



Florida Gas Transmission Company

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November 01, 2001

Mr. Clair H. Fancy, P.E.
Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Bldg.
2600 Blairstone
Tallahassee, FL 32399-2400

RECEIVED

NOV 21 2001

BUREAU OF AIR REGULATION

Reference: Facility Number: 0410004
Compressor Station No. 24, Gilchrist County

Dear Mr. Fancy:

Subject: Application for Air Construction Permit

Florida Gas Transmission Company (FGT) is proposing to upgrade an existing compressor turbine from 10,350 bhp to 15,000 bhp at the above referenced facility. This existing facility is a minor source under Title V and New Source Review regulations and the proposed modification is not significant; therefore, only a state construction permit is required.

Enclosed is an Application for an Air Construction Permit for the proposed modification. A check for \$4,500.00 is attached for the application fee.

If you have any questions or need additional information, please call me at (800) 381-1477.

Sincerely,

Jim Thompson
Environmental Project Manager
For Florida Gas Transmission Company Phase V Project

ATTACHMENTS

CC: James Alexander, Phase V w/o attachments
Rick Craig, w/o attachments
Frank Diemont
Jake Krautsch, Tallahassee

Florida Gas Transmission Company

Phase V Expansion Project

Compressor Station No. 24

Trenton, Florida

**APPLICATION
For
AIR CONSTRUCTION
PERMIT**

November 2001

Prepared by AQMcs, LLC

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1.0 INTRODUCTION

Florida Gas Transmission Company (FGT), a Delaware Corporation and ENRON/EL PASO affiliate of Houston, Texas, is proposing to modify its existing natural gas pipeline facility near Trenton in Gilchrist County, Florida (Compressor Station No. 24). This proposed modification is part of FGT's Phase V Expansion Project, aimed at increasing the supply capacity of FGT's network servicing domestic, commercial, and industrial customers in Florida. The scope of work for the Phase V Expansion 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 and pipeline within the State of Florida. 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.

Compressor Station No. 24 is located in Gilchrist County, Florida, approximately 4 miles north of Trenton on U. S. Highway 129. Figure 1-1 shows the location of the compressor station.

The proposed modification involves the upgrading of an existing compressor turbine from 10,350 bhp to 15,000 bhp (ISO). The compressor turbine is used solely for transporting natural gas by pipeline for distribution to markets in Florida. The existing engine is a Solar Mars 100-T15000S equipped with dry low NO_x (oxides of nitrogen) combustion and derated to 10,350 bhp. Under current federal and state air quality regulations, the facility constitutes a new minor stationary source. Based on the projected annual emission rates, there will be no PSD significant increase in any emissions.

Engineering designs for the proposed expansion project include selection of an engine incorporating dry low NO_x combustion technology. Dry low NO_x technology for control of NO_x emissions would represent Best Available Control Technology (BACT) for the proposed turbine engine under PSD requirements.

This application contains two additional sections. Descriptions of the existing operation at FGT's Compressor Station No. 24 and the proposed upgraded turbine are presented in Section 2.0. The air quality review requirements and applicability of state and federal regulations are discussed in Section 3.0.

FDEP permit application forms are provided in Attachment A. Attachment B contains vendor information and Attachment C contains emission calculations.

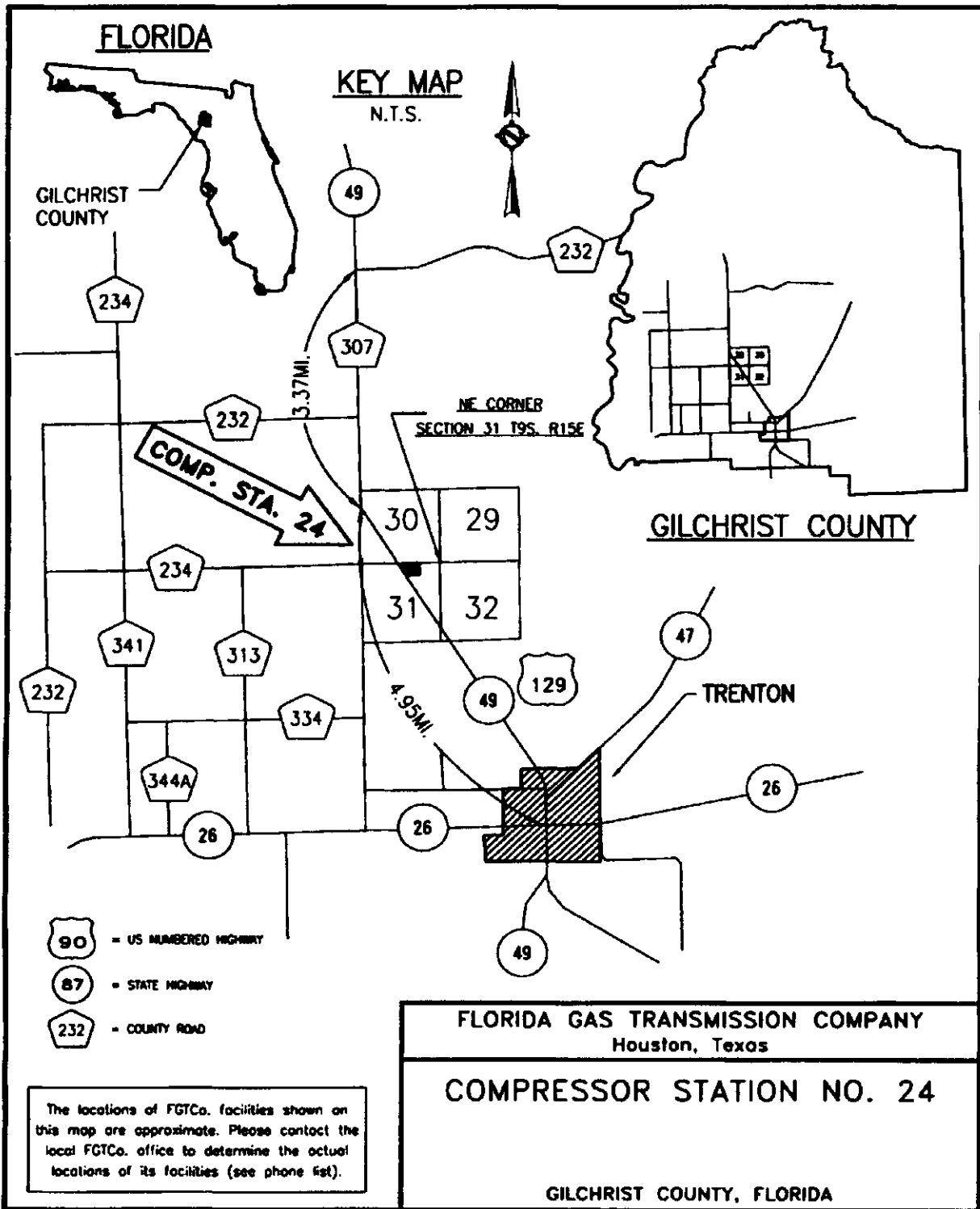


Figure 1-1

2.0 PROJECT DESCRIPTION

A plot plan of FGT's Compressor Station No. 24, showing the location of the plant boundaries and the location of the proposed modified engine is presented in Attachment B. The following sections provide a description of the operations at this location.

2.1 Existing Operations

FGT's existing Compressor Station No. 24 consists of one 10,350 bhp gas-fired turbine engine. Table 2-1 summarizes engine manufacturer and model for the existing engine. Compressor Station No. 24 was built as a part of the Phase IV Expansion Project and was constructed in 2000-2001. The existing engine is being modified as part of this expansion project.

The existing facility also has supporting equipment including pipeline condensate and oily water storage tanks and an emergency generator.

2.2 Proposed Compressor Station Modification

FGT proposes to increase the horsepower capacity of Compressor Station No. 24, as part of the Phase V Expansion Project. This will involve upgrading an existing gas-fired turbine (Compressor Engine 2401). The proposed upgraded engine will be used to increase the volumetric delivery capacity by driving a gas compressor that is a part of a gas transmission line that transports natural gas from source wells in Texas and Louisiana for delivery throughout Florida. Without the proposed modifications, it would not be possible to increase the volumetric delivery capacity necessary to meet both short and long-term demands for natural gas in Florida.

2.2.1 Upgraded Compressor Turbine

FGT proposes to upgrade one existing natural gas-fired turbine engine compressor unit at Compressor Station No. 24. The existing engine is a Solar Mars 100 T-15000S turbine compressor unit flat rated at 10,350 bhp that will be upgraded to 15,000 bhp ISO (14,922 bhp ISO at site elevation). Fuel will be exclusively natural gas from FGT's natural gas pipeline. Specifications and stack parameters for the proposed modified engine are presented in Table 2-1.

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Table 2-1 Proposed Upgraded Turbine (2401) Specifications and Stack Parameters

Parameter	Design
Compressor Engine	2401
Type	Gas Turbine
Manufacturer	Solar
Model	Mars 100 T-15000S
Unit Size	14,922 bhp (15,000 ISO)
Heat Input	7,595 Btu/hp-hr
Maximum Fuel Consumption ^a	0.11987 MMscf/hr
Speed	8,956 rpm
Stack Parameters	
Stack Height	58 ft
Stack Diameter	7.5 ft x 8 ft (rectangular)
Exhaust Gas Flow	193,613 acfm
Exhaust Temperature	903 °F
Exhaust Gas Velocity	53.8 ft/sec
<p>NOTE:</p> <p>acfm = actual cubic feet per minute. bhp = brake horsepower. Btu/hp-hr = British thermal units per brake horsepower per hour. °F = degrees Fahrenheit. ft = feet. ft/sec = feet per second. MMscf/hr = million standard cubic feet per hour. rpm = revolutions per minute.</p> <p>^aBased on vendor heat rate value plus 10% and higher heating value for natural gas of 1040 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 2-2. Emissions of NOX, CO and VOCs are based on the engine manufacturer's supplied data (See Attachment B).

Typically, turbine vendors do not provide information on particulate matter or SO₂ emissions; therefore, particulate matter emissions are based upon USEPA publication AP-42 Table 3.1-2a (USEPA, 2000) and emissions of SO₂ are based on FGT's Federal Energy Regulatory Commission (FERC) certificate limit of 10 grains sulfur per 100 cubic feet of natural gas. Hazardous air pollutant (HAP) emissions are based upon the Gas Research Institute's (GRI) HapCalc software that uses USEPA emission factors, emission factors found in research literature and emission factors based on GRI research data.

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Table 2-2 Proposed Upgraded Turbine (2401) Compressor Engine Emissions

Pollutant	Emission Factor	Reference	lb/hr	TPY
Nitrogen Oxides	11.28 lb/hr	Manufacturer Data	11.28	49.4
Carbon Monoxide	13.73 lb/hr	Manufacturer Data	13.73	60.1
Volatile Organic Compounds	0.39 lb/hr	Manufacturer Data	0.39	1.7
Particulate Matter*	0.0066 lb/MMBtu	AP-42, Table 3.1-2a	0.82	3.6
Sulfur Dioxide*	10 grains/100 scf	FERC Limit	3.42	15.0
HAPs	Various see Attachment C	GRI HapCalc 3.0	0.71	3.1

* Emissions based on vendor provided heat rate plus 10 per cent

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2.2.2 Emissions Summary

The total new emissions resulting from the project are listed on Table 2-3. As can be seen from the table, the emission increases are not significant under PSD. The calculations used to estimate these emissions are presented in Attachment D.

Table 2-3 Potential Annual Emissions (tpy) Summary

SOURCE ID	DESCRIPTION	NO _x	CO	VOC ^a	SO ₂	PM
EXISTING EMISSIONS						
2401	10,350 bhp Turbine Engine	42.1	51.3	1.5	12.8	3.1
GEN03	443 bhp Recip. Engine	2.2	0.6	0.01	0.2	0.2
FUGITIVE	Fugitive			0.32		
TANK 01	Oily Water Tank			<0.001		
TANK 02	Diesel Tank			<0.001		
TANK 03	Condensate Tank					
CURRENT TOTALS:		44.3	51.9	1.832	13	3.3
ADDITIONAL NEW EMISSIONS						
2401	15,000 bhp Turbine Engine	7.3	8.8	0.2	2.2	0.5
PROPOSED NEW TOTALS:		51.6	60.7	2.0	15.3	3.8
(a) VOC = NM/NE HC						

3.0 REGULATORY ANALYSIS

This section presents a review of federal and Florida State air quality regulations, which govern the operations and proposed modifications to be conducted at Compressor Station No. 24.

3.1 Federal Regulations 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 essential elements of the federal regulatory program and the impact they have on the proposed operations at Compressor Station No. 24.

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 that all states would be required to achieve. These minimum values or standards were developed in order to protect the public health (primary) and welfare (secondary).

Areas of the country that have air quality equal to or better than these standards (i.e., ambient concentrations less than a standard) are designated as "Attainment Areas", while those where monitoring indicates air quality is worse than the standards are 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 before initiation of construction. Similar sources located in areas designated as non-attainment or that adversely impact such areas undergo more stringent Non-attainment New Source Review (NNSR). In either case, it is necessary, as a first step, to determine the air quality classification of a project site.

All areas of all states are classified as either attainment, non-attainment or unclassifiable for each criteria pollutant. The current classification of Gilchrist County is listed on Table 3-1 for each criteria pollutant. Gilchrist County is designated as either unclassifiable or attainment for all criteria pollutants. These designations were obtained from 40 CFR 81.310, as updated in the June 5, 1998 Federal Register (FR31036) and 62-204.340 F.A.C.

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Table 3-1 Classification Of Gilchrist County For Each Criteria Pollutant

Carbon Monoxide	Attainment
Oxides of Nitrogen	Attainment
Sulfur Dioxide	Attainment
Particulate Matter (PM ₁₀)	Unclassifiable
Lead	Unclassifiable
Ozone	Attainment
Source 40 CFR 81.310 1998; 62-204.340 F.A.C.	

The designation of Unclassifiable indicates that there is insufficient monitoring data to prove that the area has attained the federal standards; however, the limited data available indicate 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 required 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 that includes a detailed analysis of the impacts from the source's emissions. 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).

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. Gilchrist County is designated as attainment area for all criteria pollutants. A project's potential to emit is then reviewed to determine whether it constitutes a major stationary source or major modification to an existing major stationary source.

A major stationary source is defined as either one of the 28 sources identified in 40 CFR 52.21 that has a potential to emit 100 tons or more per year of any regulated pollutant, or any other stationary source that has the potential to emit 250 tons or more per year of a regulated pollutant. "Potential to emit" is determined on an annual basis after the application of air pollution control equipment, or any other federally enforceable restriction.

According to the "Draft New Source Review Workshop (NSR) Manual (USEPA, October 1990),"

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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 stationary source.

"Significant" emission rates are defined as amounts equal to or greater than the emission rates given in Table 3-2.

By these definitions, and based on the emissions presented in Section 2.0, the action proposed for Compressor Station No. 24 is modification of a minor stationary source, since Compressor Station No. 24 is not one of the 28 named source categories and emits <250 TPY of each regulated pollutant. Therefore, the compressor station is not subject to PSD pre-construction review.

Table 3-2 Applicability of PSD Significant Emission Rates

Pollutant	Emission Rate Tons/Year
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfur Dioxide	40
Particulate Matter (PM/PM ₁₀)	25/15
Ozone (VOC)	40
Lead	0.6
Fluorides	3
Reduced Sulfur including Hydrogen Sulfide	10
Total Reduced Sulfur including Hydrogen Sulfide	10
Sulfuric Acid Mist	7
Lead	0.6
Mercury	0.1
VOC = Volatile Organic Compounds Sources: 40 CFR 52.21(b)(23); Table 212.400-2 62-212 F.A.C.	

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3.1.3 Non-Attainment New Source Review (NSR) Applicability

Based on the current non-attainment provisions, all new major stationary sources, or major 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 in an attainment or unclassifiable area, the non-attainment provisions 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 kilometers outside the non-attainment area.

Compressor Station No. 24 is located in an area that is designated as either attainment or not classifiable for all criteria pollutants and is not located in an area of influence outside a non-attainment area. Therefore, 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 publish a proposed regulation establishing a Standard of Performance for any category of new sources that cause or contribute significantly to air pollution and which may reasonably be anticipated to endanger public health. All Standards apply to all sources within a given category, regardless of geographic location or ambient air quality at the location.

Performance standards are published in 40 CFR 60. The new turbine installed at Compressor Station No. 24 is subject to Subpart GG, Standards of Performance for Stationary Gas Turbines, because it will have a maximum heat input at peak load of >10.7 gigajoules/hour (10 MMBtu/hr) based on the lower heating value of the natural gas fuel. This regulation establishes emission limits for NO_x and SO₂ and requires performance testing and daily monitoring of fuel nitrogen and sulfur. The applicable emission standards are provided in Table 3-4.

The NO_x emission limit for Subpart GG is calculated as follows:

$$STD = 0.0150 (14.4/Y) + F$$

$$STD = \text{Allowable NO}_x \text{ emissions}$$

$$Y = \text{Heat rate at peak load not to exceed 14.4 KJwatt-hour}$$

$$F = \text{NO}_x \text{ emission allowance}$$

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The fuel bound nitrogen in natural gas is less than 0.015% by weight. Therefore, the value of F as defined in 40 CFR 60.332(3) is equal to zero.

$$\begin{aligned} Y &= \text{Btu/bhp-hr} \times 1.055 \text{ Kj/Btu} \times \text{hp-hr/745.7 watt-hour} \\ &= 7,595 \text{ Btu/bhp-hr} \times 1.055 \text{ Kj/Btu} \times \text{hp-hr/745.7 watt-hour} \\ &= 10.75 \end{aligned}$$

$$\begin{aligned} \text{STD} &= 0.0150 (14.4/10.75) + 0 \\ &= 0.0201\% \\ &= 201 \text{ ppm}_v \end{aligned}$$

Table 3-3 summarizes the NSPS applicability for the proposed gas engines.

The turbine at this facility will meet the NSPS for NO_x of 201 ppmv (i.e., manufacturer's estimation of 25 ppmv), and for SO₂ of 150 ppmv (estimated for this turbine to be about 10 ppmv).

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Table 3-3 Applicability of New Source Performance Standards

NSPS Subpart	NSPS Regulations	Equipment	Fuel	Pollutant	Heat Input Applicability	Equipment Design Maximum*	NSPS Emission Limits	Equipment Emissions
GG	60.332(a)(2)	Engine No. 2401 Gas Turbine	Gas	NO ₂	>10 MM Btu/hr	113.3 MMBtu/hr	201 ppm _v	25 ppm _v
GG	60.333(a)	Engine No. 2401 Gas Turbine	Gas	SO ₂	>10 MM Btu/hr	113.3 MMBtu/hr	150 ppm _v	~10 ppm _v

Design maximum based on vendor data of 14,922 hp and heat input of 7,595 Btu/hp-hr (LHV).

3.2 Florida State Air Quality Regulations

Compressor Station No. 24 is currently operating under Permit No. 0390029-001-AV and is subject to the provisions of that permit. Rule 62, F.A.C., contains the air quality rules and regulations for the State of Florida. The primary federal regulations that affect Compressor Station No. 24 have been incorporated into or are referenced by these rules. The significant state regulations that are applicable to the new emission units are briefly listed below.

3.2.1 Rule 62-210.300 Permits Required

FGT is required to obtain a construction permit prior to construction of new emission units. This requirement is being met by the submittal of this application.

3.2.2 Rule 62-204.240 Ambient Air Quality Standards

FGT must not violate any of the ambient air quality standards listed under this rule.

3.2.3 Rule 62-296.320(2) Objectionable Odors

This rule prohibits the discharge of pollutants that will cause or contribute to an objectionable odor.

3.2.4 Rule 62-296.320(4)(b)1 General Particulate Emission Limiting Standards.

FGT is prohibited from allowing the new compressor engine to discharge into the atmosphere the emissions of air pollutants, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20 percent opacity).

3.2.5 Rule 62-210.300(3)(a) Exempt Emissions Units and/or Activities.

The emissions from the emergency generator, storage tanks and the fugitive leak emissions are insignificant sources and are exempt from the permitting requirements of Chapter 62-210 Stationary Sources - General Requirements, 62-213 Operation Permits For Major Sources Of Air Pollution and 62-4 Permits.

Attachment A

DEP Forms



Department of Environmental Protection

Division of Air Resources Management

APPLICATION FOR AIR PERMIT - NON-TITLE V SOURCE

See Instructions for Form No. 62-210.900(3)

I. APPLICATION INFORMATION

Identification of Facility

1. Facility Owner/Company Name: Florida Gas Transmission Company	
2. Site Name: Compressor Station No. 24	
3. Facility Identification Number: [X] Unknown	
4. Facility Location: Street Address or Other Locator: Intersection of U.S. Highway 129 and SW 50 th Street City: Trenton County: Gilchrist Zip Code: 32693	
5. Relocatable Facility? [] Yes [X] No	6. Existing Permitted Facility? [X] Yes [] No

Application Contact

1. Name and Title of Application Contact: Jim Thompson, Environmental Project Manager for Florida Gas Transmission Co. – Phase V Expansion Project	
2. Application Contact Mailing Address: Organization/Firm: Florida Gas Transmission Company Street Address: 111 Kelsey Lane, Ste. A City: Tampa State: FL Zip Code: 33619	
3. Application Contact Telephone Numbers: Telephone: (800) 381-1477 Fax: (813) 655-3951	

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	11-21-01
2. Permit Number:	0410004-004-AC

Purpose of Application

Air Operation Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

- Initial non-Title V air operation permit for one or more existing, but previously unpermitted, emissions units.
- Initial non-Title V air operation permit for one or more newly constructed or modified emissions units.

Current construction permit number: _____

- Non-Title V air operation permit revision to address one or more newly constructed or modified emissions units.

Current construction permit number: _____

Operation permit number to be revised: _____

- Initial non-Title V air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s):

- Non-Title V air operation permit revision for a synthetic non-Title V source. Give reason for revision; e.g., to address one or more newly constructed or modified emissions units.

Operation permit number to be revised: _____

Reason for revision: _____

Air Construction Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

- Air construction permit to construct or modify one or more emissions units.
- Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.
- Air construction permit for one or more existing, but unpermitted, emissions units.

Owner/Authorized Representative

1. Name and Title of Owner/Authorized Representative or Responsible Official: Rick Craig, Vice President, Southeastern Operations
2. Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: Florida Gas Transmission Company Street Address: P.O. Box 1188 City: Houston State: TX Zip Code: 77251
3. Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: (713) 646-7227 - Fax: (713) 646-6128
4. Owner/Authorized Representative Statement: <i>I, the undersigned, am the owner or authorized representative* of the facility addressed in this application. 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. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained 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. 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.</i> Signature: <u>Richard D. Craig</u> Date: <u>11/13/01</u>

* Attach letter of authorization if not currently on file.

Professional Engineer Certification

1. Professional Engineer Name: Kevin McGlynn Registration Number: 50908
2. Professional Engineer Mailing Address: Organization/Firm: McGlynn Consulting Company Street Address: 1967 Commonwealth Lane City: Tallahassee State: FL Zip Code: 32303
3. Professional Engineer Telephone Numbers: Telephone: (850)350-5035 Fax: (850) 350-5002

4. Professional Engineer Statement:

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

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution 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 found in the Florida Statutes and rules of the Department of Environmental Protection; and

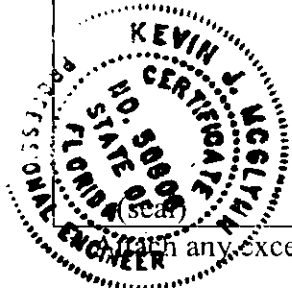
(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions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

If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X], if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [], if so), I further 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.

Kevin J. McGlynn, P.E.
Signature # 50908

November 7, 2001
Date



With any exception to certification statement.

Construction/Modification Information

1. Description of Proposed Project or Alterations:

Modification of a gas fired Solar Mars 100 T-15002S compressor turbine from a 10,350 horsepower ISO to 15,000 hp. There is no change in model name.

2. Projected or Actual Date of Commencement of Construction: 09/15/02

3. Projected Date of Completion of Construction: 12/15/02

Application Comment

This facility is part of FGT's Phase V expansion project, aimed at increasing the supply capacity of FGT's network servicing domestic, commercial, and industrial customers in Florida.

Facility Regulatory Classifications

Check all that apply:

1. <input type="checkbox"/> Small Business Stationary Source?	<input type="checkbox"/> Unknown
2. <input type="checkbox"/> Synthetic Non-Title V Source?	
3. <input type="checkbox"/> Synthetic Minor Source of Pollutants Other than HAPs?	
4. <input type="checkbox"/> Synthetic Minor Source of HAPs?	
5. <input checked="" type="checkbox"/> One or More Emissions Units Subject to NSPS?	
6. <input type="checkbox"/> One or More Emission Units Subject to NESHAP Recordkeeping or Reporting?	
7. Facility Regulatory Classifications Comment (limit to 200 characters): Facility is a minor source for PSD and Title V purposes. Modified turbine is subject to NSPS Subpart GG.	

Rule Applicability Analysis

FDEP Title V Core List 62-296.320(4)(b)1 General Visible Emissions Standards 40 CFR 60, Subpart GG Standards of Performance for Stationary Gas-fired Turbines

B. FACILITY POLLUTANTS

List of Pollutants Emitted

1. Pollutant Emitted	2. Pollutant Classif.	3. Requested Emissions Cap		4. Basis for Emissions Cap	5. Pollutant Comment
		lb/hour	tons/year		
NO _x	B				
CO	B				
VOC	B				
SO ₂	B				
PM	B				

C. FACILITY SUPPLEMENTAL INFORMATION

Supplemental Requirements

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested
2. Facility Plot Plan: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested
3. Process Flow Diagram(s): <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested
5. Supplemental Information for Construction Permit Application: <input type="checkbox"/> Attached, Document ID:: _____ <input checked="" type="checkbox"/> Not Applicable
6. Supplemental Requirements Comment: Area map is provided as Figure 1-1 in the narrative. The plot plan and other supplemental information were submitted with the original construction permit application for this facility.

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through G as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Description and Status

<p>1. Type of Emissions Unit Addressed in This Section: (Check one)</p> <p><input checked="" type="checkbox"/> 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).</p> <p><input type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, a 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.</p> <p><input type="checkbox"/> 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.</p>		
<p>2. Description of Emissions Unit Addressed in This Section (limit to 60 characters):</p> <p>15,000 bhp ISO natural gas fired turbine compressor unit</p>		
<p>3. Emissions Unit Identification Number: ID:</p>		<p><input checked="" type="checkbox"/> No ID <input type="checkbox"/> ID Unknown</p>
<p>4. Emissions Unit Status Code: C</p>	<p>5. Initial Startup Date: 12/15/02</p>	<p>6. Emissions Unit Major Group SIC Code: 49</p>
<p>7. Emissions Unit Comment: (Limit to 500 Characters)</p> <p>The turbine engine is an existing Solar Mars 100 T-15000S engine compressor unit currently rated at 10,350 bhp ISO. This turbine will be upgraded to 15,000 bhp ISO (14,922 bhp with site elevation). Fuel is exclusively natural gas from the FGT's gas pipeline. The engine incorporates dry, low NO_x combustion technology.</p>		

B. EMISSION POINT (STACK/VENT) INFORMATION

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? 2401		2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): NA			
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: NA			
5. Discharge Type Code: V	6. Stack Height: 58 feet	7. Exit Diameter: 8.74 feet	
8. Exit Temperature: 903 °F	9. Actual Volumetric Flow Rate: 193,613 acfm	10. Water Vapor: %	
11. Maximum Dry Standard Flow Rate: dscfm		12. Nonstack Emission Point Height: feet	
13. Emission Point UTM Coordinates: Zone: 17 East (km): 321.323 North (km): 3282.787			
14. Emission Point Comment (limit to 200 characters): Stack is rectangular in cross section at 7.5 ft. x 8 ft. Diameter given above is equivalent diameter (De) of stack.			

C. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment of

1. Segment Description (Process/Fuel Type) (limit to 500 characters): Natural gas fired turbine engine driving a natural gas compressor, operating full time.		
2. Source Classification Code (SCC): 2-02-002-01		3. SCC Units: million cubic feet burned
4. Maximum Hourly Rate: 0.1199	5. Maximum Annual Rate: 1050.1	6. Estimated Annual Activity Factor: NA
7. Maximum % Sulfur: 0.03	8. Maximum % Ash: NA	9. Million Btu per SCC Unit: 1040
10. Segment Comment (limit to 200 characters): Based on vendor supplied fuel rate of 113.33 MMBtu/hr plus 10% Percent sulfur is base on maximum Federal Energy Regulatory Commission (FERC) limit of 10 gr S/100 scf and gas density of 0.0455 lb/scf.		

Segment Description and Rate: Segment NA of

1. Segment Description (Process/Fuel Type) (limit to 500 characters): 		
2. Source Classification Code (SCC):		3. SCC Units:
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters): 		

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**Potential Emissions**

1. Pollutant Emitted: NOX		2. Pollutant Regulatory Code: EL	
3. Primary Control Device Code: 099	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 11.28 lb/hour 49.4 tons/year		7. Synthetically Limited? []	
8. Emission Factor: 11.28 lb/hr Reference: Vendor's data		9. Emissions Method Code: 5	
10. Calculation of Emissions (limit to 600 characters): (11.28 lb/hr)(8760 hr/1 yr)(1 ton/2000 lb) = 49.4 lb/hr			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions and site elevation.			

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units: 25 ppmv	4. Equivalent Allowable Emissions: 11.28 lb/hour 49.4 tons/year
5. Method of Compliance (limit to 60 characters): Initial performance test.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): 40 CFR 60.332(a)(2) NOX emissions to 201 ppmv.	

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**Potential Emissions**

1. Pollutant Emitted: CO		2. Pollutant Regulatory Code: NS	
3. Primary Control Device Code: NA	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 13.73 lb/hour 60.1 tons/year		7. Synthetically Limited? []	
8. Emission Factor: 13.73 lb/hr Reference: Vendor's data		9. Emissions Method Code: 5	
10. Calculation of Emissions (limit to 600 characters): (13.73 lb/hr)(8760 hr/1 yr)(1 ton/2000 lb) = 60.1 lb/hr			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions and site elevation.			

Allowable Emissions Allowable Emissions NA of

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION

Potential Emissions

1. Pollutant Emitted: VOC		2. Pollutant Regulatory Code: NS	
3. Primary Control Device Code: NA	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 0.3932 lb/hour 1.72 tons/year		7. Synthetically Limited? []	
8. Emission Factor: 0.3932 lb/hr Reference: Vendor's data		9. Emissions Method Code: 5	
10. Calculation of Emissions (limit to 600 characters): Vendor factor for unburned hydrocarbons (UHC) = 3.932 lb/hr Assume 10% is VOC. (0.3932 lb/hr)(8760 hr/1 yr)(1 ton/2000 lb = 1.72 tpy			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Vendor's data based on ISO conditions and site elevation.			

Allowable Emissions Allowable Emissions NA of

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**Potential Emissions**

1. Pollutant Emitted: SO ₂		2. Pollutant Regulatory Code: EL	
3. Primary Control Device Code: NA	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 3.42 lb/hour 15.0 tons/year		7. Synthetically Limited? []	
8. Emission Factor: 10 gr/100scf Reference: Vendor's fuel use data		9. Emissions Method Code: 2	
10. Calculation of Emissions (limit to 600 characters): $(10 \text{ gr S}/100 \text{ scf})(0.1199 \text{ MMscf/hr})(1 \text{ lb}/7000 \text{ gr}) = 1.71 \text{ lb S/hr}$ $(1.71 \text{ lb S/hr})(2 \text{ lb SO}_2/\text{lb S}) = 3.42 \text{ lb SO}_2/\text{hr}$ $(3.42 \text{ lb SO}_2/\text{hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) = 15.0 \text{ ton/yr}$			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Based on vendor's fuel use value plus 10% based on compliance test results.			

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units: 10 grains/100 scf	4. Equivalent Allowable Emissions: 3.43 lb/hour 15.0 tons/year
5. Method of Compliance (limit to 60 characters): Initial performance test.	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): 40 CFR 60.333(a) limits SO ₂ emissions to 150 ppmv.	

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION

Potential Emissions

1. Pollutant Emitted: PM		2. Pollutant Regulatory Code: NS	
3. Primary Control Device Code: NA	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 0.82 lb/hour 3.6 tons/year		7. Synthetically Limited? []	
8. Emission Factor: 0.0066 lb/MM Btu Reference: Table 3.1-2a, AP-42 4/00, Supplement E		9. Emissions Method Code: 4	
10. Calculation of Emissions (limit to 600 characters): (0.0066 lb/MMBtu)(124.66 MMBtu/hr) = 0.82 lb/hr (0.82 lb/hr)(8760 hr/yr)(1 ton/2000 lb) = 3.6 ton/yr			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Revised to vendor's fuel use value plus 10%.			

Allowable Emissions Allowable Emissions NA of

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

D. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION

Potential Emissions

1. Pollutant Emitted: HAPS		2. Pollutant Regulatory Code: NS	
3. Primary Control Device Code: NA	4. Secondary Control Device Code: NA	5. Total Percent Efficiency of Control:	
6. Potential Emissions: 0.71 lb/hour 3.1 tons/year		7. Synthetically Limited? []	
6. Emission Factor: 0.0217 g/hp-hr Reference: GRI-HAPCalc 3.0		7. Emissions Method Code: 5	
10. Calculation of Emissions (limit to 600 characters): $(0.0217\text{g/hp-hr})(14,922\text{ hp})(1\text{ lb}/453.6\text{ g}) = 0.714\text{ lb/hr}$ $(0.714\text{ lb/hr})(8760\text{ hr/yr})(1\text{ ton}/2000\text{ lb}) = 3.13\text{ ton/yr}$			
11. Pollutant Potential Emissions Comment (limit to 200 characters): Detailed calculations provided in Attachment C. Included in VOC emissions.			

Allowable Emissions Allowable Emissions NA of

1. Basis for Allowable Emissions Code: NA	2. Future Effective Date of Allowable Emissions: NA
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

Emissions Unit Information Section 1 of 1

**E. VISIBLE EMISSIONS INFORMATION
(Only Emissions Units Subject to a VE Limitation)**

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: <input checked="" type="checkbox"/> Rule <input type="checkbox"/> Other <input type="checkbox"/>
3. Requested Allowable Opacity: Normal Conditions: 20% Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: 40 CFR 60 Appendix A Method 9	
5. Visible Emissions Comment (limit to 200 characters): Subject to 62-296-320(4)(b)1 General Visible Emissions Standards.	

**F. CONTINUOUS MONITOR INFORMATION
(Only Emissions Units Subject to Continuous Monitoring)**

Continuous Monitoring System: Continuous Monitor NA of

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	<input type="checkbox"/> Rule <input type="checkbox"/> Other
4. Monitor Information: Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment (limit to 200 characters):	

G. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Supplemental Requirements

<p>1. Process Flow Diagram <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested</p>
<p>2. Fuel Analysis or Specification <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested</p>
<p>3. Detailed Description of Control Equipment <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested</p>
<p>4. Description of Stack Sampling Facilities <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Waiver Requested</p>
<p>5. Compliance Test Report <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously submitted, Date: _____ <input checked="" type="checkbox"/> Not Applicable</p>
<p>6. Procedures for Startup and Shutdown <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested</p>
<p>7. Operation and Maintenance Plan <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Waiver Requested</p>
<p>8. Supplemental Information for Construction Permit Application <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable</p>
<p>9. Other Information Required by Rule or Statute <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable</p>
<p>10. Supplemental Requirements Comment: Supplemental information was provided in the construction permit application for the original facility. The original turbine installation was tested 05/07/01.</p>

Attachment B
Vendor Information

SOLAR TURBINES INCORPORATED
 ENGINE PERFORMANCE CODE REV. 2.85
 CUSTOMER: FGT
 JOB ID: STATION 24

DATE RUN: 22-NOV-00
 RUN BY: Casadonte, Corrine

MARS 100-T15000S
 CS/MD
 122F MATCH
 GAS
 TMF-2S REV. 3.0

DATA FOR NOMINAL PERFORMANCE

Fuel Type SD NATURAL GAS

Elevation Feet 53
 Inlet Loss in. H2O 0
 Exhaust Loss in. H2O 0

	LOAD	FULL	95%	90%	85%	75%	70%
Engine Inlet Temp.	Deg. F	59.0	59.0	59.0	59.0	59.0	59.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0	60.0
Elevation Loss	Hp	29	27	26	25	22	20
Inlet Loss	Hp	0	0	0	0	0	0
Exhaust Loss	Hp	0	0	0	0	0	0
Driven Equipment Speed	RPM	8956	8806	8710	8607	8403	8306
Optimum Equipment Speed	RPM	8956	8806	8710	8607	8403	8306
Gas Generator Speed	RPM	11168	11035	10937	10841	10650	10552
Specified Load	Hp	FULL	14176	13429	12683	11191	10445
Net Output Power	Hp	14922	14176	13429	12683	11191	10445
Fuel Flow	MMBtu/hr	113.33	108.47	106.25	103.86	98.60	95.73
Heat Rate	Btu/Hp-hr	7595	7652	7912	8189	8811	9165
Inlet Air Flow	lbm/hr	332406	328324	324642	320321	309708	303399
Engine Exhaust Flow	lbm/hr	336740	332438	328661	324239	313408	306982
PCD	psi(g)	245.1	238.6	230.2	221.7	204.8	196.1
PT Inlet Temp. (T5)	Deg. F	1320	1286	1286	1286	1286	1286
Display T5, S/W	Deg. F	1360	1326	1326	1326	1326	1326
Exhaust Temperature	Deg. F	903	882	888	894	906	912

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 2.85
CUSTOMER: FGT
JOB ID:

DATE RUN: 22-NOV-00
RUN BY: Casadonte, Corrine

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR STATION 24

Fuel: SD NATURAL GAS Customer: FGT
Water Injection: NO Inquiry Number: Station 24
Number of Engines Tested: 0
Model: MARS 100-T15000S CS/MD 122F MATCH GAS
SHIPMENTS AFTER 1/95
Emissions Data: REV. 0.0

CRITICAL WARNINGS IN USE OF DATA FOR PERMITTING

1. Short term permitting values such as PPMV or lbs/hr should be based on worst case actual operating conditions specific to the application and the site. Worst case for one pollutant is not necessarily the same for another. The values on this form are only predicted emissions at one specific operating condition; not necessarily the worst case.
2. Long term reference emission units (e.g. tons/yr) should reference the average conditions at the site (e.g. ISO). That number should not be derived from the worst case value referenced above, or conversely this average must not be used to calculate worst case.
3. Nominal values are based on actual test results, or predicted in the case of no actual engine tests. Expected maximum values should be referenced for permitting.
4. If a SoLoNOx model is planned to be installed in the future, use no less than 50 PPMv CO.

The following predicted emissions performance is based on the following specific single point: (see attached)

Hp= 14922, %Full Load= 100.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	11.28	*	13.73	*	3.932 lbm/hr
*	49.39	*	60.14	*	17.223 ton/yr

Hp= 14176, %Full Load= 95.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	10.79	*	13.14	*	3.763 lbm/hr
*	47.26	*	57.55	*	16.480 ton/yr

Hp= 13429, %Full Load= 90.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	10.57	*	12.87	*	3.685 lbm/hr
*	46.29	*	56.36	*	16.141 ton/yr

Hp= 12683, %Full Load= 85.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	10.33	*	12.58	*	3.602 lbm/hr
*	45.24	*	55.09	*	15.777 ton/yr

Hp= 11191, %Full Load= 75.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	9.80	*	11.94	*	3.419 lbm/hr
*	42.94	*	52.29	*	14.975 ton/yr

Hp= 10445, %Full Load= 70.0, Elev= 53 ft, %RH= 60.0, Temperature= 59.0 F

NOX		CO		UHC	
NOM	MAX	NOM	MAX	NOM	MAX
*	25.00	*	50.00	*	25.000 PPMvd at 15% O2
*	9.52	*	11.59	*	3.319 lbm/hr
*	41.69	*	50.76	*	14.538 ton/yr

* NOMINAL EMISSIONS DATA UNAVAILABLE FOR THIS ENGINE

OTHER IMPORTANT NOTES

1. Solar does not provide maximum values for water-to-fuel ratio, SOx, particulates, or conditions outside those above without separate written approval.
2. Solar can optionally provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
3. Fuel must meet Solar standard fuel specification ES 9-98. Predicted emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If the above information is being used regarding existing equipment, it should be verified by actual site testing.

Attachment C
Emissions Calculations

Engine No. 2401

NOx Emissions: (Based on Vendor Data)

$$\text{lb NOx/hr} = 11.28$$

$$\begin{aligned} \text{tons NOx/yr} &= (\text{lb NOx/hr})(\text{hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= (11.28 \text{ lb NOx/hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= 49.41 \end{aligned}$$

CO Emissions: (Based on Vendor Data)

$$\text{lb CO/hr} = 13.73$$

$$\begin{aligned} \text{tons CO/yr} &= (\text{lb CO/hr})(\text{hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= (13.73 \text{ lb CO/hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= 60.14 \end{aligned}$$

VOC Emissions: (Based on Vendor Data)

$$\text{lb VOC/hr} = 0.39$$

$$\begin{aligned} \text{tons VOC/yr} &= (\text{lb VOC/hr})(\text{hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= (0.393 \text{ lb VOC/hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= 1.72 \end{aligned}$$

SO2 Emissions: (Based on FERC Limits)

$$\begin{aligned} \text{lb S/hr} &= (\text{gr S}/100 \text{ scf})(\text{MMscf/hr})(1 \text{ lb}/7000 \text{ gr}) \\ &= (10 \text{ gr S}/100 \text{ scf})(0.1199 \text{ MMscf/hr})(1 \text{ lb}/7000 \text{ gr}) \\ &= 1.71 \end{aligned}$$

$$\begin{aligned} \text{lb SO}_2/\text{hr} &= (\text{lb S/hr})(2 \text{ lb SO}_2/\text{lb S}) \\ &= (1.71 \text{ lb S/hr})(2 \text{ lb SO}_2/\text{lb S}) \\ &= 3.42 \end{aligned}$$

$$\begin{aligned} \text{tons SO}_2/\text{yr} &= (\text{lb SO}_2/\text{hr})(\text{hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= (3.42 \text{ lb SO}_2/\text{hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= 15.00 \end{aligned}$$

PM 10/2.5 Emissions: (Based on AP-42 Table 3.1-2a, 4/00)

$$\begin{aligned} \text{lb PM/hr} &= (\text{lb PM}/\text{MMscf})(\text{MMBtu/hr}) \\ &= (0.0066 \text{ lb/Btu})(124.67 \text{ MMBtu/hr}) \\ &= 0.82 \end{aligned}$$

$$\begin{aligned} \text{tons PM/yr} &= (\text{lb PM/hr})(\text{hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= (0.82 \text{ lb PM/hr})(8760 \text{ hr/yr})(1 \text{ ton}/2000 \text{ lb}) \\ &= 3.60 \end{aligned}$$

2401 HAP Emissions Calculations

Chemical	EF g/bhp-hr	tpy	lbs/hour	Factor Set
Formaldehyde	0.0146323	2.10648267	0.48093212	EPA
Acetaldehyde	0.0003443	0.04956582	0.0113164	EPA
1,3-Butadiene	0.0000019	0.00027353	0.00006245	EPA
Acrolein	0.000034	0.00489468	0.00111751	EPA
Propional	0.000865	0.12452639	0.02843068	GRI Field
Propylene Oxide	0.0001248	0.01796635	0.00410191	EPA
n-Nitrosodimethylamine	0.000001	0.00014396	0.00003287	EPA
Benzene	0.0006025	0.08673659	0.01980287	EPA
Toluene	0.0005595	0.08054626	0.01838956	EPA
Ethylbenzene	0.0001033	0.01487119	0.00339525	EPA
Xylenes(m,p,o)	0.0001162	0.01672829	0.00381924	EPA
2,2,4-Trimethylpentane	0.0016053	0.23110083	0.05276275	GRI Field
n-Hexane	0.0015058	0.21677669	0.0494924	GRI Field
Phenol	0.0001101	0.01585012	0.00361875	GRI Field
n-Nitrosomorpholine	0.000001	0.00014396	0.00003287	EPA
Naphthalene	0.0006025	0.08673659	0.01980287	EPA
2-Methylnaphthalene	0.0000013	0.00018715	0.00004273	GRI Field
Biphenyl	0.0003305	0.04757916	0.01086282	GRI Field
Phenanthrene	0.0000005	0.00007198	0.00001643	GRI Field
Chrysene	0.000001	0.00014396	0.00003287	GRI Field
Beryllium	0.0000001	0.0000144	0.00000329	GRI Field
Phosphorous	0.0000652	0.00938627	0.00214298	GRI Field
Chromium	0.0000056	0.00080618	0.00018406	EPA
Chromium	0.0000082	0.00118048	0.00026952	GRI Field
Manganese	0.0000069	0.00099333	0.00022679	EPA
Nickel	0.0000061	0.00087816	0.00020049	GRI Field
Cobalt	0.0000016	0.00023034	0.00005259	GRI Field
Arsenic	0.0000002	0.00002879	0.00000657	EPA
Selenium	0.0000003	0.00004319	0.00000986	GRI Field
Cadmium	0.0000036	0.00051826	0.00011832	EPA
Mercury	0.0000019	0.00027353	0.00006245	EPA
Lead	0.0000689	0.00991892	0.00226459	EPA
Totals	0.0217114	3.12559802	0.71360686	