, was distributed on July 20, 1993. The Notice of Intent was published in the Fort Pierce, Port St. Lucie Tribune, on July 31, 1993. Copies of the evaluation were available for inspection at the Department's offices in West Palm Beach and Tallahassee.

Florida Gas Transmission Company (FGTC's) application for a permit to construct a natural gas reciprocating engine in St. Lucie County, Florida, has been reviewed by the Bureau of Air Regulation in Tallahassee.

No adverse comments were submitted by EPA. Comments regarding the Permit Specific Conditions were submitted by Mr. V. Duane Pierce, Ph.D., Air Quality Supervisor for Florida Gas Transmission Company and Barry Andrews, P.E., representing FGTC as the professional engineer of record. The Bureau has considered Mr. Pierce's and Mr. Andrews' comments and agreed to the changes proposed to the draft specific conditions of the permit since these changes will not affect the air quality analysis considered during the evaluation of this project. The amendments to the Specific Conditions of this permit are as follows:

### SPECIFIC CONDITION No. 5:

#### FROM:

The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

Maximum natural gas consumption shall not exceed 0.0267 MMCF/hr.  
Maximum heat input shall not exceed 27.8 MMBTU/hr.

#### TO:

The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

Maximum natural gas consumption shall not exceed 0.0320 MMCF/hr  
(based on a fuel heating value of 1040 BTU/CF).  
Maximum heat input shall not exceed 33.36 MMBTU/hr.

### SPECIFIC CONDITION No. 1:

#### FROM:

#### Emission Limits

1. The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.4	77.26	2.0 g/bhp-hr
Carbon Monoxide	18.52	81.12	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	5.29	23.18	1.7 g/bhp-hr
Particulate Matter (TSP)	0.13	0.57	5 lbs/MMscf
Particulate Matter (PM <sub>10</sub> )	0.13	0.57	5 lbs/MMscf
Sulfur Dioxide	0.70	3.33	10 gr/100scf

TO:

Emission Limits

1. The maximum allowable emissions\* from this unit shall not exceed the emission rates as follows:

<u>Pollutant</u>	<u>lbs/hr</u>	<u>tons/yr</u>	<u>Emission Factor</u>
Nitrogen Oxides	17.4	77.26	2.0 g/bhp-hr
Carbon Monoxide	18.52	81.12	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	5.29	23.18	1.7 g/bhp-hr
Particulate Matter (TSP)	0.16	0.68	5 lbs/MMscf
Particulate Matter (PM <sub>10</sub> )	0.16	0.68	5 lbs/MMscf
Sulfur Dioxide	0.84	4.00	10 gr S/100scf

\*Based on 100% load conditions.

The final action of the Department will be to issue construction permit AC 56-230129, PSD-FL-203 with the changes noted above.



# Florida Department of Environmental Protection

Lawton Chiles  
Governor

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

Virginia B. Wetherell  
Secretary

**PERMITTEE:**

Florida Gas Transmission Company  
P. O. Box 1188  
Houston, Texas 77251-1188

Permit Number: AC 56-230129  
PSD-FL-203

Expiration Date: June 30, 1995  
County: St. Lucie  
Latitude/Longitude: 27°26'43"N  
80°24'47"W

Project: Natural Gas Compressor  
Engine (Unit No. 2005)  
Station No. 20

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-210, 212, 272, 275, 296, and 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:

For the construction of one natural gas fired engine to be located at 8701 Orange Avenue, Fort Pierce, Florida. The UTM coordinates are Zone 17, 558.01 km East and 3035.68 km North.

The source 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. Application to Construct/Operate Air Pollution Sources  
DEP Form 17-1.202(1).

**PERMITTEE:**  
**Florida Gas Transmission Company**

**Permit Number: AC 56-230129**  
**PSD-FL-203**  
**Expiration Date: June 30, 1995**

**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), 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.

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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:

- 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

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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.

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.

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)
- ( ) 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



PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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.

**SPECIFIC CONDITIONS:**

Emission Limits

1. The maximum allowable emissions\* from this unit shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	17.4	77.26	2.0 g/bhp-hr
Carbon Monoxide	18.52	81.12	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	5.29	23.18	1.7 g/bhp-hr
Particulate Matter (TSP)	0.16	0.68	5 lbs/MMscf
Particulate Matter (PM <sub>10</sub> )	0.16	0.68	5 lbs/MMscf
Sulfur Dioxide	0.84	4.00	10 gr S/100scf

\*Based on 100% load conditions.

2. Visible emissions shall not exceed 10% opacity.

Operating Rates

3. This source is allowed to operate continuously (8760 hours per year).

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

4. This source is allowed to burn natural gas only.

5. The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 0.0320 MMcf/hr (based on a fuel heating value of 1040 BTU/CF).
- Maximum heat input shall not exceed 33.36 MMBtu/hr.

6. Any change in the method of operation, equipment or operating hours shall be submitted to the DEP's Bureau of Air Regulation and Southeast 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 allowable emission limits shall be determined within 60 days after achieving the maximum production rate at which this facility will be operated, but not later than 180 days after initial start-up and annually thereafter except as provided in Specific Condition 10, below, by the following reference methods as described in 40 CFR 60, Appendix A (July 1992 version) and adopted by reference in Chapter 17-297, F.A.C.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3 Gas Analysis
- or 3A
- Method 7E Determination of Nitrogen Oxide Emissions from Stationary Source
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emissions from Stationary Sources
- Method 18. Measurements of Gaseous Organic Compound Emissions by Gas Chromatography
- Method 25A. Determination of Total Gaseous Organic Concentrations Using a Flame Ionization Analyzer

9. Other DEP approved methods may be used for compliance testing after prior Department approval. Compliance with the SO<sub>2</sub> emission limit can be determined by calculations based on fuel analysis using ASTM D1072-80, D3031-81, D4084-82, or D3246-81 for sulfur content of gaseous fuels.

**PERMITTEE:**  
**Florida Gas Transmission Company**

**Permit Number: AC 56-230129**  
**PSD-FL-203**  
**Expiration Date: June 30, 1995**

**SPECIFIC CONDITIONS:**

10. Initial compliance with the volatile organic compound (VOC) emissions limits will be demonstrated by EPA Method 25A or Method 18. Thereafter, except as provided in F.A.C. Rule 17-297.340(2), compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.

11. Stack sampling facilities shall be required and shall comply with the requirements of F.A.C. Rule 17-297.345. Tests results will be the average of 3 valid runs. The Southeast District office will be notified at least 30 days in writing in advance of the compliance test(s). The source shall operate between 90% and 100% of maximum capacity for the ambient conditions experienced during compliance test(s). Compliance test results shall be submitted to the Southeast District office no later than 45 days after completion.

12. The permittee shall annually perform a visual inspection of the turbine compressor engine, filters, associated piping system for rust spots, cracks, leaks and odors. Also ensure that safety valves and the stack are in proper order and working properly. The permittee shall document the findings and corrective action taken.

13. When the Department, after investigation, has good reason (such as odor complaints, increased visible emissions, excess emissions, etc.), to conclude that any applicable emission standard contained in this permit is being violated, it may require the owner or operator of the facility to conduct compliance tests which identify the nature and quantity of air pollutant emissions from the facility and to provide a report of said tests to the Department (F.A.C. Rule 17-297.340(2)).

**Rule Requirements**

14. 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).

15. 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)).

16. No person shall cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor pursuant to F.A.C. Rule 17-296.320(2). Objectionable odor is defined as any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonable interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance pursuant to F.A.C. Rule 17-296.200(123).

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

17. This source shall be in compliance with all applicable provisions of F.A.C. Rules 17-210.650: Circumvention; 17-210.700: Excess Emissions; Chapter 17-297: Stationary Sources-Emissions Monitoring; Chapter 17-296: Stationary Source- Emission Standards and, 17-4.130: Plant Operation-Problems.

18. 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 construction has not commenced (40 CFR 52.21(r)(2)).

19. Fugitive dust emissions, during the construction period, shall be minimized by covering or watering dust generation areas.

20. 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: fuel usage, hours of operation, RPM, air emissions limits, etc. Annual reports shall be sent to the Department's Southeast District office by March 1 of each calendar year.

21. 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).

22. An application for an operation permit must be submitted to the Southeast 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 27 day  
of September, 1993

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL PROTECTION

Virginia B. Wetherell  
Virginia B. Wetherell, Secretary

Best Available Control Technology (BACT) Determination  
Florida Gas Transmission Company  
St. Lucie County-PSD-FL-203

The applicant proposes to expand its existing natural gas pipeline compressor station No. 20 near the town of Ft. Pierce, St. Lucie County, Florida. The proposed expansion consists of adding one new Cooper- Bessemer 4,000 brake horsepower (BHP) natural-gas-fired, reciprocating internal engine.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the proposed turbine engine based on 8,760 hrs/year operation and ISO standard conditions to be as follows:

Pollutant	Max. Net Increase in Emissions (TPY)	PSD Significant Emission Rate (TPY)
NOx	77.26	40
SO <sub>2</sub>	3.33	40
PM/PM <sub>10</sub>	0.57	25/15
CO	81.12	100
VOC	23.18	40

Rule 17-212.400(2)(f)(3) of the Florida Administrative Code (F.A.C.) 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. In this case, BACT is only required for nitrogen oxides (NOx).

BACT Determination Requested by the Applicant

The BACT Determination requested by the applicant is given below:

<u>Pollutant</u>	<u>Determination</u>
NOx	2.0 g/bhp-hr

Date of Receipt of a BACT Application

April 23, 1993

Review Group Members

This determination was based upon comments received from the applicant and the Permitting and Standards Section.

BACT DETERMINATION PROCEDURE

In accordance with F.A.C. 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 control methods, systems and techniques. In addition, the regulations require 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, then 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.

#### BACT ANALYSIS FOR NITROGEN OXIDES (NOx)

##### CONTROL TECHNOLOGY REVIEW

The uncontrolled emissions of nitrogen oxides (424.9 TPY) 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 NOx control.

All potentially applicable control technologies for reciprocating engines were evaluated in the application. These technologies can be separated into major groups.

- engine modifications, and
- add-on control technology

A summary of technical feasibility of NOx emission control technologies is presented in Table I.

In addition to the technical feasibility of each one of the control technologies presented, the applicant has examined the energy and economic impacts of using ignition timing retardation, derating power output and exhaust gas recirculation. In each case these alternatives resulted in emissions that were essentially equivalent to that proposed or provided little benefit for the associated expense. As this is the case, none of these control strategies will be elaborated upon in this determination.

The analysis presented has evaluated three of the technically feasible control alternatives or possible BACT for this project, the rich-burn engine with non-selective catalytic reduction (NSCR), the lean burn engine with SCR and the lean burn engine technology (air-to-fuel ratio change). An analysis of these technologies as stated by the applicant follows:

o **Analysis of Lean-Burn Technology (air-to-fuel ratio change)**

The proposed turbocharged reciprocating engine will operate according to the manufacturer's specified operation parameters. The engine's state-of-the-art design includes small pre-ignition chambers in which a rich fuel mixture is spark-ignited. The hot gases then enter the main combustion chambers and create spontaneous combustion of the lean fuel mixture. As a result, the overall combustion process is conducted under very lean fuel conditions. Operating on the lean side of the air-to-fuel ratio allows the proposed engine to obtain peak fuel economy.

In general, thermal NOx formation is directly proportional to the combustion temperature and residence time of the combustion gases. The high mass flow rate at full-load, as indicated by the 80,640 pounds per hour of exhaust mass flow rate, reduces the residence time of the combustion gases compared to a rich-burn engine, which operates at an air-to-fuel ratio near unity. High mass flow rate also means the engine operates below the peak temperature region for thermal NOx formation. The exhaust temperature for the proposed engine is 540°F, which falls in the range of typical exhaust temperatures for reciprocating engines.

o **Analysis of Rich-Burn Engine/NSCR**

Because they operate at near stoichiometric air-to-fuel ratios, rich-burn engines generate cylinder temperatures in the range of 1,200° to 1,300°F. Engine manufacturers have found that such high temperatures do not allow high engine loading. For greater power output, engine manufacturers have found that engine modifications

(i.e., turbocharged engines which can produce more power enhancements with lower emission levels) are a better choice than building larger engine blocks.

Normally, rich-burn engine/NSCR combination applications are found only on small engines of approximately 1,000 bhp or less. The application of NSCR to an engine the size to be installed at Compressor Station No. 20 may pose unforeseen technical problems not encountered in installations on smaller units.

#### **o Analysis of Lean-Burn Engine with SCR**

As the most effective NOx abatement process in terms of removal efficiency, SCR technology has been applied for control of NOx emissions from state-of-the-art reciprocating engines. However, the reliability of SCR's performance on reciprocating engines has not been consistently demonstrated. Data on sustained NOx reduction performance for reciprocating engines are very limited.

Selective catalytic reduction is a post-combustion method for control of NOx emissions. The SCR process combines vaporized ammonia with NOx 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 NOx with a new catalyst. As the catalyst ages, the maximum NOx reduction will decrease to approximately 86 percent.

The effect of exhaust gas temperature on NOx reduction depends on the specific catalyst formulation and reactor design. Most commercial SCR systems operate over a temperature range of about 600-750°, although recently developed zeolite-based catalysts are claimed to be capable of operating at temperatures as high as 950°. At levels above and below this window, the specific catalyst formulation will not be effective and NOx reduction will decrease. Operating at high temperatures can permanently damage the catalyst through sintering of surfaces.

For this type of engine, technical concerns involved in SCR use are the narrow operating temperature range and the possible damage to the catalyst and downstream equipment. A stack gas reheat system would be required to heat the exhaust gases to the SCR's operating temperature. The integration of a reheat system adds another design criteria to an already complex system consisting of SCR components and an ammonia handling system.

A review of the BACT/LAER Clearinghouse determinations made to date on gas-fired reciprocating engines reveals that SCR has never been



applied specifically to any large-bore (i.e., greater than 1,000 bhp) and low-speed (i.e., 300 rpm) lean-burn engines due to their already low NOx emission rate.

#### BACT EVALUATION BY THE DEPARTMENT

Although technically feasible, the applicant has rejected using lean burn engine with SCR and rich-burn engine with NSCR on this type of engine because of economic, energy and environmental impacts. The following limitations, identified by the applicant, have been evaluated by the Department:

##### Energy Impact

The addition of SCR to a lean-burn engine imposes a fuel requirement of 36,733 MMBtu/yr for stack gas reheat. In addition, electrical power is required for the ammonia vaporizer and injection system. The rich-burn engine with NSCR has the highest energy requirements. Operating a rich-burn engine requires an additional 36,792 MMBtu/yr of heat input compared to using an engine with lean-burn technology. The lean-burn engine shows a savings of 36,792 MMBtu/yr in heat input over the rich-burn engine because of its inherent fuel efficient design. Therefore, a lean burn engine has no energy impact compared to the other BACT options evaluated.

##### Economic Impacts

When the three feasible NOx control alternatives are compared in terms of total cost effectiveness, the lean-burn engine/SCR technology has the highest cost effectiveness value of \$1,723 per ton of NOx removed. The rich-burn engine/NSCR technology is the next highest with \$537 per ton of NOx removed. The lean-burn engine has a nominal total cost effectiveness value of -\$49 per ton of NOx removed.

The incremental cost effectiveness values for the lean-burn engine/SCR technology and the rich-burn engine/NSCR technology are \$19,205 and \$6,415 per ton of NOx removed, respectively. The lean-burn engine has an incremental cost effectiveness of -\$49 per ton of NOx removed. Therefore, the lean-burn engine is the most cost effective control option for this project.

##### Environmental Impacts

SCR poses the greatest potential for toxic impacts due to ammonia handling and storage and ammonia slip. When the alternatives are compared in terms of adverse environmental impacts the lean-burn

engine with SCR is the worst due to potential ammonia release and disposal of the catalyst. The rich-burn engine with NSCR will also require disposal of catalyst. The lean-burn engines does not create any waste; therefore, it is the best alternative in terms of the environmental impact analysis.

In addition to nitrogen oxides and ammonia, the impacts of toxic pollutants associated with the combustion of natural gas have been evaluated. These toxics (formaldehyde and polycyclic organic matter) common to the combustion of natural gas, are expected to be emitted in minimal amounts and will not have an impact on air quality or this BACT analysis.

**BACT DETERMINATION BY DEP**

Based on the information presented by the applicant and the studies conducted, the Department believes that the NOx control technology proposed (lean-burn technology) satisfies the BACT requirement for nitrogen oxides. Although engine modifications and add-on control (SCR) could be used to provide additional control, the benefits that would be obtained do not warrant the cost. The emission limit for this compressor engine is thereby established as follows:

<u>Pollutant</u>	<u>Emissions Limit</u>
NOx	2.0 grams/bhp-hr

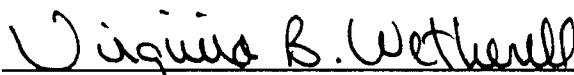
**Details of the Analysis May be Obtained by Contacting:**

Doug Outlaw, P.E., BACT Coordinator  
Department of Environmental Protection  
Bureau of Air Regulation  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended by:

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

Approved by:

  
Virginia B. Wetherell, Secretary  
Dept. of Environmental Protection

September 23 1993  
Date

September 27 1993  
Date

TABLE I


**Summary of Technical Feasibility of NO<sub>x</sub> Emission Controls  
for Reciprocating Engines**

Control Technology	NO <sub>x</sub> Controlled Emission Rate	Technical Feasibility	Comments
<b>Engine Modification Alternatives</b>			
Steam Injection	Not Applicable	No	Technically infeasible due to irreversible structural damage to engine block.
Air-to-fuel Ratio Change (or Lean-Burn Technology)	2.0 g/bhp-hr	Yes	Lowest emission rate achievable by engine modification, at least 80% control efficiency.
Retarding Ignition Timing Rich-burn Engine Lean-burn Engine	9.4 g/bhp-hr Not Applicable	Yes No	Engine timing retard between 2° and 6°; average 15% NO <sub>x</sub> reduction.
Derating Power Output Rich-burn Engine Lean-burn Engine	7.2 g/bhp-hr 1.3 g/bhp-hr	Yes Yes	Average 35% NO <sub>x</sub> reduction at 25% of engine power derated for gas-fired engines as a group. NO <sub>x</sub> reductions for turbo charged engines are less due to the lower effect on air-to-fuel ratio.
Exhaust Gas Recirculation Rich-burn Engine Lean-burn Engine	7.3 g/bhp-hr Not Applicable	Yes No	Maximum 34% NO <sub>x</sub> reduction from standard engine. Ineffective for lean-burn engine.
<b>Add-on Control Technology*</b>			
NO <sub>x</sub> OUT Process	Not Applicable	No	Technically infeasible (1000-1600°F), cost prohibitive for high temperature auxiliary equipment.
THERMAL DeNO <sub>x</sub>	Not Applicable	No	Technically infeasible (above 1000°F), cost prohibitive for high temperature auxiliary equipment.
Lean-Burn Engine/NSCR	Not Applicable	No	Technically infeasible for lean-burn engine, require <4% O <sub>2</sub> conc. in the exhaust stream.
Lean-Burn Engine/SCR	0.4 g/bhp-hr	Yes	Applicable to lean-burn engine with control efficiency of 80 percent.
Rich-Burn Engine/NSCR	1.1 g/bhp-hr	Yes	Applicable to rich-burn engine only, required greater than 4% O <sub>2</sub> conc. in exhaust gas stream. Control efficiency of 90%.

\* Except for the rich-burn engine/NSCR option, all add-on control technologies are for lean-burn engines

Memorandum

Florida Department of  
Environmental Protection

TO: Virginia B. Wetherell  
FROM: Howard L. Rhodes   
DATE: September 23, 1993  
SUBJ: Approval of Construction Permit  
Florida Gas Transmission Company  
Air Permit AC 62-229319/PSD-FL-202  
Natural Gas Compressor Station No. 15, Taylor County

Attached for your approval and signature is a permit and a BACT prepared by the Bureau of Air Regulation for the above mentioned company to construct a 12,600 bhp natural gas fired turbine.

The FGTC Phase III expansion project will be increasing the natural gas transport capacity of the existing Florida gas pipeline system. The scope of the work for Phase III includes expansions by the addition of state-of-the-art compressor engines at four existing compressor stations and two new proposed compressor stations. The proposed unit will be used to drive a gas compressor that is a part of a new gas transmission line that will transport natural gas from source wells in Texas and Louisiana. The proposed turbine will incorporate dry, low NOx combustion technology. The proposed engines would be used solely for the purpose of transporting natural gas in the pipeline for distribution in Florida.

No adverse comments were received during the public notice period. This project is not controversial.

I recommend your approval and signature.

HLR/TH/bjb

Attachments



**Florida Gas Transmission Company**

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

August 31, 1993

RECEIVED

SEP 2 1993

Ms. Patty Adams  
Air Permitting and Standards  
Florida Department of Environmental Protection  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Division of Air  
Resources Management

RE: Intent to Issue Permit  
Proof of Publication - Air Permit  
Florida Gas Transmission Company  
AC 56-189457  
Station No. 20 - St. Lucie county, Ft. Pierce, Florida  
AC 29-228821  
Station No. 30 - Hillsborough County, Plant City, Florida

Dear Ms. Adams:

As discussed with you on the phone earlier today, please find attached copies of two affidavits as proof of public notice publication for the above referenced air permits. As you can see, the originals were sent to the district offices.

Should you have any additional questions or need additional information, please do not hesitate to call me at (713) 853-3569.

Sincerely,

V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company

cc: Teresa Heron - FDEP  
William Osborne  
Allan Weatherford  
Files

FILE: FDEP01.LTR

*G. Harper EEP*  
*G. Ruppel OPS*



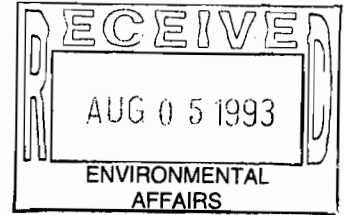
**Florida Gas Transmission Company**

P. O. Box 945100 Maitland, Florida 32794-5100 (407) 875-5800

**Certified Mail**

August 4, 1993

Mr. Tom Tittle  
Florida Department of  
Environmental Regulation  
PO Box 15425  
West Palm Beach, Florida 33406



Dear Mr. Tittle:

**RE: Intent to Issue Permit  
Proof of Publication - Air Permit  
AC56-189457  
Florida Gas Transmission Company  
Station No. 20  
St. Lucie County, Ft. Pierce, Florida**

Attached is one (1) affidavit as proof of publication of the intent to issue notice for the above-referenced site.

Please call me at 407-875-5816 if you have any questions.

Sincerely,

Allan Weatherford, REM  
Compliance Environmentalist

bc  
aw0804tt  
attach

cc: Don Sterba  
Allan Vollmer w/encl  
~~Duane Pierce~~

The Department of Environmental Protection gives notice of its intent to issue a permit to Florida Gas Transmission Company, Post Office Box 1188, Houston, Texas 77251-1188, to install one natural gas fired engine. The Company's facility is located 6 miles west of the town of Ft. Pierce, in St. Lucie County, Florida. Modeling results show that approximately 9 percent of the annual NO<sub>2</sub> Class II PSD increment will be consumed. The maximum predicted NO<sub>2</sub> impact on the PSD Class I area is well below the National Park Service recommended significant impact level. These emissions will not cause or contribute to a violation of any ambient air quality standard or PSD increment. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

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. 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 publication of this notice. 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 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 of proposed action; (c) A statement of how each petitioner's substantial interests are affected by the Department's action of 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.

AUG 04 1993

Before the undersigned authority personally appeared David T. Rutledge or Kathleen K. LeClair, who on oath says that he/she is publisher, business manager of The Tribune, a daily newspaper published at Fort Pierce in St. Lucie County, Florida; that the attached copy of the advertisement, being a NOTICE OF INTENT TO ISSUE PERMIT the matter of installing one natural gas fired engine in St. Lucie County as published in said newspaper in the issues of July 31, 1993.

Affiant further says that The Tribune is a newspaper published at Fort Pierce, said St. Lucie County, Florida, and that the said newspaper has heretofore been continuously published in St. Lucie County, Florida, each day and has been carried as second class mail matter at the post office in Fort Pierce, in said St. Lucie County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that has neither paid nor promised any person, firm or corporation any discount, rate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Witness my hand and subscribed before me this 2nd day of August, 1993.  
Lilli Anne Senesac  
Notary Public  
State of Florida at Large  
My Commission Expires April 2, 1994

(AL) Notary Public Lilli-Anne Senesac AA763828

Best Available Copy

petitioner's substantial interests are affected by the Department's action of 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 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 Notice. 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 publication of this notice 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, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Park Court-  
yard  
Tallahassee, Florida

Department of Environmental Protection  
Southeast District Office  
1900 South Congress Avenue, Suite A, West Palm Beach, Florida 33406.

Any person may send written comments on the proposed action to Mr. Preston Lewis at the Department's Tallahassee address. All comments received within 30 days of the publication of this notice will be considered in the Department's final determination.

Further, a public hearing can be requested by any person(s). Such requests must be submitted within 30 days of this notice.

Publish: July 31, 1993





## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

August 11, 1993

RECEIVED  
AUG 12 1993  
Division of Air  
Resources Management

Mr. Clair Fancy  
Chief, Bureau of Air Regulations  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

RE: Changes to FGT Phase III Expansion Project Air Permits

Draft Air Permit AC 62-229319 / PSD-FL-202  
Natural Gas Compressor Station No. 15, Taylor County

Draft Air Permit AC 05-229322  
Natural Gas Compressor Station No. 19, Brevard County

Draft Air Permit AC 56-230129 / PSD-FL-203  
Natural Gas Compressor Station No. 20, St. Lucie County

Draft Air Permit AC 50-229440  
Natural Gas Compressor Station No. 21, Palm Beach County

Draft Air Permit AC 09-229441  
Natural Gas Compressor Station No. 26, Citrus County

Draft Air Permit AC 29-228821  
Natural Gas Compressor Station No. 30, Hillsborough County

Dear Mr. Fancy:

We respectfully propose the following changes to each of the above referenced draft permits.

### Item A

We propose increasing the maximum heat inputs and maximum natural gas consumption rates for each engine (Specific condition #5). We are proposing this change as a result of test results

Mr. Clair Fancy  
FGT Phase III Permits  
August 11, 1993  
Page 2

on our Phase II engines which indicate higher values than those provided by the engine manufacturers and used in the permits for Phase II engines. The values proposed in our applications for our Phase III engines are also based on values provided by the manufacturers. We believe it is necessary to increase these values for our Phase III engines, in order to prevent potential future compliance problems. We propose to increase these values by 20 %. We believe the new values will be more correct. Since the SO<sub>2</sub> and PM emission rates are based on fuel consumption, we are proposing to increase these also. These changes are provided in the attached table.

#### Item B

The emission limits in the permits (Specific Condition #1) represent the emission rates at 100% load conditions. We propose adding a statement or footnote to this emission limit table that indicates this.

#### Item C

On the same emission limit table the Emission Factor for SO<sub>2</sub> is given as "10 gr/100scf." This suggests that the factor is based upon 10 gr of SO<sub>2</sub> when it is actually sulfur. We suggest the following wording be used: "100 gr S/100/scf" to avoid confusion.

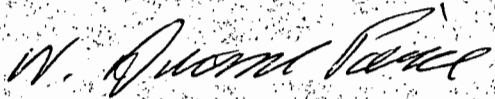
#### Item D

Specific Condition #12 (#11 for AC 56-230129 / PSD-FL-203 Compressor Station No. 20 and Ac 05-229322 Compressor Station No. 19) requires the source to be tested while operating "between 95% and 100% of maximum capacity." The permits for our Phase II engines require testing between 90% and 100% of maximum capacity. Due to the nature of our operations, it is sometimes difficult to reach even the 90% load on our engines when a test is scheduled. Raising this minimum level to 95% will make this a greater problem. We therefore request that this condition be changed to require testing "between 90% and 100% of maximum capacity" as required by our other permits.

Mr. Clair Fancy  
FGT Phase III Permits  
August 11, 1993  
Page 3

Again FGT appreciates this opportunity to comment on these permit conditions and your consideration of our proposed changes. If you have any questions or need additional information, please do not hesitate to call me at (713) 853-3569.

Sincerely,



V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company

cc: Carlon Nelson  
William Osborne  
Allan Weatherford  
Barry Andrews - ENSR  
Files

FILE: 00FDER01.LTR

*J. Deryn*  
*H. Zhang*  
*G. Cole, NE Dist.*  
*A. Zadm, C Dist.*  
*B. Thomas, SW Dist.*  
*J. Goldman, SE Dist.*

### ORIGINALLY PROPOSED VALUES

STATION	MAXIMUM HEAT INPUT (MMBtu/hr)	MAXIMUM GAS CONSUMPTION (MMscf/hr)	SO <sub>2</sub> EMISSIONS		PM/PM <sub>10</sub> EMISSIONS	
			lb/hr	T/yr	lb/hr	T/yr
15	109.66	0.1054	3.01	13.19	0.53	2.31
19	38.3	0.0368	0.94	4.12	0.17	0.74
20	27.8	0.0267	0.70	3.33	0.13	0.57
21	59.60	0.057	1.64	7.18	0.29	1.26
26	59.60	0.057	1.64	7.18	0.29	1.26
30	13.13	0.013	0.37	1.62	0.064	0.28

### NEW VALUES

STATION	MAXIMUM HEAT INPUT (MMBtu/hr)	MAXIMUM GAS CONSUMPTION (MMscf/hr)	SO <sub>2</sub> EMISSIONS		PM/PM <sub>10</sub> EMISSIONS	
			lb/hr	T/yr	lb/hr	T/yr
15	131.59	0.1265	3.61	15.83	0.64	2.77
19	45.96	0.0442	1.13	4.94	0.20	0.89
20	33.36	0.0320	0.84	4.00	0.16	0.68
21	71.52	0.0684	1.97	8.62	0.35	1.51
26	71.52	0.0684	1.97	8.62	0.35	1.51
30	15.76	0.0156	0.44	1.94	0.077	0.34



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

4APT-AEB

JUL 26 1993

RECEIVED

AUG 03 1993

Mr. Clair H. Fancy, P.E., Chief  
Bureau of Air Regulation  
Florida Department of Environmental  
Protection

Division of Air  
Resources Management

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

RE: Florida Gas Transmission Company, Compressor Station  
Number 20, St. Lucie County, FL (PSD-FL-203)

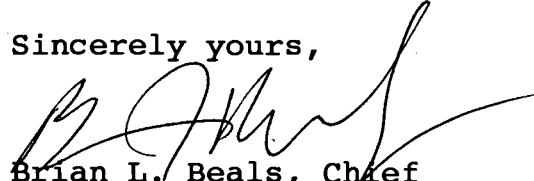
Dear Mr. Fancy:

This is to acknowledge receipt of the Prevention of Significant Deterioration (PSD) permit application package for the above referenced facility, by your letter dated April 28, 1993. The proposed expansion to the existing facility will be the addition of one Cooper-Bessemer 10V-275C natural gas fired, reciprocating, internal combustion engine, equipped with lean-burn technology. The proposed engine is rated at 4,000 brake horsepower and will be used to drive gas compressors for transporting natural gas by pipeline for distribution to markets in the Gulf Coast region. The proposed modification is subject to PSD review on the basis of significant NO<sub>x</sub> emissions.

The applicant proposes to limit NO<sub>x</sub> emissions from the combustion engine through lean-burn technology.

We have reviewed the package as submitted and have no adverse comments. Thank you for the opportunity to review and comment on the package. If you have any questions or comments, please contact Mr. Scott Davis of my staff at (404) 347-5014.

Sincerely yours,

  
Brian L. Beals, Chief  
Source Evaluation Unit  
Air Enforcement Branch  
Air, Pesticides, and Toxics  
Management Division

cc: J. Peron  
K. Zhang  
J. Goldman, SE Unit } 8-6-93  
J. Bunyak, WPS }





## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

July 30, 1993

RECEIVED

AUG 2 1993

Division of Air  
Resources Management  
Mr. Clair Fancy, P.E.  
Chief, Bureau of Air Regulation  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Dear Mr. Fancy:

Upon reviewing the Technical Evaluations and Preliminary Determinations for the proposed natural gas compressor engines located in Palm Beach County (Station No. 21) and Citrus County (Station No. 26), it was discovered that our draft permits contained the nominal lb/hr emission rates rather than the maximum emission rates which were presented in the Applications to Operate/Construct Air Pollution Sources. Further review indicates that this error also holds true for draft permits which have been received for proposed natural gas compressor engines located in Taylor County (Station No. 20).

Florida Gas Transmission Company (FGTC) requests that the permits be amended to include the maximum lb/hr emission levels for the natural gas compressor engines addressed above as follows:

Station	Pollutant (lb/hr)					
	No <sub>x</sub>	CO	VOC	TSP	PM <sub>10</sub>	SO <sub>2</sub>
No. 15 - Taylor County (AC 62-229319)	18.66	13.49	0.76	0.53	0.53	3.01
No. 19 - Brevard County (AC 05-229322)	79.38	45.20	16.57	0.19	0.19	1.05
No. 20 - St. Lucie County (AC 56-230129)	52.92	26.46	12.35	0.15	0.15	0.84
No. 21 - Palm Beach County (AC 50-229440)	9.15	6.64	0.38	0.29	0.29	1.64
No. 26 - Citrus County (AC 09-229441)	9.15	6.64	0.38	0.29	0.29	1.64

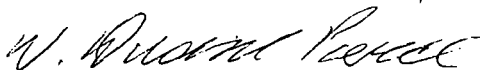
Mr. Clair Fancy, P.E.  
July 30, 1993  
Page 2.

These changes do not affect the TPY limits which are based on the nominal lb/hr emission rates. FGTC also discovered that for Station 21, the nominal lb/hr emission rates presented in Table 2-2 of our application were inadvertently transferred to the maximum lb/hr column on page 4A of the Application to Operate/Construct Air Pollution Sources. To resolve this error, FGTC has included a corrected page 4A and has had this transmittal letter signed and sealed by Barry Andrews (ENSR Consulting and Engineering) who is representing FGTC as the professional engineer of record. This procedure is consistent with instructions given by Mr. Preston Lewis of your bureau.

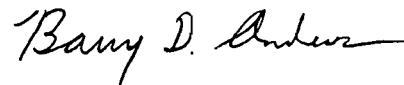
Please note that this letter is not intended to address all of FGTC's comments for Stations 20, 21 and 26. FGTC is presently reviewing the Technical Evaluations and Preliminary Determinations for each of these Stations and will be providing additional comments in the near future.

FGTC appreciates the opportunity to provide the Bureau of Air Regulation with these comments. Should you have any questions, please contact Duane Pierce at (713) 853-3569.

Sincerely,



V. Duane Pierce, Ph.D.  
Air Quality Supervisor  
Phase III Expansion Project  
Florida Gas Transmission Company



Barry Andrews, P.E.  
ENSR Consulting and Engineering

Enclosures

cc:	Carlton Nelson	EB0463
	William R. Osborne	EB0365
	Files	

VDP:meb  
pierce\corres\073093

# SECTION 111: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

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

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

## 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)

Emission Point 2101

Name of Contaminant	Emission <sup>1</sup>		Allowed <sup>2</sup> Emission Rate per Rule 17-2	Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
NO <sub>x</sub>	9.15	39.05			9.15	39.05	
CO	6.64	28.29			6.64	28.29	
NMHC	.38	1.62			.38	1.62	
SO <sub>2</sub>	1.64	7.18			1.64	7.18	
PM	.29	1.26			.29	1.26	

<sup>1</sup>See Section V, Item 2.

<sup>2</sup>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)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).



P 230 524 371



# Receipt for Certified Mail

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

To: <u>Carl Schulz</u>	
Street and No. <u>FIA GAS TRANS</u>	
P.O. Box and ZIP Code <u>Houston, TX</u>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <u>7-20-93</u>	
<u>AC 56-230129</u>	
<u>PSD-FI-203</u>	

PS Form 3800, June 1991

Is your RETURN ADDRESS completed on the reverse side?

## SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
Carl D. Schulz, VP  
Project Mgmt Services  
FIA GAS Transmission  
P.O. BOX 1188  
Houston, TX 77251-1188

4a. Article Number  
P 230 524 371

4b. Service Type  
☐ Registered ☐ Insured  
☐ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery  
JUL 23 1993

5. Signature (Addressee)

8. Addressee's Address (Only if requested and fee is paid)

6. Signature (Agent)

PS Form 3811, December 1991

☆U.S. GPO: 1992-323-402

DOMESTIC RETURN RECEIPT

Thank you for using Return Receipt Service.



Lawton Chiles  
Governor

# Florida Department of Environmental Protection

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

Virginia B. Wetherell  
Secretary

July 20, 1993

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

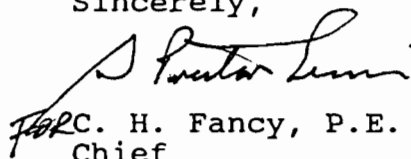
Mr. Carl D. Schulz, Vice President  
Project Management Services  
Florida Gas Transmission Company  
Post Office Box 1188  
Houston, Texas 77251-1188

Dear Mr Schulz:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit to install one natural gas fired engine in near Fort Pierce, St. Lucie County, Florida.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Preston Lewis of the Bureau of Air Regulation.

Sincerely,



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

CHF/TH/kt

Attachments

cc: I. Goldman, SE District  
B. Andrews, P.E., ENSR  
J. Bunyak, NPS  
J. Harper, EPA

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CERTIFIED MAIL

In the Matter of an  
Application for Permit by:

DEP File No. AC 56-230129  
PSD-FL-203

Florida Gas Transmission Company  
Post Office Box 1188  
Houston, Texas 77251-1188

---

INTENT TO ISSUE

The Department of Environmental Protection gives notice of its intent to issue an air construction permit (copy attached) for the proposed project as detailed in the application specified above, for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Florida Gas Transmission, applied on April 23, 1993, to the Department of Environmental Protection for a permit to construct one natural gas fired engine located 6 miles west of the town of Ft. Pierce, in St. Lucie County, Florida.

The Department has permitting jurisdiction under the provisions of Chapter 403, Florida Statutes and Florida Administrative Code (F.A.C.) Chapters 17-212 and 17-4. The project is not exempt from permitting procedures. The Department has determined that a construction permit is required for the proposed work.

Pursuant to Section 403.815, Florida Statutes and Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department's Bureau of Air Regulation, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

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. 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 permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of their receipt of this intent, whichever first occurs. 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 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 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 intent. 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 intent 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, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL PROTECTION

*Fol*   
C. H. Fancy, P.E., Chief  
Bureau of Air Regulation  
2600 Blair Stone Road  
Tallahassee, Florida 32399  
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this INTENT TO ISSUE and all copies were mailed by certified mail before the close of business on 7-20-93 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

7-20-93  
Date

Copies furnished to:

- I. Goldman, SE District
- B. Andrews, P.E., ENSR
- J. Bunyak, NPS
- J. Harper, EPA

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
NOTICE OF INTENT TO ISSUE PERMIT

The Department of Environmental Protection gives notice of its intent to issue a permit to Florida Gas Transmission Company, Post Office Box 1188, Houston, Texas 77251-1188, to install one natural gas fired engine. The Company's facility is located 6 miles west of the town of Ft. Pierce, in St. Lucie County, Florida. Modeling results show that approximately 9 percent of the annual NO<sub>2</sub> Class II PSD increment will be consumed. The maximum predicted NO<sub>2</sub> impact on the PSD Class I area is well below the National Park Service recommended significant impact level. These emissions will not cause or contribute to a violation of any ambient air quality standard or PSD increment. A determination of Best Available Control Technology (BACT) was required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

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. 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 publication of this notice. 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 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 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 Notice. 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 publication of this notice 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, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Protection  
Bureau of Air Regulation  
111 S. Magnolia Park Courtyard  
Tallahassee, Florida

Department of Environmental Protection  
Southeast District Office  
1900 S. Congress Avenue-Suite A  
West Palm Beach, Florida 33406

Any person may send written comments on the proposed action to Mr. Preston Lewis at the Department's Tallahassee address. All comments received within 30 days of the publication of this notice will be considered in the Department's final determination.

Further, a public hearing can be requested by any person(s). Such requests must be submitted within 30 days of this notice.

Technical Evaluation  
and  
Preliminary Determination

Florida Gas Transmission Company  
St. Lucie County  
Fort Pierce, Florida  
Station No. 20

Natural Gas Compressor Engine  
Permit No. AC 56-230129  
PSD-FL-203

Department of Environmental Protection  
Division of Air Resources Management  
Bureau of Air Regulation

July 20, 1993



## **I. SYNOPSIS OF APPLICATION**

### **I.1 Applicant Name and Address**

Florida Gas Transmission Company  
P. O. Box 1188  
Houston, Texas 77251-1188

### **I.2 Reviewing and Process Schedule**

Date of Receipt of Application: April 23, 1993

Application Completeness Date: April 23, 1993

## **II. FACILITY INFORMATION**

### **II.1 Facility Location**

Florida Gas Transmission Company's (FGTC) facility is located at 8701 Orange Avenue in Fort Pierce, Florida. The UTM coordinates are Zone 17, 558.01 km E and 3035.68 km N.

### **II.2 Standard Industrial Classification Code**

This facility is classified as follows:

Major Group No. 49 - Electric, Gas and Sanitary Services

Group No. 492 - Gas Production and Distribution

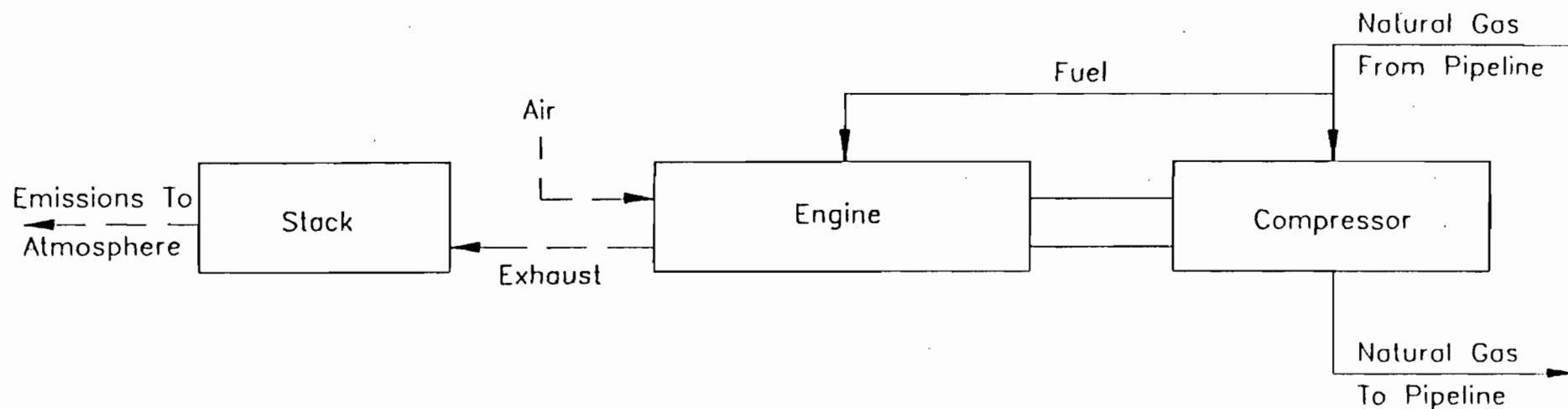
Industry No. 4922 - Natural Gas Transmission

### **II.3 Facility Category**

The FGTC site, in Fort Pierce, is classified as a major emitting facility for nitrogen oxides (NO<sub>x</sub>). The proposed project will increase NO<sub>x</sub> emissions by 77.53 tons per year and CO emissions by 81.71 tons per year. The total permitted emissions for this facility shall not exceed 658.08 tons NO<sub>x</sub> per year and 214.21 tons CO per year.

## **III. PROJECT DESCRIPTION**

The FGTC proposed to install one natural gas fired engine (Cooper-Bessemer 10V-275C, equipped with lean burn technology). The engine has 10 power cylinders and is rated at 4,000 bhp at 275 revolutions per minute (rpm). The engine is turbocharged, increasing the air inlet manifold pressure, which allows the engine to operate at a high air-to-fuel ratio. This turbocharging produces more power output from the engine than would otherwise be attained without having to use a larger size engine. A flow diagram of the integral engine compressor unit is presented in the attached Figure 2.1.



**ENSR**<sup>TM</sup>

ENSR CONSULTING & ENGINEERING

FIGURE 2-1  
PROCESS FLOW DIAGRAM  
OF AN  
ENGINE-COMPRESSOR UNIT

DRAWN:	DC/SH	DATE:	11-6-92	PROJECT NUMBER
APPV'D:		REVISED:	3-16-93	6792-018

### III.1 Background Information

The FGTC existing compressor station consists of four natural gas fired reciprocating IC engines (two 1,500 bhp, one 2,000 bhp, and one 2,400 bhp). These compressor units were installed before the CAA amendment of 1977: two Worthington engines, 1,500 bhp Model SEHG-6 each were installed in 1966, a Worthington 2,000 bhp Model SEHG-8 engine was installed in 1968 and a 4,000 bhp Dresser-Rand Model 412-KVSR was installed in 1991. These existing engines are not being modified as part of this Phase II expansion project.

In general, the FGTC Phase III expansion project will be increasing the natural gas transport capacity of the existing Florida gas pipeline system. The scope of the work for Phase III includes expansions by the addition of state-of-the art compressor engines at four existing compressor stations and two new proposed compressor stations. The proposed engines would be used solely for the purpose of transporting natural gas in the pipeline for distribution in Florida. The main gas pipeline and the approximate locations of the existing and proposed compressor stations along the main pipeline are shown in Figure 1-1.

### IV. RULE APPLICABILITY

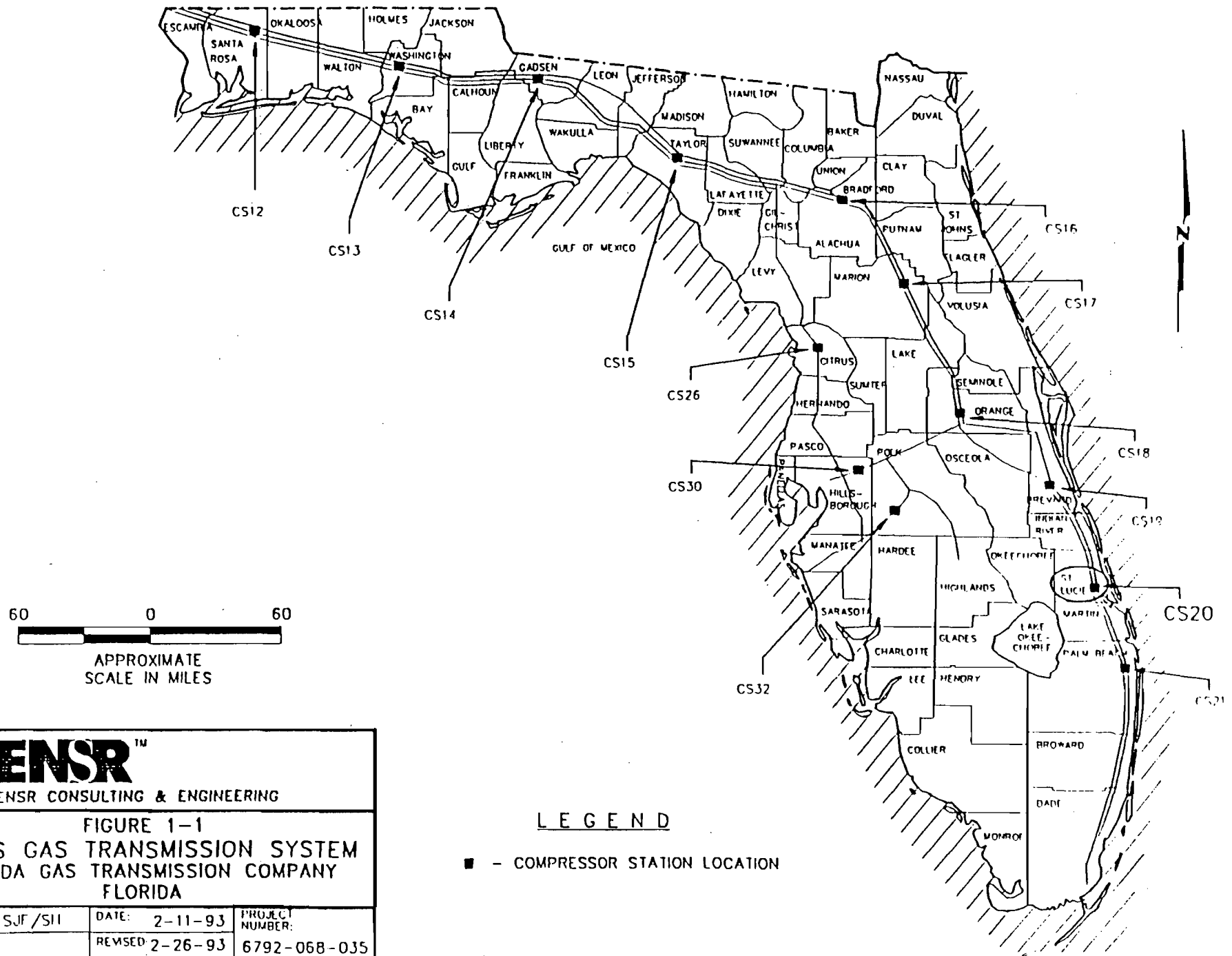
The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Florida Administrative (F.A.C.) Chapters 17-209 through 17-297.

This plant is located in an area (St. Lucie County) designated attainment for all criteria pollutants as in accordance with Rule 17-275.400.

The proposed project will be reviewed in accordance with F.A.C Rule 17-212.400, Prevention of Significant Deterioration, because it will be a major modification to a major facility. This review consists of a determination of Best Available Control Technology (BACT) and unless otherwise exempted, an air quality impact of the increased emissions. The review also includes a review of the project's impacts on soils, vegetation, visibility and air quality impact resulting from residential and industrial growth.

The proposed facility shall comply with applicable provisions of F.A.C. Chapter 17-297, Stationary Sources-Emissions Monitoring; F.A.C. 17-296, Stationary Sources-Emissions Standards; F.A.C. Rule 17-296.300 Best Available Control Technology; and F.A.C. Rule, 17-212.400, Prevention of Significant Deterioration.

CE679265  
12-15-92



## V. SOURCE IMPACT ANALYSIS

### V.1 Control Technology Review

A complete BACT evaluation was submitted with the application. This evaluation included analyzing technologies involving engine modification and technologies involving exhaust gas treatment. Furthermore, the evaluation also included the feasibility of the different NO<sub>x</sub> control methods and a comparison of the technical environmental, energy and economic impacts. Based on this approach, the lean-burn engine was determined to represent BACT.

The proposed engine will incorporate "lean-burn" technology, which is state-of-the-art design for minimizing air pollutant concentration in the exhaust gases from gas-fired reciprocating IC engines. In the lean-burn design, a small, fuel-rich mixture is combusted in a preignition chamber. The hot combustion gases from the preignition then pass to the main combustion chamber, where they ignite a lean mixture of fuel. Since most of the fuel entering the engine is burned in a lean state (i.e., high ratio of air to fuel), exhaust NO<sub>x</sub> emissions are minimized.

### V.2 Emission Limitations

The operation of this source will produce emissions of NO<sub>x</sub>, CO, VOCs, particulates, and SO<sub>2</sub> from the burning of natural gas. Table I summarizes the proposed emissions from this source. Table II summarizes total emissions from this station No. 20.

TABLE I  
SUMMARY OF EMISSIONS  
(Unit No. 2005)

Maximum Potential	Emissions From Proposed Compressor Engine		Significant Emission Rate
Pollutant	(lbs/hr)	(TPY)	(TPY)
Nitrogen Oxides	17.64	77.26	40
Carbon Monoxide	18.52	81.12	100
Volatile Organic Compounds (non-methane)	5.29	23.18	40
Particulate Matter (TSP)	0.13	0.57	25
Particulate Matter (PM <sub>10</sub> )	0.13	0.57	15
Sulfur Dioxide	0.76	3.33	40

### V.3 Air Quality Analysis

#### a. Introduction

The proposed Florida Gas Transmission pipeline compressor station No. 20 will emit one pollutant which is PSD significant nitrogen oxides (NO<sub>x</sub>).

**Annual (TPY) Emission Levels**  
**FGTC's Compressor Station No. 20**

- Other Sources Includes: ancillary equipment, storage tanks and equipment leaks.
- STATION TOTAL = EXISTING + PROJECT

The air quality impact analysis required by the PSD regulations for this pollutant includes:

- \* An analysis of existing air quality;
- \* A PSD increment analysis;
- \* An Ambient Air Quality Standards (AAQS) analysis;
- \* An analysis of impacts on soils, vegetation, and visibility and of growth-related air quality modeling impacts; and
- \* A "Good Engineering Practice" (GEP) stack height determination.

The analysis of existing air quality generally relies on preconstruction monitoring data collected with EPA-approved methods. The PSD increment and AAQS analysis depends on the air quality dispersion modeling carried out in accordance with EPA guidelines.

Based on the required analysis, the Department has reasonable assurance that the proposed Florida Gas Transmission pipeline compressor station No. 20, as described in this report and subject to the approval proposed herein, will not cause or contribute to a violation of any ambient air quality standard or PSD increment. A discussion of the modeling methodology and required analysis follows.

#### b. Analysis of Existing Air Quality

Preconstruction ambient air quality monitoring is required for all pollutants subject to PSD review. An exemption to the monitoring requirement can be obtained if the maximum air quality impact, as determined by air quality modeling, is less than a pollutant-specific "de minimus" concentration.

The predicted impact of the proposed project for NO<sub>2</sub>, the only pollutant subject to PSD review for this project is 1.84 ug/m<sup>3</sup>, annual average. The annual average de minimus concentration level for NO<sub>2</sub> is 14 ug/m<sup>3</sup>. Therefore, an ambient monitoring analysis is not required.

#### c. Modeling Methodology

The EPA-approved Industrial Source Complex long-term (ISCLT2) dispersion model was used to evaluate the pollutant emissions from the proposed facility. All recommended EPA default options were used. Direction-specific downwash parameters were used because the stacks were less than the good engineering practice (GEP) stack height.

Meteorological data used in the modeling consisted of five years (1982-1986) of hourly surface data taken at West Palm Beach, Florida and twice-daily upper air data also taken at West Palm Beach.

These data were used in the National Climate Data Center (NCDC) stability array (STAR) preprocessor program for the ISCLT2 model. The STAR program converts the hourly data into the joint frequency of occurrence of wind direction, wind speed, and atmospheric stability.

The highest predicted yearly impact from the proposed NOx emissions was compared with the standards.

#### d. Modeling Results

All PSD Class II dispersion modeling was performed with receptors placed at 100m intervals on a 31 x 31 grid centered on the project. The maximum air quality impact from the proposed facility is 1.84 ug/m<sup>3</sup>, which is greater than the PSD significant impact level of 1.0 ug/m<sup>3</sup> for NOx. Therefore, further dispersion modeling for comparison with AAQS and PSD Class II increment consumption for NO<sub>2</sub> was required. The significant impact area was determined to be 1 km and an emissions inventory for NOx sources in the area was developed. The maximum predicted PSD Class II NO<sub>2</sub> increment consumption is 2.31 ug/m<sup>3</sup>, annual average. This value is less than the PSD Class II NO<sub>2</sub> increment of 25 ug/m<sup>3</sup>, annual average. However, the maximum predicted concentration due to all NOx sources in the area is 287 ug/m<sup>3</sup>, annual average. This value is greater than 100 ug/m<sup>3</sup>, annual average, which is the AAQS for NO<sub>2</sub>. When the use of the ISCLT2 model predicts values greater than the NO<sub>2</sub> AAQS, a refined method may be used to arrive at a maximum predicted NO<sub>2</sub> concentration. The ozone limiting method, which is approved by the Department and EPA, involves an initial comparison of the estimated NOx concentration and the ambient O<sub>3</sub> concentration to determine which is the limiting factor to NO<sub>2</sub> formation. The maximum predicted NO<sub>2</sub> concentration using the ozone limiting method is 74 ug/m<sup>3</sup>, which is less than the AAQS of 100 ug/m<sup>3</sup>.

The facility is within 150 km of the Everglades National Park, a PSD Class I area. For potential impacts to this Class I area, a modeling analysis was performed for NO<sub>2</sub> to calculate concentrations out to 30 km from the facility. The results showed that potential NO<sub>2</sub> annual concentrations (0.01 ug/m<sup>3</sup>) in the direction (South and Southwest) of the Everglades National Park, were well below the National Park Service Class I screening level of 0.025 ug/m<sup>3</sup> annual average. Therefore, no further PSD Class I modeling was required.

#### e. Additional Impacts Analysis

The applicant did an air quality related values analysis. Since the maximum project impact for NOx is predicted to be less than the applicable AAQS including the national secondary standards developed to protect public welfare-related values, the project is not expected to have a harmful impact on soils and vegetation.

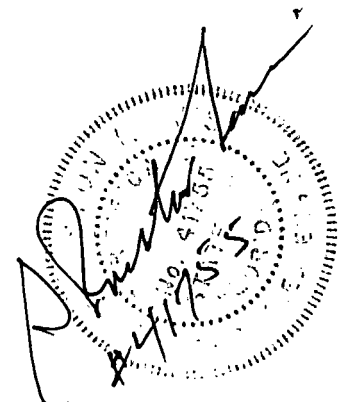


Visual Impact Screening and Analysis, known as VISCREEN, the EPA-approved Level I visibility computer model was used to estimate the impact of proposed project's emissions upon visibility in Class I area. The results indicated the maximum visibility impacts caused by the project do not exceed the screening criteria inside or outside the Class I area. As a result, there is no significant impact upon visibility predicted for the Class I area.

There will be a small number of temporary construction workers constructing the additional facilities at Compressor Station No. 20. However, there will be no increase in the permanent regional work force. As a result there will be no permanent impacts on air quality due to associated population growth.

## VI. CONCLUSION

Based on the information provided by Florida Gas Transmission Company, the Department has reasonable assurance that the proposed project, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-209 through 17-297 of the Florida Administrative Code.

A handwritten signature in black ink is written over a circular stamp. The stamp contains the text "FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION" around the perimeter and "DIVISION OF AIR QUALITY" in the center. The date "JUN 15 1985" is stamped across the middle of the circle.



Lawton Chiles  
Governor

# Florida Department of Environmental Protection

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

Virginia B. Wetherell  
Secretary

**PERMITTEE:**

Florida Gas Transmission Company  
P. O. Box 1188  
Houston, Texas 77251-1188

**Permit Number:** AC 56-230129

PSD-FL-203

**Expiration Date:** June 30, 1995

**County:** St. Lucie

**Latitude/Longitude:** 27°26'43"N

80°24'47"W

**Project:** Natural Gas Compressor  
Engine (Unit No. 2005)  
Station No. 20

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-210, 212, 272, 275, 296, and 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:

For the construction of one natural gas fired engine to be located at 8701 Orange Avenue, Fort Pierce, Florida. The UTM coordinates are Zone 17, 558.01 km East and 3035.68 km North.

The source 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. Application to Construct/Operate Air Pollution Sources  
DEP Form 17-1.202(1).

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**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), 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.

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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:

- 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

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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.

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.

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)
- ( ) 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

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**GENERAL CONDITIONS:**

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.

**SPECIFIC CONDITIONS:**

Emission Limits

1. The maximum allowable emissions from this unit shall not exceed the emission rates as follows:

Pollutant	lbs/hr	tons/yr	Emission Factor
Nitrogen Oxides	17.4	77.26	2.0 g/bhp-hr
Carbon Monoxide	18.52	81.12	2.8 g/bhp-hr
Volatile Organic Compounds (non-methane)	5.29	23.18	1.7 g/bhp-hr
Particulate Matter (TSP)	0.13	0.57	5 lbs/MMscf
Particulate Matter (PM <sub>10</sub> )	0.13	0.57	5 lbs/MMscf
Sulfur Dioxide	0.70	3.33	10 gr/100scf

2. Visible emissions shall not exceed 10% opacity.

Operating Rates

3. This source is allowed to operate continuously (8760 hours per year).

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

4. This source is allowed to burn natural gas only.

5. The permitted operating parameters and utilization rates for this natural gas compressor engine shall not exceed the values stated in the application. The parameters include, but are not limited to:

- Maximum natural gas consumption shall not exceed 0.0267 MMscf/hr.
- Maximum heat input shall not exceed 27.8 MMBtu/hr.

6. Any change in the method of operation, equipment or operating hours shall be submitted to the DEP's Bureau of Air Regulation and Southeast 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 allowable emission limits shall be determined within 60 days after achieving the maximum production rate at which this facility will be operated, but not later than 180 days after initial start-up and annually thereafter, by the following reference methods as described in 40 CFR 60, Appendix A (July 1992 version) and adopted by reference in Chapter 17-297, F.A.C.

- Method 1. Sample and Velocity Traverses
- Method 2. Volumetric Flow Rate
- Method 3 Gas Analysis
- or 3A
- Method 7E Determination of Nitrogen Oxide Emissions from Stationary Source.
- Method 9. Determination of the Opacity of the Emissions from Stationary Sources
- Method 10. Determination of the Carbon Monoxide Emissions from Stationary Sources
- Method 25A. Determination of Total Gaseous Organic Concentrations Using a Flame Ionization Analyzer

9. Other DEP approved methods may be used for compliance testing after prior Department approval. Compliance with the SO<sub>2</sub> emission limit can be determined by calculations based on fuel analysis using ASTM D1072-80, D3031-81, D4084-82, or D3246-81 for sulfur content of gaseous fuels.

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

10. Initial compliance with the volatile organic compound (VOC) emissions limits will be demonstrated by EPA Method 25 or Method 18. Thereafter, except as provided in F.A.C. Rule 17-297.340(2), compliance with the VOC emission limits will be assumed, provided the CO allowable emission rate is achieved.
11. Stack sampling facilities shall be required and shall comply with the requirements of F.A.C. Rule 17-297.345. Tests results will be the average of 3 valid runs. The Southeast District office will be notified at least 30 days in writing in advance of the compliance test(s). The source shall operate between 95% and 100% of maximum capacity for the ambient conditions experienced during compliance test(s). Compliance test results shall be submitted to the Southeast District office no later than 45 days after completion.
12. 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 and 40 CFR 60, Appendix F, Quality Assurance Procedures (July 1, 1992 version). Pursuant to F.A.C. Rule 17-4.160(14), the permittee shall retain all monitoring records related to the requirements of this permit for a period of three (3) years.
13. The permittee shall annually perform a visual inspection of the turbine compressor engine, filters, associated piping system for rust spots, cracks, leaks and odors. Also ensure that safety valves and the stack are in proper order and working properly. The permittee shall document the findings and corrective action taken.
14. When the Department, after investigation, has good reason (such as odor complaints, increased visible emissions, excess emissions, etc.), to conclude that any applicable emission standard contained in this permit is being violated, it may require the owner or operator of the facility to conduct compliance tests which identify the nature and quantity of air pollutant emissions from the facility and to provide a report of said tests to the Department (F.A.C. Rule 17-297.340(2)).

Rule Requirements

15. 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).



PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

16. 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)).

17. No person shall cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor pursuant to F.A.C. Rule 17-296.320(2). Objectionable odor is defined as any odor present in the outdoor atmosphere which by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonable interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance pursuant to F.A.C. Rule 17-296.200(123).

18. This source shall be in compliance with all applicable provisions of F.A.C. Rules 17-210.650: Circumvention; 17-210.700: Excess Emissions; Chapter 17-297: Stationary Sources-Emissions Monitoring; Chapter 17-296: Stationary Source- Emission Standards and, 17-4.130: Plant Operation-Problems.

19. 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 construction has not commenced (40 CFR 52.21(r)(2)).

21. Fugitive dust emissions, during the construction period, shall be minimized by covering or watering dust generation areas.

22. 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, RPM, air emissions limits, etc. Annual reports shall be sent to the Department's Southeast District office by March 1 of each calendar year.

23. 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).

PERMITTEE:  
Florida Gas Transmission Company

Permit Number: AC 56-230129  
PSD-FL-203  
Expiration Date: June 30, 1995

**SPECIFIC CONDITIONS:**

24. An application for an operation permit must be submitted to the Southeast 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 \_\_\_\_\_ day  
of \_\_\_\_\_, 1993

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL PROTECTION

\_\_\_\_\_  
Virginia B. Wetherell, Secretary

Best Available Control Technology (BACT) Determination  
Florida Gas Transmission Company  
St. Lucie County-PSD-FL-203

The applicant proposes to expand its existing natural gas pipeline compressor station No. 20 near the town of Ft. Pierce, St. Lucie County, Florida. The proposed expansion consists of adding one new Cooper- Bessemer 4,000 brake horsepower (BHP) natural-gas-fired, reciprocating internal engine.

The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the proposed turbine engine based on 8,760 hrs/year operation and ISO standard conditions to be as follows:

<u>Pollutant</u>	<u>Max. Net Increase in Emissions (TPY)</u>	<u>PSD Significant Emission Rate (TPY)</u>
NOx	77.26	40
SO <sub>2</sub>	3.33	40
PM/PM <sub>10</sub>	0.57	25/15
CO	81.12	100
VOC	23.18	40

Rule 17-212.400(2)(f)(3) of the Florida Administrative Code (F.A.C.) 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. In this case, BACT is only required for nitrogen oxides (NOx).

BACT Determination Requested by the Applicant

The BACT Determination requested by the applicant is given below:

<u>Pollutant</u>	<u>Determination</u>
NOx	2.0 g/bhp-hr

Date of Receipt of a BACT Application

April 23, 1993

Review Group Members

This determination was based upon comments received from the applicant and the Permitting and Standards Section.

BACT DETERMINATION PROCEDURE

In accordance with F.A.C. 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 control methods, systems and techniques. In addition, the regulations require 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, then 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.

#### BACT ANALYSIS FOR NITROGEN OXIDES (NOx)

##### CONTROL TECHNOLOGY REVIEW

The uncontrolled emissions of nitrogen oxides (424.9 TPY) 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 NOx control.

All potentially applicable control technologies for reciprocating engines were evaluated in the application. These technologies can be separated into major groups.

- engine modifications, and
- add-on control technology

A summary of technical feasibility of NOx emission control technologies is presented in Table I.

In addition to the technical feasibility of each one of the control technologies presented, the applicant has examined the energy and economic impacts of using ignition timing retardation, derating power output and exhaust gas recirculation. In each case these alternatives resulted in emissions that were essentially equivalent to that proposed or provided little benefit for the associated expense. As this is the case, none of these control strategies will be elaborated upon in this determination.

The analysis presented has evaluated three of the technically feasible control alternatives or possible BACT for this project, the rich-burn engine with NSCR, the lean burn engine with SCR and the lean burn engine technology (air-to-fuel ratio change). An analysis of these technologies as stated by the applicant follows:

o **Analysis of Lean-Burn Technology (air-to-fuel ratio change)**

The proposed turbocharged reciprocating engine will operate according to the manufacturer's specified operating parameters. The engine's state-of-the-art design includes small pre-ignition chambers in which a rich fuel mixture is spark-ignited. The hot gases then enter the main combustion chambers and create spontaneous combustion of the lean fuel mixture. As a result, the overall combustion process is conducted under very lean fuel conditions. Operating on the lean side of the air-to-fuel ratio allows the proposed engine to obtain peak fuel economy.

In general, thermal NOx formation is directly proportional to the combustion temperature and residence time of the combustion gases. The high mass flow rate at full-load, as indicated by the 80,640 pounds per hour of exhaust mass flow rate, reduces the residence time of the combustion gases compared to a rich-burn engine, which operates at an air-to-fuel ratio near unity. High mass flow rate also means the engine operates below the peak temperature region for thermal NOx formation. The exhaust temperature for the proposed engine is 540°F, which falls in the range of typical exhaust temperatures for reciprocating engines.

o **Analysis of Rich-Burn Engine/NSCR**

Because they operate at near stoichiometric air-to-fuel ratios, rich-burn engines generate cylinder temperatures in the range of 1,200° to 1,300°F. Engine manufacturers have found that such high temperatures do not allow high engine loading. For greater power output, engine manufacturers have found that engine modifications

(i.e., turbocharged engines which can produce more power enhancements with lower emission levels) are a better choice than building larger engine blocks.

Normally, rich-burn engine/NSCR combination applications are found only on small engines of approximately 1,000 bhp or less. The application of NSCR to an engine the size to be installed at Compressor Station No. 20 may pose unforeseen technical problems not encountered in installations on smaller units.

#### **o Analysis of Lean-Burn Engine with SCR**

As the most effective NOx abatement process in terms of removal efficiency, SCR technology has been applied for control of NOx emissions from state-of-the-art reciprocating engines. However, the reliability of SCR's performance on reciprocating engines has not been consistently demonstrated. Data on sustained NOx reduction performance for reciprocating engines are very limited.

Selective catalytic reduction is a post-combustion method for control of NOx emissions. The SCR process combines vaporized ammonia with NOx 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 NOx with a new catalyst. As the catalyst ages, the maximum NOx reduction will decrease to approximately 86 percent.

The effect of exhaust gas temperature on NOx reduction depends on the specific catalyst formulation and reactor design. Most commercial SCR systems operate over a temperature range of about 600-750°, although recently developed zeolite-based catalysts are claimed to be capable of operating at temperatures as high as 950°. At levels above and below this window, the specific catalyst formulation will not be effective and NOx reduction will decrease. Operating at high temperatures can permanently damage the catalyst through sintering of surfaces.

For this type of engine, technical concerns involved in SCR use are the narrow operating temperature range and the possible damage to the catalyst and downstream equipment. A stack gas reheat system would be required to heat the exhaust gases to the SCR's operating temperature. The integration of a reheat system adds another design criteria to an already complex system consisting of SCR components and an ammonia handling system.

A review of the BACT/LAER Clearinghouse determinations made to date on gas-fired reciprocating engines reveals that SCR has never been

applied specifically to any large-bore (i.e., greater than 1,000 bhp) and low-speed (i.e., 300 rpm) lean-burn engines due to their already low NOx emission rate.

#### BACT EVALUATION BY THE DEPARTMENT

Although technically feasible, the applicant has rejected using lean burn engine with SCR and rich-burn engine with NSCR on this type of engine because of economic, energy and environmental impacts. The following limitations, identified by the applicant, have been evaluated by the Department:

##### Energy Impact

The addition of SCR to a lean-burn engine imposes a fuel requirement of 36,733 MMBtu/yr for stack gas reheat. In addition, electrical power is required for the ammonia vaporizer and injection system. The rich-burn engine with NSCR has the highest energy requirements. Operating a rich-burn engine requires an additional 36,792 MMBtu/yr of heat input compared to using an engine with lean-burn technology. The lean-burn engine shows a savings of 36,792 MMBtu/yr in heat input over the rich-burn engine because of its inherent fuel efficient design. Therefore, a lean burn engine has no energy impact compared to the other BACT options evaluated.

##### Economic Impacts

When the three feasible NOx control alternatives are compared in terms of total cost effectiveness, the lean-burn engine/SCR technology has the highest cost effectiveness value of \$1,723 per ton of NOx removed. The rich-burn engine/NSCR technology is the next highest with \$537 per ton of NOx removed. The lean-burn engine has a nominal total cost effectiveness value of 347.7 per ton of NOx removed.

The incremental cost effectiveness values for the lean-burn engine/SCR technology and the rich-burn engine/NSCR technology are \$19,205 and \$6,415 per ton of NOx removed, respectively. The lean-burn engine has an incremental cost effectiveness of \$-49 per ton of NOx removed. Therefore, the lean-burn engine is the most cost effective control option for this project.

##### Environmental Impacts

SCR poses the greatest potential for toxic impacts due to ammonia handling and storage and ammonia slip. When the alternatives are compared in terms of adverse environmental impacts the lean-burn

engine with SCR is the worst due to potential ammonia release and disposal of the catalyst. The rich-burn engine with NSCR will also require disposal of catalyst. The lean-burn engines does not create any waste; therefore, it is the best alternative in terms of the environmental impact analysis.

In addition to nitrogen oxides and ammonia, the impacts of toxic pollutants associated with the combustion of natural gas have been evaluated. These toxics (formaldehyde and polycyclic organic matter) common to the combustion of natural gas, are expected to be emitted in minimal amounts and will not have an impact on air quality or this BACT analysis.

BACT DETERMINATION BY DEP

Based on the information presented by the applicant and the studies conducted, the Department believes that the NOx control technology proposed (lean-burn technology) satisfies the BACT requirement for nitrogen oxides. Although engine modifications and add-on control (SCR) could be used to provide additional control, the benefits that would be obtained do not warrant the cost. The emission limit for this compressor engine is thereby established as follows:

<u>Pollutant</u>	<u>Emissions Limit</u>
NOx	2.0 grams/bhp-hr

Details of the Analysis May be Obtained by Contacting:

Doug Outlaw, P.E., BACT Coordinator  
Department of Environmental Protection  
Bureau of Air Regulation  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

Recommended by:

Approved by:

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

\_\_\_\_\_  
Virginia B. Wetherell, Secretary  
Dept. of Environmental Protection

\_\_\_\_\_  
Date 1993

\_\_\_\_\_  
Date 1993



TABLE I

**Summary of Technical Feasibility of NO<sub>x</sub> Emission Controls  
for Reciprocating Engines**

Control Technology	NO <sub>x</sub> Controlled Emission Rate	Technical Feasibility	Comments
<b>Engine Modification Alternatives</b>			
Steam Injection	Not Applicable	No	Technically infeasible due to irreversible structural damage to engine block.
Air-to-fuel Ratio Change (or Lean-Burn Technology)	2.0 g/bhp-hr	Yes	Lowest emission rate achievable by engine modification, at least 80% control efficiency.
Retarding Ignition Timing Rich-burn Engine Lean-burn Engine	9.4 g/bhp-hr Not Applicable	Yes No	Engine timing retard between 2° and 6°; average 15% NO <sub>x</sub> reduction.
Derating Power Output Rich-burn Engine Lean-burn Engine	7.2 g/bhp-hr 1.3 g/bhp-hr	Yes Yes	Average 35% NO <sub>x</sub> reduction at 25% of engine power derated for gas-fired engines as a group. NO <sub>x</sub> reductions for turbo charged engines are less due to the lower effect on air-to-fuel ratio.
Exhaust Gas Recirculation Rich-burn Engine Lean-burn Engine	7.3 g/bhp-hr Not Applicable	Yes No	Maximum 34% NO <sub>x</sub> reduction from standard engine. Ineffective for lean-burn engine.
<b>Add-on Control Technology*</b>			
NO <sub>x</sub> OUT Process	Not Applicable	No	Technically infeasible (1000-1600°F), cost prohibitive for high temperature auxiliary equipment.
THERMAL DeNO <sub>x</sub>	Not Applicable	No	Technically infeasible (above 1000°F), cost prohibitive for high temperature auxiliary equipment.
Lean-Burn Engine/NSCR	Not Applicable	No	Technically infeasible for lean-burn engine, require <4% O <sub>2</sub> conc. in the exhaust stream.
Lean-Burn Engine/SCR	0.4 g/bhp-hr	Yes	Applicable to lean-burn engine with control efficiency of 80 percent.
Rich-Burn Engine/NSCR	1.1 g/bhp-hr	Yes	Applicable to rich-burn engine only, required greater than 4% O <sub>2</sub> conc. in exhaust gas stream. Control efficiency of 90%.

\* Except for the rich-burn engine/NSCR option, all add-on control technologies are for lean-burn engines.

Source: FGTC's air pollution permit application (1993)



# United States Department of the Interior



## NATIONAL PARK SERVICE

Southeast Regional Office  
75 Spring Street, S.W.  
Atlanta, Georgia 30303

IN REPLY REFER TO:

N16(SER-ODN)

MAY 18 1993

RECEIVED

MAY 21 1993

Division of Air  
Resources Management

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

Dear Mr. Fancy:

We have reviewed the Prevention of Significant Deterioration permit application that you forwarded to us regarding Florida Gas Transmission Company's proposed expansion of its existing pipeline system. The expansion will include the installation of a new 4,000 bhp compressor engine at Compressor Station 20, located in St. Lucie County, near Fort Pierce, Florida. Compressor Station 20 is located approximately 135 km north of Everglades National Park, a Class I air quality area administered by the National Park Service.

The additional natural gas fired engine at Compressor Station 20 will result in a significant increase in nitrogen oxide emissions (77.5 tons per year) and a slight increase in emissions of sulfur dioxide, carbon monoxide, and volatile organic compounds. Based on these relatively small increases in emissions and the distance from the facility to Everglades National Park, we do not anticipate that the proposed project will have a significant impact on sensitive resources at the park.

Thank you for providing us the opportunity to comment on Florida Gas Transmission Company's permit application. If we can be of further assistance, please contact Dee Morse of our Air Quality Division in Denver at (303) 969-2071.

Sincerely,

TCB

James W. Coleman, Jr.  
Regional Director  
Southeast Region

bcc:

SERO: AQC

EVER: Supt.

AQD-DEN: Morse

AQD-WASO: Ross

cc: J. Neuron

C. Holladay

J. Goldman, SE Dist.

J. Harper, EPA

B. Andrews, ENSR

5/28/93



## Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

April 28, 1993

Mr. John Bunyak, Chief  
Policy, Planning and Permit Review Branch  
National Park Service-Air Quality Division  
P. O. Box 25287  
Denver, CO 80225

Dear Mr. Bunyak:

RE: FL Gas Transmission Company  
Compressor Station #20  
St. Lucie County, PSD-FL-203

The Department has received the above referenced PSD application package. Please review this package and forward your comments to the Department's Bureau of Air Regulation by May 20, 1993. The Bureau's FAX number is (904)922-6979.

If you have any questions, please contact Teresa Heron or Cleve Holladay at (904)488-1344 or write to me at the above address.

Sincerely,

*Patricia G. Adams*  
for C. H. Fancy, P.E.  
Chief  
Bureau of Air Regulation

CHF/pa

Enclosures



## Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Virginia B. Wetherell, Secretary

April 28, 1993

Ms. Jewell A. Harper, Chief  
Air Enforcement Branch  
U.S. EPA, Region IV  
345 Courtland Street, N.E.  
Atlanta, Georgia 30308

Dear Ms. Harper:

RE: FL Gas Transmission Company  
Compressor Station #20  
St. Lucie County, PSD-FL-203

The Department has received the above referenced PSD application package. Please review this package and forward your comments to the Department's Bureau of Air Regulation by May 20, 1993. The Bureau's FAX number is (904)922-6979.

If you have any questions, please contact Teresa Heron or Cleve Holladay at (904)488-1344 or write to me at the above address.

Sincerely,

*Patricia G. Adams*  
for C. H. Fancy, P.E.  
Chief  
Bureau of Air Regulation

CHF/pa

Enclosures



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

April 22, 1993

RECEIVED

APR 23 1993

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

Division of Air  
Resources Management

Dear Mr. Fancy:

Florida Gas Transmission Company, an ENRON/SONAT affiliate, is proposing to expand its existing pipeline system and has filed an application with the Federal Energy Regulatory Commission for a certificate of public convenience and necessity. This expansion will require the installation of three new compressor stations and the addition of new engines at eight existing stations. As discussed in a meeting on December 18, 1992, with you, Mr. Preston Lewis, and other members of your staff, two of the new stations and four of the existing stations requiring new engines are located in Florida. One of these is Compressor Station No. 20, located in St. Lucie County, near Ft. Pierce, Florida.

Attached for your consideration is one original and six copies of an application for a PSD permit for the addition of one new 4,000 bhp Cooper-Bessemer 10V-275 engine at Compressor Station No. 20. A check for the permit fee in the amount of \$7,500.00 is also attached.

Should you have any questions concerning this application, please call Dr. V. Duane Pierce at (713) 853-3569.

Sincerely,

C. D. Schulz  
Vice President Project Management Services  
Florida Gas Transmission Company

CDS:DP  
pierce\corres\acovfl20.ltr

An **ENRON/SONAT** Affiliate



## Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

April 22, 1993

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

Dear Mr. Fancy:

Florida Gas Transmission Company, an ENRON/SONAT affiliate, is proposing to expand its existing pipeline system and has filed an application with the Federal Energy Regulatory Commission for a certificate of public convenience and necessity. This expansion will require the installation of three new compressor stations and the addition of new engines at eight existing stations. As discussed in a meeting on December 18, 1992, with you, Mr. Preston Lewis, and other members of your staff, two of the new stations and four of the existing stations requiring new engines are located in Florida. One of these is Compressor Station No. 20, located in St. Lucie County, near Ft. Pierce, Florida.

Attached for your consideration is one original and six copies of an application for a PSD permit for the addition of one new 4,000 bhp Cooper-Bessemer 10V-275 engine at Compressor Station No. 20. A check for the permit fee in the amount of \$7,500.00 is also attached.

Should you have any questions concerning this application, please call Dr. V. Duane Pierce at (713) 853-3569.

Sincerely,

  
C. D. Schulz  
Vice President Project Management Services  
Florida Gas Transmission Company

CDS:DP  
pierce\corres\acovf20.ltr

RECEIVED  
FINANCE & ACCOUNTING  
1993 MAY -  
DEPARTMENT OF  
ENVIRONMENTAL  
REGULATION

RECEIVED  
DER - MAIL ROOM  
1993 APR 26 AM 10:19



# Florida Gas Transmission Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

April 22, 1993

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

Dear Mr. Fancy:

Florida Gas Transmission Company, an ENRON/SONAT affiliate, is proposing to expand its existing pipeline system and has filed an application with the Federal Energy Regulatory Commission for a certificate of public convenience and necessity. This expansion will require the installation of three new compressor stations and the addition of new engines at eight existing stations. As discussed in a meeting on December 18, 1992, with you, Mr. Preston Lewis, and other members of your staff, two of the new stations and four of the existing stations requiring new engines are located in Florida. One of these is Compressor Station No. 20, located in St. Lucie County, near Ft. Pierce, Florida.

Attached for your consideration is one original and six copies of an application for a PSD permit for the addition of one new 4,000 bhp Cooper-Bessemer 10V-275 engine at Compressor Station No. 20. A check for the permit fee in the amount of \$7,500.00 is also attached.

RECEIVED  
FINANCE ACCOUNTING  
DEPARTMENT OF  
ENVIRONMENTAL  
REGULATION  
MAY 11 11:43 AM '93

CHECK NO.  
0622084214

FLORIDA GAS TRANSMISSION COMPANY  
P.O. BOX 1188  
HOUSTON, TEXAS 77251-1188

DATE OF CHECK  
04-01-93

**ENRON  
CORP**

This check is VOID unless printed on BLUE background

EXACTLY \$\*\*\*\*\*7,500 DOLLARS 00 CENTS

AMOUNT OF CHECK

\$\*\*\*\*\*7,500.00

PAY  
TO THE  
ORDER  
OF

STATE OF FLORIDA DEPT OF  
ENVIRONMENTAL REGULATION  
TWIN TOWERS OFFICE BUILDING  
TALLAHASSEE, FL  
32399-2400

BY

*[Signature]*

AUTHORIZED REPRESENTATIVE

NORWEST BANK GRAND JUNCTION



CHECK NO.  
0622084214

FLORIDA GAS TRANSMISSION COMPANY  
P.O. BOX 1188  
HOUSTON, TEXAS 77251-1188

DATE OF CHECK  
04-01-93



This check is VOID unless printed on BLUE background

EXACTLY \$\*\*\*\*\*7,500 DOLLARS 00 CENTS

AMOUNT OF CHECK  
\$\*\*\*\*\*7,500.00

PAY  
TO THE  
ORDER  
OF

STATE OF FLORIDA DEPT OF  
ENVIRONMENTAL REGULATION  
TWIN TOWERS OFFICE BUILDING  
TALLAHASSEE, FL  
32399-2400

BY

  
"AUTHORIZED REPRESENTATIVE"

NORWEST BANK GRAND JUNCTION

CHECK NO. 0622084214

REMITTANCE STATEMENT  
FLORIDA GAS TRANSMISSION COMPANY

PAGE 001 OF 001

VOUCHER NO.	INVOICE DATE	INVOICE NUMBER	PURCHASE ORDER	AMOUNT		
				GROSS	DISCOUNT	NET
9304000088	040193	CKR040193		7,500.00	0.00	7,500.00
AIR PERMIT APPLICATION FEE			FOR COMPRESSOR STATION		NO. 20	- FORT PIERCE
ST. LUCIE COUNTY, FLORIDA					TOTAL	7,500.00

Special Instructions

CALL MARCY BABB, X3295



**Florida Gas  
Transmission  
Company**

**PHASE III  
EXPANSION  
PROJECT**

**Compressor Station No. 20  
St. Lucie County, Florida**

**Prevention of Significant Deterioration  
and Permit to Construct Applications**

**Volume I**

**April 1993**

## CONTENTS

<b>1.0 INTRODUCTION</b>	<b>1-1</b>
<b>2.0 PROJECT DESCRIPTION</b>	<b>2-1</b>
2.1 Existing Operations	2-1
2.2 Proposed Compressor Station Addition	2-1
2.2.1 Compressor Engine Addition	2-1
2.2.2 Support Equipment Additions	2-5
2.2.3 Fugitive Emissions	2-7
2.2.4 Emissions Summary	2-7
<b>3.0 REGULATORY ANALYSIS</b>	<b>3-1</b>
3.1 Federal Regulatory Review	3-1
3.1.1 Classification of Ambient Air Quality	3-1
3.1.2 PSD Applicability	3-3
3.1.2.1 Increments/Classifications	3-8
3.1.2.2 Control Technology Review	3-11
3.1.2.3 Air Quality Monitoring Requirements	3-12
3.1.2.4 Source Impact Analysis	3-13
3.1.2.5 Additional Impact Analyses	3-13
3.1.2.6 Good Engineering Practice (GEP) Stack Height Analysis	3-15
3.1.3 Non-Attainment New Source Review (NSR) Rules	3-16
3.1.4 Applicability of New Source Performance Standards (NSPS)	3-16
3.1.5 Applicability of National Emission Standards for Hazardous Air Pollutants (NESHAP)	3-17
3.2 Florida State Air Quality Regulations	3-17
<b>4.0 AIR QUALITY IMPACT ANALYSIS</b>	<b>4-1</b>
4.1 Modeling Methodology and Assumptions	4-1
4.1.1 General Modeling Methodology	4-1
4.1.2 Model Selection	4-3
4.1.3 Modeling Options	4-4
4.1.4 Selection of Dispersion Coefficients	4-4
4.1.5 Meteorological Data	4-4
4.1.6 Source Data	4-6
4.1.7 Receptor Grids Modeled	4-6

**CONTENTS**  
(Cont'd)

4.1.8	Building Wake Effects and GEP Considerations . . . . .	4-9
4.2	Model Results . . . . .	4-10
<b>5.0</b>	<b>SOILS, VEGETATION, VISIBILITY AND ASSOCIATED POPULATION GROWTH IMPACTS . . . . .</b>	<b>5-1</b>
5.1	Impacts Upon Soils and Vegetation . . . . .	5-1
5.2	Impacts Upon Visibility . . . . .	5-1
5.3	Impacts Due to Associated Population Growth . . . . .	5-2
<b>6.0</b>	<b>BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION . . . . .</b>	<b>6-1</b>
6.1	The BACT Process . . . . .	6-1
6.2	NO <sub>x</sub> Control Review . . . . .	6-4
6.2.1	Applicable NSPS . . . . .	6-4
6.2.2	Previous BACT Limits . . . . .	6-4
6.2.3	Identification of NO <sub>x</sub> Control Technologies for Reciprocating Engines . . . . .	6-4
6.2.4	Technologies Involving Engine Modification . . . . .	6-6
6.2.4.1	Steam/Water Injection . . . . .	6-6
6.2.4.2	Air-to-Fuel Ratio Changes . . . . .	6-7
6.2.4.3	Retarded Ignition Timing . . . . .	6-8
6.2.4.4	Derating Power Output . . . . .	6-8
6.2.4.5	Exhaust Gas Recirculation . . . . .	6-9
6.2.5	Technologies Involving Exhaust Gas Treatment . . . . .	6-10
6.2.5.1	NO <sub>x</sub> OUT Process . . . . .	6-10
6.2.5.2	Thermal DeNO <sub>x</sub> . . . . .	6-11
6.2.5.3	Nonselective Catalytic Reduction . . . . .	6-12
6.2.5.4	Lean-Burn Engine with Selective Catalytic Reduction (SCR) . . . . .	6-12
6.2.5.5	Combination of Rich-Burn Engine and NSCR . . . . .	6-13
6.2.5.6	Summary of Technically Feasible NO <sub>x</sub> Control Methods . . . . .	6-14
6.2.6	Evaluation of Technically Feasible NO <sub>x</sub> Control Methods . . . . .	6-14
6.2.6.1	Ranking of Feasible Control Technologies . . . . .	6-16
6.2.6.2	Analysis of Lean-Burn Engine with SCR . . . . .	6-16
6.2.6.3	Analysis of Rich-Burn Engine with NSCR . . . . .	6-20
6.2.6.4	Analysis of Lean-Burn Engine with Derating Power Output . . . . .	6-24
6.2.6.5	Analysis of Lean-Burn Engine . . . . .	6-25
6.2.7	NO <sub>x</sub> BACT Summary and Conclusion . . . . .	6-26

**CONTENTS**  
(Cont'd)

6.2.7.1	Comparison of Environmental Effects .....	6-26
6.2.7.2	Comparison of Energy Impacts .....	6-28
6.2.7.3	Comparison of Economic Analysis .....	6-28
6.2.7.4	NO <sub>x</sub> Control Summary .....	6-28
6.3	BACT Summary .....	6-30
<b>7.0</b>	<b>REFERENCES .....</b>	<b>7-1</b>

**APPENDICES**

<b>A</b>	<b>APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCE</b>
<b>B</b>	<b>PLOT PLAN</b>
<b>C</b>	<b>SITE SUMMARY TABLE</b>
<b>D</b>	<b>SUPPORTING CALCULATIONS</b>
<b>E</b>	<b>FDER REGULATORY REQUIREMENTS SUMMARY</b>
<b>F</b>	<b>AREA CONCENTRATION MAPS FROM ISC MODELING</b> <b>GEP STRUCTURE DOWNWASH OUTPUT TABLE</b> <b>VISIBILITY ANALYSIS SCREENING RESULTS</b> <b>HARDCOPY MODEL OUTPUT</b> <b>FLOPPY DISK WITH MODELING AND GEP INPUT AND OUTPUT FILES</b>
<b>G</b>	<b>OZONE LIMITING METHOD</b>
<b>H</b>	<b>ADJACENT NO<sub>x</sub> SOURCES FROM FDER</b>
<b>I</b>	<b>BACT/LAER CLEARINGHOUSE SUMMARY</b> <b>ECONOMIC IMPACT ANALYSIS</b> <b>CONTROL SYSTEM COST ANALYSIS SUMMARY</b>

## LIST OF TABLES

2-1	Summary of Existing Engine Information . . . . .	2-2
2-2	Engine Specifications and Stack Parameters for the Proposed Project . . . . .	2-4
2-3	Emissions from FGTC's Proposed Compressor Engine . . . . .	2-6
2-4	Emissions from FGTC's Proposed Emergency Electrical Generator . . . . .	2-8
2-5	FGTC's Compressor Station No. 20 Fugitive VOC's Emission Calculation and Summary . . . . .	2-9
2-6	Annual (TPY) Emission Levels . . . . .	2-10
3-1	National and State Ambient Air Quality Standards . . . . .	3-2
3-2	Classification of St. Lucie County for Each Criteria Pollutant . . . . .	3-4
3-3	Major Stationary Sources . . . . .	3-5
3-4	PSD Significant Emission Rates . . . . .	3-7
3-5	PSD Area Class Definitions . . . . .	3-9
3-6	Allowable PSD Increments and Significance Levels . . . . .	3-10
3-7	De Minimis Monitoring Concentrations . . . . .	3-14
4-1	Major Features of the ISC Model . . . . .	4-5
4-2	FGTC Phase III, Station No. 20, Summary of Source Parameters Used in the Modeling Analysis . . . . .	4-7
4-3	FGTC Phase III Expansion, Station No. 20, Modeled Emission Rates . . . . .	4-8
4-4	FGTC Phase III, Station No. 20, Building Dimensions . . . . .	4-11
4-5	FGTC Phase III, Station No. 20, Modeling Results Maximum Predicted Average Concentration of Modeled Pollutants and Comparison to Significant Impact Levels . . . . .	4-12
4-6	FGTC Phase III, Station No. 20, Maximum Modeled Off-Site Impact . . . . .	4-13
4-7	FGTC Phase III Project Station No. 20, PSD Adjacent Sources Maximum Modeled Off-Site Impact for PSD Increment Analysis . . . . .	4-15
4-8	FGTC Phase III Project Station 20, Ozone Limiting Results . . . . .	4-16
6-1	Summary of BACT Determinations for NO <sub>x</sub> Emissions from Natural Gas-Fired Reciprocating Pipeline Engines . . . . .	6-5
6-2	Summary of Technical Feasibility of NO <sub>x</sub> Emission Controls for Reciprocating Engines . . . . .	6-15
6-3	BACT "Top-Down" Hierarchy of NO <sub>x</sub> Control Technologies . . . . .	6-17
6-4	Summary of Capital and Operating Costs for Lean-burn Engine and SCR NO <sub>x</sub> Controls . . . . .	6-21
6-5	Summary of Capital and Operating Costs for Rich-burn Engine and NSCR NO <sub>x</sub> Controls . . . . .	6-23
6-6	Summary of Capital and Operating Costs for Lean-burn Engine NO <sub>x</sub> Controls . .	6-27

---

**LIST OF TABLES**  
(Cont'd)

<b>6-7</b>	Summary of Top-Down BACT Impact Analysis Results for NO <sub>x</sub> for a Stationary IC Reciprocating Engine .....	<b>6-29</b>
------------	---	-------------

**LIST OF FIGURES**

<b>1-1</b>	FGTC's Gas Transmission System .....	<b>1-2</b>
<b>1-2</b>	Site Location Map, Compressor Station No. 20, Florida Gas Transmission Company, Ft. Pierce, Louisiana .....	<b>1-3</b>
<b>2-1</b>	Process Flow Diagram of an Engine-Compressor Unit .....	<b>2-3</b>
<b>6-1</b>	"Top-Down" BACT Decision-Making Process .....	<b>6-2</b>

## 1.0 INTRODUCTION

Florida Gas Transmission Company (FGTC), a Delaware Corporation and ENRON/SONAT affiliate of Houston, Texas, is proposing to expand its existing natural gas pipeline facility in St. Lucie County, Florida (Compressor Station No. 20). This proposed modification is part of FGTC's overall Phase III expansion project, aimed at increasing the supply capacity of the FGTC's network servicing domestic, commercial, and industrial customers along the Gulf Coast. The scope of work for the Phase III project includes expansion, through the addition of state-of-the-art compressor engines, at eight existing compressor stations and the development of three new compressor stations. The new pipeline will follow much of the right-of-way of the existing system.

The basic project components include:

- mainline loops, additions, and replacements;
- lateral loops and additions;
- meter station additions, modifications, and expansions;
- regulator additions, modifications, and expansions; and
- compressor station additions and modifications.

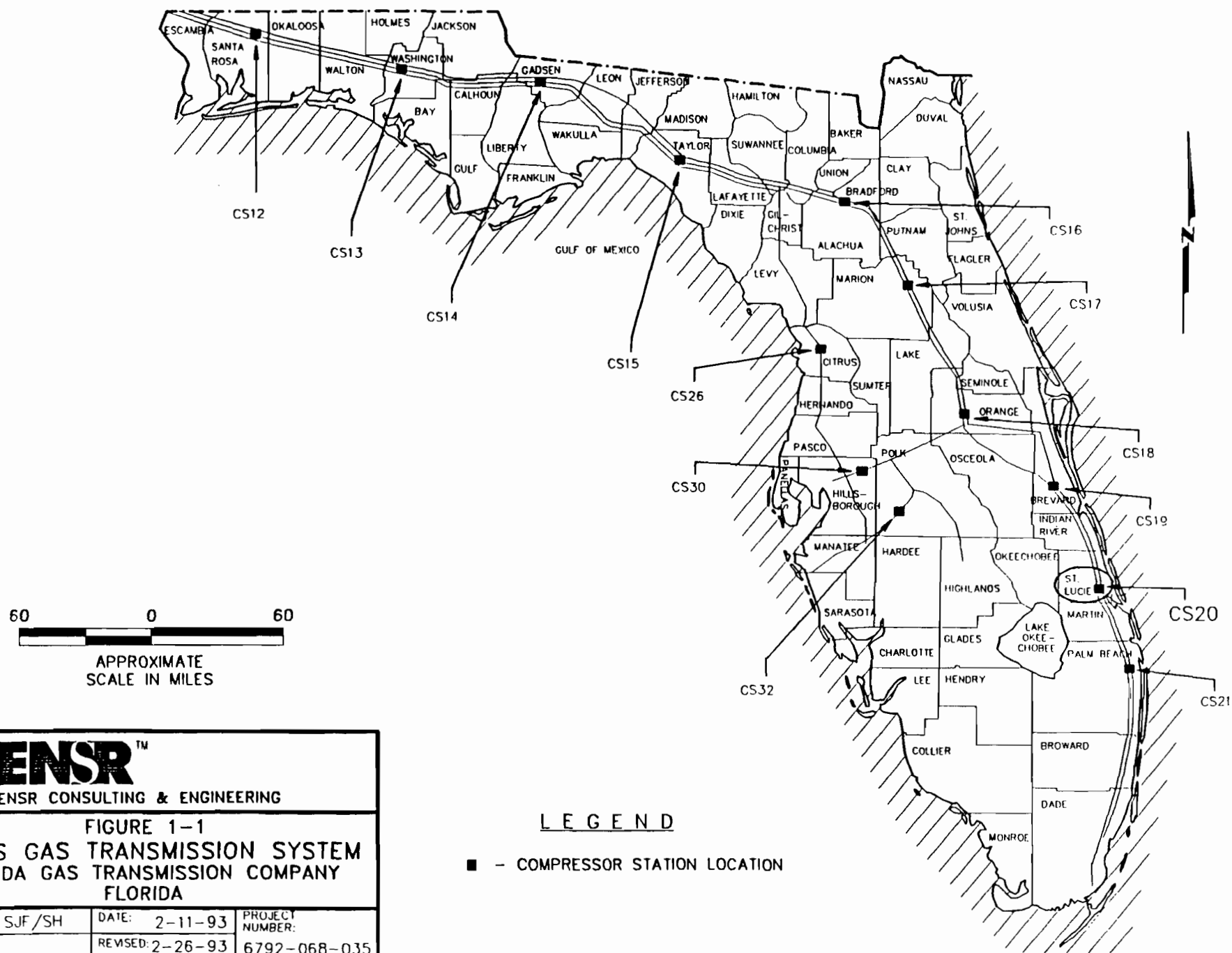
The route of the main gas pipeline, and the approximate location of Compressor Station No. 20 along the main pipeline are shown in Figure 1-1.

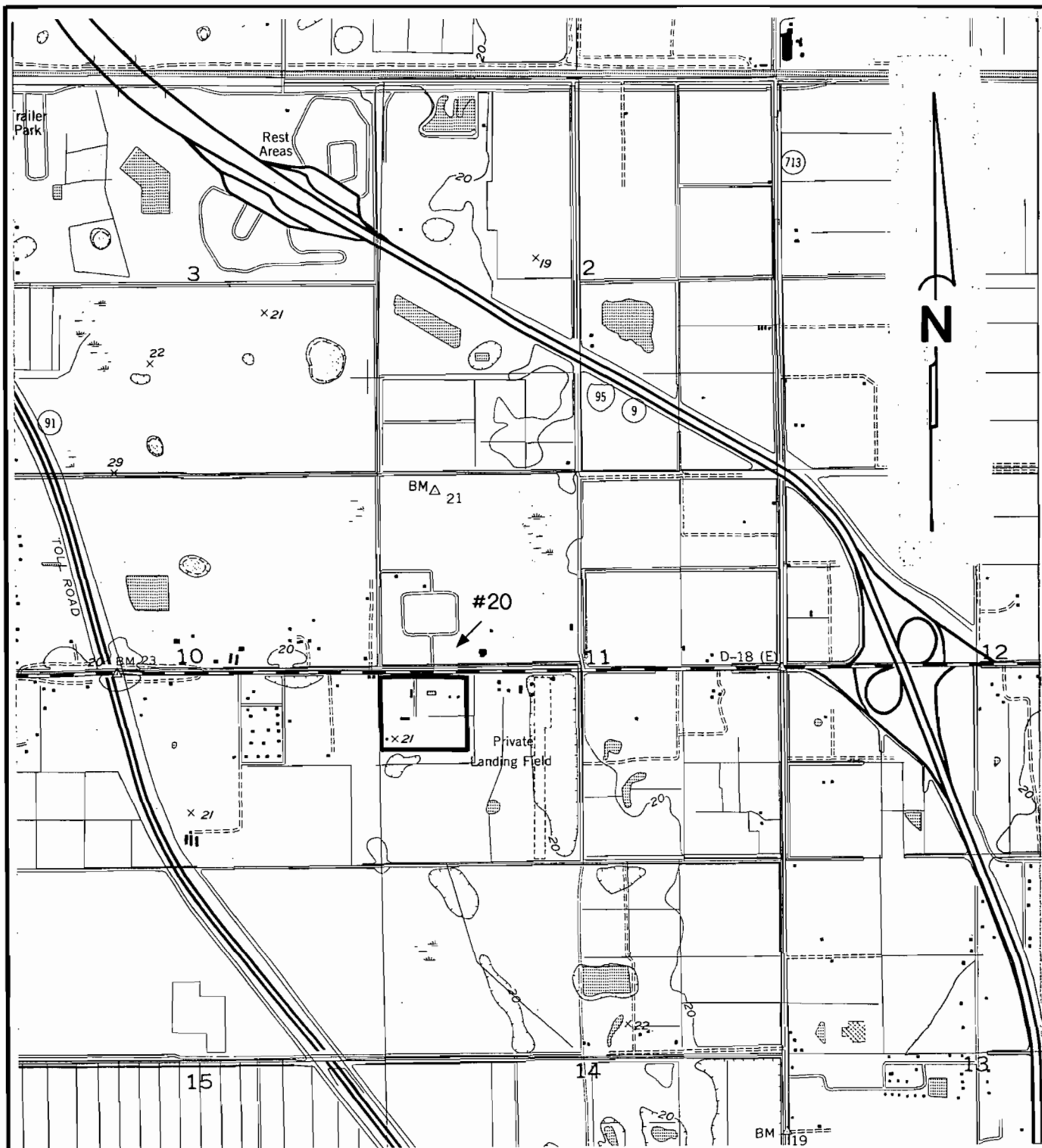
Compressor Station No. 20 is located 6 miles west of the town of Ft. Pierce, in St. Lucie County, Florida. Figure 1-2 shows the site location of the existing compressor station.

The proposed expansion at this location consists of the installation of one (1) 4,000 brake horsepower (bhp), natural-gas-fired, reciprocating, internal combustion (IC), engine. The proposed engine will be used solely for the purpose of transporting natural gas by pipeline for distribution to markets in the Gulf Coast region. The proposed engine is a Cooper-Bessemer 10V-275C, equipped with lean-burn technology. Under current federal and state air quality regulations, the proposed engine will constitute a major modification of an existing major stationary source, due to the net change in NO<sub>x</sub> emissions.

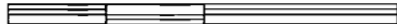
This report addresses the requirements of the Prevention of Significant Deterioration (PSD) review procedures pursuant to rules and regulations implementing the Clean Air Act (CAA) Amendments of 1977. The Florida Department of Environmental Regulations (FDER) has PSD review and







0 2000 4000



SCALE IN FEET

REFERENCE: U.S.G.S. Quadrangle Map for  
Fort Pierce NW,  
Florida, 1983.

**ENSR**<sup>TM</sup>

ENSR CONSULTING AND ENGINEERING

FIGURE 1-2  
SITE LOCATION MAP  
**COMPRESSOR STATION #20**  
FLORIDA GAS TRANSMISSION COMPANY  
FT. PIERCE, FLORIDA

DRAWN BY: SJF/SH

DATE: 12-16-92

PROJECT  
NUMBER:

CHK'D BY:

REVISED:

6792-068-035

approval authority in Florida. Based on the proposed emissions from the addition of the one 4,000 bhp IC engine, a PSD review is required for NO<sub>x</sub>.

Engineering designs for the proposed expansion project include selection of an engine incorporating lean-burn technology. Lean-burn technology for emission control represents Best Available Control Technology (BACT) for the proposed IC engine.

This application contains six additional sections. Descriptions of the existing operation at FGTC's Compressor Station No. 20, and the one (1) proposed, 4,000 bhp engine to be added to the station, are presented in Section 2.0. The air quality review requirements and applicability of state and federal regulations to the proposed project are discussed in Section 3.0. The methodology and results of the air dispersion modeling and air quality impact analysis are presented in Section 4.0, and impacts on soil, vegetation and visibility are summarized in Section 5.0. The BACT analysis required as part of the PSD permitting process is presented in Section 6.0. References cited in this document are included in Section 7.0.

FDER permit application forms are presented in Appendix A. Additional appendices contain information which support the representations made in this application.

## 2.0 PROJECT DESCRIPTION

A plot plan of FGTC's Compressor Station No. 20, showing the location of the plant boundaries, the existing emission sources, and the location of the proposed engine addition, is presented in Appendix B. The following sections provide a description of the existing operations at this location, as well as the proposed project.

### 2.1 Existing Operations

FGTC's existing Compressor Station No. 20 consists of two (2) 1,500 bhp, one (1) 2,000 bhp, and (1) 2,400 bhp, natural-gas-fired, reciprocating, IC engines. Table 2-1 summarizes engine manufacturer, model, and dates of installation for each of the existing engines. The original installation was made in 1966 (Compressor Engine Nos. 2001, and 2002). A later installation was made in 1968 (Compressor Engine No. 2003). These engines were all installed before the CAA Amendments of 1977. An addition referred to as "Phase II" was constructed in 1991 (Compressor Engine No. 2004). These existing engines are not being modified as part of this expansion project.

### 2.2 Proposed Compressor Station Addition

As part of the Phase III project, FGTC proposes to increase the horsepower capacity of Compressor Station No. 20. This will be achieved by adding one new IC engine (Compressor Engine No. 2005) and associated support equipment. The proposed new engine will be used to drive a gas compressor that is a part of a new gas transmission line that will transport natural gas from source wells in Texas and Louisiana for delivery throughout the Gulf Coast pipeline network. Without the proposed engine, it would not be possible to increase the volumetric delivery capacity necessary to meet both short- and long-term demands for natural gas along the Gulf Coast.

#### 2.2.1 Compressor Engine Addition

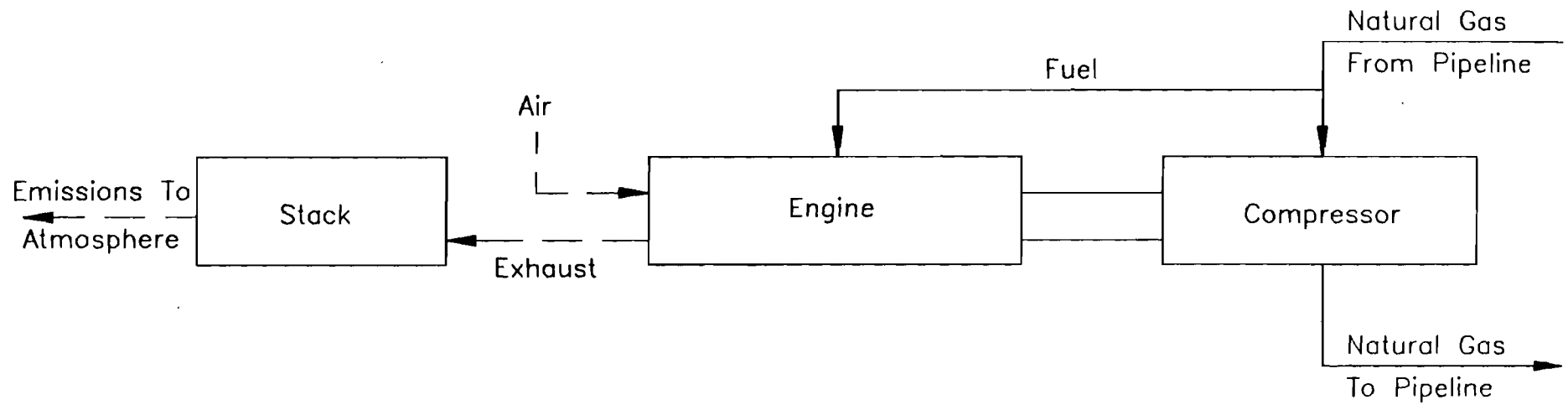
The new engine will be a Cooper-Bessemer 10V-275C engine compressor unit. The engine has 10 power cylinders and is rated at 4,000 bhp at 275 revolutions per minute (rpm). A flow diagram of a typical compressor unit is presented in Figure 2-1. Fuel will be exclusively natural gas from the FGTC's gas pipeline. Engine specifications and stack parameters for the proposed engine are presented in Table 2-2. The proposed engine will incorporate lean-burn technology.

**TABLE 2-1**

**Summary of Existing Engine Information  
Compressor Station No. 20**

<b>Engine No.</b>	<b>Date of Installation</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Brake Horse Power (bhp)</b>
2001	1966	Reciprocating	Worthington	SEHG-6	1500
2002	1966	Reciprocating	Worthington	SEHG-6	1500
2003	1968	Reciprocating	Worthington	SEHG-8	2000
2004	1991	Reciprocating	Dresser - Rand	412-KVSR	2400

CE679259  
(DALLAS/HPCL21)



**ENSR**™

ENSR CONSULTING & ENGINEERING

FIGURE 2-1  
PROCESS FLOW DIAGRAM  
OF AN  
ENGINE-COMPRESSOR UNIT

DRAWN:	DC/SH	DATE:	11-6-92	PROJECT NUMBER:
APP'D:		REVISED:	3-16-93	6792-068

**TABLE 2-2**

**Engine Specifications and Stack Parameters for  
the Proposed Project**

Parameter	Design Specification
<u>Compressor Engine</u>	<u>2005</u>
Type	Reciprocating Engine
Manufacturer	Cooper-Bessemer
Model	10V-275C
Air Charging	Turbocharged
Unit Size	4,000 bhp
Number of Power Cylinders	10
Number of Compressor Cylinders	4
Power Cylinder Data	
Bore Size	18.0 inches
Stroke	20.0 inches
Cylinder Power	400 bhp
Specific Heat Input	6,950 Btu/bhp-hr Nominal -7,650 Btu/bhp-hr (Maximum)
Maximum Fuel Consumption	0.0294 MMscf/hr
Speed	275 rpm
<u>Stack Parameters</u>	
Stack Height	65 ft
Stack Diameter	4 ft
Exhaust Gas Flow	34,928 acfm
Exhaust Temperature	540° F
Exhaust Gas Velocity	47.31 ft/sec.
<p>NOTE:</p> <p>acfm = actual cubic feet per minute.</p> <p>bhp = brake horsepower.</p> <p>Btu/bhp-hr = British thermal units per brake horsepower per hour.</p> <p>° F = degrees fahrenheit.</p> <p>ft = feet.</p> <p>ft/sec = feet per second.</p> <p>lb/hr = pounds per hour.</p> <p>scf = standard cubic feet.</p> <p>MMscf/hr = million standard cubic feet per hour.</p> <p>rpm = revolutions per minute.</p> <p><sup>a</sup> Based on heating value for natural gas of 1,040 British thermal units per standard cubic foot (Btu/scf).</p>	

Hourly and annual emissions of regulated pollutants from the proposed engine, under normal operating conditions, are presented in Table 2-3. The table also includes the maximum hourly emissions which can be expected from this proposed class of engine. These maximum values represent the highest emission rate a unit could produce under any operating condition. It should be noted that these highest emission rates would only occur for short periods, under extreme load and weather conditions, which are unlikely to be encountered at this compressor station. They have been included to ensure the facility is properly permitted. Emissions of oxides of nitrogen ( $\text{NO}_x$ ), carbon monoxide (CO), and non-methane hydrocarbons (NMHC) are based on engine manufacturer's supplied data (See Appendix C).

Typically, IC engine vendors do not provide information on particulate matter (PM) or sulfur dioxide ( $\text{SO}_2$ ) emissions. Therefore, PM emissions are based upon USEPA publication AP-42 (USEPA, 1985) emission factors for natural gas combustion in boilers, and emissions of  $\text{SO}_2$  are based on FGTC's natural gas contract limits of 10 grains sulfur per 100 cubic feet of gas.

### **2.2.2 Support Equipment Additions**

In addition to the compressor engine, some support equipment will be installed at the site. This added support equipment will include:

- A new compressor building
- A 625-bhp natural gas fired emergency stand-by generator

The location of the new on-site structure is shown on the facility plot plan contained in Appendix B. The new compressor building, housing the new engine, has approximate dimensions of 60 feet wide by 72 feet long by 41 feet high.

The control and operation of a compressor station requires a steady electrical power supply. As there is potential for local utility service to be disrupted, FGTC must maintain a backup power system. To meet this need at Compressor Station No. 20, a 625-bhp (450 kw) natural-gas-fired emergency stand-by generator will be installed at the site. To control emissions the new generator will be equipped with a catalytic converter. The converter is 90% effective on  $\text{NO}_x$ , 80% effective on CO and 50% effective on NMHC.



**TABLE 2-3**

**Emissions from FGTC's  
Proposed Compressor Engine**

Pollutant	Emission Factor	Reference	Maximum Emissions		
			Maximum lb/hr	Nominal lb/hr	TPY
Nitrogen Oxides	2.00 grams/bhp-hr	Manufacturer Data	52.92	17.64	77.26
Carbon Monoxide	2.10 grams/bhp-hr	Manufacturer Data	26.46	18.52	81.12
Volatile Organic Compounds (non-methane)	0.60 grams/bhp-hr	Manufacturer Data	12.35	5.29	23.18
Particulate Matter	0.015 grams/bhp-hr	AP-42 (factor of 5 lb/MMscf)	0.15	0.13	0.57
Sulfur Dioxide	0.086 grams/bhp-hr	10 grains/100 scf	0.84	0.76	3.33

**NOTE:**

Maximum natural gas consumption is 29,400 standard cubic feet per hour (scf/hr).

grams/bhp-hr	=	grams per brake horsepower per hour.
grains/100scf	=	grains per one hundred standard cubic feet.
lb/hr	=	pounds per hour.
lb/MMscf	=	pounds per million standard cubic feet.
scf	=	standard cubic feet.
TPY	=	tons per year.

The hourly and annual emissions from this unit are presented in Table 2-4. Hourly emissions were calculated from manufacturer's data in a manner similar to the calculations for main compressor engines. Annual emissions reflect a 400-hour-per-year operational restriction. Detailed emission calculations are presented in Appendix D.

### **2.2.3 Fugitive Emissions**

Potential new emissions from Compressor Station No. 20 include fugitive emissions from the new valves and flanges to be in gas service. These fugitive emissions have been estimated using USEPA factors for components in gas service. Table 2-5 lists the quantities of existing and new components to be installed as part of the Phase III project and an estimate of the fugitive emissions from these sources.

### **2.2.4 Emissions Summary**

The total change in emissions resulting from the proposed project are listed in Table 2-6. The calculations used to estimate these emissions are presented in Appendix D.

**TABLE 2-4**

**Emissions from FGTC's  
Proposed Emergency Electrical Generator**

Pollutant	Emission Factor	Reference	Emissions	
			lb/hr	TPY
Nitrogen Oxides	0.98 grams/bhp-hr	Manufacturer Data	1.35	0.27
Carbon Monoxide	2.14 grams/bhp-hr	Manufacturer Data	2.95	0.59
Volatile Organic Compounds (non-methane)	0.04 grams/bhp-hr	Manufacturer Data	0.055	0.011
Particulate Matter	0.018 grams/bhp-hr	AP-42 (factor of 5 lb/MMscf)	0.025	0.005
Sulfur Dioxide	0.10 grams/bhp-hr	10 grains/100 scf	0.14	0.028
<p><b>NOTE:</b></p> <p>Emission calculations based on unit operating a maximum of 400 hours per year. Maximum natural gas consumption is 5,038 standard cubic feet per hour (scf/hr).</p> <p>grams/bhp-hr = grams per brake horsepower per hour. grains/100scf = grains per one hundred standard cubic feet. lb/hr = pounds per hour. lb/MMscf = pounds per million standard cubic feet. scf = standard cubic feet TPY = tons per year.</p>				

**TABLE 2-5**  
**FGTC's Compressor Station No. 20**  
**Fugitive VOC's Emission Calculation**  
**and Summary**

COMPONENT TYPE	SERVICE	COMPONENT COUNT	EMISSION FACTORS	NM/NE* FRACTION	EMISSIONS		
					LBS/HR	LBS/DAY	TONS/YR
<b>CURRENT:</b>							
Valve	Gas	136	1.06 Lbs/Day (a)	0.005	0.030	0.72	0.13
Flange	Gas	308	0.57 Lbs/Day (a)	0.005	0.037	0.88	0.16
Compressor Seal	Gas	4	39.7 Lbs/Day (a)	0.005	0.033	0.79	0.14
				Total	0.100	2.39	0.44
<b>PROJECT ADDED:</b>							
Valve	Gas	26	1.06 Lbs/Day (a)	0.005	0.006	0.14	0.03
Flange	Gas	75	0.57 Lbs/Day (a)	0.005	0.009	0.21	0.04
Compressor Seal	Gas	1	39.7 Lbs/Day (a)	0.005	0.008	0.20	0.04
				Total	0.023	0.55	0.10
<b>FUTURE: (b)</b>							
Valve	Gas	162			0.036	0.86	0.16
Flange	Gas	383			0.045	1.09	0.20
Compressor Seal	Gas	5			0.041	0.99	0.18
				Total:	0.123	2.94	0.54
Notes: (a) - EPA-450/3-83-007, page 3-9 (b) - Future = current + project added * - NM/NE = non-methane/non-ethane							

**TABLE 2-6**

**Annual (TPY) Emission Levels  
FGTC's Compressor Station No. 20**

SOURCE ID	DESCRIPTION	NO <sub>x</sub>	CO	VOC (NM/NE HC)	SO <sub>2</sub>	PM
<b>EXISTING FACILITY</b>						
	COMPRESSOR ENGINES:					
2001	1500 bhp Recip. Engine	159.36	20.28	6.37	1.34	0.23
2002	1500 bhp Recip. Engine	159.36	20.28	6.37	1.34	0.23
2003	2000 bhp Recip. Engine	212.47	27.04	8.50	1.79	0.31
2004	2400 bhp Recip. Engine	49.36	64.90	39.40	2.09	0.41
	OTHER SOURCES: *	—	—	2.89	—	—
<b>EXISTING TOTAL</b>		580.55	132.50	63.53	6.56	1.18
<b>PROJECT RELATED</b>						
	COMPRESSOR ENGINE:					
2005	4000 bhp Recip. Engine	77.26	81.12	23.18	3.33	0.57
2011	EMERGENCY GENERATOR	0.27	0.59	0.01	0.03	0.01
	FUGITIVE	—	—	0.10	—	—
<b>PROJECT TOTAL</b>		77.53	81.71	23.29	3.36	0.58
<b>STATION TOTAL **</b>		658.08	214.21	86.82	9.92	1.76
* - Other Sources includes: ancillary equipment, storage tanks and equipment leaks. ** - STATION TOTAL = EXISTING + PROJECT						

---

### 3.0 REGULATORY ANALYSIS

This section presents a review of federal and Florida state air quality regulations which govern the operations to be conducted at Compressor Station No. 20.

#### 3.1 Federal Regulatory Review

The federal regulatory programs administered by the USEPA have been developed under the authority of the Clean Air Act. The following subsections review the key elements of the federal regulatory program and the impact they have on operations at Compressor Station No. 20. Special attention will be placed on National Ambient Air Quality Standards (AAQS) (40 CFR 50), New Source Performance Standards (NSPS) (40 CFR 60), National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR 61), and Prevention of Significant Deterioration (PSD) (40 CFR 52.21).

##### 3.1.1 Classification of Ambient Air Quality

The 1970 Amendments to the CAA gave the USEPA specific authority to establish the minimum level of air quality which all states would be required to achieve. These minimum values or standards were developed to protect the public health (primary) and welfare (secondary). The federally promulgated standards and additional state standards, are presented on Table 3-1.

Areas of the country which have air quality equal to or better than these standards (i.e., ambient concentrations less than a standard) became designated as "Attainment Areas", while those where monitoring indicated air quality was less than the standards became known as "Non-attainment Areas." The designation of an area has particular importance for a proposed project as it determines the type of permit review to which the application will be subject.

Major new sources or major modifications to existing major sources located in attainment areas are required to obtain a PSD permit prior to initiation of construction. Similar sources located in or near areas designated as Non-attainment or that adversely impact such areas, will undergo more stringent New Source Review (NSR). In either case it is necessary, as a first step, to determine the air quality classification of a project site.

TABLE 3-1

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS  
( $\mu\text{g}/\text{m}^3$ )

	AVERAGING PERIOD	EPA STANDARDS		FLORIDA STANDARDS
		PRIMARY	SECONDARY	
PM <sub>10</sub>	24-hour <sup>(1)</sup>	150	150	150
	annual <sup>(2)</sup>	50	50	50
SO <sub>2</sub>	3-hour <sup>(1)</sup>	---	1,300	1,300
	24-hour <sup>(1)</sup>	365	---	260
	annual <sup>(2)</sup>	80	---	60
CO	1-hour <sup>(1)</sup>	---	40,000	40,000
	8-hour <sup>(1)</sup>	10,000	---	10,000
NO <sub>2</sub>	annual <sup>(2)</sup>	100	100	100
O <sub>3</sub>	1-hour <sup>(3)</sup>	235	235	235
<p>(1) Not to be exceeded more than once per year.  (2) Never to be exceeded.  (3) Not to be exceeded more than 3 days over 3 years.</p> <p>Source: 40 CFR 50; 36FR22384; §17-2.300 F.A.C.</p>				

The 1990 CAA Amendments called for a review of the ambient air quality of all regions of the United States. States were required to file with the USEPA by March 15, 1991, designations of all areas as either attainment, non-attainment or unclassifiable. The current classification of St. Lucie County is listed below on Table 3-2, for each criteria pollutant. St. Lucie County is designated as Better than Standards for SO<sub>2</sub> and TSP, Unclassifiable/Attainment for CO and ozone, cannot be classified for NO<sub>x</sub>, and has not been classified for PM<sub>10</sub>. These designations were obtained from 40 CFR 81, as updated in the November 6, 1991, Federal Register (56FR56694).

The designation of Unclassifiable/Attainment indicates that there is insufficient monitoring data to prove that the area has attained the federal standards; however, the limited data available indicates that the standard has been achieved. Areas with this classification are treated as attainment areas for permitting purposes.

### **3.1.2 PSD Applicability**

The 1977 CAA Amendments added Part C - Prevention of Significant Deterioration to the Act. This part requires proposed new major stationary sources or existing sources planning a major modification in an area that has attained the National AAQS, to conduct a preconstruction review of the project that includes a detailed analysis of the emissions it would generate, available emission control technology, and project related impacts.

Federal air quality permitting regulations for attainment areas are codified in the Code of Federal Regulations (CFR), Title 40 - Protection of the Environment, Part 52.21 - Prevention of Significant Deterioration (40 CFR 52.21). While the portion of the Florida State Implementation Plan (SIP) related to PSD regulations has been approved by the USEPA, and authority for the program has been transferred to the state, the applicability of the program to Compressor Station No. 20 will be reviewed in this section, as it remains primarily a federal program.

For the PSD regulations to apply to a given project, the proposed location must be in a PSD area, i.e., an area that has been classified as attainment or as unclassifiable for a particular pollutant. The project's potential to emit is then reviewed to determine whether it constitutes a major stationary source or major modification.

A major stationary source is defined as either one of the 28 sources identified in 40 CFR 52.21 (see Table 3-3) and which has a potential to emit 100 tons or more per year of any regulated pollutant, or any other stationary source which has the potential to emit 250 tons or more per year of a regulated pollutant. "Potential to emit" has a special meaning here as it is determined



**TABLE 3-2**

**Classification of St. Lucie County  
For Each Criteria Pollutant**

Carbon Monoxide	Unclassifiable/Attainment
Oxides of Nitrogen	Cannot be Classified or Better than National Standards
Sulfur Dioxide	Better than Standards
Particulate Matter (PM <sub>10</sub> )	Not Designated
Total Suspended Particulate	Better than Standards
Ozone	Unclassifiable/Attainment
Source: 40 CFR 81.300, 1991 56FR56694	

**TABLE 3-3**
**Major Stationary Sources**

Fossil Fuel-Fired Steam Electric Plants of More Than 250,000,000 British Thermal Units Per Hour Heat Input
Coal Cleaning Plants (with thermal dryers)
Kraft Pulp Mills
Portland Cement Plants
Primary Zinc Smelters
Iron and Steel Mill Plants
Primary Aluminum Ore Reduction Plants
Primary Copper Smelters
Municipal Incinerators Capable of Charging More Than 250 Tons of Refuse Per Day
Hydrofluoric, Sulfuric or Nitric Acid Plants
Petroleum Refineries
Lime Plants
Phosphate Rock Processing Plants
Coke Oven Batteries
Sulfur Recovery Plants
Carbon Black Plants
Primary Lead Smelters
Fuel Conversion Plants
Sintering Plants
Secondary Metal Production Plants
Chemical Processing Plants
Fossil-Fuel Boilers (or combination thereof) Totaling of More Than 250,000,000 British Thermal Units Per Hour Heat Input
Petroleum Storage and Transfer Units With a Total Storage Capacity Exceeding 300,000 Barrels
Taconite Ore Processing Plants
Glass Fiber Processing Plants
Charcoal Production Plants
Source: 40 CFR 51.165(a)(iv)(2)(c)

on an annual basis after the application of air pollution control equipment, or any other federally enforceable restriction.

According to the "PSD Workshop Manual," (USEPA, 1980) for a modification to be classified as major and therefore, subject to PSD review:

- (1) the modification must occur at an existing major stationary source, and
- (2) the net emissions increase of any pollutant emitted by the source, as a result of modification is "significant," or
- (3) the modification results in emissions increases which if considered alone would constitute a major source.

"Significant" emission rates are defined as amounts equal to or greater than the emission rates given in Table 3-4.

By this definition, and based on the emissions presented in Section 2.0, Compressor Station No. 20 is an existing major stationary source due to emissions of nitrogen oxides. Even though the new engine is not listed as one of the 28 named source categories, based on emissions presented in Section 2.0, installation of the new engine will require a PSD review because the net increase in NO<sub>x</sub> emissions is significant (see Table 3-4) at this existing major source (Compressor Station No. 20).

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Major new facilities and major modifications are required to undergo the following analyses and reviews related to PSD for each pollutant emitted in significant amounts:

- Control Technology Review
- Source Impact Analysis
- Air Quality Analysis (monitoring)
- Source Information
- Additional Impact Analyses
- Good Engineering Practice (GEP) Stack Height Analysis.

Discussions concerning each of these requirements are presented in the following sections.

TABLE 3-4

PSD Significant Emission Rates

POLLUTANT	EMISSION RATE TONS/YEAR
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfur Dioxide	40
Total Suspended Particulates	25
Ozone (VOC)	40
Lead	0.6
Asbestos	0.007
Beryllium	0.0004
Mercury	0.1
Vinyl Chloride	1.0
Fluorides	3
Sulfuric Acid Mist	7
Total Reduced Sulfur	10
Reduced Sulfur	10
Hydrogen Sulfide	10
VOC = Volatile Organic Compound	

---

### 3.1.2.1 Increments/Classifications

In 1977, USEPA promulgated PSD regulations related to the requirements for classifications, increments, and area designations as set forth by Congress. PSD increments were initially set for only SO<sub>2</sub> and Total Suspended Particulates (TSP). However, in 1988, USEPA promulgated final PSD regulations for nitrogen oxides (NO<sub>x</sub>) and established PSD increments for nitrogen dioxide (NO<sub>2</sub>). On October 15, 1989, USEPA proposed PSD increments for PM<sub>10</sub>. The PM<sub>10</sub> increments are somewhat lower in magnitude than the TSP increments.

An area is designated as being Class I, II, or III depending on the criteria listed in Table 3-5.

The current federal PSD increments for different area classifications are shown in Table 3-6. Class I increments are the most stringent, allowing the smallest amount of air quality deterioration, while the Class III increments allow the greatest amount of deterioration. Florida Department of Environmental Regulation (FDER) has adopted the USEPA class designations and allowable PSD increments for TSP, SO<sub>2</sub>, and NO<sub>2</sub>.

The term "baseline concentration" evolved from federal and state PSD regulations and refers to a concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition in the PSD regulations, baseline concentration means the ambient concentration level that exists in the baseline areas at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

- The actual emissions representative of sources in existence on the applicable baseline date; and
- The allowable emissions of major stationary sources that began construction before January 6, 1975, for SO<sub>2</sub> and TSP sources, or February 8, 1988, for NO<sub>x</sub> sources; but which were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

- Actual emissions from any major stationary source on which construction began after January 6, 1975, for SO<sub>2</sub> and TSP sources, and after February 8, 1988, for NO<sub>x</sub> sources; and

TABLE 3-5

PSD Area Class Definitions

CLASS I

All of the following areas which were in existence on August 7, 1977, shall be Class I and may not be redesignated:

- International parks
- National wilderness areas which exceed 5,000 acres in size
- National memorial parks which exceed 5,000 acres in size, and
- National parks which exceed 6,000 acres in size

Areas which were redesignated as Class I under regulations promulgated before August 7, 1977, shall remain Class I, but may be redesignated

CLASS II

Any other area, unless otherwise specified in the legislation creating such area, is initially designated Class II, but may be redesignated.

CLASS III

Any area other than Class I areas for which a request for redesignation has been received may be designated as Class III.

The following areas may be redesignated only as Class I or II:

- An area as of August 7, 1977, exceeding 10,000 acres in size and which was a national monument, a national primitive area, a national preserve, a national recreation area, a national wild and scenic river, a national wildlife refuge, a national lakeshore or seashore; and
- A national park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres in size.

Source: 40 CFR 52.21

**TABLE 3-6**  
**ALLOWABLE PSD INCREMENTS AND IMPACT SIGNIFICANCE LEVELS ( $\mu\text{g}/\text{m}^3$ )**

Pollutant	Averaging Time	PSD Increments*		Significant Impact Levels
		Class I	Class II	
Particulate Matter (TSP)	Annual Geometric Mean	5	19	1
	24-hour Maximum	10	37	5
Particulate Matter ( $\text{PM}_{10}$ )	Annual Arithmetic Mean	4 <sup>a</sup>	17 <sup>a</sup>	1
	24-hour Maximum	8 <sup>a</sup>	30 <sup>a</sup>	5
Sulfur Dioxide	Annual Arithmetic Mean	2	20	1
	24-hour Maximum	5	91	5
	3-hour Maximum	25	512	25
Carbon Monoxide	8-hour Maximum	NA	NA	500
	1-hour Maximum	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	2.5	25	1
<sup>a</sup> Proposed by EPA in the Federal Register on October 5, 1989. Note: Particulate Matter (TSP) = total suspended particulate matter. Particulate Matter ( $\text{PM}_{10}$ ) = particulate matter with aerodynamic diameter $\leq 10 \mu\text{m}$ $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter NA = Not applicable, i.e., no standard exists. Source: Federal Register, Vol 43, No. 118, June 19, 1978; 40 CFR 50; 40 CFR 52.21; F.A.C. Chap. 17-2.400. * No Class III areas have been designated; therefore, there are no Class III increments.				

- Actual emission increases and decreases at any stationary source occurring after the baseline date.

If air quality impacts of a project are less than the significant impact levels presented in Table 3-6, increment consumption is not considered.

The minor source baseline date for SO<sub>2</sub> and TSP has been set as December 27, 1977, for the entire state of Florida (Chapter 17-2.450, F.A.C.). The minor source baseline date for NO<sub>2</sub> has been set as March 28, 1988, for all of Florida.

### **3.1.2.2 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 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 facility or modification exceeds the significant emission rate (see Table 3-4).

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA. The primary purpose of BACT is to optimize consumption of PSD air quality increments and, thereby, enlarge the potential for future economic growth without significantly degrading air quality (USEPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in USEPA's "Guidelines for Determining Best Available Control Technology (BACT)" (USEPA, 1978) and in the "PSD Workshop Manual" (USEPA, 1980). These guidelines were prepared by USEPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area since BACT analyses must be conducted on a case-by-case basis (USEPA, 1980).

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry in light of existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with New Source Performance Standards (NSPS) for a source (if applicable). An evaluation of the air pollution control techniques and systems is required. The evaluation is to include a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the



environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (USEPA, 1978).

Historically, a "bottom-up" approach consistent with the BACT Guidelines and "PSD Workshop Manual" has been used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected. However, USEPA developed a concern that the bottom-up approach was not providing the level of BACT decisions originally intended. As a result, in December 1987, the USEPA Assistant Administrator for Air and Radiation mandated the adoption of a new "top-down" approach to BACT decision making.

The top-down BACT approach starts with the most stringent (or top) technology and emissions limit that has been applied elsewhere to the same or a similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose to use it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic or energy impacts. The differences between the proposed facility and the facility on which the control technique was applied previously must be justified. Recently, USEPA issued a draft guidance document on the top-down approach entitled "Top-Down Best Available Control Technology Guidance Document" (USEPA, 1990a).

A top-down BACT analysis is presented in Section 6.0, Best Available Control Technology.

### **3.1.2.3 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 ambient air quality data in the area affected by any criteria pollutant emitted in significant rates by the proposed major stationary source or major modification.

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

Under the exemption rule, FDER may exempt a proposed PSD source from the monitoring requirements for a particular pollutant if the air quality impacts are less than the *de minimis* levels presented in Table 3-7 [Chapter 17-2.500(3)(e), F.A.C.].

Impacts resulting from the proposed project presented in Section 4.0 indicate impacts will be well below the *de minimis* level and no monitoring is required.

#### 3.1.2.4 Source Impact Analysis

A source impact analysis must be performed for a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-4). The PSD regulations specifically provide for the use of atmospheric dispersion models in performing the impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated USEPA models must normally be used in performing the impact analysis. Specific applications for other than USEPA-approved models require USEPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the USEPA publication "Guideline on Air Quality Models" (USEPA, 1987b). The source impact analysis for criteria pollutants may be limited to only the new or modified source if the net increase in impact due to the new or modified source is below significance levels, as presented in Table 3-6.

Various lengths of record for meteorological data can be utilized for the 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 five years of meteorological data are used in the modeling analysis, the highest concentration at each receptor must normally be used for comparison to air quality standards. Impacts resulting from the proposed project are presented in Section 4.0, Air Quality Impact Analysis.

#### 3.1.2.5 Additional Impact Analyses

In addition to an air quality impact analysis, federal and Florida PSD regulations require analysis 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 due to general commercial, residential, industrial, and other growth associated with the source must also be addressed.

TABLE 3-7

De Minimis Monitoring Concentrations

Pollutant	De Minimis Monitoring Concentration ( $\mu\text{g}/\text{m}^3$ )
Carbon Monoxide	575, 8-hour
Nitrogen Oxides	14, annual
Sulfur Dioxide	13, 24-hour
Total Suspended Particulates	10, 24-hour
Ozone (VOC)	100 TPY <sup>a</sup>
Lead	0.1, 3-month
Asbestos	NM
Beryllium	0.001, 24-hour
Mercury	0.25, 24-hour
Vinyl Chloride	15, 24-hour
Fluorides	0.25, 24-hour
Sulfuric Acid Mist	NM
Total Reduced Sulfur	10, 1-hour
Reduced Sulfur	10, 1-hour
Hydrogen Sulfide	0.2, 1-hour
<sup>a</sup> No de minimis concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone. NM = no ambient measurement method. $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter. VOC = Volatile Organic Compound. Sources: 40 CFR 52.21; Chapter 335-3-14-.04, A.A.C.	

These analyses are required for each pollutant emitted in significant amounts (Table 3-6). These analyses are presented in Section 5.0, Soils, Vegetation, Visibility, and Associated Population Growth Impacts.

### **3.1.2.6 Good Engineering Practice (GEP) Stack Height Analysis**

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollution not be affected by a stack which exceeds GEP height. Further, no dispersion credit is given during air quality modeling for stacks which exceed GEP. GEP stack height is defined as the highest of:

- 65 meters; or
- a height established by applying the formula

$$H_{GEP} = H + 1.5 L$$

Where;  $H_{GEP}$  = GEP Stack Height,

H = Height of the structure or nearby structure, and

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

- a height demonstrated by fluid modeling or field study.

A structure or terrain feature is considered nearby if a stack is within a distance of five times the structure's height or maximum projected width. Only the smaller value of the height or projected width is used and the distance to the structure cannot be greater than 0.8 kilometers. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with National AAQS and PSD increments not exceed GEP stack height, the actual stack height may be greater.

The stack height regulations also increase GEP stack height beyond that resulting from the formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or modeled to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because terrain in the vicinity of the project site is generally flat, plume impaction was not considered in determining the GEP stack height.

The proposed stack at Compressor Station No. 20 will be 65 feet (19.8 meters) tall. Based on the proposed building dimensions, the calculated GEP stack height is less than 65 meters;

therefore, GEP stack height is 65 meters. Since the stack is less than GEP stack height, it complies with the regulatory requirement.

### **3.1.3 Non-Attainment New Source Review (NSR) Rules**

Based on the current non-attainment provisions, all new major stationary sources, or modifications to such sources, located in a non-attainment area must undergo non-attainment New Source Review, if they have the potential to emit above an NSR significant threshold. For major new sources or major modifications that locate in an attainment or unclassifiable area, the non-attainment provisions will also apply if the source or modification is located within the area of influence of a non-attainment area. The area of influence is defined as an area which is outside the boundary of a non-attainment area but within the locus of all points that are 50 km outside the non-attainment area. Based on Chapter 17-2.510(2)(a)2.a, F.A.C., all volatile organic compound sources which are located within an area of influence are exempt from the provisions of new source review for non-attainment areas.

Compressor Station No. 20 is located in an area classified as either attainment or unclassifiable for all criteria pollutants. Therefore, installation of the new IC engine at this compressor station is not subject to federal non-attainment New Source Review.

### **3.1.4 Applicability of New Source Performance Standards (NSPS)**

The regulation of new sources through the development of standards applicable to a specific category of sources was a significant step taken by the 1970 CAA Amendments. The Administrator was directed to prepare and publish a list of stationary source categories which, in the Administrator's judgement, cause or contribute significantly to air pollution and which may reasonably be anticipated to endanger public health. Further, the Administrator was to publish a proposed regulation establishing a Standard of Performance for any new source which fell into that category. The significant feature of the Section was that it would apply to all sources within a given category, regardless of its geographic location or the ambient air quality at that location. The standards, in essence defined emission limitations that would be applicable to a particular source group.

A portion of Section 111 of the Act requires states to develop their own set of performance standards. State standards apply to existing sources and only to those pollutants for which air quality criteria had not been developed or were not covered by either Section 108 or 112 of the Act. Additionally, the states could regulate any source whether it was covered by a federally designated source category or not. It is clear that Congress wanted to give the states specific authority to regulate existing sources which would, otherwise, only be subject to the provisions

of Section 111 if they were new. New Source Performance Standards promulgated by the state of Florida are discussed in Section 3.2 and Appendix E.

Currently, there are 66 separate performance standards published in 40 CFR 60. The new compressor engine to be installed at Compressor Station No. 20 is not subject to any listed standard.

### **3.1.5 Applicability of National Emission Standards for Hazardous Air Pollutants (NESHAP)**

Realizing that there were numerous pollutants that did not meet the specific criteria for development of a National AAQS, Congress included Section 112 in the 1970 amendments which specifically addressed this problem. Section 112 provides the USEPA with a vehicle for developing standards for potentially hazardous pollutants.

During the development of the 1970 CAA Amendments, the Senate prepared a report identifying many such compounds which were to be considered for regulation under the new section. The 1990 CAA Amendments significantly expanded the number of compounds to be regulated under Section 112. Under the current provisions of the Act, 189 compounds or classes of compounds are to be regulated under Section 112 by November 15, 2000.

The regulations which were developed to implement Section 112 are presented in 40 CFR, Part 61. This part contains a listing of those pollutants that have been designated as being hazardous (Part 61.01) as defined in Section 112, and standards applicable to specific industries. Unlike the New Source Performance Standards, this Section is applicable to new and existing sources that emit pollutants subject to the Section. None of the promulgated standards currently apply to Compressor Station No. 20.

## **3.2 Florida State Air Quality Regulations**

Title 17, F.A.C., contains the environmental rules and regulations for the State of Florida. The primary federal regulations which affect Compressor Station No. 20 have been incorporated, for the most part in whole, into the Florida state regulations. Specific air quality regulations of the State of Florida are too numerous to discuss in detail in this section, however, an applicability review was performed during the preparation of this document. The results of this review are presented in Appendix E. Compressor Station No. 20 will operate in compliance with all applicable Florida state regulations as documented in Appendix E.

## **4.0 AIR QUALITY IMPACT ANALYSIS**

The FDER, Air Quality Division, requires that an ambient air quality impact analysis be performed on a proposed project's emissions. For State Authority to Construct permits, this involves comparison of the project's impact to the State and National AAQS, discussed in Section 3.0 of this report. For PSD, additional assessments of increment consumption and impacts on Class I areas must also be conducted. The following section outlines the general approach used for these analyses. This approach was developed in consultation with the FDER and The Guideline on Air Quality Models, (USEPA, 1987b).

### **4.1 Modeling Methodology and Assumptions**

This section outlines the approach used in the air dispersion modeling analysis. Model selection, meteorological data used, structure downwash considerations and model results for Compressor Station No. 20, St. Lucie County, Florida are discussed.

#### **4.1.1 General Modeling Methodology**

The air dispersion modeling approach follows USEPA and the FDER guidelines for determining compliance with State and National AAQSs and PSD. Air dispersion modeling was used to establish compliance with federal and/or state AAQS and to determine whether a PSD significant impact would occur.

The procedure listed below was followed:

- Model predictions for annual and short-term average concentrations based on net increases in NO<sub>x</sub> and CO emissions for the project were performed using the Industrial Source Complex long-term (ISCLT2) and short-term (ISCST2) model (version 92062). A brief description of the Industrial Source Complex (ISC) model is given in Section 4.1.2.
- For preliminary PSD analysis and comparison to annual National AAQS for NO<sub>x</sub>, the ISCLT2 was run using each of the latest five years of available meteorological data obtained from the Support Center for Regulatory Air Models (SCRAM) and processed into the Stability Array (STAR) format. The maximum off-site NO<sub>x</sub> impact from all 5 years was then compared to the PSD/AAQS significance level. Since NO<sub>x</sub> off-site

impacts were greater than the  $1 \mu\text{g}/\text{m}^3$  significance level, additional modeling was performed for  $\text{NO}_x$ .

- An area of impact (AOI) was determined for  $\text{NO}_x$  using all 5 years of meteorological data. The distance to the most distant receptor having a significant annual impact ( $1 \mu\text{g}/\text{m}^3$ ) for  $\text{NO}_x$  was determined and this defined the radius of the AOI.
- PSD increment consumption and a more detailed assessment of National AAQS compliance was performed for  $\text{NO}_x$ , since the maximum impact from the proposed facility sources exceeded the significant impact level ( $1 \mu\text{g}/\text{m}^3$ ). The FDER was consulted and the appropriate PSD increment consuming and National AAQS adjacent source inventory was ordered.
- To determine PSD increment consumption for  $\text{NO}_x$ , the proposed project sources and all other emission sources identified by the FDER as increment consuming were modeled using the ISC-LT2 model. The model was run using the 5 years of data previously discussed. The maximum off-site concentration from this analysis was compared to the PSD Class II increment for  $\text{NO}_x$  of  $25 \mu\text{g}/\text{m}^3$  to determine facility compliance.
- Additional modeling to demonstrate compliance with the  $\text{NO}_x$  National AAQS was conducted in a similar manner. However, all on-site and adjacent  $\text{NO}_x$  emitting sources were included. The results of this screening analysis indicated a potential exceedance of the  $\text{NO}_x$  National AAQS. Therefore, second level screening was performed using the Ozone ( $\text{O}_3$ ) Limiting Method (Cole and Summerhays, 1979).

The use of the Ozone Limiting Method was approved by the FDER on April 7, 1993 (personal communication 1993). The Ozone Limiting Method involves an initial comparison of the estimated maximum  $\text{NO}_x$  concentration and the ambient  $\text{O}_3$  concentration to determine which is the limiting factor to  $\text{NO}_2$  formation.

- i) If the ambient  $\text{O}_3$  concentration is greater than the maximum  $\text{NO}_x$  concentration, total conversion of  $\text{NO}_x$  to  $\text{NO}_2$  is assumed.
- ii) If the maximum  $\text{NO}_x$  concentration is greater than the ambient  $\text{O}_3$  concentration, the formation of  $\text{NO}_2$  is limited by the ambient  $\text{O}_3$  concentration. In this case, the  $\text{NO}_2$  concentration is set equal to the ambient  $\text{O}_3$  concentration plus a correction factor which accounts for in-stack and near stack thermal conversion.



In the Ozone Limiting Method the formation of  $\text{NO}_x$  is based objectively on the oxidizing potential of atmospheric  $\text{O}_3$ . For a more detailed description of the Ozone Limiting Method refer to Appendix G.

- A preconstruction monitoring exemption level analysis was conducted to determine if the proposed facility must conduct an air sampling program prior to construction and start up.
- Since the site is within 150 kilometers of a Class I area, modeling with ISCLT2 was conducted to determine the impact of the PSD increment consuming emissions at the nearest boundary of the Class I area.
- A Level I screening analysis using the USEPA model VISCREEN was used to determine impact on visibility due to the proposed project.
- For comparison to short-term AAQS for CO, the ISCST2 was run with five years (1985-1989) of meteorological data from the Support Center for Regulatory Air Models (SCRAM) Computer Bulletin Board. The maximum predicted off-site concentration was compared to the PSD significance level for CO for each averaging period of concern. Since all off-site receptors showed a concentration less than the significance level, no additional modeling analysis was conducted for CO.

#### **4.1.2 Model Selection**

The ISC dispersion model was used to evaluate emissions from the proposed facility. The ISC model was selected primarily for the following reasons:

- EPA and FDER have approved the general use of the model for air quality dispersion analysis because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (USEPA, 1987b);
- The ISC model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain; and
- The results from the ISC model are appropriate for addressing compliance with AAQS and PSD increments.

Major features of the ISC model are presented in Table 4-1. Concentrations due to point, area and volume sources are calculated by the model using the steady-state Gaussian plume equation for a continuous source.

#### **4.1.3 Modeling Options**

For modeling analyses that will undergo regulatory review, the following model options are recommended in the Guideline on Air Quality Models (USEPA, 1987b) and are referred to as the regulatory default options in the ISC model:

- Final plume rise at all receptor locations,
- Stack-tip downwash,
- Buoyancy-induced dispersion,
- Default wind speed profile coefficients for rural or urban option,
- Default vertical potential temperature gradients, and
- Reducing calculated SO<sub>2</sub> concentrations in urban areas by using a decay half-life of 4 hours (i.e., reduce the SO<sub>2</sub> concentration by 50 percent for every 4 hours of plume travel time).

In this analysis, the USEPA regulatory default options were used to address maximum impacts.

#### **4.1.4 Selection of Dispersion Coefficients**

The ISC model has rural and urban options which affect the wind speed profile, 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 facility'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 kilometer radius around the proposed source, the urban option is selected. Otherwise, the rural option is used. Based on a review of the USGS topographical map of the land within a 3 kilometer radius around the facility, the rural mode was selected.

#### **4.1.5 Meteorological Data**

The USEPA Guideline on Air Quality Models (USEPA, 1987b) recommends the use of 5 years of representative meteorological data for use in air quality modeling. The most recent, readily available 5-year period is preferred. The meteorological data may be collected either on-site or at the nearest National Weather Service (NWS) station.

**TABLE 4-1**  
**Major Features of the ISC Model**

ISC Model Features
<ul style="list-style-type: none"> <li>• Polar or Cartesian coordinate systems for receptor locations</li> <li>• Rural or urban option that affect windspeed profile exponent, dispersion rates, and mixing height calculations</li> <li>• Plume rise as a result of momentum and buoyancy as a function of downwind distance for stack emissions (Briggs)</li> <li>• Procedures suggested by Huber and Snyder (1976), Huber (1977), Schulman and Hanna (1986), and Schulman and Scire (1980) for evaluating building downwash and wake effects</li> <li>• Procedures suggested by Briggs for evaluating stack-tip downwash</li> <li>• Separation of multiple point sources</li> <li>• Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations</li> <li>• Capability of simulating point, line, volume, and area sources</li> <li>• Capability to calculate dry deposition</li> <li>• Variation of windspeed with height (windspeed-profile exponent law)</li> <li>• Concentration estimates for annual average</li> <li>• Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm</li> <li>• Receptors located above local terrain (i.e., "flagpole" receptors)</li> <li>• Consideration of time-dependent exponential decay of pollutants</li> <li>• The method of Pasquill (1976) to account for buoyancy-induced dispersion</li> <li>• A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)</li> </ul>
<p>SOURCE: Users Guide for the Industrial Source Complex (ISC2) Dispersion Models Vol. 1 Draft. USEPA 450/4-92-008a.</p>

The NWS station in West Palm Beach, Florida, located approximately 45 miles south of the site, is the nearest weather station that routinely records the hourly surface data required by air dispersion models. Because of the proximity of this NWS station to the site, the West Palm Beach meteorological data were considered representative of weather conditions occurring at the St. Lucie County Compressor Station.

Meteorological data used in the analysis were obtained from the FDER. The data consisted of a 5-year record of surface and upper air weather observations (1982-1986). Surface and upper air data were collected by the NWS at West Palm Beach. The data base consists of hourly surface data (i.e., windspeed, wind direction), and twice daily mixing heights. The surface and upper air data were preprocessed using the USEPA program RAMMET, which combines the surface and upper air data into a single file, which can then be input directly into the ISCST2 model. The 5 years of surface data from West Palm Beach were then processed using the USEPA STAR program, to generate the STAR files for use in the ISCLT2 model.

#### **4.1.6 Source Data**

The source parameters for Compressor Station No. 20 are given in Table 4-2. The location of the proposed stacks within the facility are presented on the plot plan in Appendix B. The emission point listed as 2005 on Table 4-2 corresponds to the new compressor engine. Emission point 2011 corresponds to the new emergency generator. Table 4-3 lists the emission rates modeled for NO<sub>x</sub> and CO. The maximum pound-per-hour emission rates shown in the table were input to the ISCST2 model to determine concentrations for the short term averaging periods. Vendor supplied emission rates, in grams/bhp-hr, converted to tons per year emission rates, were used by the ISCLT2 model to determine annual average concentrations.

The full list of adjacent sources provided by the FDER is included in Appendix H. The "Screening Ratio Technique," approved by FDER was used to screen out some of the NO<sub>x</sub> sources from the emissions inventory list. A memo discussing the application of the "Screening - Ratio Technique" and the refined adjacent source list are also included in Appendix H.

#### **4.1.7 Receptor Grids Modeled**

For ISCST2 and ISCLT2, the following receptor grids were modeled:

- A 100-meter spaced, 25 x 25 receptor grid array was used to determine the maximum off-site CO concentration.

**TABLE 4-2**

**FGTC Phase III  
Station No. 20  
Summary of Source Parameters Used in the  
Modeling Analysis**

Source Number	Stack Location (m)		Stack Dimensions		Operating Parameters	
	X (m)	Y (m)	Height (m)	Diameter (m)	Temperature (K)	Velocity (m/s)
2005	0	0	19.81	1.22	555.38	14.12
2011	36	150	6.71	0.15	873.16	78.73

**TABLE 4-3**

**FGTC Phase III Expansion  
Station No. 20  
Modeled Emission Rates**

<b>SOURCE NO.</b>	<b>NO<sub>x</sub> TONS/YR</b>	<b>CO MAX LB/HR</b>
2005	77.26	26.46
2011	0.27	2.95
<b>SOURCE NO.</b>	<b>NO<sub>x</sub> GM/SEC</b>	<b>CO MAX GM/SEC</b>
2005	2.22	3.33
2011	0.008	0.37

- A 100-meter spaced, 31 x 31 grid array was used to determine the maximum off-site NO<sub>x</sub> concentration.
- A 100-meter spaced, 31 x 31 grid array was used to cover the AOI for NO<sub>x</sub> adjacent source modeling.
- A 2-kilometer spaced, 31 x 31 grid array was used to determine NO<sub>x</sub> concentrations for the Class I area (Everglades National Park).

These receptor grids were used, per guidance from FDER and the Guideline on Air Quality Models (USEPA, 1987b).

#### 4.1.8 Building Wake Effects and GEP Considerations

Based on the dimensions of the structures located on the facility property, all stacks will be less than GEP height. Also, based on the location of emission points in relation to buildings and other solid structures, the stack emissions will be affected by wakes from some of the structures. Therefore, the potential for building downwash must be considered in the modeling analysis.

The procedure used for addressing the effects of building downwash are those recommended in the User's Guide for the Industrial Source Complex (ISC2) Dispersion Models (USEPA, 1992). In the ISC2 model, the building heights and widths are input in to the model for each direction. If the Huber-Snyder building downwash routine is used, the model picks the worst case dimension from all values. The effective width used by the program is the diameter of a circle with an area equal to the square of the width input to the model.

If a specific width is to be modeled, then the value input to the model must be calculated according to the following formula:

$$M_w = \sqrt{\pi \times \left(\frac{H_w}{2}\right)^2}$$

$$= 0.886H_w$$

where:  $M_w$  = building width input to the model to produce a building width of  $H_w$  used in the dispersion calculation.

$H_w$  = the actual building width for dispersion calculations.

If the Schulman-Scire wake effects method is used, the user inputs the building height and projected width associated with each wind sector. The actual inputs to the ISC2 model were generated using the Bowman Environmental Engineering Automated Downwash Program. The plant coordinates of all building corners, tier corners, tank centers and emission points are input into the Downwash Program. The program provides direction-specific building dimensions for either the ISC2 long- or short-term model, which are then directly input into the ISC2 source file. The program was run using a rectangular building wake area and an angle increment of 1 degree.

A summary of actual building dimensions for structures considered is presented in Table 4-4. Note that the warehouse, control building, paint storage, firehouse building, and pipeline building were not entered into the Bowman Program. Because of the buildings' low heights and positions with respect to the new stacks, they would have no influence on stack emissions.

## 4.2 Model Results

Initial modeling was performed for the net increase in emissions of the following pollutants emitted from the new compressor engine and the emergency generator to be installed at Compressor Station No. 20:

- $\text{NO}_x$ , and
- CO.

These were the only pollutants modeled, since under PSD, only pollutants with a "Significant" increase in emissions resulting from major new or modified sources need to be considered. A summary of the maximum predicted off-site concentrations for each modeled pollutant, averaging period, National AAQS, and PSD/AAQS significance level is shown in Table 4-5. Table 4-6 presents the maximum off-site impact for  $\text{NO}_x$  and CO for each year modeled. The predicted maximum off-site impacts from each pollutant, due to the proposed changes at the facility were generally north and west of the property boundary.

Review of the maximum predicted off-site CO concentrations presented in Table 4-6 shows that all were below the PSD significance levels. The results of this air dispersion modeling indicate



**TABLE 4-4**

**FGTC Phase III  
Station No. 20  
Building Dimensions**

<b>Building</b>	<b>Actual Building Dimensions</b>		
	<b>Height (ft)</b>	<b>Length (ft)</b>	<b>Width (ft)</b>
Office/Auxiliary	21	135	25
Old Compressor Building	34	190	54
New Compressor Building	41	72	60
Warehouse	15	105	30
Control Building	10	15	10
Paint Storage	11	20	20
Fire House Building	12	40	15
Pipeline Building	15	60	30
<b>Note:</b> Only the Office/Auxiliary building, Old Compressor and New Compressor buildings were entered into the GEP model. The other structures do not affect stack emissions.			

TABLE 4-5

FGTC PHASE III  
STATION NO. 20  
MODELING RESULTS  
MAXIMUM PREDICTED AVERAGE CONCENTRATION OF MODELED  
POLLUTANTS AND COMPARISON TO SIGNIFICANT IMPACT LEVEL

	AVG TIME	MAX OFFSITE ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )	SIGNIFICANT IMPACT ( $\mu\text{g}/\text{m}^3$ )
NO <sub>x</sub>				
SOURCES 2005 and 2011	Annual	1.84	100	1
CO				
SOURCES 2005 and 2011	1-hour	113	40,000	2,000
	8-hour	58	10,000	500
Notes: Annual maximums are from 5 separate model runs (1985-1989) STAR met data. Short term maximums are from five runs with 1985-1989 met data.				

**TABLE 4-6**

**FGTC Phase III Project  
Station No. 20  
Maximum Modeled Off-Site Impact**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
NO <sub>x</sub>	Annual	1.72	1.17	1.74	1.49	1.84
CO	1-hour	113	113	108	112	113
	8-hour	58	51	58	52	48
NOTE: All values in $\mu\text{g}/\text{m}^3$ unless otherwise noted.						

that the proposed increase in CO emissions from Compressor Station No. 20 should not have an adverse effect on the surrounding area.

The proposed project's NO<sub>x</sub> and CO maximum predicted off-site concentrations are below the preconstruction monitoring levels. The NO<sub>x</sub> concentration is less than the preconstruction monitoring level of 14 µg/m<sup>3</sup> (1.84 µg/m<sup>3</sup>) and CO 8-hour average concentration is less than the preconstruction monitoring level of 575 µg/m<sup>3</sup> (58 µg/m<sup>3</sup>). Since both CO and NO<sub>x</sub> are below the preconstruction monitoring level, there will not be a need to monitor prior to construction.

The analysis of the proposed project's NO<sub>x</sub> emissions found the maximum exceeded the PSD significance level (1.84 µg/m<sup>3</sup> versus 1.0 µg/m<sup>3</sup>). Therefore, two additional analyses are required as discussed in Section 4.1.1.

For PSD increment consumption, the proposed project sources, and adjacent increment consuming sources identified by the state were processed using the ISCLT model. Table 4-7 presents the results of this effort. As shown by the table, the maximum increment consumed is 2.31 µg/m<sup>3</sup> compared to PSD Class II limit of 25 µg/m<sup>3</sup>. Therefore, the proposed project is in compliance with PSD regulations.

The second additional analysis required a demonstration of compliance with the National AAQS. This analysis was similar to that performed for increment consumption but included all on- and off-site sources, not just those which consume PSD increment. Table 4-8 presents a summary of the National AAQS compliance review.

The maximum off-site annual average NO<sub>x</sub> concentration was predicted to be 287 µg/m<sup>3</sup> (Table 4-8). Therefore, the Ozone Limiting Method, which is a second-level screening technique discussed in Section 6.2.3 of the USEPA Guideline on Air Quality Models (USEPA 1987b), was used to refine the estimate of project impact.

An annual average ozone concentration of 1.15 ppm (24.4 µg/m<sup>3</sup>) for St. Lucie County was provided by FDER. This data was combined with the results from the ISCLT2 model, as input to the Ozone Limiting Method described in Appendix G. The resulting maximum predicted NO<sub>2</sub> concentrations are listed in the last column of Table 4-8. The maximum off-site NO<sub>2</sub> concentration, including the addition of the background NO<sub>x</sub> concentration, was 74.1 µg/m<sup>3</sup>.

This result indicates that the maximum post project NO<sub>2</sub> concentration will not exceed the National AAQS limit of 100 µg/m<sup>3</sup>.

**TABLE 4-7**

**FGTC Phase III Project  
Station No. 20  
PSD Adjacent Sources  
Maximum Modeled Off-Site Impact  
for PSD Increment Analysis**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
<b>NO<sub>x</sub></b>	<b>Annual</b>	2.18	1.73	2.19	1.94	2.31
NOTE: All values in $\mu\text{g}/\text{m}^3$ unless otherwise noted. NO <sub>x</sub> Class II PSD increment equals $25\mu\text{g}/\text{m}^3$ .						

**TABLE 4-8**  
**FGTC Phase III Project**  
**Station 20**  
**Ozone Limiting Results**  
**( $\mu\text{g}/\text{m}^3$ )**

Year	Maximum NO <sub>x</sub> Impact	Thermal NO <sub>x</sub> <sup>a</sup>	Background Annual Average Ozone Concentration	NO <sub>2</sub> Impact <sup>b</sup>	Background Annual Average NO <sub>x</sub>	Total NO <sub>2</sub> Impact
1985	286.5	28.7	24.4	53.1	21	74.1
1986	254.7	25.5	24.4	49.9	21	70.9
1987	282.1	28.2	24.4	52.6	21	73.6
1988	284.8	28.5	24.4	52.9	21	73.9
1989	286.1	28.6	24.4	53.0	21	74.0
<sup>a</sup> Thermal NO <sub>x</sub> = 0.1 [NO <sub>x</sub> ] <sup>b</sup> [NO <sub>2</sub> ] = 0.1 [NO <sub>x</sub> ] + [O <sub>3</sub> ] Note: [ ] denotes concentrations						

Since the site is within 150 kilometers of the Everglades National Park, additional analysis was required for Visibility and Class I increment. A visual effects screening model (VISCREEN) showed that impacts on visibility from the facility would not exceed the criteria inside or outside the closest Class I area (Everglades National Park). The maximum predicted plume contrast against both sky (0.000) and terrain (0.00) is well below the Class I criteria for visibility (0.05). The delta E color difference parameter for sky (0.002) and terrain (0.00) is much less than the 2.00 criteria. The results of the visibility analysis are included in Appendix F.

A floppy diskette containing all model input and output files, and structure downwash program input and output is included in Appendix F. Area concentration maps, showing the facility boundary and maximum impacts for NO<sub>x</sub> and CO at each modeled receptor, are included in Appendix F for the worst case year.

## **5.0 SOILS, VEGETATION, VISIBILITY AND ASSOCIATED POPULATION GROWTH IMPACTS**

PSD regulations require proposed actions be reviewed for potential effects to soils, vegetation, visibility and that they be evaluated for possible secondary air quality impacts associated with population growth induced by the project. This section reviews these issues for the proposed expansion of Compressor Station No. 20.

### **5.1 Impacts Upon Soils and Vegetation**

The USEPA has suggested screening level concentrations for determining the potential for impacts to vegetation impacts from exposure to  $\text{NO}_x$ ,  $\text{SO}_2$  and  $\text{CO}$ . Since  $\text{NO}_x$  is the only pollutant which will be emitted in significant quantities, it will be the only pollutant reviewed for impacts to vegetation.

The USEPA screening threshold is  $94 \mu\text{g}/\text{m}^3$  for  $\text{NO}_x$  on an annual basis. Maximum project impact for  $\text{NO}_x$  is predicted to be  $1.84 \mu\text{g}/\text{m}^3$ , therefore no impact to vegetation is likely and no additional investigation warranted.

The amounts of nitrogen and/or sulfur which could be deposited on local soils by the project are minimal. Therefore, although not quantified, the impacts are not expected to be measurable.

### **5.2 Impacts Upon Visibility**

Analysis of impacts to visibility, as required under PSD regulations is directed toward preserving the "integral vista" of Class I areas. In Florida, this analysis is restricted to those sources within 150 kilometers of a Class I area due to the limited ability of current models to accurately define impacts for areas outside this zone.

The only Class I area within 150 km of Compressor Station No. 20 is The Everglades National Park, 135 kilometers south. Based on the results of the USEPA VISCREEEN model as presented in Section 4.2, no adverse impact is expected.



### **5.3 Impacts Due to Associated Population Growth**

There will be a small increase in the number of temporary construction workers during the construction of the additional facilities at Compressor Station No. 20. However, there will be no increase in the permanent regional work force. As a result there will be no permanent impacts on air quality due to associated population growth.

## **6.0 BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION**

The prime movers in the natural gas industry are generally heavy duty, natural gas-fired, stationary IC engines. These engines are applied to power compressors used for pipeline transmission, field collection of gas from wells, underground storage, and gas processing plant activities. Stationary IC engines used include both gas turbines and reciprocating engines.

The use of reciprocating engines has been widespread at natural gas pipeline compressor stations. A recent Gas Research Institute research study (GRI, 1990) reports that the number of reciprocating engines is five times that of gas turbines. The advantages of reciprocating engines are primarily their fuel efficiency and their capability to operate reliably at variable loads to meet the fluctuating pipeline conditions. Since Compressor Station No. 20 is an existing compressor station with significant load fluctuations, a reciprocating engine will be installed.

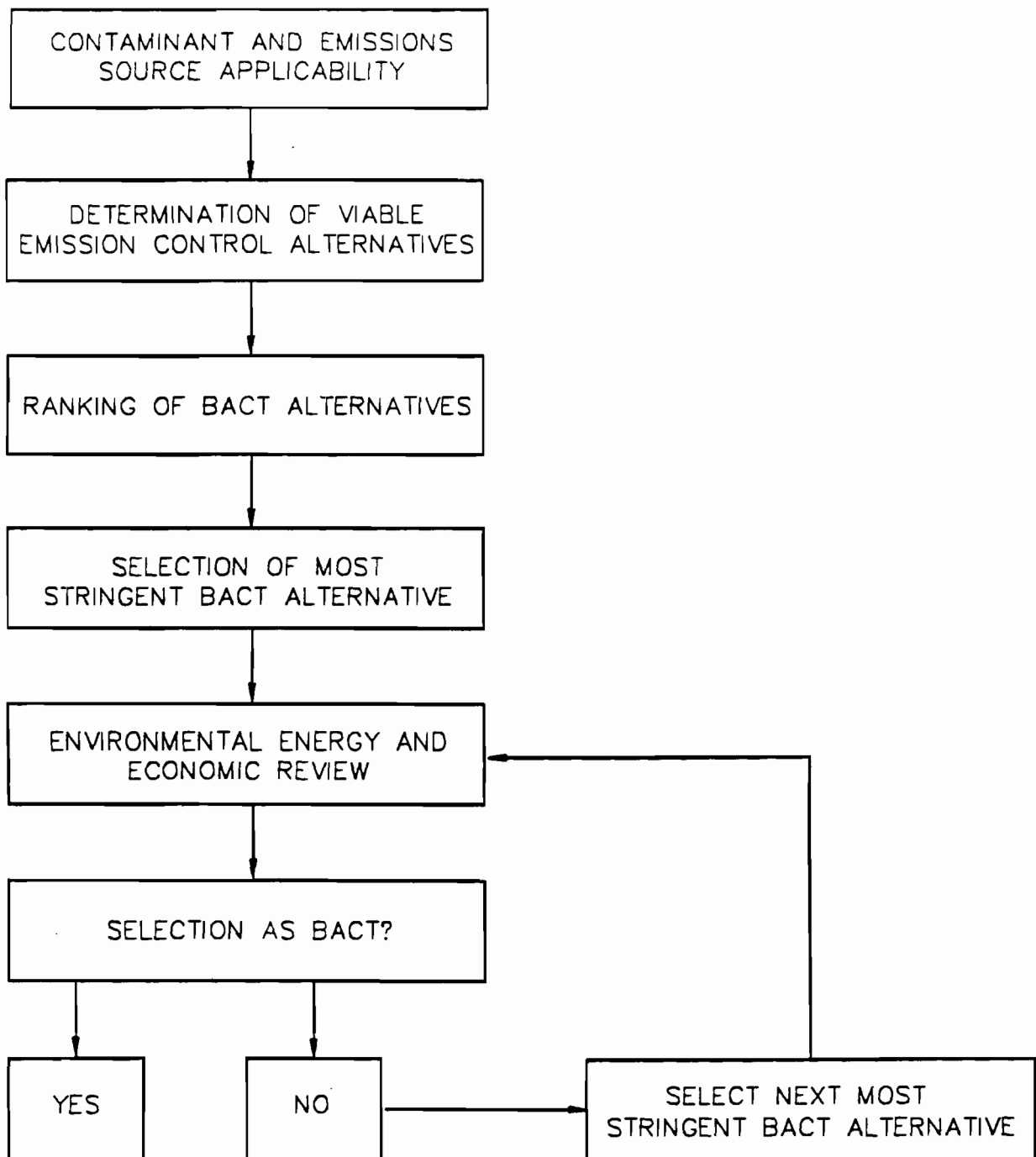
FGTC selected the use of a reciprocating engine instead of a gas turbine for the following reasons:

- Gas turbines do not respond as quickly and efficiently to load changes. Wide fluctuations in gas demand are likely to occur along the pipeline at the location of Compressor Station No. 20.
- Compressor Station No. 20 is an existing station with 4 reciprocating engines operating on site. The mechanical operation of a reciprocating engine generates a pulse vibration which can adversely affect the operation of a gas turbine.

The total potential emissions of NO<sub>x</sub> from the proposed new engine are 77.26 TPY, exceeding the PSD significant emission rate of 40 TPY. Therefore, a BACT analysis for NO<sub>x</sub> must be performed, including identification of control technologies for reciprocating engines; a review of environmental, energy and economic impacts associated with technically feasible control options; and a BACT analysis summary.

### **6.1 The BACT Process**

The structure of the BACT analysis is shown in Figure 6-1. This approach reflects the most recent "top-down" BACT guidance (USEPA, 1990a) by USEPA for PSD permit determinations as described in Section 3.1.2.2 of this report application.



**ENSR**™

ENSR CONSULTING & ENGINEERING

FIGURE 6-1  
"TOP DOWN" BACT  
DECISION-MAKING PROCESS  
FLORIDA GAS TRANSMISSION COMPANY  
FLORIDA

DRAWN: SH	DATE: 01-19-93	PROJECT NUMBER:
APPV'D:	REVISED:	6792-068

No technically feasible alternative should be ruled out when emission control technologies are selected for evaluation as BACT. The review should be broad enough to consider controls applied to similar source categories as well as innovative control technology where energy, environmental, or economic impacts so warrant.

The environmental analysis should estimate the net impact associated with each control alternative. Both beneficial, as well as, adverse impacts should be discussed and, where possible, quantified. When environmental impacts are weighed, the analysis should consider all pollutants affected by the control alternative. This includes pollutants that are not currently regulated under the CAA (such as air toxics), but may cause significant environmental impacts. In addition, the environmental analysis should consider appropriate non-air effects, such as water pollution or solid/hazardous waste impacts.

The energy impact analysis should estimate the direct energy effects of the control alternatives in units of energy consumption (Btu's, kwh, barrels of oil, tons of coal, etc.). Where possible, the energy requirements of the control options should be shown in terms of total and incremental (units of energy per ton of reduction) energy costs.

The economic analysis involves assessing the costs associated with installation and operation of the various BACT alternatives. Examples of costs to be included are:

- capital and interest charges,
- engineering and installation costs,
- operating and maintenance labor and materials costs,
- energy costs,
- water disposal costs, and
- lost revenue due to equipment downtime.

Credit for tax incentives should also be included along with credits for product recovery costs and by-product sales generated from the use of control systems.

This review follows the standard approach for BACT economic evaluations that determines annual control cost per unit of pollution removed. The total annual operating cost, in dollars, for alternative controls are divided by the total emission reductions in tons, to produce easily compared dollars per ton ratios. Incremental cost ratios (in dollars per ton) of one control method over another are also calculated for comparison based on incremental annual cost and incremental emissions reductions approved for BACT economic evaluations. Additional details of this cost estimating procedure are contained in Appendix I.

## **6.2 NO<sub>x</sub> Control Review**

This section provides the NO<sub>x</sub> BACT assessment for the proposed engine to be installed at Compressor Station No. 20.

### **6.2.1 Applicable NSPS**

The minimum control requirements of BACT are those imposed by NSPS. For IC engines an NSPS has been promulgated only for stationary gas turbines (40 CFR Part 60, Subpart GG). A comparable standard for reciprocating engines has not been issued. Therefore, NSPS regulations do not provide any guidance in establishing BACT.

### **6.2.2 Previous BACT Limits**

Another important consideration in reviewing potential BACT emission limits is past BACT determinations for similar sources. The USEPA BACT/LAER Clearinghouse (USEPA, 1987-1992) contains extensive data on past BACT regulatory determinations for reciprocating engines in natural gas compressor service. Table 6-1 summarizes BACT determinations issued since 1987 for NO<sub>x</sub> emissions from gas-fired stationary reciprocating engines. The information was obtained from BACT/LAER Clearinghouse documents from 1987 to 1992, as well as from actual permit applications, permits issued, and conversations with personnel of air permitting agencies from various states. Information from the BLIS Bulletin Board System was obtained using the following standard query: Process Code Number = 15.004 (Natural Gas Internal Combustion), Process Name = Engine, and Pollutant = NO<sub>x</sub>. All reciprocating engines, which include natural gas compressor stations and power/cogeneration and other uses identified in the BACT/LAER Clearinghouse are listed in a table in Appendix I.

### **6.2.3 Identification of NO<sub>x</sub> Control Technologies for Reciprocating Engines**

This section evaluates the control technologies capable of reducing NO<sub>x</sub> emissions produced by reciprocating engines relative to their potential application as BACT for the proposed 4,000-bhp reciprocating engine. This BACT analysis follows USEPA's most recent draft guideline for the top-down approach (USEPA, 1990a).

All potentially applicable control technologies for reciprocating engines are reviewed. The technologies can be separated into two major groups:

- Reducing NO<sub>x</sub> emissions by modification of the conventional reciprocating engine with "low-NO<sub>x</sub>" engine design, and

**TABLE 6-1**  
**Summary of BACT Determinations for NOx Emissions from Natural Gas-Fired Reciprocating Pipeline Compressor Engines**

Company Name	State	Permit Number	Date of Permit	Total Capacity (Bhp)	Engine Specifications				NOx Emission Limit*			Control Method
					Fuel Type	Make	Model	Size (Bhp)	(g/Bhp-hr)	(lb/hr)	(tpy)	
Southern Natural Gas Co.	AL	406-0003-X002	19-Feb-88	4,160	N.G.			4,160	2.2			Clean Burn Engine
Florida Gas Transmission Company	AL	503-3028-X001	22-Feb-91	2,400	N.G.	Cooper	GMVR-12C	2,400	2.0			Lean Combustion
Southern Natural Gas Company	AL	406-0003-X	19-Feb-88	4,160	N.G.	Dresser-Rand	TCVD-10	4,160	2.2	20.2		Lean Burn Engine(1)
Mohave Pipeline Operating Co.	AZ	1231	12-Jun-91	17,500	N.G.			17,500			491.7	Fuel Usage
Mohave Pipeline Operating Co.	AZ	1231	12-Jun-91	13,800	N.G.			13,800			347.8	Fuel Usage
Florida Gas Transmission Company	FL	FL-160	09-May-91	4,000	N.G.	Cooper	GW-330C2	4,000	2.0			Lean Burn Engine
Florida Gas Transmission Company	FL	FL-161	10-May-91	2,400	N.G.	Dresser-Rand	412-KVSR	2,400	2.0			Lean Burn Engine
Northern Natural Gas Company	IA	PROJECT-89-117	05-Sep-90	8,000	N.G.	Cooper		4,000	1.8			Lean Burn Engine
Northern Natural Gas Company	IA	PROJECT-89-117	05-Sep-90	8,000	N.G.	Cooper		2,000	1.8			Lean Burn Engine
Northern Natural Gas Company	IA	PROJECT-89-117	05-Sep-90	8,000	N.G.	Cooper		2,000	1.8			Lean Burn Engine
Natural Gas Pipeline Company	IL	85100014	01-Mar-89	1,600	N.G.	Worthington	MLV-10	4,000	9.0	79.4		Design & Oper. Pract.
Florida Gas Transmission Company	LA	PSD-LA-567	17-Apr-91	2,400	N.G.	Cooper	GMWC-8C	2,400	3.5			Lean Burn Engine
Florida Gas Transmission Company	MS	2200-00008	14-May-91	2,400	N.G.	Dresser-Rand	412-KVSR	2,400	2.0			Lean Combustion
Meridian Oil Gathering, Inc.	NM	PSD-NM-742-M-2	11-Oct-90	21,200	N.G.	White Super.	8SGTB	2,650	1.5			Clean Burn
NGPL	OK	90-075-C	01-Nov-90	2,400	N.G.			2,400	2.5			Lean Burn Combustion
NGPL	OK	90-075-C	01-Nov-90	1,600	N.G.			1,600	2.5			Lean Burn Combustion
Consolidated Gas Pipeline Corp.	PA	59-399-008	10-May-88	8,400	N.G.	Dresser-Rand	TCV-10	4,200	3.0	27.8		Lean Burn Engine (2)
National Fuel Gas Supply Corp.	PA	53-329-001	13-Jun-89	6,000	N.G.	Cooper	8015JHC2	3,000	2.0	13.2		Lean Burn Engine
National Fuel Gas Supply Corp.	PA	53-329-022	01-Oct-90	2,600	N.G.	Waukesha	12V-AT25GL	2,600	2.0	6.6		Clean Burn Tech.
CNG Transmission Corporation	PA	18-329-001	24-Sep-91	4,200	N.G.	Superior	12-SGTB	4,200	2.0	6.6		Clean Burn Tech.
CNG Transmission Corporation	PA	04-329-001	13-Mar-92	3,200	N.G.			3,200	2.0	3.4		Clean Burn Tech.
ANR Production Company	VA	11064	03-Mar-88	1,800	N.G.	Caterpillar	G398TAA	600	1.2	1.6		Catalytic Converter

(1) Per Stack Test

(2) Air to Fuel Ratio = 4.5 to 1

\* For a single engine

\*\* pound per day

N.G = Natural Gas

- Converting NO<sub>x</sub> in the exhaust gas from the reciprocating engine by add-on catalytic exhaust gas treatment devices.

The discussion of each potential NO<sub>x</sub> control technology includes a description of the technology and the potential NO<sub>x</sub> emission reduction, if the technology is concluded to be technically feasible.

#### **6.2.4 Technologies Involving Engine Modification**

The concept of low-NO<sub>x</sub> reciprocating engines is described in the NSPS Background Information Document (BID) for reciprocating engines issued by USEPA in July 1979 (USEPA, 1979). Five types of engine or process modifications have been recognized by USEPA as technically viable for reducing NO<sub>x</sub> emissions from stationary reciprocating engines:

- Steam/Water injection,
- Air-to-fuel ratio changes,
- Retarded ignition timing,
- Derating power output, and
- Exhaust gas recirculation.

Each method is discussed in the following sections.

##### **6.2.4.1 Steam/Water Injection**

The concept of designing a low-NO<sub>x</sub> reciprocating engine focuses on controlling the combustion temperature, because thermal NO<sub>x</sub> formation generally increases as combustion temperature increases. Favorable conditions for thermal oxidation of molecular nitrogen can be reduced by quenching the flame temperature with low quality steam or water. In this method, steam or water is injected at a location downstream from the combustion zone inside each firing cylinder.

Steam or water injection to reduce NO<sub>x</sub> formation does not work well at the high water injection rate required for reciprocating engines. Experiments with large-bore, reciprocating engines have concluded that steam/water injection for controlling NO<sub>x</sub> emissions can cause irreversible structural damage to the engine block (USEPA, 1979). Thus, steam or water injection technology for reciprocating engines is considered technically infeasible. Therefore, this method will not be discussed further.

#### 6.2.4.2 Air-to-Fuel Ratio Changes

The state-of-the-art concept in designing a low-NO<sub>x</sub> reciprocating engine involves raising the air-to-fuel ratio to create a lean fuel mixture for the combustion process. The peak combustion temperature is lowered due to a lower heat of combustion from burning less fuel, and by the high excess air level, which tends to dilute the combustion gases. Cooper-Bessemer was the first manufacturer of reciprocating engines to incorporate this concept, which it called CleanBurn® technology, into the design of new engines.

In general, the high air-to-fuel ratio design is referred to as lean-burn technology for gas-fired reciprocating engines. The name is derived from the lean mixture of air-to-fuel in the main combustion cylinder. The air-to-fuel ratio can reach as high as 200 for some engine designs and operating conditions, according to one of the major reciprocating engine suppliers (Dresser-Rand, 1990).

The lean-burn design requires increasing the stoichiometric air-to-fuel ratio above the design ratio for a conventional reciprocating rich-burn engine. In general, small increases in the air-to-fuel ratio (approximately 10%) cause a significant reduction in NO<sub>x</sub> (approximately 30%) with less than a 5% fuel penalty (USEPA, 1979). On turbocharged engines, this NO<sub>x</sub> reduction using lean-burn technology can be achieved by operating at high manifold pressures, which results in lower combustion temperatures and reduces NO<sub>x</sub> formation; however, misfiring and erratic combustion can occur at very lean mixtures. The limits to which the air-to-fuel ratio can be increased are related to three major engine design factors:

- The capability of the turbocharger to produce higher air manifold pressures for rated engine loading,
- The ability of the ignition system to light-off the leaner mixtures, and
- The combustion chamber characteristics which must maintain efficient combustion with leaner mixtures.

With the current state-of-the-art engine and turbocharger designs coupled with advanced control technology, all of these factors can be achieved.

Lean-burn, natural gas-fired reciprocating engines are capable of achieving NO<sub>x</sub> emission levels as low as 2.0 grams/bhp-hr, depending on size of the engine, manufacturer, type of fuel, etc. NO<sub>x</sub> emissions from current generation uncontrolled rich-burn or first generation lean-burn



reciprocating engines are equal to 11 grams/bhp-hr as presented in AP-42, Section 3.2 (USEPA, 1988). Thus, the state-of-the-art, lean-burn engine results in a NO<sub>x</sub> decrease of 82%.

#### **6.2.4.3 Retarded Ignition Timing**

Retarding the spark ignition timing of the reciprocating engine reduces the peak combustion pressure and temperature, thereby lowering thermal NO<sub>x</sub> formation. The timing delay is measured by degrees in reference to the engine's crankshaft rotation. The greatest benefit from this method is realized with small (2 to 6°) changes in timing. After about 6° timing retard, the amount of NO<sub>x</sub> reduction per degree diminishes while fuel consumption rises rapidly (USEPA, 1979).

A study for the American Gas Association showed that the NO<sub>x</sub> emissions from 10 different gas-fired, naturally aspirated engine models ranged from a 7% reduction to a 2% increase per degree of ignition retardation (Urban and Springer, 1975). USEPA's research (USEPA, 1979) reported that NO<sub>x</sub> reductions (per degree of retard) ranged from 0.6% to 8.5% for turbocharged engines. Overall, the USEPA's report concluded that retarding ignition timing reduced NO<sub>x</sub> emissions 15% for uncontrolled gas-fired engines.

Based on an uncontrolled emission rate of 11.0 grams/bhp-hr, as specified in USEPA's AP-42, retarding the ignition could conceivably result in an emission rate as low as 9.35 grams/bhp-hr. However, this is more than 4.5 times higher than for the engine proposed for installation at Compressor Station No. 20.

This method is not applicable to the new generation of lean-burn engines, as control of ignition timing has already been incorporated in the design of the units. Further adjustments could actually increase NO<sub>x</sub> emissions which runs counter to the indicated objective. Therefore, this method will not be reviewed further.

#### **6.2.4.4 Derating Power Output**

A reciprocating engine can be derated by operating at less than its full rated horsepower. The effect of derating on an engine is to reduce peak combustion cylinder temperatures and pressures, thus lowering NO<sub>x</sub> formation rates.

Reported NO<sub>x</sub> reduction levels achieved by derating an engine vary greatly for different reciprocating engines. Data compiled by USEPA (USEPA, 1979) show that non-turbocharged engines achieve the largest reduction because derating has a greater effect on air-to-fuel ratios for these units. In contrast, turbocharged engines operate at a more constant air-to-fuel ratio

and, therefore, very little NO<sub>x</sub> reduction is achieved by derating. Normalized NO<sub>x</sub> reduction from derating (i.e., percent of NO<sub>x</sub> reduction per percent derate) is reported from 0.25% to 6.2% for normally aspirated or blower-charged engines, and 0.01% to 2.6% for turbocharged engines. The USEPA report showed that NO<sub>x</sub> reduction ranged from a 10% increase to a 90% reduction, and averaged approximately a 35% reduction at a derating of 25% of rated torque for all engines as a group. Naturally aspirated engines are affected to a greater degree, as derating has a more significant fuel leaning effect on this engine type. Turbocharged engines are affected to a lesser degree as changes to air-to-fuel ratio are less.

While it is true that an emission reduction can be achieved by this method, the horsepower produced by the engine is also reduced. The 4,000 horsepower required for Compressor Station No. 20 was determined by FGTC's System Planning Department as needed to meet the projected gas volume demand based on FGTC gas contracts. Therefore, lowering the required horsepower of the proposed engine would decrease the volume of gas transmitted through the station and ultimately jeopardize FGTC's ability to fulfill gas contracts. If this method were employed at Compressor Station No. 20, a larger compressor engine would be required to compensate for the power derate. The net effect of installing a larger engine (5,400 bhp) and derating by 25% for NO<sub>x</sub> control is a 20% decrease in NO<sub>x</sub> emissions (0.8% NO<sub>x</sub> reduction per percent derate).

#### **6.2.4.5 Exhaust Gas Recirculation**

Exhaust gas recirculation (EGR) reduces peak combustion temperatures in a reciprocating engine by replacing a fraction of the combustion air with exhaust gases. The recirculated exhaust gases serve to absorb heat without providing significant additional oxygen for the conversion of nitrogen to NO<sub>x</sub>.

EGR can be accomplished by either introducing exhaust gases into the intake manifold or restricting the exit of gases from the cylinder by internal recirculation. Externally recirculated gases must be cooled before they are reintroduced into the combustion cylinder to provide greater heat absorption per charge.

EGR is most effective in reducing NO<sub>x</sub> emission from conventional, rich-burn reciprocating engines because its application can increase the air-to-fuel ratio. USEPA's research (1979) reported a NO<sub>x</sub> reduction of 34% for a gas-fired blower-charged engine with 6% EGR rate. Excessive EGR rates can result in increased fuel consumption, high CO emissions, and engine misfire (GRI, 1990).

EGR is not effective for a lean-burn engine with a high air intake flow rate, since EGR cannot further dilute the air/fuel mixture to any appreciable degree. In addition, no system has been developed for the complex control needed to regulate the recirculation of the exhaust gases.

Based on the NO<sub>x</sub> emission rate from an uncontrolled rich-burn engine of 11.0 grams/bhp-hr, and 34% reduction due to EGR, EGR is capable of achieving a NO<sub>x</sub> emission rate of 7.3 grams/bhp-hr. Because EGR does not apply to the current generation of lean-burn engines, and because the emission rate EGR would produce for a rich-burn engine is greater than that proposed, EGR will not be reviewed further.

## **6.2.5 Technologies Involving Exhaust Gas Treatment**

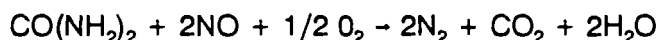
Review of the literature on control technologies has identified four post-combustion control options for reducing NO<sub>x</sub> emissions. These options include:

- NO<sub>x</sub>OUT Process
- Thermal DeNO<sub>x</sub>
- Nonselective Catalytic Reduction
- Selective Catalytic Reduction

Each of these control methods and their applicability to the proposed project are reviewed below.

### **6.2.5.1 NO<sub>x</sub>OUT Process**

The NO<sub>x</sub>OUT process originated from the initial research by the Electric Power Research Institute (EPRI) in 1976 on the use of urea to reduce NO<sub>x</sub>. EPRI licensed the proprietary process to Fuel Tech, Inc., for commercialization. In the NO<sub>x</sub>OUT process, aqueous urea is injected into the flue gas stream ideally within a temperature range of 1,600°F to 1,900°F (Fuel Tech, 1990). In the presence of oxygen, the following reaction occurs:



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<sub>x</sub>. 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 1,000°F and 1,950°F (Lin, Diep and Dubin, 1991). Advantages of the system are:

- Low capital and operating costs due to utilization of urea injection, and

- The proprietary catalysts used are nontoxic and nonhazardous, thus eliminating potential disposal problems.

Disadvantages of the system are:

- Formation of ammonia from excess urea treatment rates and/or improper use of reagent catalysts, and
- $\text{SO}_3$ , 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  $\text{NO}_x\text{OUT}$  system is limited to three reported cases:

- Trial demonstration on a 62.5-ton-per-hour (TPH) stoker-fired wood waste boiler with 60 to 65%  $\text{NO}_x$  reduction,
- A 600-million-British-thermal-unit (MMBtu) CO boiler with 60 to 70%  $\text{NO}_x$  reduction, and
- A 75-megawatt (MW) pulverized coal-fired unit with 65%  $\text{NO}_x$  reduction.

The  $\text{NO}_x\text{OUT}$  system has not been demonstrated on any stationary IC engine.

The  $\text{NO}_x\text{OUT}$  process is not technically feasible for the proposed lean-burn engine. The exhaust gas temperature of a lean-burn engine is typically between 495°F and 550°F, well below the temperature range of 1,000°F to 1950°F required for the  $\text{NO}_x\text{OUT}$  process to work effectively. Raising the exhaust temperature several hundred degrees would require installation of an exhaust gas heater. The heater installation would be economically prohibitive and would result in increases in fuel consumption, the volume of gases that must be treated by the control system, and increased air emissions, including  $\text{NO}_x$ . Therefore, this analysis does not consider the  $\text{NO}_x\text{OUT}$  process.

#### 6.2.5.2 Thermal De $\text{NO}_x$

Thermal De $\text{NO}_x$  is Exxon Research and Engineering Company's (Exxon, 1986, 1987) patented process for  $\text{NO}_x$  reduction. The process is a high temperature selective noncatalytic reduction (SNCR) of  $\text{NO}_x$  using ammonia as the reducing agent. Thermal De $\text{NO}_x$  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, the required temperature must be achieved by additional firing in the exhaust stream prior to ammonia injection.

The only known commercial applications of Thermal DeNO<sub>x</sub> are on heavy industrial boilers, large furnaces, and incinerators with exhaust gas temperatures above 1,800°F. There are no known Thermal DeNO<sub>x</sub> applications in the reciprocating engine industry. Temperatures of 1,800°F require alloy construction materials with very large piping and components since the exhaust gas volume is increased by several times. As with the NO<sub>x</sub>OUT process, high capital, operating, and maintenance costs are expected due to construction material specifications, additional duct burner systems, and increased fuel consumption. Burning additional fuel would increase emissions.

The exhaust gas temperature of a lean-burn engine is typically between 495°F to 550°F thus, the Thermal DeNO<sub>x</sub> process is technically infeasible because the reciprocating engines exhaust gas temperature is below the optimal temperature range of 1,000 to 1,800°F, and the cost to raise the exhaust gas to such a high temperature would be prohibitively expensive.

#### **6.2.5.3 Nonselective Catalytic Reduction**

A non-selective catalytic reduction system (NSCR), is commercially available for NO<sub>x</sub> 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) to be effective. Because rich-burn engines typically achieve low oxygen levels of less than 4% and the required (GRI, 1990) temperature, they can use the NSCR process. Lean-burn engines typically have a high air-to-fuel ratio (exhaust gas oxygen content of 12 to 15%), and an exhaust gas temperature of 515°F. As a result, NSCR is not a technically feasible add-on NO<sub>x</sub> control device for FGTC's proposed lean-burn engine. Therefore, the combination of a lean-burn engine and NSCR was not considered further in the BACT analysis.

#### **6.2.5.4 Lean-Burn Engine with Selective Catalytic Reduction (SCR)**

A NO<sub>x</sub> abatement technology for oil- and gas-fired combustion sources currently receiving considerable attention is the selective catalytic reduction (SCR) process with ammonia injection. The technology has been well developed and applied in Japan, especially for control of emissions from gas-, oil-, and coal-fired utility boilers. SCR has been applied domestically on combustion sources which generate large quantities of NO<sub>x</sub>, such as utility and industrial boilers and electric power generating gas turbines.

SCR catalysts consist of two types: metal oxides and zeolite. The base metal catalysts are either vanadium or titanium embedded into a ceramic matrix structure; the zeolite catalysts are ceramic molecular sieves extruded into modules of honeycomb shape. The all-ceramic zeolite catalysts are durable, and less susceptible to catalyst masking or poisoning than the noble

metal/ceramic base catalysts (Byrne, Chen and Speronello, 1991). All catalysts exhibit advantages and disadvantages in terms of exhaust gas temperatures, ammonia/ $\text{NO}_x$  ratio, and optimum exhaust gas oxygen concentrations. A common disadvantage for all catalyst systems is the narrow window of temperature between 600°F and 900°F within which the  $\text{NO}_x$  reduction process takes place (Schorr, 1989; Steuler, 1990a, 1990b; Engelhard, 1990a,b,c; Johnson-Matthey, 1990). Operating outside this temperature range results in catastrophic harm to the catalyst system. Chemical poisoning can occur at lower temperature conditions, while thermal degradation occurs at higher temperatures. Reactivity can be restored only through catalyst replacement.

Catalysts are subject to loss of activity over time. Since the catalyst is the most costly component of the SCR system, applications require servicing and cleaning the catalyst's surface every 2,000 to 3,000 hours of operation. The cleaning normally consists of blowing the catalyst surfaces with a compressed air gun or water jet. Most catalyst suppliers guarantee a catalyst life of 3 years, assuming certain operating conditions.

Technically, SCR is potentially applicable to further reduce the already low  $\text{NO}_x$  emissions (2 grams/bhp-hr) from the proposed lean-burn reciprocating engine. SCR is capable of achieving  $\text{NO}_x$  reduction of 70 to 90%. For the proposed lean-burn engine, with already low  $\text{NO}_x$  concentration in the exhaust gases, a removal rate of 80% is the maximum which can be expected. This would result in  $\text{NO}_x$  emissions of 0.4 grams/bhp-hr, which represents an overall 96%  $\text{NO}_x$  reduction compared to an uncontrolled rich-burn engine (at 11.0 grams/bhp-hr).

#### **6.2.5.5 Combination of Rich-Burn Engine and NSCR**

Although the March 15, 1990, draft top-down BACT guideline document does not require inherently higher emitting processes than the proposed process be evaluated, this BACT analysis also considered the option of using rich-burn engines coupled with NSCR.

Rich-burn reciprocating engines are defined as those which contain less than 4% oxygen concentration in the exhaust gas. Typically, rich-burn engines are naturally aspirated engines with near stoichiometric air-to-fuel ratios and produce exhaust gas temperatures in the range of 1,200°F to 1,300°F.

NSCR technology uses a precious metal to catalyze the reactions of  $\text{NO}_x$  with CO and unburned hydrocarbon fuel in the exhaust gas streams to form nitrogen, carbon dioxide, and water vapor. A complete NSCR system includes an exhaust gas oxygen sensor, an exhaust gas monitor, a hydrocarbon fuel injector, an automatic air/fuel controller, and a temperature sensor for automatic shutdown of the engine if overheating occurs. The engine exhaust entering the

catalyst bed is maintained slightly fuel-rich to maximize NO<sub>x</sub> reduction. The hydrocarbon fuel injector automatically controls an adjustable valve that supplies a small amount of hydrocarbon fuel to compensate for the changes in engine load or ambient conditions.

Technically, NSCR is potentially applicable to reduce 90% of the NO<sub>x</sub> emissions in the exhaust gas of the rich-burn reciprocating engine (Exxon, 1987). Using 11 gram/bhp-hr as the uncontrolled NO<sub>x</sub> emission rate for a rich-burn engine, a NO<sub>x</sub> removal efficiency of 90% will result in a NO<sub>x</sub> emission level of 1.1 gram/bhp-hr (i.e., 10% of the uncontrolled rich-burn engine NO<sub>x</sub> emission rate of 11.0 gram/bhp-hr).

#### **6.2.5.6 Summary of Technically Feasible NO<sub>x</sub> Control Methods**

There are two basic alternatives for reduction of NO<sub>x</sub> emissions from reciprocating engines: engine modification and add-on control technology. Table 6-2 summarizes the technical evaluation of NO<sub>x</sub> emission control methods applicable to reciprocating engines.

In the engine modification category, only lean-burn technology and derating power output are considered as technically feasible for this project. Although retarding ignition timing and exhaust gas recirculation can be applied to rich-burn engines, the NO<sub>x</sub> emissions are greater than those from a comparable lean-burn engine. Steam/water injection, air-to-fuel ratio changes and EGR for lean-burn engines are considered technically infeasible and will not be reviewed further. The application of these methods to rich-burn engines results in emission rates higher than that of the unit proposed for installation, so they need not be considered further.

In the add-on control technology category, only the lean-burn engine/SCR combination and rich-burn engine/NSCR combination are considered technically feasible. Other methods such as the NO<sub>x</sub>OUT process, Thermal DeNO<sub>x</sub>, and the lean-burn engine/NSCR combination are considered technically infeasible.

#### **6.2.6 Evaluation of Technically Feasible NO<sub>x</sub> Control Methods**

This section examines the four technically feasible NO<sub>x</sub> control methods identified in the previous discussion. The control methods, which include lean-burn engine design, achieve a NO<sub>x</sub> control level that is equal to or greater than rich-burn technology. The four control alternatives are ranked according to their total removal effectiveness. Each alternative is examined further in regards to technical issues, environmental effects, energy requirements and impacts, and economic impacts.

**TABLE 6-2**

**Summary of Technical Feasibility of NO<sub>x</sub> Emission Controls  
for Reciprocating Engines**

Control Technology	NO <sub>x</sub> Controlled Emission Rate	Technical Feasibility	Comments
<b>Engine Modification Alternatives</b>			
Steam Injection	Not Applicable	No	Technically infeasible due to irreversible structural damage to engine block.
Air-to-fuel Ratio Change (or Lean-Burn Technology)	2.0 g/bhp-hr	Yes	Lowest emission rate achievable by engine modification, at least 80% control efficiency.
Retarding Ignition Timing Rich-burn Engine Lean-burn Engine	9.4 g/bhp-hr Not Applicable	Yes No	Engine timing retard between 2° and 6°; average 15% NO <sub>x</sub> reduction.
Derating Power Output Rich-burn Engine Lean-burn Engine	7.2 g/bhp-hr 1.3 g/bhp-hr	Yes Yes	Average 35% NO <sub>x</sub> reduction at 25% of engine power derated for gas-fired engines as a group. NO <sub>x</sub> reductions for turbo charged engines are less due to the lower effect on air-to-fuel ratio.
Exhaust Gas Recirculation Rich-burn Engine Lean-burn Engine	7.3 g/bhp-hr Not Applicable	Yes No	Maximum 34% NO <sub>x</sub> reduction from standard engine. Ineffective for lean-burn engine.
<b>Add-on Control Technology*</b>			
NO <sub>x</sub> OUT Process	Not Applicable	No	Technically infeasible (1000-1600°F), cost prohibitive for high temperature auxiliary equipment.
THERMAL DeNO <sub>x</sub>	Not Applicable	No	Technically infeasible (above 1000°F), cost prohibitive for high temperature auxiliary equipment.
Lean-Burn Engine/NSCR	Not Applicable	No	Technically infeasible for lean-burn engine, require <4% O <sub>2</sub> conc. in the exhaust stream.
Lean-Burn Engine/SCR	0.4 g/bhp-hr	Yes	Applicable to lean-burn engine with control efficiency of 80 percent.
Rich-Burn Engine/NSCR	1.1 g/bhp-hr	Yes	Applicable to rich-burn engine only, required greater than 4% O <sub>2</sub> conc. in exhaust gas stream. Control efficiency of 90%.

\* Except for the rich-burn engine/NSCR option, all add-on control technologies are for lean-burn engines.



#### **6.2.6.1 Ranking of Feasible Control Technologies**

The top-down BACT approach requires the ranking of the NO<sub>x</sub> emission control alternatives by achievable emission levels. The four options, ranked in order of removal effectiveness, are:

- lean-burn engine with SCR,
- rich-burn engine with NSCR,
- lean-burn engine with derating,
- lean-burn engine.

A baseline condition must be established for BACT ranking and economic analysis. The baseline is defined as the uncontrolled rate of the process under review. Therefore, the baseline condition for the emissions of stationary reciprocating engines would be the emission factor for a heavy-duty, natural gas-fired pipeline compressor engine with a NO<sub>x</sub> emission level of 11 grams/bhp-hr, as found in AP-42 (USEPA, 1985).

Presented in Table 6-3 is the BACT top-down hierarchy of the technically feasible NO<sub>x</sub> emission control technologies, their corresponding NO<sub>x</sub> emission rates, and their control efficiencies calculated from their baseline emission level.

#### **6.2.6.2 Analysis of Lean-Burn Engine with SCR**

##### Technical Issues

As the most effective NO<sub>x</sub> abatement process in terms of removal efficiency, SCR technology has been applied for control of NO<sub>x</sub> emissions from state-of-the-art reciprocating engines. However, the reliability of SCR's performance on reciprocating engines has not been consistently demonstrated. Data on sustained NO<sub>x</sub> reduction performance for reciprocating engines are very limited.

Technical concerns involved in SCR use are the narrow operating temperature range and the possible damage to the catalyst and downstream equipment. A stack gas reheat system would be required to heat the exhaust gases to the SCR's operating temperature (see further discussion under Energy Requirements and Impacts). The integration of a reheat system adds another design criteria to an already complex system consisting of SCR components and an ammonia handling system.

TABLE 6-3

BACT "Top-Down" Hierarchy of NO<sub>x</sub> Control Technologies

BACT Ranking	Technology	Brake Emission Rate (g/bhp-hr)	Annual Emissions (TPY)	Total Emission Reduction (TPY)*	Total Control Efficiency (%)*
First	Lean-burn Engine with SCR	0.4	15.4	409.5	96%
Second	Rich-burn Engine with NSCR	1.1	42.5	382.4	90%
Third	Lean-burn Engine/Derating Power +	1.3	50.2	374.7	88%
Fourth	Lean-burn Engine	2.0	77.2	347.7	82%
Baseline	Rich-burn Engine	11.0	424.9	-	-

- \* Total emission reduction and total control efficiency are calculated from baseline emission level.
- + The range of control effectiveness is dependent on the percent of engine's rated torque. The calculated values are based on 35% NO<sub>x</sub> reduction at 25% derated power (or 75% rated torque).

Ammonia is used as a reactant for the  $\text{NO}_x$  reduction reactions. Excess ammonia use can cause formation of ammonium bisulfate compounds under irregular operating conditions. These compounds can act as catalyst poisoning agents and can damage metal ductwork downstream. Thus, the SCR system requires a strict maintenance service schedule that includes manual cleaning every 2,000 to 2,500 hours of operation (Steuler, 1990a). Cleaning consists of blowing the catalyst surfaces with a compressed air gun and vacuuming out soot.

In California, the South Coast Air Quality Management District (SCAQMD, 1984) reported SCR demonstration tests on seven reciprocating engines. The report indicated that only one SCR system was able to complete the 4,000 hours of continuous testing; the other six engine/SCR units failed for a variety of reasons including poor catalyst performance and problematic ammonia injection operation. A recent survey report by the Gas Research Institute on SCR (GRI, 1990) states:

A total of 13 SCR units are currently installed on reciprocating engines. Only one unit involves gas transmission. A number of operational problems impacting SCR performance and engine operation have been documented. At least three SCR units applied to reciprocating engines are scheduled to be replaced with alternative controls....

A review of the BACT determinations made to date on gas-fired reciprocating engines (Table 6-1) reveals that SCR has never been applied specifically to any large-bore (i.e., greater than 1,000 bhp) and low-speed (i.e., 300 rpm) lean-burn engines due to their already low  $\text{NO}_x$  emission rate.

Application of SCR on gas-fired engines has been limited to small-bore, high-speed engines typically less than 1,000 bhp, at 900 rpm or greater (i.e., ANR Production Company's 600-bhp engine, see Table 6-1), and Shell California Production's 600-bhp engine (See Appendix I). The only SCR application to a large-bore reciprocating engine was reported for Pfizer, Inc.'s cogeneration facility in Massachusetts (1990). This project involved a 6,710-bhp engine with an estimated uncontrolled  $\text{NO}_x$  emission rate between 5 and 12 grams/bhp-hr for dual-fuel (94% natural gas, 6% diesel) and diesel fuel, respectively (see Appendix I). However, Pfizer's engine differs from FGTC's proposed engine in both fuel fired and application.

On September 5, 1990, a PSD permit was issued to Northern Natural Gas Company (Northern Natural Gas Co., 1990) for a gas-fired 4,000-bhp gas compressor engine in Iowa. The Iowa Department of Natural Resources (IDNR), indicated that "application of SCR systems to the engine as applied for would represent a transfer of technology since none are known to be operational." IDNR further found such "technology transfer to be unreliable at best with a high percentage of down time likely." Therefore, SCR was rejected as BACT by IDNR due to its uncertain reliability.

---

### Environmental Effects

The add-on SCR technology for NO<sub>x</sub> control will pose other potential adverse environmental impacts such as accidental spills and emissions of ammonia, and solid waste disposal for the non-inert spent catalyst. These issues are briefly described in the following discussion.

The SCR system requires the use of ammonia as reagent to convert NO<sub>x</sub> to nitrogen gas and water. The main environmental issues include delivery, handling, and storage of ammonia, which pose inherent safety and health risks in the event of accidental releases. In proposing NO<sub>x</sub> abatement regulations for stationary gas turbines, California's South Coast Air Quality Management District (SCAQMD) performed a risk assessment of spill handling and storage of ammonia. The study concluded that ammonia handling and storage associated with the operation of a SCR system could realistically present serious consequences, and recommended further consideration of potential impacts and mitigation measures (SCAQMD, 1979). Generally, aqueous ammonia systems (normally between 25 to 29% ammonia concentration) are used at installations located in populated areas. However, such practice increases the complexity, size, and the cost of the ammonia system since greater amounts of aqueous ammonia must be handled and stored than for SCR systems that use anhydrous ammonia.

Ammonia slippage is a normal occurrence during operation of SCR control equipment. NO<sub>x</sub> abatement system suppliers generally report ammonia slippage levels of 10 ppm.

Spent catalysts of the metal oxides type must be disposed of properly. Typically, a metal oxide catalyst contains approximately 5% vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>). In pure commercial form, V<sub>2</sub>O<sub>5</sub> is considered a hazardous material by the USEPA. Ceramic-based, honeycomb-shaped catalysts such as zeolite can be landfilled due to the inert intrinsic properties of ceramic materials.

### Energy Requirements and Impacts

The add-on technology of SCR imposes the following energy penalties:

- Additional energy requirements to compensate for power loss due to additional back pressure from the SCR;
- Electrical requirements for heating the ammonia solution and operating the injection system; and

- Additional energy necessary for reheating the proposed engine exhaust gases from 540°F up to the SCR operating range of 700°F [SCR manufacturers specify a typical operating temperature window between 600°F to 900°F (Engelhard, 1990a,b,c; and Steuler, 1990)].

Using the lean-burn engine will result in better fuel economy than the baseline rich-burn engine; however, the addition of SCR would require a minimum of 4.19 MMBtu/hr or 36,733 MMBtu/yr for stack gas reheating. This reduces the net fuel savings for a lean-burn engine with SCR to 59,000 MMBtu/yr from the original 4.2 MMBtu/hr or 36,792 MMBtu/yr fuel savings of a rich-burn engine.

### Economic Analysis

A cost summary for two lean-burn engines, each equipped with a SCR NO<sub>x</sub> control system is presented in Table 6-4. The additional capital cost, both direct and indirect, for this control option is \$1,389,146. This includes \$618,000 for hardware (SCR system, lean-burn engine, exhaust reheat ductwork, monitoring equipment and support structures) and \$67,980 in freight and taxes.

The annualized cost resulting from installation of this system is \$725,999. This is based on a direct operating cost (labor and material) of \$296,778, and indirect operating cost of \$203,207 and a cost recovery factor of \$226,014.

The total and incremental cost effectiveness is \$1,773/ton and \$19,205/ton, respectively. The total cost effectiveness is based on a total NO<sub>x</sub> removal efficiency of 96% which corresponds to a total annual reduction of 409.5 tons from the baseline engine. The incremental cost value is based on the SCR system decreasing NO<sub>x</sub> emissions by 27.1 TPY from those which would occur with the next most stringent technology.

### **6.2.6.3 Analysis of Rich-Burn Engine with NSCR**

#### Technical Issues

Because they operate at near stoichiometric air-to-fuel ratios, rich-burn engines generate cylinder temperatures in the range of 1,200°F to 1,300°F. Engine manufacturers have found that such high temperatures do not allow high engine loading. For greater power output, engine manufacturers have found that engine modifications (i.e., turbocharged engines which can produce more power enhancements with lower emission levels) are a better choice than building

TABLE 6-4

**Summary of Capital and Operating Costs  
for Lean-burn Engine and SCR NO<sub>x</sub> Controls**

Direct Capital Cost	\$ 891,774
Indirect Capital Cost	\$ 497,372
Total Capital Cost	\$1,389,146
Direct Operating Costs	\$ 296,778
Overhead	\$ 147,641
Capital Charges at 16.27 percent of Capital Cost	\$ 226,014
G&A, Taxes, and Insurance at 4 percent	\$ 55,566
Interest on Working Capital	<u>Neglected</u>
Total Annual Costs	\$ 725,999
Total NO <sub>x</sub> Removed	409.5 tpy
Total Cost Effectiveness	\$ 1,773 per ton
NOTE: See Appendix G for cost details.	

larger engine blocks. In the current U.S. market, rich-burn engines over 2,000 bhp are not standard off-the-shelf items; however, a 4,000-bhp engine can be obtained by special order.

Normally, rich-burn engine/NSCR combination applications are found only on small engines of approximately 1,000 bhp or less (i.e., a 600-bhp engine for ANR Production Company, Virginia; a 380-bhp engine for De La Guerra Power, Inc., California; and a 200-bhp engine for Richmond Exploration Corp., California; see Appendix I). The application of NSCR to an engine the size to be installed at Compressor Station No. 20 may pose unforeseen technical problems not encountered in installations on smaller units.

#### Environmental Effects

Environmental impacts are expected to be minimal for the rich-burn engine/NSCR option since no toxic or hazardous reagents are required, and rich-burn/NSCR technology generally produces lower CO and VOC emissions than a lean-burn engine. Catalyst disposal will be required when using NSCR. Most vendors guarantee a service life of 3 years for the catalyst system.

#### Energy Requirements and Impacts

The NSCR converter does not require any additional fuel other than a small amount of hydrocarbon fuel used for injection into the exhaust gas mixture to ensure fuel rich conditions. The fuel economy of the rich-burn engine is approximately 8,000 Btu/bhp-hr compared to the 6,950 Btu/bhp-hr for the proposed lean-burn engine. For a 4,000-bhp output, an additional 4.2 MMBtu/hr heat input is required, or approximately 36,792 MMBtu/yr for an annual cost of \$75,792.

#### Economic Analysis

Capital and annualized cost estimates were prepared for two rich-burn engines, each equipped with a NSCR converter. Cost of the NSCR converter was provided by Johnson-Matthey as \$80,000 per unit. The NSCR can achieve 90% NO<sub>x</sub> reduction. The resulting NO<sub>x</sub> emission rate is 1.1 grams/bhp-hr.

The control costs for two NSCR converters designed for a 4,000-bhp rich-burn engine are summarized in Table 6-5. The direct capital cost is calculated to be \$159,307, and the indirect capital cost is calculated to be \$93,533. The total capital investment is \$252,841.

**TABLE 6-5**

**Summary of Capital and Operating Costs  
for Rich-burn Engine and NSCR NO<sub>x</sub> Controls**

Direct Capital Cost	\$ 159,307
Indirect Capital Cost	\$ 93,533
Total Capital Cost	\$ 252,841
Direct Operating Costs	\$ 109,207
Overhead	\$ 45,075
Capital Charges at 16.27 percent of Capital Cost	\$ 41,137
G&A, Taxes, and Insurance at 4 percent	\$ 10,114
Interest on Working Capital	<u>Neglected</u>
Total Annual Costs	\$ 205,533
Total NO <sub>x</sub> Removed	382.4 tpy
Total Cost Effectiveness	\$ 537 per ton
NOTE: See Appendix G for cost details.	



The annualized cost resulting from installation of a rich-burn engine equipped with an NSCR catalyst is \$205,533. This is based on direct and indirect operating costs presented above and a cost recovery factor of \$41,137.

The total and incremental cost effectiveness are \$537/ton and \$6,415/ton, respectively. The total cost effectiveness is based on a total NO<sub>x</sub> removal efficiency of 90% which corresponds to an total annual reduction of 382.4 ton from the baseline engine. The incremental cost value is based on the NSCR system decreasing NO<sub>x</sub> emissions by 34.7 TPY from those which would occur with the next most stringent technology.

#### **6.2.6.4 Analysis of Lean-Burn Engine with Derating Power Output**

##### Technical Issues

Derating power output does not require additional equipment. Derating involves restricting the engine torque to a level below its normal operating design rate. To derate an engine the throttle valve setting is adjusted to change the power output. Although a derated engine produces less NO<sub>x</sub> emissions, derating reduces the overall engine efficiency and shortens its service life as much as 25% (Dresser-Rand, 1990). In addition, continuous derating operation would require a bigger, more expensive engine to meet the overall power requirement. Derating power output is not considered BACT for the proposed lean-burn engine because of potential engine reliability problems, shortened engine life, and increased emissions of CO and hydrocarbons.

##### Environmental Effects

Application of this technology would result in lower NO<sub>x</sub> emissions, but emissions of carbon monoxide and hydrocarbon would increase. Dresser-Rand has reported a 40% reduction of NO<sub>x</sub> emissions with a corresponding increase of 28% in carbon monoxide (CO) emissions and 48% increase in total hydrocarbon emissions based on a 30% derating of a 4,000-bhp lean-burn engine.

##### Energy Requirements and Impacts

In general, derating an engine will result in less fuel economy. USEPA (1979) reported a fuel penalty of 8% based on derating a dual-fuel engine by 25%. Manufacturers of gas-fired reciprocating engines state that derating by 30% increases fuel consumption by approximately 8%.

## Economic Analysis

If derating is used, a larger engine would be necessary to meet the FGTC's requirement of 4,000 bhp. Derating larger engines will increase both the capital cost and annual operating cost for the proposed compressor engines, and will severely impact the component's durability. Since the proposed engine requires a high reliability at various power settings, derating larger engines is not considered feasible. A detailed economic analysis was not performed for this technology.

### **6.2.6.5 Analysis of Lean-Burn Engine**

#### Technical Issues

The proposed turbocharged reciprocating engine will operate according to the manufacturer's specified operating parameters. The engine's state-of-the-art design includes small pre-ignition chambers in which a rich fuel mixture is spark-ignited. The hot gases then enter the main combustion chambers and create spontaneous combustion of the lean fuel mixture. As a result, the overall combustion process is conducted under very lean fuel conditions. Operating on the lean side of the air-to-fuel ratio allows the proposed engine to obtain peak fuel economy.

In general, thermal  $\text{NO}_x$  formation is directly proportional to the combustion temperature and residence time of the combustion gases (USEPA, 1979). The high mass flow rate at full-load, as indicated by the 67,476 pounds per hour of exhaust mass flow rate, reduces the residence time of the combustion gases compared to a rich-burn engine, which operates at an air-to-fuel ratio near unity. High mass flow rate also means the engine operates below the peak temperature region for thermal  $\text{NO}_x$  formation. The exhaust temperature for the proposed engine is 540°F, which falls in the range of typical exhaust temperatures for reciprocating engines. Thus, the rate of thermal  $\text{NO}_x$  formation is equal to the conventional rich-burn engine.

#### Environmental Effects

There are no adverse environmental impacts expected for using the lean-burn engine, since there is no wastewater or solid waste created. Emissions to the atmosphere are less than for the baseline rich-burn engine and do not result in significant impacts (see section 4.0).

#### Energy Requirements and Impacts

The lean-burn engine is more fuel efficient than a comparable rich-burn engine. The fuel saving is 4.2 MMBtu/hr for a total annual savings of 36,792 MMBtu/yr.

## Economic Analysis

Capital and annualized cost estimates were prepared for the lean-burn engine proposed for Compressor Station No. 20. The differential engine cost of the lean-burn engine compared to the baseline rich-burn engine was obtained from other recent permit applications submitted by FGTC. The engine has a guaranteed NO<sub>x</sub> emission limit of 2.0 grams/bhp-hr.

Control costs for the engine are summarized in Table 6-6. The differential engine cost for the Cooper-Bessemer 10V-275C engine is approximately \$100,000 per unit, from which the direct capital cost is calculated to be \$158,730, and the indirect capital cost is calculated to be \$68,254. The total capital investment is \$226,984.

The direct operating cost includes \$7,937 for normal maintenance of the lean-burn technology components of the engine and a fuel credit of \$75,792 for better fuel efficiency compared to the baseline rich-burn engine. The indirect operating cost is \$13,841 and the capital recovery cost is \$36,930. The annualized cost is -\$17,083 for the lean-burn engine.

The total and incremental cost effectiveness is \$-49/ton. The total cost effectiveness is based on a total NO<sub>x</sub> removal efficiency of 82% which corresponds to a total and incremental reduction of 347.7 tons from the baseline engine.

### **6.2.7 NO<sub>x</sub> BACT Summary and Conclusion**

The BACT analysis for NO<sub>x</sub> control has identified three feasible control alternatives: the lean-burn engine with SCR, the rich-burn engine with NSCR, and the lean-burn engine. Selection of a control technology as BACT will be based on comparison of the overall environmental, energy, and economic impacts. The most effective control alternative not eliminated will be selected as BACT.

#### **6.2.7.1 Comparison of Environmental Effects**

The lean-burn engine does not create any waste; therefore, it is the best alternative in terms of the environmental impact analysis. SCR poses the greatest potential for toxic impacts due to ammonia handling and storage and ammonia slip. When the alternatives are compared in terms of adverse environmental impacts the lean-burn engine with SCR is the worst due to potential ammonia release and disposal of the catalysts. The rich-burn engine with NSCR is the next worst option due to disposal of catalyst.

TABLE 6-6

Summary of Capital and Operating Costs  
for Lean-burn Engine NO<sub>x</sub> Controls

Direct Capital Cost	\$ 158,730
Indirect Capital Cost	\$ 68,254
Total Capital Cost	\$ 226,984
Direct Operating Costs	\$ - 67,855
Overhead	\$ 4,762
Capital Charges at 16.27 percent of Capital Cost	\$ 36,930
G&A, Taxes, and Insurance at 4 percent	\$ 9,080
Interest on Working Capital	<u>Neglected</u>
Total Annual Costs	\$ -17,083
Total NO <sub>x</sub> Removed	347.7 tpy
Total Cost Effectiveness	\$ -49 per ton
NOTE: See Appendix I for cost details.	

### **6.2.7.2 Comparison of Energy Impacts**

The lean-burn engine shows a savings of 36,792 MMBtu/yr in heat input over the rich-burn engine because of its inherent fuel efficient design. Therefore, a lean-burn engine has no energy impact compared to the other BACT options evaluated. The addition of SCR to a lean-burn engine imposes a fuel requirement of 36,733 MMBtu/yr for stack gas reheat. In addition, electrical power is required for the ammonia vaporizer and injection system. The rich-burn engine with NSCR has the highest energy requirements. Operating a rich-burn engine requires an additional 36,792 MMBtu/yr of heat input compared to using an engine with lean-burn technology. Thus, the lean-burn engine is the best alternative in view of the energy impact analysis.

### **6.2.7.3 Comparison of Economic Analysis**

When the three feasible NO<sub>x</sub> control alternatives are compared in terms of total cost effectiveness, the lean-burn engine/SCR technology has the highest cost effectiveness value of \$1,723 per ton of NO<sub>x</sub> removed. The rich-burn engine/NSCR technology is the next highest with \$537 per ton of NO<sub>x</sub> removed. The lean-burn engine has a nominal total cost effectiveness value of \$ -49 per ton of NO<sub>x</sub> removed.

The incremental cost effectiveness values for the lean-burn engine/SCR technology and the rich-burn engine/NSCR technology are \$13,345 and \$6,415 per ton of NO<sub>x</sub> removed, respectively. The lean-burn engine has an incremental cost effectiveness of \$-49 per ton of NO<sub>x</sub> removed. Therefore, the lean-burn engine is the most cost effective control option.

The detailed cost estimating procedure is presented in Appendix I.

### **6.2.7.4 NO<sub>x</sub> Control Summary**

Based on the top-down BACT analysis, the proposed Cooper-Bessemer 10V-275C lean-burn engine is BACT for FGTC's proposed modification to Compressor Station No. 20. The environmental, energy, and economic impacts are summarized in Table 6-7. Both the lean-burn engine/SCR and the rich-burn engine/NSCR control options are eliminated primarily due to their high total and incremental cost effectiveness values for NO<sub>x</sub> control. Recently, it has been determined by the FDER that incremental cost effectiveness values of \$4,000 to \$5,000 per ton of NO<sub>x</sub> removed are unreasonable. These values were established for much larger sources of NO<sub>x</sub>, such as utility gas turbine combined-cycle projects. In addition, add-on control technologies have significant energy penalties along with potential adverse environmental impacts, and these systems are not fully proven on IC engines of the size proposed by FGTC.

**Table 6-7**  
**Summary of Top-Down BACT Impact Analysis Results for NO<sub>x</sub> for a Stationary IC Reciprocating Engine**

Control Alternative	Annual Emissions (TPY)*	Total Emission Reduction (TPY)*	Incremental Emission Reduction (TPY)*	Environmental Impacts		Energy Impacts Incremental Increase over baseline		Total Annualized Cost (\$/yr)	Economic Impacts		
				Potential Toxic Air Impact?	Potential Adverse Environmental Impacts?	Natural Gas (MMBtu/yr)	Electricity (MW-hr/yr)		Incremental Annualized Cost (\$/yr)	Total Cost Effectiveness (\$/ton)	Incremental Cost Effectiveness (\$/ton)
Lean-Burn Engine with SCR	15.4	409.5	27.1	Yes	Yes	(59)	12	\$725,999	\$520,466	\$1,773	\$19,205
Rich-Burn Engine with NSCR	42.5	382.4	34.7	No	No	36,792	0	\$205,533	\$222,616	\$537	\$6,415
Lean-Burn Engine	77.2	347.7	347.7	No	No	(36,792)	0	(\$17,083)	(\$17,083)	(\$49)	(\$49)
Baseline (rich-burn engine)	424.9	-----	-----	---	---	-----	---	-----	-----	---	---

\* Total emission reduction, total annualized cost effectiveness are calculated based on similar baseline parameter values.

\*\* Incremental values are based on the next lower control technology's parameter values.

With lean-burn/SCR and rich-burn/NSCR options eliminated, the lean-burn engine is BACT. This is consistent with current BACT determinations shown in Table 6-1 for similar source applications. In the most recent top-down BACT analysis, IDNR has concluded that the inherently low NO<sub>x</sub> emitting lean-burn engine is BACT for Northern Natural Gas Company. In its BACT summary, IDNR rejected SCR on the grounds of uncertain reliability and unreasonable cost effectiveness. No other stationary IC sources, whether in natural-gas-related applications or other industrial processes, which use similar fuel and equivalent engines (i.e., natural-gas-fired and 4,000-bhp lean-burn engine) have been required to bear a high incremental cost effectiveness to reduce NO<sub>x</sub> emissions.

### **6.3 BACT Summary**

FGTC has conducted a top-down BACT analysis for NO<sub>x</sub> from the proposed compressor engine at Compressor Station No. 20. The conclusions and key analysis results are summarized in this section.

The proposed BACT level for NO<sub>x</sub> is 2.0 grams/bhp-hr based on a reciprocating engine using lean-burn technology. Two types of potential NO<sub>x</sub> control technology alternatives were evaluated: engine modifications and post-combustion controls that treat the exhaust gas stream.

Engine modifications included steam/water injection, air-to-fuel ratio changes, retarded ignition timing, derating power output, and exhaust gas recirculation. The air-to-fuel ratio option is incorporated in the lean-burn engine design. Steam/water injection was rejected as technically infeasible. Retarded ignition timing, and exhaust gas recirculation were rejected as technically infeasible for lean-burn engines. Engine derating was rejected because of concerns regarding engine inefficiency and economic impacts.

Four potential post-combustion control options were considered: NO<sub>x</sub>OUT, Thermal DeNO<sub>x</sub>, selective catalytic reduction (SCR), and nonselective catalytic reduction (NSCR). Thermal DeNO<sub>x</sub> and NO<sub>x</sub>OUT were rejected as not commercially available and is technically infeasible for reciprocating engines. SCR and NSCR were rejected on the basis of adverse cost, economic and environmental impacts.

## 7.0 REFERENCES

- Auer, A.H. 1978. Correlation of Land Use and Cover with Meteorological Anomalies. J. Appl. Meteor., Vol 17.
- Byrne, J.W., Chen, J.M., and B.K. Speronello. 1991. Selective Catalytic Reduction of NO<sub>x</sub> Using Zeolitic Catalysts for High Temperature Applications.
- Cole, Henry S. and Summerhays, John E. 1979. A Review of Techniques Available for Estimating Short-Term NO<sub>2</sub> Concentration. Journal of the Air Pollution Control Association. Vo. 30, No. 8.
- Cooper Industries, Inc. 1987. Cooper-Bessemer Integral Gas Engine-Compressors, Performance Through Innovation (Technical Sales Literature).
- Cooper Industries, Inc. 1990. Personal Communication With Cooper's Sales Engineer on CleanBurn® Technology and Lean-Burn Engine Performance.
- Dresser-Rand Company. 1990. Personal Communications With Dresser-Rand's Sales Engineer on Engine Specification and Performance.
- Engelhard Corporation. 1990a. Catalyst Technology for Cleaner Air.
- Engelhard Corporation. 1990b. Verbal Budgetary Quotation for NO<sub>x</sub> Abatement System.
- Engelhard Corporation. 1990c. Budgeting Quotation for NO<sub>x</sub>/CO Control System.
- Exxon Research and Engineering Company. 1986. Thermal DeNO<sub>x</sub>: A Commercial Selective Non-Catalytic NO<sub>x</sub> Reduction Process for Waste-to-Energy Applications (B.E. Hurst and C.M. White, presented at ASME 12th Biennial National Waste Processing Conference, Denver, Colorado, June 2nd).
- Exxon Research and Engineering Company. 1987. Improved ER&E Thermal DeNO<sub>x</sub> Process.
- Florida Gas Transmission Company. 1990. PSD Permit Application, Station No. 12, Prepared by KBN Engineering and Applied Sciences, Inc. October.



Fuel Tech. 1988. Control of Nitrogen Oxides Emissions From Stationary Sources. Presented at the Annual Meeting of the American Power Conference. April 1988.

Fuel Tech. 1989. Standard Technical Sales Literature.

Fuel Tech. 1990. Standard Technical Sales Literature.

Gas Research Institute. 1990. Evaluation of NO<sub>x</sub> Reduction Technology for Natural Gas Industry Prime Movers - Update to Special Report GRI-87/0257 (Compiled by Carlo Castaldini, Acurex Corporation, Mountain View, CA).

Johnson Matthey Catalyst Systems Division. 1990. Standard Technical Sales Literature.

Lin, M.L., Diep, D.V., and L. Dublin. Unique Features of Urea-Based NO<sub>x</sub>OUT Process for Reducing NO<sub>x</sub> Emissions; Presented at 8th Pittsburg Coal Conference, October 14-18, 1991.

Massachusetts, Commonwealth of, Department of Environmental Quality Engineering. 1990. Permit Application B-87-C-066 for Pfizer, Inc. Diesel Cogen Facility in Adams, MA. Springfield, MA.

Neveril, R. B., et al. 1978. Capital and Operating Costs of Selected air Pollution Control Systems (V). J. of the Air Poll. Control Assoc., Vo. 28(12): 1253-1256.

Nitrogen Nergas Corporation. 1990. Kleenaire Process.

Nitrogen Nergas Corporation. 1990. Budgetary Quotation for Kleenaire System.

Northern Natural Gas Company. 1990. PSD. PSD Project - 89-117, issued September 5.

Personal Communication. 1993. Tom Rogers. Florida Department of Environmental Regulation, with Mark Fridel, ENSR Consulting and Engineering.

Schorr, M.M. 1989. The Real Economics of SCR as BACT for Gas Turbines; Presented at the AWMA 82nd Annual Meeting and Exhibition in Anaheim, CA.

South Coast Air Quality Management District (SCAQMD). 1979. The California Air Resources Board (CARB) Proposal on Control Strategy for Internal Combustion Engines - Ruling 1110.

South Coast Air Quality Management District (SCAQMD). 1984. State of Technology Related to Rule 1100 - Emission from Stationary Internal Combustion Engines (Demonstration). Staff report by L.M. Bowen, E. Larson, and A. Rawuka.

Steuler International Corporation. 1990a. Standard Technical Sales Literature.

Stueler International Corporation. 1990b. Budgetary Quotation for CER-NO<sub>x</sub> System.

Texas Air Control Board (TACB). 1990. Personal Communication with a TACB Air Permitting Engineer. Austin, TX.

Urban, C.M., and K.J. Springer. 1975. Study of Exhaust Emissions From Natural Gas Pipeline Compressor Engines (American Gas Association: Project PR-15-61, p.57). Southwest Research Institute, San Antonio, TX.

U.S. Department of Energy/Energy Information Administration (DOE/EIA). 1987. Cost and Quality of Fuels for Electric Utility Plants, 1989. U.S. Government Printing Office. DOE/EIA-0191(89).

U.S. Environmental Protection Agency (USEPA). 1978. Workbook for Comparison of Air Quality Models.

U.S. Environmental Protection Agency (USEPA). 1978. Guidelines for Determining Best Available Control Technology (BACT). Research Triangle Park, NC.

U.S. Environmental Protection Agency (USEPA). 1979. Stationary Internal Combustion Engine: Standard Support and Environmental Impact Statement. Volume 1: Proposed Standard Performance (Draft). Research Triangle Park, NC. USEPA-405/2-78-125a.

U.S. Environmental Protection Agency (USEPA). 1980. PSD Workshop Manual. Research Triangle Park, N.C.

U.S. Environmental Protection Agency (USEPA). 1985. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (Supplement B, p. 3.2-2) AP-42. Research Triangle Park, NC.

U.S. Environmental Protection Agency (USEPA). 1986. Environmental Assessment of a Reciprocating Engine Retrofitted With Selective Catalytic Reduction (Volume I: Technical Results). Research Triangle Park, NC. USEPA-1699/7-86-014a.)

- 
- U.S. Environmental Protection Agency (USEPA). 1987a. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Research Triangle Park, NC. USEPA-4-87-007.
- U.S. Environmental Protection Agency (USEPA). 1987b. Guideline on Air Quality Models, Supplement A (Revised). USEPA-450/2-78-027.
- U.S. Environmental Protection Agency (USEPA). 1990a. "Top-Down" Best Available Control Technology Guidance Document (Draft). Research Triangle Park, NC.
- U.S. Environmental Protection Agency (USEPA). 1990b. OAQPS Control Cost Manual (4th Ed.) USEPA Publication: Research Triangle Park, NC. USEPA-450/3-90-006.
- U.S. Environmental Protection Agency (USEPA). 1987 to 1990. BACT/LAER Clearinghouse--A Compilation of Control Technology Determinations. Research Triangle Park, NC.
- U.S. Environmental Protection Agency (USEPA). User's Guide for the Industrial Source Complex (ISC2) Dispersion Models. Vol I (Draft). USEPA-405/4-92-2a.

**APPENDIX A**

**APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCE**



BEST AVAILABLE COPY

# Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-3400  
Lawton Chiles, Governor Carol M. Browner, Secretary

AC 56-230129

PSD-FL-003

RECEIVED

APR 23 1993

## APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCE <sup>Bureau of</sup> Air Regulation

SOURCE TYPE: Natural Gas Compressor Engine ☒ New ☐ Existing  
APPLICATION TYPE: ☐ Construction ☐ Operation ☐ Modification  
COMPANY NAME: Florida Gas Transmission Company COUNTY: St. Lucie  
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) Station 20, Unit No. 5  
SOURCE LOCATION: Street 8701 Orange City Ft. Pierce  
UTM: East 558.01 km North 3,035.68 km  
Latitude 27° 26' 43" N Longitude 80° 24' 47" W  
APPLICANT NAME AND TITLE: Carl D. Schulz, Vice President, Project Management Services,  
Florida Gas Transmission Company, (713) 853-3893  
APPLICANT ADDRESS: P.O. Box 1188, Houston, Texas 77251-1188

### SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

#### A. APPLICANT

Florida Gas Transmission

I am the undersigned owner or authorized representative\* of Company

I certify that the statements made in this application for a 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, Flor 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 permit establishment.

\*Attach letter of authorization

Signed: Carl D. Schulz

Carl D. Schulz, Vice President, Project Management Services  
Name and Title (Please Type)

Date: \_\_\_\_\_ Telephone No. (713) 853-3893

#### 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 examined/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in permit application. There is reasonable assurance, in my professional judgment, that

<sup>1</sup> See Florida Administrative Code Rule 17-2.100(57) and (104)

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

Signed Barry D. Andrews

\_\_\_\_\_  
Name (Please Type)

\_\_\_\_\_  
Company Name (Please Type)

\_\_\_\_\_  
Mailing Address (Please Type)

Florida Registration No. 36024 Date: 4-14-93 Telephone No. (205) 740-8240

SECTION II: GENERAL PROJECT INFORMATION

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

See Application report. Section 1.0 - Facility Description

Section 2.0 - Project Description

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

Start of Construction February 1994 Completion of Construction December 1994

- 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.)

Not Applicable

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

Not Applicable

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 \_\_\_\_\_

\_\_\_\_\_  
Name (Please Type)

\_\_\_\_\_  
Company Name (Please Type)

\_\_\_\_\_  
Mailing Address (Please Type)

Florida Registration No. \_\_\_\_\_ Date: \_\_\_\_\_ Telephone No. \_\_\_\_\_

SECTION II: GENERAL PROJECT INFORMATION

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

See Application report. Section 1.0 - Facility Description

Section 2.0 - Project Description

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

Start of Construction February 1994 Completion of Construction December 1994

- 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.)

Not Applicable

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

Not Applicable

2. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;  
 if power plant, hrs/yr \_\_\_\_\_; if seasonal, describe: Not Applicable

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
3. Does the State "Prevention of Significant Deterioration" (PSD)  
 requirement apply to this source? If yes, see Sections VI and VII. Yes
4. Do "Standards of Performance for New Stationary Sources" (NSPS)  
 apply to this source? No
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 justifi-  
 cation for any answer of "No" that might be considered questionable.

See Application Report.



SECTION 1.1: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

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

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

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

1. Total Process Input Rate (lbs/hr): Not Applicable

2. Product Weight (lbs/hr): Not Applicable

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

Emission Point 2005

Name of Contaminant	Emission <sup>1</sup>		Allowed <sup>2</sup> Emission Rate per Rule 17-2	Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
NO <sub>x</sub>	52.92	77.3			52.92	77.3	
CO	26.46	81.1			26.46	81.1	
VOC	12.35	23.18			12.35	23.18	
SO <sub>2</sub>	0.84	3.33			0.84	3.33	
PM	0.15	0.6			0.15	0.6	

<sup>1</sup>See Section V, Item 2.

<sup>2</sup>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)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

SECTION 17: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

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

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

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

1. Total Process Input Rate (lbs/hr): Not Applicable

2. Product Weight (lbs/hr): Not Applicable

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

Emission Point 2011

Name of Contaminant	Emission <sup>1</sup>		Allowed <sup>2</sup> Emission Rate per Rule 17-2	Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
NO <sub>x</sub>	1.35	0.27			1.35	0.27	
CO	2.95	0.59			2.95	0.59	
VOC	0.06	0.01			0.06	0.01	
SO <sub>2</sub>	0.14	0.03			0.14	0.03	
PM	0.03	0.005			0.03	0.005	

<sup>1</sup>See Section V, Item 2.

<sup>2</sup>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)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

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

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

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
	0.025	0.0267	27.80

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

Fuel Analysis:

Percent Sulfur: 0.031 ( by weight) Percent Ash: N/A  
 Density: 0.0455 lb/ft<sup>3</sup> lbs/gal Typical Percent Nitrogen: N/A  
 Heat Capacity: 22,857 BTU/lb N/A BTU/gal  
 Other Fuel Contaminants (which may cause air pollution): \_\_\_\_\_

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

Annual Average N/A Maximum N/A

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

Not Applicable

Emission Point 2005  
Stack Height: 65

Gas Flow Rate: 34,928 ACFM DSCFM Gas Exit Temperature: 540 °F.

SECTION IV: INCINERATOR INFORMATION

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

Date Constructed \_\_\_\_\_ Model No. \_\_\_\_\_

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

[ ] Other (specify)

Emission Point 2011

Gas Flow Rate: 3,043 ACFM DSCFM Gas Exit Temperature: 1112 °F

Water Vapor Content: \_\_\_\_\_ % Velocity: 258.3 FPS

## SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste \_\_\_\_\_

Total Weight Incinerated (lbs/hr) \_\_\_\_\_ Design Capacity (lbs/hr) \_\_\_\_\_

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

Manufacturer \_\_\_\_\_

Date Constructed \_\_\_\_\_ Model No. \_\_\_\_\_

	Volume (ft) <sup>3</sup>	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 device: ☐ Cyclone ☐ Wet Scrubber ☐ Afterburner

[ ] Other (specify) \_\_\_\_\_

Brief description of operating characteristics of control devices: \_\_\_\_\_

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

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

#### SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]  
See Application Report, Section 2.0, Appendix C, D
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 Application Report, Appendix C, D
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).  
See Application Report, Appendix C, D
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.)  
Not Applicable
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).  
Not Applicable
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.  
See Application Report, Figure 2-1
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).  
See Application Report, Figure 1-1, 2-1
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.  
See Application Report, Appendix B

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

Submitted Separately

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**

See Application Report, Section 3.0 and 6.0

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

☐ Yes ☐ No

Contaminant

Rate or Concentration

_____	_____
_____	_____
_____	_____
_____	_____

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

☐ Yes ☐ No

Contaminant

Rate or Concentration

_____	_____
_____	_____
_____	_____
_____	_____

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

Contaminant

Rate or Concentration

_____	_____
_____	_____
_____	_____
_____	_____

- D. Describe the existing control and treatment technology (if any).

1. Control Device/System:

2. Operating Principles:

3. Efficiency:\*

4. Capital Costs:

\*Explain method of determining

BEST AVAILABLE COPY

6. Useful Life:

5. 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).

1.

- a. Control Device: \_\_\_\_\_      b. Operating Principles: \_\_\_\_\_  
 c. Efficiency:<sup>1</sup> \_\_\_\_\_      d. Capital Cost: \_\_\_\_\_  
 e. Useful Life: \_\_\_\_\_      f. Operating Cost: \_\_\_\_\_  
 g. Energy:<sup>2</sup> \_\_\_\_\_      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:<sup>1</sup> \_\_\_\_\_      d. Capital Cost: \_\_\_\_\_  
 e. Useful Life: \_\_\_\_\_      f. Operating Cost: \_\_\_\_\_  
 g. Energy:<sup>2</sup> \_\_\_\_\_      h. Maintenance Cost: \_\_\_\_\_  
 i. Availability of construction materials and process chemicals:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:

1. Control Device:

2. Efficiency:<sup>1</sup>

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:<sup>2</sup>

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration

(8) Process Rate:<sup>1</sup>

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration

(8) Process Rate:<sup>1</sup>

10. Reason for selection and description of systems:

<sup>1</sup>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

Refer to Application Report

##### A. Company Monitored Data

1. \_\_\_\_\_ no. sites \_\_\_\_\_ TSP \_\_\_\_\_ SO<sub>2</sub>\* \_\_\_\_\_ 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).

D. 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

E. Meteorological Data Used for Air Quality Modeling

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) \_\_\_\_\_

F. Computer Models Used

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.

G. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO <sub>2</sub>	_____ grams/sec

H. Emission Data Used in Modeling

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.

I. Attach all other information supportive to the PSD review.

- J. 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.
- K. 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.

**APPENDIX B**

**PLOT PLAN**

**APPENDIX C**  
**SITE SUMMARY TABLE**

**Phase III Station Characteristics**

20-Apr-93

CS20.WK1

Compressor Station: Number 20

Name: Ft. Pierce

County: St. Lucie

Nearest City: Ft. Pierce

Compressor Supervisor: Donnie Owings

Mailing Address: 8701 Orange

Ft. Pierce, Florida 34945

Telephone: 407-466-6277

Latitude: 27-26-43

Longitude: 80-24-47

UTM Zone: 17

UTM Easting: 558.01 km

UTM Northing: 3,035.68 km

Elevation (ft): 22

**ENGINE IDENTIFICATION**

2005

**Phase III Engine Characteristics**

Operating Time (hr/yr)	8760
Hours/Day	24
Days/Week	7
Engine Type	Recip.
Manufacturer	Cooper - Bessemer
Model	10V-275C
Horsepower Rating (hp)	4000
Air Charging	Turbo
Exhaust Temperature (F)	540
Mass Flow Rate (lbs/hr) (a)	80,640
Volumetric Flow Rate (acfm)	34,928
Volumetric Flow Rate (dscfm)	18,163
Nominal Fuel Consumption (MMscfh) (b)	0.0267
Max. Fuel Consumption (MMscfh) (b)	0.0294
Nominal Specific Fuel Consump. (Btu/bhp-hr)	6,950
Maximum Specific Fuel Consump. (Btu/bhp-hr)	7,650
Nominal Heat Input (MMBtu/Hr)	27.8
Maximum Heat Input (MMBtu/Hr)	30.6

**Phase III Stack Parameters**

Stack Height (ft)	65.00
Stack Diameter (ft)	4.00
Stack to Building Offset (ft)	24.00
Building Height (ft) (c)	41.00
Building Length (ft) (c)	72.00
Building Width (ft) (c)	60.00

**Phase III Fuel Characteristics**

Fuel Type	N.G.
Heating Value (Btu/CF)	1040
Heat Capacity (Btu/lb)	22,857
Density (lb/cubic ft)	0.0455
Percent Sulfur (%) (d)	0.031
Percent Ash (%)	N/A

ENGINE IDENTIFICATION

2005

Phase III Emissions Rates by Engine for Station 20

Grams/BHP-Hour		Nominal	Maximum
	NOX	2.000	6.000
	CO	2.100	3.000
	NMHC	0.600	1.400
	SO2 (e)	0.086	0.095
	PM (f)	0.015	0.017
Pounds/Hour			
	NOX	17.64	52.92
	CO	18.52	26.46
	NMHC	5.29	12.35
	SO2	0.76	0.84
	PM	0.13	0.15
Tons/Year			
	NOX	77.26	
	CO	81.12	
	NMHC	23.18	
	SO2	3.33	
	PM	0.57	

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) Engine enclosed in building.
- (d) Percent by weight.
- (e) Based on 10 grains S/100 SCF n.g. (assume full conversion).
- (f) Based AP-42 factor of 5 lbs/MMSCF.

## Phase III Station Characteristics

20-Apr-93  
CS20EG.WK1

Compressor Station: Number 20  
Name: Ft. Pierce  
County: St. Lucie  
Nearest City: Ft. Pierce  
Compressor Supervisor: Donnie Owings  
Mailing Address: 8701 Orange  
Ft. Pierce, Florida 34945  
Telephone: 407-466-6277  
Latitude: 27-26-43  
Longitude: 80-24-47  
UTM Zone: 17  
UTM Easting: 558.01 km  
UTM Northing: 3,035.68 km  
Elevation (ft): 22

## ENGINE IDENTIFICATION

2011

## Phase III Emergency Generator Characteristics

Operating Time (hr/yr)	400
Engine Type	Recip.
Manufacturer	Caterpillar
Model	398 TA-LCR
Horsepower Rating (hp)	625
Kilowatt Rating (kw)	450
Exhaust Temperature (F)	1112
Volume Air to Fuel Ratio	9.5:1
Exhaust Flow (acfm)	3,043
Air Flow (kg/hr)	1,929
Nominal Fuel Consumption (MMscfh) (b)	0.0050
Max. Fuel Consumption (MMscfh) (b)	0.0050
Brake Specific Fuel Consump. (Btu/bhp-hr)	8,387
Maximum Heat Input (MMBtu/Hr)	5.24

## Phase III Stack Parameters

Stack Height (ft)	22
Stack Diameter (ft)	0.5
Stack to Building Offset (ft)	5
Building Height (ft) (c)	21
Building Length (ft) (c)	135
Building Width (ft) (c)	25

## Phase III Fuel Characteristics

Fuel Type	N.G.
Heating Value (Btu/CF)	1040
Heat Capacity (Btu/lb)	22,857
Density (lb/cubic ft)	0.0455
Percent Sulfur (%) (d)	0.031
Percent Ash (%)	N/A



ENGINE IDENTIFICATION

2011

Phase III Emissions Rates for Emergency Generator at Station 20

Grams/BHP-Hour

NOX	0.980
CO	2.140
NMHC	0.040
SO2 (e)	0.105
PM (f)	0.018

Pounds/Hour

Maximum

NOX	1.350
CO	2.950
NMHC	0.055
SO2	0.144
PM	0.025

Tons/Year

Restricted (400 hrs/yr)

NOX	0.270
CO	0.590
NMHC	0.011
SO2	0.028
PM	0.005

Notes:

- (a) Wet mass flow (@ 60 F, 14.7 psi).
- (b) Based on heating value of fuel gas.
- (c) Engine enclosed in auxillary building.
- (d) Percent by weight.
- (e) Based on 10 grains S/100 SCF n.g. (assume full conversion).
- (f) Based AP-42 factor of 5 lbs/MMSCF.

**APPENDIX D**  
**SUPPORTING CALCULATIONS**

---

**CRITERIA POLLUTANT  
EMISSION CALCULATIONS**

**MAXIMUM HEAT INPUT:**

**COMPRESSOR ENGINE:**

Engine No. 2005:

Fuel Heating Value	=	1,040 Btu/cf
Engine Rating	=	4,000 bhp
Brake Specific Fuel Consumption (max.)	=	7,650 Btu/bhp-hr
Brake Specific Fuel Consumption (nominal)	=	6,950 Btu/bhp-hr
Maximum Heat Input = MMBtu/Hr	=	(Btu/bhp-hr * hp)/10 <sup>6</sup>
	=	(7,650 * 4,000)/10 <sup>6</sup>
	=	30.6 MMBtu/hr

**POLLUTANT EMISSION FACTORS:**

**COMPRESSOR ENGINE:**

Engine No. 2005:

**NORMAL OPERATION:**

NO <sub>x</sub> :	2.00 grams/bhp-hr	Manufacturer's Data
CO:	2.10 grams/bhp-hr	Manufacturer's Data
NMHC:	0.60 grams/bhp-hr	Manufacturer's Data
SO <sub>2</sub> :	10 grains/100 CF	Contract Limit on Sulfur Content
lb/SO <sub>2</sub> /hr	= 10 grains/100 CF * 1 lb/7,000 grains * Btu/bhp-hr * bhp * 1 CF/1,040 Btu * 64 lb SO <sub>2</sub> /32 lb S = 10 grains/100CF * 1 lb/7,000 grains * 6,950 Btu/bhp-hr * 4,000 bhp * 1 CF/1,040 Btu * 64 lb SO <sub>2</sub> /32 lb S	

$$\begin{aligned}
 &= 0.76 \text{ lb SO}_2/\text{hr} \\
 \text{grams/bhp-hr} &= \text{lb SO}_2/\text{hr} * 453.6 \text{ g} * 1/\text{bhp} \\
 &= 0.76 \text{ lb SO}_2/\text{hr} * 453.6 \text{ g} * 1/4,000 \text{ bhp} \\
 &= 0.086 \text{ grams/bhp-hr}
 \end{aligned}$$

$$\begin{aligned}
 \text{PM:} & 5 \text{ lbs}/10^6 \text{ CF} && \text{Table 1.4-1, AP-42} \\
 \text{lb PM/hr} &= 5 \text{ lb PM}/10^6 \text{ CF} * \text{CF/hr} \\
 &= 5 \text{ lb PM}/10^6 \text{ CF} * 0.0267 \text{ MMCF/hr} \\
 &= 0.13 \text{ lb PM/hr} \\
 \text{grams/bhp-hr} &= \text{lb PM/hr} * 453.6 \text{ g/lb} * 1/\text{bhp} \\
 &= 0.13 \text{ lb PM/hr} * 453.6 \text{ g/lb} * 1/4,000 \text{ bhp} \\
 &= 0.015 \text{ grams/bhp-hr}
 \end{aligned}$$

WORST CASE:

NO <sub>x</sub> :	6.00 grams/bhp-hr	Manufacturer's Data
CO:	3.00 grams/bhp-hr	Manufacturer's Data
NMHC:	1.40 grams/bhp-hr	Manufacturer's Data
SO <sub>2</sub> :	10 grains/100 CF	Contract Limit on Sulfur Content

$$\begin{aligned}
 \text{lb/SO}_2/\text{hr} &= 10 \text{ grains}/100 \text{ CF} * 1 \text{ lb}/7,000 \text{ grains} * \text{Btu/bhp-hr} \\
 &\quad * \text{bhp} * 1 \text{ CF}/1,040 \text{ Btu} * 64 \text{ lb SO}_2/32 \text{ lb S} \\
 &= 10 \text{ grains}/100 \text{ CF} * 1 \text{ lb}/7,000 \text{ grains} * 7,650 \text{ Btu/bhp-hr} \\
 &\quad * 4,000 \text{ bhp} * 1 \text{ CF}/1,040 \text{ Btu} * 64 \text{ lb SO}_2/32 \text{ lb S} \\
 &= 0.84 \text{ lb SO}_2/\text{hr} \\
 \text{grams/bhp-hr} &= \text{lb SO}_2/\text{hr} * 453.6 \text{ g} * 1/\text{bhp} \\
 &= 0.84 \text{ lb SO}_2/\text{hr} * 453.6 \text{ g/lb} * 1/4,000 \text{ bhp} \\
 &= 0.095 \text{ grams/bhp-hr}
 \end{aligned}$$

---

PM:	5 lb/10 <sup>6</sup> CF	Table 1.4-1, AP-42
lb PM/hr	= 5 lb PM/10 <sup>6</sup> CF * CF/hr	
	= 5 lb PM/10 <sup>6</sup> CF * 0.0294 MMCF/hr	
	= 0.15 lb PM/hr	
grams/bhp-hr	= lb PM/hr * 453.6 g/lb * 1/bhp	
	= 0.15 lb SO <sub>2</sub> /hr * 453.6 g/lb * 1/4,000 bhp	
	= 0.017 grams/bhp-hr	

#### **HOURS OF OPERATION:**

The compressor engines are analyzed as if they have a potential to operate 8,760 hours per year.

---

**NO<sub>x</sub> EMISSIONS**

**COMPRESSOR ENGINE**

Engine No. 2005:

NORMAL OPERATION:

$$\begin{aligned} \text{lb NO}_x/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (2.00 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\ &= 17.64 \text{ lb/hour} \end{aligned}$$

$$\begin{aligned} \text{tons NO}_x/\text{yr} &= (\text{lb NO}_x/\text{hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= (17.64 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= 77.26 \text{ tons/year} \end{aligned}$$

WORST CASE:

$$\begin{aligned} \text{lb NO}_x/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (6.00 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\ &= 52.92 \text{ lb/hour} \end{aligned}$$

**EMISSION SUMMARY:**

NORMAL OPERATION:

$$\begin{aligned} \text{lb NO}_x/\text{hr} &= 17.64 \text{ lb NO}_x/\text{hr} \\ \text{tons NO}_x/\text{yr} &= 77.26 \text{ TPY NO}_x \end{aligned}$$

WORST CASE:

$$\text{lb NO}_x/\text{hr} = 52.92$$

---

**CO EMISSIONS****COMPRESSOR ENGINE**

Engine No. 2005:

NORMAL OPERATION:

$$\begin{aligned}\text{lb CO/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (2.10 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\ &= 18.52 \text{ lb/hour}\end{aligned}$$

$$\begin{aligned}\text{tons CO/yr} &= (\text{lb CO/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= (18.52 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= 81.12 \text{ tons/year}\end{aligned}$$

WORST CASE:

$$\begin{aligned}\text{lb CO/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (3.00 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\ &= 26.46 \text{ lb/hour}\end{aligned}$$

**EMISSION SUMMARY:**

NORMAL OPERATION:

$$\text{lb CO/hr} = 18.52 \text{ lb CO/hr}$$

$$\text{tons CO/yr} = 81.12 \text{ TPY CO}$$

WORST CASE:

$$\text{lb CO/hr} = 26.46 \text{ lb CO/hr}$$

---

**NMHC EMISSIONS**

**COMPRESSOR ENGINE**

Engine No. 2005:

**NORMAL OPERATION:**

$$\begin{aligned}
 \text{lb NMHC/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.60 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 5.29 \text{ lb/hour} \\
 \text{tons NMHC/yr} &= (\text{lb NMHC/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (8.82 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 23.18 \text{ tons/year}
 \end{aligned}$$

**WORST CASE:**

$$\begin{aligned}
 \text{lb NMHC/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (1.40 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 12.35 \text{ lb NMHC/hour}
 \end{aligned}$$

**EMISSIONS SUMMARY:**

**NORMAL OPERATION:**

$$\begin{aligned}
 \text{lb NMHC/hr} &= 8.82 \text{ lb NMHC/hr} \\
 \text{tons NMHC/yr} &= 23.18 \text{ TPY NMHC}
 \end{aligned}$$

**WORST CASE:**

$$\text{lb NMHC} = 12.35 \text{ lb NMHC/hr}$$



---

**SO<sub>2</sub> EMISSIONS**

**COMPRESSOR ENGINE**

Engine No. 2005:

**NORMAL OPERATION:**

$$\begin{aligned}
 \text{lb SO}_2/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.086 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 0.76 \text{ lb/hour} \\
 \text{tons SO}_2/\text{yr} &= (\text{lb SO}_2/\text{hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (0.76 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 3.33 \text{ tons/year}
 \end{aligned}$$

**WORST CASE:**

$$\begin{aligned}
 \text{lb SO}_2/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.095 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 0.84 \text{ lb/hr}
 \end{aligned}$$

**EMISSIONS SUMMARY:**

**NORMAL OPERATION:**

$$\text{lb SO}_2/\text{hr} = 0.76 \text{ lb SO}_2/\text{hr}$$

$$\text{tons SO}_2/\text{yr} = 3.33 \text{ TPY SO}_2$$

**WORST CASE:**

$$\text{lb SO}_2/\text{hr} = 0.84 \text{ lb SO}_2/\text{hr}$$

PM EMISSIONS

COMPRESSOR ENGINE

Engine No. 2005:

NORMAL OPERATION:

$$\begin{aligned}
 \text{lb PM/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.015 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 0.13 \text{ lb/hour/engine} \\
 \text{tons PM/yr} &= (\text{lb PM/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (0.13 \text{ lb/hr}) * (8760 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 0.57 \text{ tons/year}
 \end{aligned}$$

WORST CASE:

$$\begin{aligned}
 \text{lb PM/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.017 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (4000 \text{ bhp}) \\
 &= 0.15 \text{ lb/hr}
 \end{aligned}$$

EMISSION SUMMARY:

NORMAL OPERATION:

$$\begin{aligned}
 \text{lb PM/hr} &= 0.13 \text{ lb PM/hr} \\
 \text{tons PM/yr} &= 0.57 \text{ TPY PM}
 \end{aligned}$$

WORST CASE:

$$\text{lb PM/hr} = 0.15 \text{ lb PM/hr}$$

**CRITERIA POLLUTANT  
EMISSION CALCULATIONS**

**MAXIMUM HEAT INPUT:**

**EMERGENCY ELECTRICAL GENERATOR:**

Generator No. 2011:

Fuel Heating Value	=	1040 Btu/cf
Engine Rating	=	625 bhp
Brake Specific Fuel Consumption	=	8,387 Btu/bhp-hr
Maximum Heat Input = MMBtu/Hr	=	(Btu/bhp-hr * hp)/10 <sup>6</sup>
	=	(8,387 * 625)/10 <sup>6</sup>
	=	5.24 MMBtu/hr
Gas Consumption	=	(5.24 MMBtu/hr/1040 Btu/scf)
	=	0.005 MMscf/hr

**POLLUTANT EMISSION FACTORS:**

**EMERGENCY ELECTRICAL GENERATOR:**

Generator No. 2011:

Without Catalytic Silencer

NO <sub>x</sub> :	9.8 grams/bhp-hr	Manufacturer's Data
CO:	10.7 grams/bhp-hr	Manufacturer's Data
HC:	0.8 grams/bhp-hr	Manufacturer's Data
NMHC:	0.08 grams/bhp-hr	(10 % of HC)
SO <sub>2</sub> :	10 grains/100 CF	Contract Limit on Sulfur Content
	0.10 grams/bhp-hr	

$$\begin{aligned}
 \text{lbSO}_2/\text{hr} &= 10 \text{ grains}/100 \text{ CF} * 1 \text{ lb}/7,000 \text{ grains} * \text{Btu}/\text{bhp-hr} \\
 &\quad * \text{bhp} * \text{CF}/1,040 \text{ Btu} * 64 \text{ lb SO}_2/32 \text{ lb} \\
 &= 10 \text{ grains}/100 \text{ CF} * 1 \text{ lb}/7,000 \text{ grains} * 8,387 \text{ Btu}/\text{bhp-hr} \\
 &\quad * 625 \text{ bhp} * \text{CF}/1,040 \text{ Btu} * 64 \text{ lb SO}_2/32 \text{ lb} \\
 &= 0.144 \text{ lb SO}_2/\text{hr} \\
 \text{grams}/\text{bhp-hr} &= \text{lb SO}_2/\text{hr} * 453.6 \text{ g}/1 \text{ lb}/\text{bhp} \\
 &= 0.144 \text{ lb SO}_2/\text{hr} * 453.6 \text{ g}/1 \text{ lb}/625 \text{ bhp} \\
 &= 0.10 \text{ grams}/\text{bhp-hr}
 \end{aligned}$$

$$\begin{aligned}
 \text{PM:} & \quad 5 \text{ lbs}/10^6 \text{ CF} & \quad \text{Table 1.4-1, AP-42} \\
 \text{lb PM}/\text{hr} &= 5 \text{ lb PM}/10^6 \text{ CF} * \text{CF}/\text{hr} \\
 &= 5 \text{ lb PM}/10^6 \text{ CF} * 0.005 \text{ MMCF}/\text{hr} \\
 &= 0.025 \text{ lb PM}/\text{hr} \\
 \text{grams}/\text{bhp-hr} &= \text{lb PM}/\text{hr} * 453.6 \text{ g}/1 \text{ lb}/\text{bhp} \\
 &= 0.025 \text{ lb PM}/\text{hr} * 453.6 \text{ g}/\text{lb}/625 \text{ bhp} \\
 &= 0.018 \text{ grams}/\text{bhp-hr}
 \end{aligned}$$

#### With Catalytic Silencer

NO <sub>x</sub> :	0.98 grams/bhp-hr	(10% of NO <sub>x</sub> W/O Catalytic Silencer)
CO:	2.14 grams/bhp-hr	(20% of CO W/O Catalytic Silencer)
NMHC:	0.04 grams/bhp-hr	(50% of NMHC W/O Catalytic Silencer)
SO <sub>2</sub> :	0.10 grains/100 CF	(100% of SO <sub>2</sub> W/O Catalytic Silencer)
PM:	0.018 grams/bhp-hr	(100% of PM W/O Catalytic Silencer)

#### HOURS OF OPERATION:

The generator will operate a maximum of 400 hours per year.

---

**NO<sub>x</sub> EMISSIONS****EMERGENCY ELECTRICAL GENERATOR**

Generator No. 2011:

$$\begin{aligned}\text{lb NO}_x/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (0.98 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (625 \text{ bhp}) \\ &= 1.35 \text{ lb/hour} \\ \text{tons NO}_x/\text{yr} &= (\text{lb NO}_x/\text{hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= (1.35 \text{ lb/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= 0.27 \text{ tons/year}\end{aligned}$$

---

**CO EMISSIONS****EMERGENCY ELECTRICAL GENERATOR**

Generator No. 2011:

$$\begin{aligned}\text{lb CO/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\ &= (2.14 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (625 \text{ bhp}) \\ &= 2.95 \text{ lb/hour} \\ \text{tons CO/yr} &= (\text{lb CO/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= (2.95 \text{ lb/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\ &= 0.59 \text{ tons/year}\end{aligned}$$

## NMHC EMISSIONS

### EMERGENCY ELECTRICAL GENERATOR

Generator No. 2011:

$$\begin{aligned}
 \text{lb NMHC/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.04 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (625 \text{ bhp}) \\
 &= 0.055 \text{ lb/hour} \\
 \text{tons NMHC/yr} &= (\text{lb NMHC/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (0.055 \text{ lb/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 0.011 \text{ tons/year}
 \end{aligned}$$

## SO<sub>2</sub> EMISSIONS

### EMERGENCY ELECTRICAL GENERATOR

Generator No. 2011:

$$\begin{aligned}
 \text{lb SO}_2/\text{hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.10 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (625 \text{ bhp}) \\
 &= 0.14 \text{ lb/hour} \\
 \text{tons SO}_2/\text{yr} &= (\text{lb SO}_2/\text{hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (0.14 \text{ lb/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 0.028 \text{ tons/year}
 \end{aligned}$$



**PM EMISSIONS**

**EMERGENCY ELECTRICAL GENERATOR**

Generator No. 2011:

$$\begin{aligned}
 \text{lb PM/hr} &= (\text{grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (\text{bhp}) \\
 &= (0.018 \text{ grams/bhp-hr}) * (0.002205 \text{ lb/gram}) * (625 \text{ bhp}) \\
 &= 0.025 \text{ lbs/hour} \\
 \text{tons PM/yr} &= (\text{lb PM/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= (0.025 \text{ lb/hr}) * (400 \text{ hr/yr}) / (2000 \text{ lb/ton}) \\
 &= 0.005 \text{ tons/year}
 \end{aligned}$$

**APPENDIX E**  
**FDER REGULATORY REQUIREMENTS SUMMARY**

**AIR QUALITY  
REGULATORY REQUIREMENTS CHECKLIST  
FLORIDA**

<b><u>Rules and Regulations</u></b>	<b><u>Applicability</u></b>	<b><u>Name</u></b>	<b><u>Comments</u></b>
Title 17		Rules and Regulations of the State of Florida	Heading. No specific regulatory requirements.
• Chapter 17-2		Air Pollution	Heading. No specific regulatory requirements.
• Part I		Definitions	Heading. No specific regulatory requirements.
§17-2.100	Yes	Definitions	This subsection defines the terms used in Chapter 17-2. No specific regulatory requirements.
• Part II		General Provisions	Heading. No specific regulatory requirements.
§17-2.200	Yes	Statement of Intent	Chapter 17-2 is promulgated to eliminate, prevent, and control air pollution, except from outdoor burning and outdoor heating devices which are regulated under Chapter 17-5. It also furthers the Department of Environmental Regulation's (DER's) Prevention of Significant Deterioration (PSD) policy, and establishes ambient air quality standards and emission standards. No specific regulatory requirements.
§17-2.210	Yes	Permits Required	Unless exempt, all sources at the compressor station which emit or can reasonably be expected to emit any air pollutant are required to be permitted prior to

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			<p>construction, modification, or initial or continued operation. FGTC must file a construction permit for new sources or those desiring to undergo modification. The permit term will be for a time period sufficient to allow determination of compliance. An operation permit is required of the source after the construction permit expires. The permit specifies the manner, nature, volume and frequency of emission permitted, applicable limiting standard (if any), proper operation and maintenance of pollution control equipment, and a term of 5 years. Requirements for sources which have shut down and desire to reactivate are specified. Exemptions to Chapter 17-2 are listed including emergency electrical generators operating <math>\leq 400</math> hrs/yr.</p>
\$17-2.215	No	Emission Estimates	<p>Standards for making emissions estimates for all regulatory purposes including permitting and reporting purposes are established. Since standards have only been established for solid sulfur storage and handling facilities, this section is not applicable to the compressor station.</p>
\$17-2.220	Yes	Public Notice and Comment	<p>Public notice must be provided by FGTC for construction (including modifications) permit applications. There are additional public notice requirements for sources subject to New Source Review (NSR), i.e., sources located in non-attainment areas, or Prevention of Significant Deterioration (PSD), i.e., sources located in attainment</p>

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			areas. FGTC is required to publish the public notice after it has been prepared by DER. Procedures and specifications for public notice are detailed.
§17-2.240	Yes	Circumvention	Circumvention of pollution control devices and use of improperly operating devices are prohibited. No specific regulatory requirements.
§17-2.250	Yes	Excess Emissions	Excess emissions resulting from startup, shutdown, or malfunction are allowed for $\leq 2$ hours in any 24-hour period provided best operational practices to minimize emissions are used and the activity did not result from poor maintenance or operations. Fossil fuel steam generators are presented as a special case. DER must be notified by FGTC of upset emissions followed by a written report on the malfunction(s), if requested.
§17-2.260	Yes	Air Quality Models	FGTC's estimates of concentrations of ambient air pollutants are to be based on applicable air quality models, data bases, and other DER approved requirements specified in USEPA's " <u>Guidelines On Air Quality Models</u> " (1978). Alternative models may be allowed following public comment and as justified in USEPA's "Workbook for Comparison of Air Quality Models" (1978).

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
§17-2.270	Yes	Stack Height Policy	For the purpose of estimating ambient air concentrations through modeling, FGTC must use Good Engineering Practice (GEP). A required emission limitation shall not be affected by stack heights which exceed GEP or by other specified dispersion techniques. Actual stack heights are not restricted. GEP specifications and details regarding dispersion techniques are presented. The engine stack at this facility meets GEP.
§17-2.280	Yes	Severability	If any part of this rule is invalidated, all other parts remain valid. No specific regulatory requirements.
§17-2.290	Yes	Effective Date	The effective date of this rule is 11/1/81. No specific regulatory requirements.
• Part III		Ambient Air Quality	Heading. No specific regulatory requirements.
§17-2.300	Yes	Ambient Air Quality Standards	Standards are established to protect human health and welfare. Violations of ambient air quality standards (AAQS) are not allowed by any source. Standards are established for SO <sub>2</sub> (maximum 3-hour concentration not to be exceeded more than once per year = 1,500 µg/m <sup>3</sup> ; 24-hour standard not to be exceeded more than once per year = 260 µg/m <sup>3</sup> ); for PM <sub>10</sub> (24-hour average concentration not to be exceeded more than once per year = 150 µg/m <sup>3</sup> ); for CO (maximum 1-hour concentration not to be exceeded more than once per

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			<p>year = 40 <math>\mu\text{g}/\text{m}^3</math>); for <math>\text{O}_3</math> (daily maximum 1-hour concentration not to be exceeded an average of more than one day per year = 100 <math>\mu\text{g}/\text{m}^3</math>); for <math>\text{NO}_2</math> (annual arithmetic mean = 100 <math>\mu\text{g}/\text{m}^3</math>); and for lead (maximum quarterly arithmetic mean = 1.5 <math>\mu\text{g}/\text{m}^3</math>). Specific instructions for determining <math>\text{O}_3</math> exceedances and compliance are presented. FGTC is required to maintain AAQS.</p>
§17-2.310	Yes	Maximum Allowable Increases (Prevention of Significant Deterioration Increments	<p>At each point within the baseline area, any increase in pollutant concentration by the compressor station over the baseline concentration shall be limited to the amounts specified in this section. Specifications regarding averaging periods and allowable increases are presented on a pollutant-by-pollutant basis for each area designation (i.e., Class I or II). One exceedance per year above the maximum allowable increase is permitted during one averaging period in the year. The engines at this station is an existing major stationary source for at least one criteria pollutant. Therefore, the new engine is subject to preconstruction PSD review.</p>
§17-2.320	Yes	Air Pollution Episodes	<p>Air Pollution Episodes are defined and classified. DER is authorized to declare and terminate episodes and define affected areas. Preplanned abatement strategies prepared by FGTC may be requested by DER. Plan contents are established. Procedures for enforcing non-compliance are presented.</p>

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
§17-2.330	Yes	Air Alert	Alert level criteria are defined. Actions required of specific sources upon declaration of an alert are given. FGTC is prohibited from any form of open burning.
§17-2.340	Yes	Air Warning	Warning level criteria are defined. Actions required of specific sources upon declaration of a warning are given. FGTC is prohibited from any form of open burning and unnecessary space heating and cooling.
§17-2.350	Yes	Air Emergency	Emergency level criteria are defined. Actions required of specific sources upon declaration of an emergency are given. FGTC is prohibited from any form of open burning, any construction other than in case of an emergency, and unnecessary lighting, heating, or cooling in unoccupied structures. FGTC is required to take any action that will result in the maximum reduction of air pollutants from the compressor station.
• Part IV		Area Designation and Attainment Dates	Heading. No specific regulatory requirements.
§17-2.400	Yes	Procedures for Designation and Redesignation of Areas	All areas of the state are to be designated as non-attainment, attainment, or unclassifiable with respect to each pollutant for which an AAQS has been established. Area determinations determine emission limiting standards, new and modified source review requirements, and other air pollution control measures. All areas not designated as non-attainment are PSD areas



<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			<p>which require establishment of a baseline date. PSD areas are further classified as Class I, II, or III areas for which maximum allowable increases in SO<sub>2</sub> and TSP shall apply after the baseline date. FGTC must comply with these maximum allowable increases. Air Quality Maintenance Areas are former non-attainment areas which have been redesignated to attainment or unclassifiable. These areas remain subject to the emission limiting standards and permit limitations imposed upon them as non-attainment areas. Procedures for redesignation of Class I, II, and III areas and PSD areas are established.</p>
§17-2.410	Yes	Designation of Areas Not Meeting Ambient Air Quality Standards (Non-attainment Areas)	Ozone, TSP, and SO <sub>2</sub> non-attainment areas within the state are designated. NO <sub>x</sub> or PM <sub>10</sub> non-attainment areas have been designated. No specific regulatory requirements.
§17-2.420	Yes	Designation of Areas Meeting Ambient Air Quality Standards (Attainment Areas)	All areas not designated as non-attainment or unclassifiable are designated as attainment areas. This compressor station is located in an attainment area for SO <sub>2</sub> and PM, and unclassifiable for all other criteria pollutants. No specific regulatory requirements.
§17-2.430	Yes	Designation of Areas Which Cannot Be Classified Attainment or	Unclassifiable areas in the State are designated. These are all areas not designated as attainment or non-attainment. This compressor station is located in an area

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
		Non-attainment	unclassifiable for NO <sub>x</sub> , CO, and ozone. No specific regulatory requirements.
§17-2.440	Yes	Designation of Class I, Class II, and Class III Areas	Class I areas are specifically designated. All other areas are designated as Class II areas. No Class III areas are designated. No specific regulatory requirements.
§17-2.450	Yes	Designation of Prevention of Significant Deterioration (PSD) Areas	All of the State is a PSD area for TSP and SO <sub>2</sub> (except for designated non-attainment areas) and has a major source baseline date of 1/6/75; a minor source baseline date of 12/27/77; and a trigger date of 8/7/77. All of the state is a PSD area for NO <sub>2</sub> and has a major source baseline date of 2/28/88; a minor source baseline date of 3/28/88; and a trigger date of 2/8/88. No specific regulatory requirements.
§17-2.460	Yes	Designation of Air Quality Maintenance Areas	Air Quality Maintenance Areas within the State are designated. Non-attainment areas which will automatically become air quality maintenance areas upon redesignation by USEPA as attainment are listed. No specific regulatory requirements.
• Part V		New and Modified Source Review Requirements	Heading. No specific regulatory requirements
§17-2.500	No	Prevention of Significant Deterioration	This rule applies to construction of new sources or modification of existing sources in attainment areas. Twenty-eight categories of major facilities (Table 500-1) subject

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			to this section are established. The engine at this station is not one of these listed sources. Specific construction and operation permit requirements are presented. Violations of AAQS are not allowed, nor are emission increases above baseline concentrations which have been summed with the lesser of the allow-able increases or AAQS. The criteria for determining whether or not the compressor station is subject to NSR are presented. Fugitive emissions cannot be used to subject a facility to NSR, and NSR does not apply to sources located in non-attainment areas. Although the engines at this station are not one of the 28 listed sources, they have the potential to emit $\geq 250$ TPY of at least one criteria pollutant for which the area is designated as attainment. Therefore, Compressor Station No. 20 is subject to PSD preconstruction review. Source exemptions to New Source Review (NSR) are presented. Applicability of NSR to new or modified major and minor sources is established.
\$17-2.510	Yes	New Source Review for Non-attainment Areas	This compressor station is located in an attainment area for all criteria pollutants.
\$17-2.520	No	Sources Not Subject to Prevention of Significant Deterioration or	This rule applies to sources not subject to NSR but not exempt from general permitting requirements. This compressor station is subject to the PSD requirements

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
		Non-attainment Requirements (con't)	presented in §17-2.500. Therefore, this section does not apply to the compressor station.
§17-2.530	No	Source Reclassification	A source whose operating permit has been revoked is deemed permanently shut down. A source whose permit has lapsed is deemed permanently shut down unless DER is notified within 20 days of the date of lapse and that the source intends to continue operation. The source must meet the additional requirements specified in this rule. This rule does not apply since the permit for this facility has never been revoked or has never lapsed.
§17-2.540	No	Source Specific New Source Review Requirements	This rule applies only to sulfur storage and handling facilities.
• Part VI		Emission Limiting and Performance Standards	Heading. No specific regulatory requirement.
§17-2.600	No	Specific Source Emission Limiting Standards	Emission limiting standards for specified sources are presented. This compressor station is not one of the specified sources.
§17-2.610	Yes	General Particulate Emission Limiting Standard	This rule establishes a PM standard for sources not subject to any other PM or opacity standard. The compressor station is subject to this standard since it is not subject to any other PM limiting standard. A process rate

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			standard and a 20% opacity standard is established. The rule mandates that reasonable practices be taken to prevent unconfined PM emissions.
§17-2.620	Yes	General Pollutant Emission Limiting Standard	Vapor emission control is required for storing, pumping handling, processing, loading, unloading, or using in any process or installation VOCs or organic solvents. FGTC's compressor station must not emit objectionable odors.
§17-2.630	No	Best Available Control Technology (BACT)	Because this source is subject to PSD and because BACT is a requirement under PSD NSR, the engine is subject to BACT.
§17-2.640	No	Lowest Achievable Emission Rate (LAER)	LAER is required for construction in non-attainment areas or areas of influence on non-attainment areas. Because this compressor station is located in an attainment area for all criteria pollutants, the engine is not subject to LAER.
§17-2.650	No	Reasonably Available Control Technology (RACT)	RACT for VOC control is established for sources in non-attainment areas and air quality maintenance areas, and for PM in air quality maintenance areas and areas of influence on them. Because this compressor station is located in an attainment area for all criteria pollutants, this section does not apply.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
\$17-2.660	Yes	Standards of Performance for New Stationary Sources	Heading. No specific regulatory requirements.
• Subpart D	No	Standards of Performance for Fossil-Fuel Fired Steam Generators for which Construction is Commenced After August 17, 1991	This facility is not a fossil-fuel fired steam generator.
• Subpart Da	No	Standards for Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978	This facility is not an electric utility steam generating unit.
• Subpart Db	No	Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units	This facility is not a steam generating unit.
• Subpart E	No	Standards of Performance for Incinerators	This facility is not an incinerator.
• Subpart F	No	Standards of Performance for Portland Cement Plants	This facility is not a Portland Cement Plant.
• Subpart G	No	Standards of Performance for Nitric Acid Plants	This facility is not a nitric acid plant.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart H	No	Standards of Performance for Sulfuric Acid Plants	This facility is not a sulfuric acid plant.
• Subpart I	No	Standards of Performance for Asphalt Concrete Plants	This facility is not a hot mix asphalt facility.
• Subpart J	No	Standards of Performance for Petroleum Refineries	This facility is not a petroleum refinery.
• Subpart K	No	Standards of Performance for Storage Vessels for Petroleum Liquids Constructed after June 11, 1973, and Prior to May 19, 1978	The storage vessels at this facility do not meet the minimum criteria specified (storage capacity $\geq 40,000$ gallons).
• Subpart Ka	No	Standards of Performance for Storage Vessels for Petroleum Liquids Constructed after May 18, 1978.	The storage vessels at this facility do not meet the minimum criteria specified (storage capacity $\geq 40,000$ gallons).
• Subpart Kb	No	Standards of Performance for Storage Vessels for Petroleum Liquids Constructed after July 23, 1978.	The storage vessels at this facility do not meet the minimum criteria specified (storage capacity $\geq 40$ m <sup>3</sup> ).
• Subpart L	No	Standards of Performance for Secondary Lead Smelters	This facility is not a lead smelter.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart M	No	Standards of Performance for Secondary Brass and Bronze Ingot Production Plants	This facility does not produce brass or bronze.
• Subpart N	No	Standards of Performance for Iron and Steel Plants	This facility is not an iron or steel plant.
• Subpart Na	No	Standards of Performance for Basic Oxygen Process Steel-making Facilities for which Construction is Commenced after January 20, 1983	This facility is not a steelmaking facility.
• Subpart O	No	Standards of Performance for Sewage Treatment Plants	This facility is not a sewage treatment plant.
• Subpart P	No	Standards of Performance for Primary Copper Smelters	This facility is not a copper smelter.
• Subpart Q	No	Standards of Performance for Primary Zinc Smelters	This facility is not a zinc smelter.
• Subpart R	No	Standards of Performance for Primary Lead Smelters	This facility is not a lead smelter.
• Subpart S	No	Standards of Performance for Primary Aluminum Reduction Plants	This facility is not an aluminum reduction plant.



<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart T	No	Standards of Performance for Phosphate Fertilizer Industry (P.F.I.): Wet Process Phosphoric Acid Plants	This facility is not part of the phosphate fertilizer industry.
• Subpart U	No	Standards of Performance for P.F.I.s: Superphosphoric Acid Plants	This facility is not part of the phosphate fertilizer industry.
• Subpart V	No	Standards of Performance for P.F.I.s: Diammonium Phosphate Plants	This facility is not part of the phosphate fertilizer industry.
• Subpart W	No	Standards of Performance for P.F.I.s: Triple Superphosphate Plants	This facility is not part of the phosphate fertilizer industry.
• Subpart X	No	Standards of Performance for P.F.I.s: Granular Triple Superphosphate Storage Facilities	This facility is not part of the phosphate fertilizer industry.
• Subpart Y	No	Standards of Performance for Coal Preparation Plants	This facility is not a coal preparation plant.
• Subpart Z	No	Standards of Performance for Ferroalloy Production Facilities	This facility is not a ferroalloy production facility.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart AA	No	Standards of Performance for Steel Plants: Electric Arc Furnaces Constructed after October 21, 1974, and on or before August 17, 1983	This facility is not a steel plant.
• Subpart AAa	No	Standards of Performance for Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed after August 7, 1983	This facility is not a furnace.
• Subpart BB	No	Standards of Performance for Kraft Pulp Mills	This facility is not a Kraft pulp mill.
• Subpart CC	No	Standards of Performance for Glass Manufacturing Plants	This facility is not a glass manufacturing plant.
• Subpart DD	No	Standards of Performance for Grain Elevators	This facility is not a grain elevator.
• Subpart EE	No	Standards of Performance for Surface Coating: Metal Furniture	This facility is not involved in surface coating operations.
• Subpart GG	No	Standards of Performance for Stationary Gas Turbines	The engine to be installed at Compressor Station No. 20 is not a turbine engine.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart HH	No	Standards of Performance for Lime Manufacturing Plants	This facility is not a lime manufacturing plant.
• Subpart KK	No	Standards of Performance for Lead-Acid Battery Manufacture Plants	This facility is not a lead-acid battery manufacturing plant.
• Subpart LL	No	Standards of Performance for Metallic-Mineral Processing Plants	This facility is not a metallic-mineral processing plant.
• Subpart MM	No	Standards of Performance for Automobile and Light Duty Truck Surface Coating Operations	This facility is not a surface coating facility.
• Subpart NN	No	Standards of Performance for Phosphate Rock Plants	This facility is not a phosphate rock plant.
• Subpart PP	No	Standards of Performance for Ammonium Sulfate Manufacturing	This facility is not involved in the manufacture of ammonium sulfate.
• Subpart QQ	No	Standards of Performance for Graphic Arts Industry: Publication Rotogravure Printing	This facility is not part of the graphic arts industry.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart RR	No	Standards of Performance for Pressure Sensitive Tape and Label Surface Coating Operations	This facility is not involved in coating operations.
• Subpart SS	No	Standards of Performance for Industrial Surface Coating: Large Appliances	This facility is not involved in coating operations.
• Subpart TT	No	Standards of Performance for Metal Coil Surface Coating	This facility is not involved in coating operations.
• Subpart UU	No	Standards of Performance for Asphalt Processing and Asphalt Roofing Manufacture	This facility is not involved in asphalt processing or asphalt roofing manufacture.
• Subpart VV	No	Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	This facility is not a SOCMF facility.
• Subpart WW	No	Standards of Performance for the Beverage Can Surface Coating Industry	This facility is not involved in coating operations.
• Subpart XX	No	Standards of Performance for Bulk Gasoline Terminals	This facility is not a bulk gasoline terminal.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart AAA	No	Standards of Performance for New Residential Wood Heaters	This facility is not a residential wood heater.
• Subpart BBB		Standards of Performance for the Rubber Tire Manufacturing Industry	This facility is not involved in the manufacture of rubber tires.
• Subpart FFF	No	Standards of Performance for Flexible Vinyl and Urethane Coating and Printing	This facility is not involved in coating or printing.
• Subpart GGG	No	Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries	This facility is not a petroleum refinery.
• Subpart HHH	No	Standards of Performance for Synthetic Fiber Production Facilities	This facility is not a synthetic fiber production facility.
• Subpart III	No	Standards of Performance for Volatile Organic Compound (VOC) Emissions from the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	This facility is not a SOCMI facility.
• Subpart JJJ	No	Standards of Performance for Petroleum Dry Cleaners	This facility is not a petroleum dry cleaner.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart KKK	No	Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants	This facility is not a natural gas processing plant.
• Subpart LLL	No	Standards of Performance for Onshore Natural Gas Processing: SO <sub>2</sub> Emissions	This facility is not a natural gas processing plant.
• Subpart NNN	No	Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations	This facility is not a SOCMI facility.
• Subpart OOO	No	Standards of Performance for Nonmetallic Mineral Processing Plants	This facility is not a nonmetallic mineral processing plant.
• Subpart PPP	No	Standards of Performance for Wool Fiberglass Insulation Manufacturing Plants	This facility is not a wool fiberglass manufacturing plant.
• Subpart QQQ	No	Standards of Performance for Petroleum Wastewater Systems	This facility is not a petroleum wastewater system.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart SSS	No	Standards of Performance for Magnetic Tape Manufacturing Industry	This facility is not involved in the manufacture of magnetic tape.
• Subpart TTT	No	Standards of Performance for Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	This facility is not a surface coating facility.
• Subpart VVV	No	Standards of Performance for Polymeric Coating of Supporting Substrates Facilities	This facility is not involved in coating operations.
\$17-2.670	No	National Emission Standards for Hazardous Air Pollutants	The federal NESHAPS are incorporated here by reference.
• Subpart B	No	Radon-222 Emission from Underground Uranium Mines	This facility is not an underground uranium mine.
• Subpart C	No	Beryllium	This facility is not a source of beryllium.
• Subpart D	No	Beryllium Rocket Motor Firing	This facility is not engaged in rocket motor firing.
• Subpart E	No	Mercury	There are no mercury emissions from this facility.
• Subpart F	No	Vinyl Chloride	There are no vinyl chloride emissions from this facility.
• Subpart G	No		Reserved. No specific regulatory requirements.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart H	No		Reserved. No specific regulatory requirements.
• Subpart I	No		Reserved. No specific regulatory requirements.
• Subpart J	No	Benzene Equipment Leaks	There are no benzene emissions from this facility.
• Subpart K	No		Reserved. No specific regulatory requirements.
• Subpart L	No	Benzene Emissions from Coke By-Product Recovery Plants	This facility is not a coke by-product recovery plant.
• Subpart M	No	Asbestos	There are no asbestos emissions at this facility.
• Subpart N	No	Standard for Inorganic Arsenic Emissions from Glass Manufacturing Plants	This facility is not a glass manufacturing plant.
• Subpart O	No	Standard for Inorganic Arsenic Emissions from Primary Copper Smelters	This facility is not a primary copper smelter.
• Subpart P	No	Standard for Inorganic Arsenic Emissions from Arsenic Trioxide and Metallic Arsenic Production Facilities	This facility is not an arsenic production facility.
• Subpart Q	No		Reserved. No specific regulatory requirements.



<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart R	No		Reserved. No specific regulatory requirements.
• Subpart S	No		Reserved. No specific regulatory requirements.
• Subpart T	No		Reserved. No specific regulatory requirements.
• Subpart U	No		Reserved. No Specific regulatory requirements.
• Subpart V	No	Equipment Leaks (Fugitive Emission Sources)	This facility will have no benzene or vinyl chloride emissions.
• Subpart W	No	Radon-222 Emissions from Licensed Uranium Mill Tailings	This facility is not a licensed uranium mill tailing.
• Subpart X	No		Reserved. No specific regulatory requirements.
• Subpart Y	No	Benzene Emissions from Benzene Storage Vessels	This facility does not have benzene storage vessels.
• Subpart Z	No		Reserved. No specific regulatory requirements.
• Subpart AA	No		Reserved. No specific regulatory requirements.
• Subpart BB	No	Benzene Emissions from Benzene Transfer Operations	There are no benzene transfer operations at this facility.
• Subpart CC	No		Reserved. No specific regulatory requirements.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Subpart DD	No		Reserved. No specific regulatory requirements.
• Subpart EE	No		Reserved. No specific regulatory requirements.
• Part VII	No	Source Sampling and Monitoring	Heading. No specific regulatory requirements.
§17-2.700	Yes	Stationary Point Source Emissions Test Procedures	The methods and procedures which FGTC must use to perform compliance test on stack emission are presented.
§17-2.710	No	Continuous Monitoring Requirements	These requirements apply only to certain specified sources. This facility is not one of those specified.
§17-2.753	No	DER Ambient Test Methods	These requirements apply only to certain specified sources. This facility is not one of those specified.
• Part VIII	Yes	Local Air Pollution Control Programs	This part establishes local air pollution control programs. in specified counties. This facility is not located in one of the counties with approved programs.
• Part IX	No	Compliance Schedules	This part applies only to certain specified sources. This facility is not one of the sources specified.
• Chapter 17-4		Permits	Heading. No specific regulatory requirements.
§17-4.001	No	Scope of Part I	This section establishes that procedures for obtaining an FDER permit will be presented in Part I. No specific regulatory requirements.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
§17-4.020	Yes	Definitions	Definitions of terms used in Part I to which FGTC is subject are presented.
§17-4.021	No	Transferability of Definitions	Terms defined in other Chapters retain their meaning here, unless otherwise defined. No specific regulatory requirements.
§17-4.022	No	Determination of the Landward Extent of Surface Waters of the State	Transferred to §17-3.022. No specific regulatory requirements.
§17-4.030	Yes	General Prohibition	All FGTC stationary sources must have a valid permit unless exempted, and must be constructed, maintained, and operated consistent with the terms of the permit.
§17-4.040	Yes	Exemptions	DER may exempt structural changes which will not change quality, nature, or quantity of emissions or will not cause pollution. DER may exempt sources which do not contribute significantly to pollution problems within the state. FGTC may request an exemption for sources which meet the previously stated conditions.
§17-4.050	Yes	Procedure to Obtain Permit: Application	FGTC is to complete an application in quadruplicate on DER forms. The application must be certified by a Florida Registered Professional Engineer and must be accompanied by the appropriate processing fee. FGTC must submit a certification of construction and permit fee

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
			upon completion of construction in order to be granted an operation permit.
§17-4.055	Yes	Permit Processing	This section establishes the schedule which DER must follow in processing the permit application. DER may request additional information from FGTC. FGTC may request a hearing if it believes that the requested information is not legally authorized.
§17-4.060	Yes	Consultation	FGTC or their representatives are encouraged to consult with DER prior to submitting the permit application. No specific regulatory requirements.
§17-4.070	Yes	Standards for Issuing or Denying Permits; Issuance; Denial	The construction permit will be issued "for a period of time as necessary." The operation permit will have a 5 year term. FGTC's compliance history will be considered in issuing/denying the application. DER will stipulate permit conditions. No specific regulatory requirements.
§17-4.080	Yes	Modification of Permit Conditions	DER may, after issuing the permit, modify or establish new permit conditions. FGTC may request a permit modification permit extension.
§17-4.090	Yes	Renewals	FGTC must apply for a permit renewal prior to 60 days before the expiration of the permit.
§17-4.100	Yes	Suspension and Revocation	FGTC's permit may be suspended or revoked for actions specified within the section.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
\$17-4.110	Yes	Financial Responsibility	DER may request FGTC to submit proof of financial responsibility, and may require a bond to guarantee compliance.
\$17-4.120	Yes	Transfer of Permits	FGTC must submit an "Application for Transfer of Permit" within 30 days of selling/legally transferring a permitted facility.
\$17-4.140	No	Reports	Repealed. No specific regulatory requirements.
\$17-4.150	Yes	Review	After having received notice of a proposed or final DER action, FGTC waives its right to an administrative hearing if FGTC fails to respond to the notice with 14 days of receipt.
\$17-4.160	Yes	Permit Conditions	FGTC is required to properly operate and maintain the facility in order to maintain compliance. DER may access FGTC's records, inspect the facility, and collect samples. All FGTC data may be used in enforcement proceedings. FGTC must keep a copy of the permit at the facility. All monitoring information, reports, and data used to complete applications must be retained at the site or other location specified in the permit for 3 years. FGTC is required to keep specific information regarding monitoring data.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Part II	No	Specific Permits: Requirements	Heading. No specific regulatory requirements.
§17-4.200	No	Scope of Part II	This section establishes that additional requirements for certain permits are established in the following sections. No specific regulatory requirements.
§17-4.210	Yes	Construction Permits	FGTC is required to apply on DER forms for a permit to construct.
§17-4.220	Yes	Operation Permit for New Sources	FGTC is required to submit the appropriate fee and certification that construction was completed.
§17-4.230	No	Operation Permits for Pollution Sources	Repealed. No specific regulation requirements.
§17-4.240	No	Operation Permits for Water Pollution Sources	This facility is not a water pollution source.
§17-4.242	No	Antidegradation Permitting Requirements; Outstanding Florida Waters; Outstanding National Resource Waters; Equitable Abatement	This facility is not a water pollution source.
§17-4.243	No	Exemption from Water Quality Criteria	This facility is not a water pollution source.

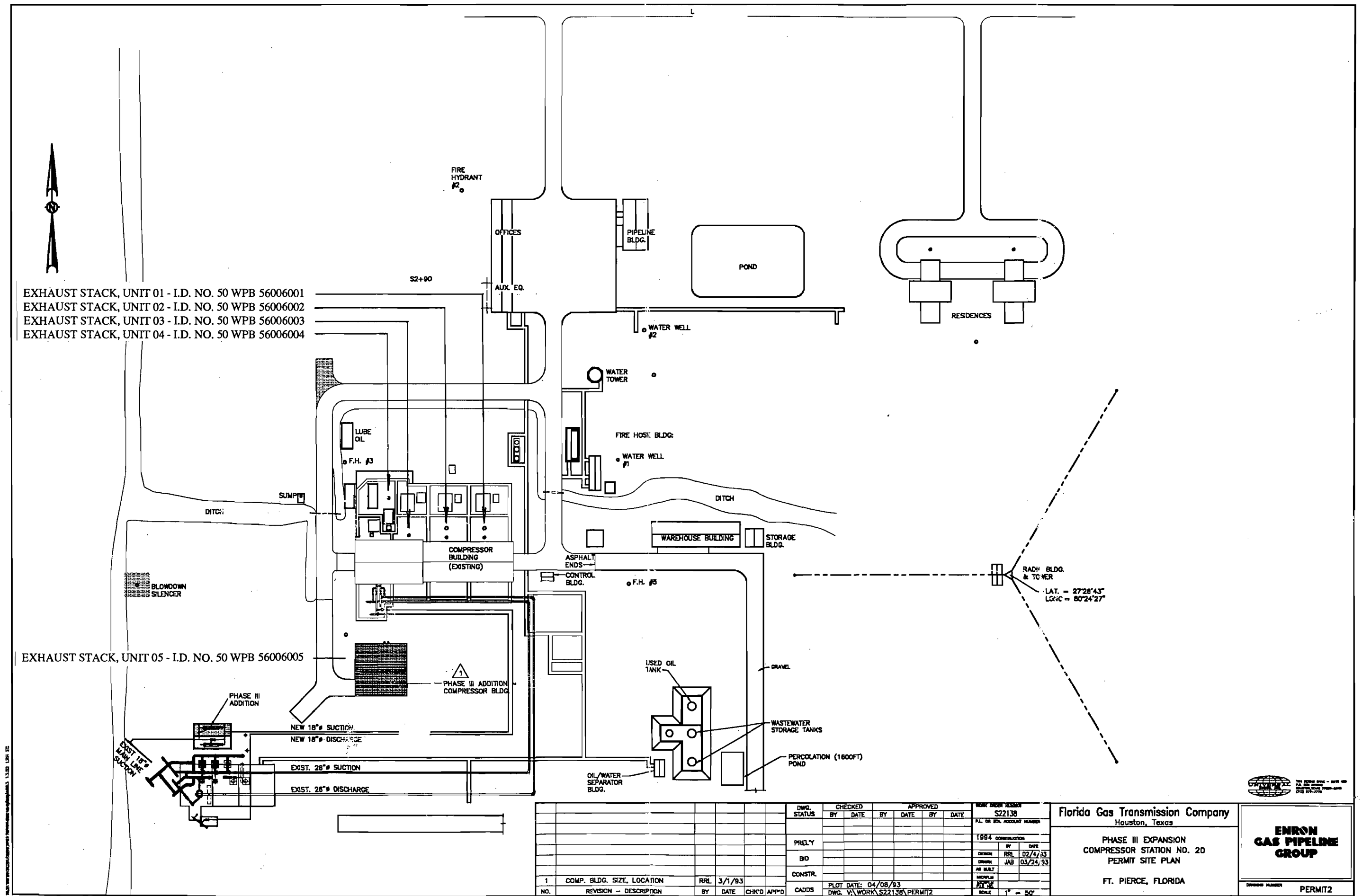
<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
§17-4.244	No	Mixing Zones; Surface Waters	This facility is not a water pollution source.
§17-4.245	No	Installations Discharging to Ground Water; Permitting and Monitoring Requirements	Transferred to §17-28.700. This facility is not a water pollution source.
§17-4.246	No	Sampling and Testing Methods	This facility is not a water pollution source.
§17-4.247	No	Pollution Surveys	Transferred to §17-19.090. This facility is not a water pollution source.
§17-4.248	No	Stormwater	Repealed. No specific regulatory requirements.
§17-4.250	No	Water Pollution Temporary Operation Permits; Conditions	This facility is not a water pollution source.
§17-4.260	No	Permits Required for Sewage	Repealed. No specific regulatory requirements.
§17-4.270	No	Drainage Wells; Permits	Deleted. No specific regulatory requirements.
§17-4.280	No	Dredging or Filling Activities; Permits, Certifications	Transferred to §17-12.150. This facility is not engaged in dredge/fill operations.
§17-4.290	No	Construction, Dredging, or Filling in, or over Navigable Waters; Permits Required Pursuant to Chapter 253, F.S.	Transferred to §17-12.160. This facility is not engaged in dredge/fill operations.

<u>Rules and Regulations</u>	<u>Applicability</u>	<u>Name</u>	<u>Comments</u>
• Part III	No	Procedures for General Permits	This facility does not meet the requirements for being issued a general permit.
• Chapter 17-256	No	Open Burning and Frost Protection Fires	This facility will not be engaged in open burning or use of frost protection fires.
• Chapter 17-8	Yes	Ad Valorem Tax Assessment Rules	A tax assessor may require FGTC to submit a detailed list of pollution control devices at the facility, and their cost and function, for the purpose of assessing ad valorem taxes.
• Chapter 17-242	No	Mobile Source - Motor Vehicle Emission Standards and Test Procedures	This facility is not involved with compliance and testing of mobile sources/motor vehicles.
• Chapter 17-243	No	Tampering With Motor Vehicle Air Pollution Control Equipment	This facility is not involved with checking motor vehicle pollution control devices for tampering.



# AIR EMISSIONS PLOT PLAN C/S 20

## Source I.D. No. 50 WPB 56006001 through 56006005



DWG. STATUS PRELY BID CONSTR. CADD				CHECKED BY DATE BY DATE BY DATE				APPROVED BY DATE BY DATE BY DATE				WORK ORDER NUMBER S22138 P.L. OR B.O. ACCOUNT NUMBER		Florida Gas Transmission Company Houston, Texas PHASE III EXPANSION COMPRESSOR STATION NO. 20 PERMIT SITE PLAN FT. PIERCE, FLORIDA		<b>ENRON GAS PIPELINE GROUP</b> PERMIT2	
				1994 CONTRIBUTION DESIGN RRL 02/4/93 DRAWN JAB 03/24/93 CHECKED APPROVED SCALE 1" = 50'				PLOT DATE: 04/08/93 DWG. V. WORK S22138 PERMIT2									
NO. REVISION - DESCRIPTION BY DATE CHK'D APP'D																	



P 230 524 291



# Receipt for Certified Mail

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

PS Form 3800, June 1991

Sent to <b>Carl Schulz</b>	
Street and No. <b>FIA GAS TRANS</b>	
P.O. Box and ZIP Code <b>Houston, TX</b>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	<b>TAYLOR</b>
Return Receipt Showing to Whom & Date Delivered	<b>St. Lucie</b>
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <b>9-28-93</b> <b>AC 62-229319-PSD- FI-202</b> <b>AC 56-230129- PSD-FI-203</b>	

Is your RETURN ADDRESS completed on the reverse side?

## SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

- ☐ Addressee's Address
- ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
**Carl N. Schulz, VP**  
**FIA GAS Transmission**  
**P.O. BOX 1188**  
**Houston, TX**  
**77251-1188**

4a. Article Number  
**P 230 524 291**

4b. Service Type  
☐ Registered ☐ Insured  
☒ Certified ☐ COD  
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery  
**SEP 30 1993**

5. Signature (Addressee)

8. Addressee's Address (Only if requested and fee is paid)

6. Signature (Agent)  
**TRAVIS HENRY**

Thank you for using Return Receipt Service.

PS Form 3811, December 1991

☆U.S. GPO: 1992-323-402

DOMESTIC RETURN RECEIPT

P 230 524 371



**Receipt for  
Certified Mail**

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

Sender's Name <i>Carl Schulz</i>	
Street and No. <i>FIA GAS TRANS</i>	
P.O. State and ZIP Code <i>Houston, TX</i>	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date <i>7-20-93</i> <i>AC 56-230129</i> <i>PSD-F1-203</i>	

PS Form 3800, June 1991

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:  
*Carl D. Schulz, VP*  
*Project Mgmt Services*  
*1/2 GAS Transmission*  
*PO BOX 1188*  
*Houston, TX 77251-1188*

4a. Article Number  
*P 230 524 371*

- 4b. Service Type
- |   |   |
|---|---|
| <input type="checkbox"/> Registered           | <input type="checkbox"/> Insured                        |
| <input checked="" type="checkbox"/> Certified | <input type="checkbox"/> COD                            |
| <input type="checkbox"/> Express Mail         | <input type="checkbox"/> Return Receipt for Merchandise |

7. Date of Delivery  
*JUL 23 1993*

5. Signature (Addressee)

8. Addressee's Address (Only if requested and fee is paid)

6. Signature (Agent)  
*[Signature]*

Thank you for using Return Receipt Service.

PS Form 3811, December 1991

★U.S. GPO: 1992-323-402

**DOMESTIC RETURN RECEIPT**

Check Sheet

Company Name: FL Gas Transmission  
Permit Number: AC 56-230129  
PSD Number:  
County: PSD 203  
Permit Engineer:  
Others involved:

→ P5/2

Application:

- ☒ Initial Application
- ☒ Incompleteness Letters
- ☐ Responses
- ☐ Final Application (if applicable)
- ☐ Waiver of Department Action
- ☐ Department Response
- ☐ Other

Intent:

- ☒ Intent to Issue
- ☒ Notice to Public
- ☒ Technical Evaluation
- ☒ BACT Determination
- ☒ Unsigned Permit
- ☐ Correspondence with:
  - ☒ EPA
  - ☐ Park Services
  - ☐ County
  - ☐ Other
- ☒ Proof of Publication
- ☐ Petitions - (Related to extensions, hearings, etc.)
- ☐ Other

Final Determination:

- ☒ Final Determination
- ☒ Signed Permit
- ☒ BACT Determination
- ☐ Other

Post Permit Correspondence:

- ☐ Extensions
- ☒ Amendments/Modifications
- ☐ Response from EPA
- ☐ Response from County
- ☐ Response from Park Services
- ☒ Other