

# **Air Construction Permit Application – Temporary Gas Turbines**

## Arvah B. Hopkins Electric Generating Station



April 16, 2004

**City of Tallahassee**  
**Your Own Utilities<sup>SM</sup>**



Prepared by  
Golder Associates Inc.  
6241 NW 23<sup>rd</sup> Street, Suite 500  
Gainesville, Florida 32653

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## **AIR PERMIT APPLICATION**



# Department of **RECEIVED** Environmental Protection

APR 16 2004

## Division of Air Resource Management BUREAU OF AIR REGULATION APPLICATION FOR AIR PERMIT - LONG FORM

### I. APPLICATION INFORMATION

**Air Construction Permit** – Use this form to apply for an air construction permit for a proposed project:

- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

**Air Operation Permit** – Use this form to apply for:

- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

**Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option)**

– Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

#### Identification of Facility

1. Facility Owner/Company Name: <b>City of Tallahassee, Electric Utilities</b>	
2. Site Name: <b>Arvah B. Hopkins Generating Station</b>	
3. Facility Identification Number: <b>0730003</b>	
4. Facility Location...: Street Address or Other Locator: <b>Route 4, Box 450, 1125 Geddie Road (County Road 1585)</b> City: <b>Tallahassee</b> County: <b>Leon</b> Zip Code: <b>32304</b>	
5. Relocatable Facility? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6. Existing Title V Permitted Facility? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

#### Application Contact

1. Application Contact Name: <b>Jennette Curtis, Environmental Services Administrator</b>	
2. Application Contact Mailing Address... Organization/Firm: <b>City of Tallahassee, Environmental Resources</b> Street Address: <b>City Hall, 300 South Adams Street</b> City: <b>Tallahassee</b> State: <b>Florida</b> Zip Code: <b>32301-1731</b>	
3. Application Contact Telephone Numbers... Telephone: <b>(850) 891-8850</b> ext. Fax: <b>(850) 891-8277</b>	
4. Application Contact Email Address: <b>curtisj@talgov.com</b>	

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<b>4-16-04</b>
2. Project Number(s):	<b>0730003-004-Ac</b>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

## APPLICATION INFORMATION

### Purpose of Application

**This application for air permit is submitted to obtain: (Check one)**

#### **Air Construction Permit**

☒ Air construction permit.

#### **Air Operation Permit**

- ☐ Initial Title V air operation permit.
- ☐ Title V air operation permit revision.
- ☐ Title V air operation permit renewal.
- ☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
- ☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

#### **Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)**

- ☐ Air construction permit and Title V permit revision, incorporating the proposed project.
- ☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

**Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:**

- ☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

### Application Comment

**This application is for twenty three 5.5 megawatt natural-gas fired turbines to be temporarily located at the Arvah B. Hopkins Generating Station until repairs and tuning can be completed on Unit No. 8 located at Purdom Generating Station and the unit becomes fully operational. The units will not be operated after September 30, 2004.**

## APPLICATION INFORMATION

### Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
New	Twenty Three 5.5 Megawatt Natural Gas-fired Turbines	AC1D	

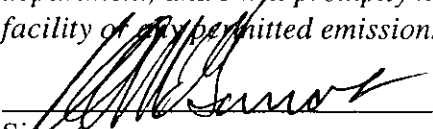
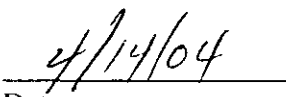
### Application Processing Fee

Check one: ☐ Attached - Amount: \$ \_\_\_\_\_ ☒ Not Applicable

## APPLICATION INFORMATION

### Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :	
<b>Robert E. McGarrah, Manager of Power Production</b>	
2. Owner/Authorized Representative Mailing Address:	
Organization/Firm: <b>City of Tallahassee</b>	
Street Address: <b>2602 Jackson Bluff Road</b>	
City: <b>Tallahassee</b> State: <b>Florida</b> Zip Code: <b>32304</b>	
3. Owner/Authorized Representative Telephone Numbers...	
Telephone: <b>(850) 891 - 5534</b> Fax: <b>(850) 891 - 5162</b>	
4. Owner/Authorized Representative Email Address: <b>McGarraR@talgov.com</b>	
5. Owner/Authorized Representative Statement:	
<p><i>I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit 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 and all other requirements identified in this application to which the facility is subject. 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 the facility of any permitted emissions unit.</i></p>	
 Signature	 Date



## APPLICATION INFORMATION

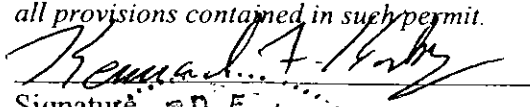
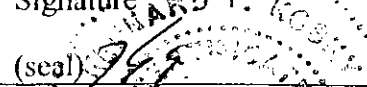
### Application Responsible Official Certification

**Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."**

1. Application Responsible Official Name:
2. Application Responsible Official Qualification (Check one or more of the following options, as applicable): <input type="checkbox"/> For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C. <input type="checkbox"/> For a partnership or sole proprietorship, a general partner or the proprietor, respectively. <input type="checkbox"/> For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official. <input type="checkbox"/> The designated representative at an Acid Rain source.
3. Application Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
4. Application Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
5. Application Responsible Official Email Address:
6. Application Responsible Official Certification: <i>I, the undersigned, am a responsible official of the Title V source addressed in this air permit 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 and all other applicable requirements identified in this application to which the Title V source is subject. 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 the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.</i>  Signature _____ Date _____

## APPLICATION INFORMATION

### Professional Engineer Certification

1. Professional Engineer Name: <b>Kennard F. Kosky</b> Registration Number: <b>14996</b>
2. Professional Engineer Mailing Address... Organization/Firm: <b>Golder Associates Inc.**</b> Street Address: <b>6241 NW 23<sup>rd</sup> Street, Suite 500</b> City: <b>Gainesville</b> State: <b>FL</b> Zip Code: <b>32653</b>
3. Professional Engineer Telephone Numbers... Telephone: <b>(352) 336-5600</b> ext. <b>516</b> Fax: <b>(352) 336-6603</b>
4. Professional Engineer Email Address: <b>kkosky@golder.com</b>
5. Professional Engineer Statement: <i>I, the undersigned, hereby certify, except as particularly noted herein*, that:</i>  (1) <i>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</i>  (2) <i>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.</i>  (3) <i>If the purpose of this application is to obtain a Title V air operation permit (check here <input type="checkbox"/>, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.</i>  (4) <i>If the purpose of this application is to obtain an air construction permit (check here <input checked="" type="checkbox"/>, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here <input type="checkbox"/>, 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.</i>  (5) <i>If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here <input type="checkbox"/>, 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.</i>   Signature: <b>Kennard F. Kosky</b> Date: <b>4/15/04</b>  (seal) 

\* Attach any exception to certification statement.

\*\* Board of Professional Engineers Certificate of Authorization #00001670

## II. FACILITY INFORMATION

### A. GENERAL FACILITY INFORMATION

#### Facility Location and Type

1. Facility UTM Coordinates... Zone <b>16</b> East (km) <b>749.53</b> North (km) <b>3371.7</b>		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) <b>30/27/08</b> Longitude (DD/MM/SS) <b>84/24/00</b>	
3. Governmental Facility Code: <b>4</b>	4. Facility Status Code: <b>A</b>	5. Facility Major Group SIC Code: <b>49</b>	6. Facility SIC(s): <b>4911</b>
7. Facility Comment :			

#### Facility Contact

1. Facility Contact Name: <b>Jennette Curtis, Environmental Services Administrator</b>
2. Facility Contact Mailing Address... Organization/Firm: <b>City of Tallahassee, Environmental Resources</b> Street Address: <b>City Hall, 300 South Adams Street</b> City: <b>Tallahassee</b> State: <b>Florida</b> Zip Code: <b>32301-1731</b>
3. Facility Contact Telephone Numbers: Telephone: <b>(850) 891-8850</b> ext. Fax: <b>(850) 891-8277</b>
4. Facility Contact Email Address: <b>curtisj@talgov.com</b>

#### Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official Email Address:

## FACILITY INFORMATION

### Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. <input type="checkbox"/> Small Business Stationary Source	<input type="checkbox"/> Unknown
2. <input type="checkbox"/> Synthetic Non-Title V Source	
3. <input checked="" type="checkbox"/> Title V Source	
4. <input checked="" type="checkbox"/> Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. <input type="checkbox"/> Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. <input checked="" type="checkbox"/> Major Source of Hazardous Air Pollutants (HAPs)	
7. <input type="checkbox"/> Synthetic Minor Source of HAPs	
8. <input checked="" type="checkbox"/> One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. <input type="checkbox"/> One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. <input type="checkbox"/> One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. <input type="checkbox"/> Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:  <b>NSPS - 40 CFR Part 60, Subpart GG applies to the proposed turbines.</b>	

## FACILITY INFORMATION

### List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
Particulate Matter - PM	A	No
Particulate Matter with an aerodynamic diameter less than 10 microns - PM <sub>10</sub>	A	No
Sulfur Dioxide - SO <sub>2</sub>	A	No
Nitrogen Oxides - NO <sub>x</sub>	A	No
Carbon Monoxide - CO	A	No
Volatile Organic Compounds - VOCs	A	No
Total Hazardous Air Pollutants - HAPs	A	No

## FACILITY INFORMATION

### B. EMISSIONS CAPS

#### Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility Wide Cap [Y or N]? (all units)	3. Emissions Unit ID No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

## FACILITY INFORMATION

### C. FACILITY ADDITIONAL INFORMATION

#### Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input checked="" type="checkbox"/> Attached, Document ID: <b>CT-FI-C1</b> <input type="checkbox"/> Previously Submitted, Date: _____
2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____
3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____

#### Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable (existing permitted facility)
2. Description of Proposed Construction or Modification: <input checked="" type="checkbox"/> Attached, Document ID: <b>Part II</b>
3. Rule Applicability Analysis: <input checked="" type="checkbox"/> Attached, Document ID: <b>Part II</b>
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable

### **Additional Requirements for FESOP Applications**

- ### **Additional Requirements for Title V Air Operation Permit Applications**

- ### Additional Requirements Comment



**ATTACHMENT CT-FI-C1**

**FACILITY PLOT PLANS**

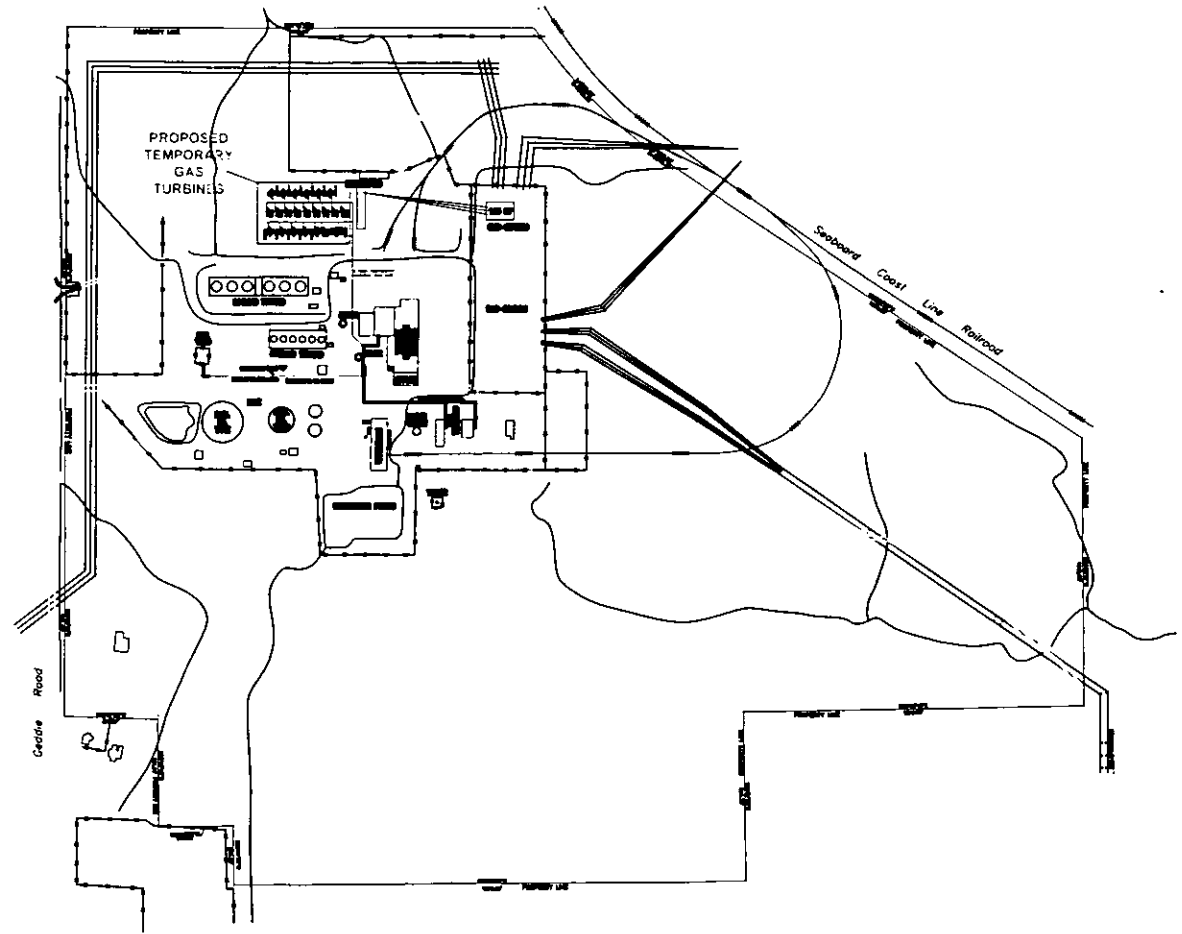
REV	DATE	REVISION	DR	CH	APPROVED
1	11-03-04	CHANGES AT HOODSING AND CONCRETE PAV			

- NOTES
- 233 ACRE PROPERTY
  - TEMPORARY GENERATION COVERING APPROXIMATELY 160,000 SQ. FT.
  - 23 GAS TURBINES COVERING APPROXIMATELY 85,000 SQ. FT.
  - 3 PHASE TRANSMISSION LINES CONNECTING TO EXISTING TRANSFORMERS

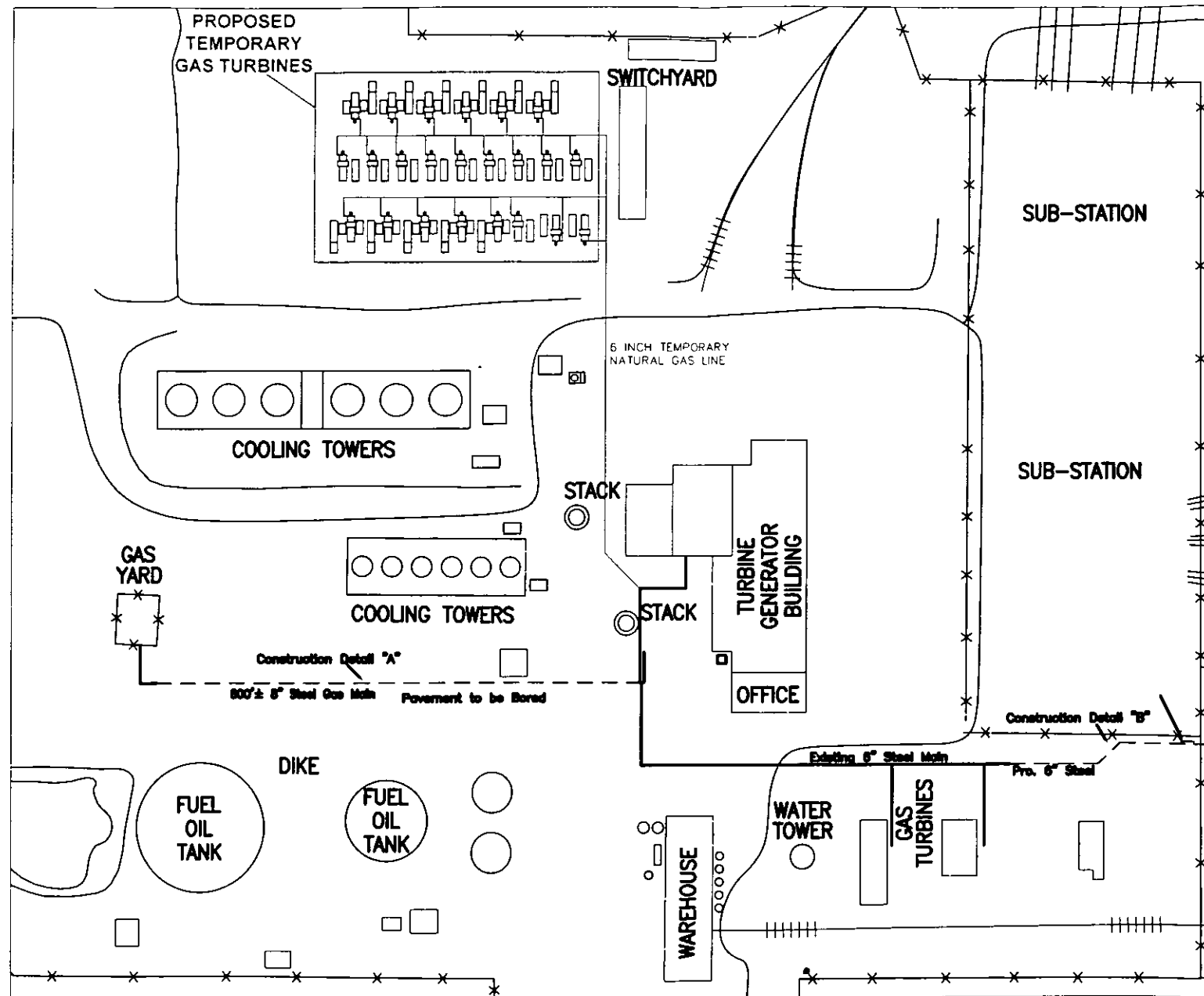
- LEGEND
- NPDES OUTFALL
  - SURFACE FLOW
  - ✓ CREEK
  - DRAINAGE AREA BOUNDARY
  - TIECLINE
  - FENCE
  - PROPERTY LINE



HOPKINS GENERATING STATION CITY OF TALLAHASSEE, FLORIDA (TAX ID No. 59-6000435)		
PROPOSED TEMPORARY POWER BLOCK OVERALL SITE PLAN		
EBASCO SERVICES INCORPORATED		
SCALE	APPROVED	DATE APRIL 14, 2004
DEPT. EED		CTAL-HPKO-C-V-00000
DR		
CH		



REV	DATE	REVISION	DR	CH	APPROVED
1	11-02-04	ADD L&L & L&L ADD L&L & L&L ADD L&L & L&L			



# LEGEND

- HPDES OUTFALL
- SURFACE FLOW
- CREEK
- DRAINAGE AREA
- BOUNDARY
- TRAILLINE
- FENCE
- PROPERTY LINE



HOPKINS GENERATING STATION  
CITY OF TALLAHASSEE, FLORIDA  
PROPOSED TEMPORARY POWER BLOCK  
LOCATION

ATTENTION:	DEPT. SLCT. PROJ.	APPROVED:	DATE
			CTAL - HPKO - C - V - 0000
			A

## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

### III. EMISSIONS UNIT INFORMATION

**Title V Air Operation Permit Application** - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

**Air Construction Permit or FESOP Application** - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

**Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application** - Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]

Gas Turbines

**A. GENERAL EMISSIONS UNIT INFORMATION****Title V Air Operation Permit Emissions Unit Classification**

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

**Emissions Unit Description and Status**

1. Type of Emissions Unit Addressed in this Section: (Check one)

☒ 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, 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.

☐ 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.

2. Description of Emissions Unit Addressed in this Section:

**Twenty Three 5.5 megawatt natural gas-fired turbines**

3. Emissions Unit Identification Number: **008**

4. Emissions Unit Status Code: <b>C</b>	5. Commence Construction Date: <b>Upon Permit Issuance</b>	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: <b>49</b>	8. Acid Rain Unit? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
--	---	--------------------------	--	--

9. Package Unit:

Manufacturer: **Solar Turbines Inc.**

Model Number: **Solar Taurus 60 – 7300S**

10. Generator Nameplate Rating: **5.5 MW**

11. Emissions Unit Comment:

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**Emissions Unit Control Equipment**

1. Control Equipment/Method(s) Description:

205 – Low NO<sub>x</sub> Burners

2. Control Device or Method Code(s): 205

**Section [1] of [1]  
Gas Turbines**

**(Optional for unregulated emissions units.)**

1. Maximum Process or Throughput Rate:		
2. Maximum Production Rate: <b>5.5 MW (each)</b>		
3. Maximum Heat Input Rate: <b>63.07 million Btu/hr (LHV)</b>		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	24 hours/day 19 weeks/year	7 days/week 11,500 hours/year
6. Operating Capacity/Schedule Comment:	<p><b>Total annual operating hours indicated are the total for all 23 gas turbines. City of Tallahassee requests that the turbines be permitted this way to allow greater operational flexibility. The units will not operate after September 30, 2004.</b></p>	

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**C. EMISSION POINT (STACK/VENT) INFORMATION**  
(Optional for unregulated emissions units.)

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram: <b>Gas Turbines</b>		2. Emission Point Type Code: <b>1</b>	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:  <b>One exhaust stack for each unit.</b>			
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:			
5. Discharge Type Code: <b>V</b>	6. Stack Height: <b>24 feet</b>	7. Exit Diameter: <b>3.5 feet</b>	
8. Exit Temperature: <b>910 °F</b>	9. Actual Volumetric Flow Rate: <b>101,600 acfm</b>	10. Water Vapor: <b>%</b>	
11. Maximum Dry Standard Flow Rate: <b>dscfm</b>		12. Nonstack Emission Point Height: <b>feet</b>	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment: <b>See Site Plan in Part II.</b>			



**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**D. SEGMENT (PROCESS/FUEL) INFORMATION**

**Segment Description and Rate:** Segment 1 of 1

1. Segment Description (Process/Fuel Type):  <b>Internal Combustion Engine – Electric Generation; Turbine, Natural Gas</b>		
2. Source Classification Code (SCC): <b>2-01-002-01</b>		3. SCC Units: <b>Million Cubic Feet</b>
4. Maximum Hourly Rate: <b>0.067</b>	5. Maximum Annual Rate: <b>770.5</b>	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: <b>1,050</b>
10. Segment Comment:  <b>Maximum Hourly Rate is for one gas turbine. Maximum annual rate is for twenty three gas turbines based on total of 11,500 hours of operation.</b>		

**Segment Description and Rate:** Segment \_\_\_\_ of \_\_\_\_

1. Segment Description (Process/Fuel Type):		
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:		

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**E. EMISSIONS UNIT POLLUTANTS****List of Pollutants Emitted by Emissions Unit**

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM/PM <sub>10</sub>			NS
SO <sub>2</sub>			NS
NO <sub>x</sub>	205		EL
CO			NS
VOCs			NS

## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

## POLLUTANT DETAIL INFORMATION

Page [1] of [5]  
Particulate Matter

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –  
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

**Potential/Estimated Fugitive Emissions**

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: <b>PM/PM<sub>10</sub></b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>27.6 lb/hour                      6.9 tons/year</b>		4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
5. Range of Estimated Fugitive Emissions (as applicable): to                      tons/year			
6. Emission Factor:  Reference:		7. Emissions Method Code: <b>1</b>	
8. Calculation of Emissions:  <b>See Table 2-2 of Part II.</b>			
9. Pollutant Potential/Estimated Fugitive Emissions Comment: <b>PM/PM<sub>10</sub> emissions are synthetically limited by restricting the total annual operating hours for all twenty three gas turbines to 11,500 hours.</b>			

**EMISSIONS UNIT INFORMATION**Section {1} of {1}  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page {1} of {5}  
Particulate Matter**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -  
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**EMISSIONS UNIT INFORMATION**Section [1] of [1]  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page [2] of [5]  
Sulfur Dioxide**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –  
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS****(Optional for unregulated emissions units.)****Potential/Estimated Fugitive Emissions**

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: <b>SO<sub>2</sub></b>	2. Total Percent Efficiency of Control:
3. Potential Emissions: <b>8.76 lb/hour                      2.19 tons/year</b>	4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
5. Range of Estimated Fugitive Emissions (as applicable): to                      tons/year	
6. Emission Factor:  Reference:	7. Emissions Method Code: <b>1</b>
8. Calculation of Emissions:  <b>See Table 2-2, Part II.</b>	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: <b>SO<sub>2</sub> emissions are synthetically limited by restricting the total annual operating hours for all twenty three gas turbines to 11,500 hours.</b>	

**EMISSIONS UNIT INFORMATION**Section [1] of [1]  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page [2] of [5]  
Sulfur Dioxide**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -  
ALLOWABLE EMISSIONS****Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.****Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

## POLLUTANT DETAIL INFORMATION

Page [3] of [5]  
Nitrogen Oxides

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –  
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

**Potential/Estimated Fugitive Emissions**

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: <b>NO<sub>x</sub></b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>134.3 lb/hour                      33.6 tons/year</b>		4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
5. Range of Estimated Fugitive Emissions (as applicable): to                      tons/year			
6. Emission Factor:  Reference:		7. Emissions Method Code: <b>1</b>	
8. Calculation of Emissions:  <b>See Table 2-2, Part II.</b>			
9. Pollutant Potential/Estimated Fugitive Emissions Comment: <b>NO<sub>x</sub> emissions are synthetically limited by restricting the total annual operating hours for all twenty three gas turbines to 11,500 hours.</b>			

## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

## POLLUTANT DETAIL INFORMATION

Page [3] of [5]  
Nitrogen Oxides

**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -  
ALLOWABLE EMISSIONS**

**Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.**

**Allowable Emissions** Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: <b>ESCPD</b>	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: <b>25 ppmvd @ 15% O<sub>2</sub></b>	4. Equivalent Allowable Emissions: <b>134.3 lb/hour      33.6 tons/year</b>
5. Method of Compliance: <b>Given the temporary nature of these sources, the applicant is requesting to use previous compliance tests for these units. EPA method 7 or 20 compliance Test upon 100 hours of operation and up to 4 of the 23 turbines at 90 to 100% load.</b>	
6. Allowable Emissions Comment (Description of Operating Method): <b>Title 40 – CFR 60, Subpart GG</b>	

**Allowable Emissions** Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: <b>ESCPD</b>	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: <b>39 TPY</b>	4. Equivalent Allowable Emissions: <b>lb/hour      39 tons/year</b>
5. Method of Compliance: <b>Recordkeeping of fuel usage and operating hours.</b>	
6. Allowable Emissions Comment (Description of Operating Method):	

**Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: <b>lb/hour      tons/year</b>
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	



## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

## POLLUTANT DETAIL INFORMATION

Page [4] of [5]  
Carbon Monoxide

**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –  
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS**

(Optional for unregulated emissions units.)

**Potential/Estimated Fugitive Emissions**

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: <b>CO</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>163.5 lb/hour                      40.9 tons/year</b>		4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
5. Range of Estimated Fugitive Emissions (as applicable): to                      tons/year			
6. Emission Factor:  Reference:		7. Emissions Method Code: <b>1</b>	
8. Calculation of Emissions:  <b>See Table 2-2, Part II.</b>			
9. Pollutant Potential/Estimated Fugitive Emissions Comment: <b>CO emissions are synthetically limited by restricting the total annual operating hours for all twenty three gas turbines to 11,500 hours.</b>			

**EMISSIONS UNIT INFORMATION**Section [1] of [1]  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page [4] of [5]  
Carbon Monoxide**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -  
ALLOWABLE EMISSIONS****Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.****Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**Allowable Emissions** Allowable Emissions \_\_\_\_ of \_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**EMISSIONS UNIT INFORMATION**Section [1] of [1]  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page [5] of [5]  
Volatile Organic Compounds**F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION –  
POTENTIAL/ESTIMATED FUGITIVE EMISSIONS****(Optional for unregulated emissions units.)****Potential/Estimated Fugitive Emissions**

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: <b>VOCs</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>3.38 lb/hour                      0.85 tons/year</b>		4. Synthetically Limited? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
5. Range of Estimated Fugitive Emissions (as applicable): to                      tons/year			
6. Emission Factor:  Reference:		7. Emissions Method Code: <b>1</b>	
8. Calculation of Emissions:  <b>See Table 2-2, Part II.</b>			
9. Pollutant Potential/Estimated Fugitive Emissions Comment: <b>VOC emissions are synthetically limited by restricting the total annual operating hours for all twenty three gas turbines to 11,500 hours.</b>			

**EMISSIONS UNIT INFORMATION**Section [1] of [1]  
Gas Turbines**POLLUTANT DETAIL INFORMATION**Page [5] of [5]  
Volatile Organic Compounds**F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION -  
ALLOWABLE EMISSIONS**

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour                      tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]

Gas Turbines

**G. VISIBLE EMISSIONS INFORMATION**

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

**Visible Emissions Limitation:** Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: <b>VE20</b>	2. Basis for Allowable Opacity: <input checked="" type="checkbox"/> Rule <input type="checkbox"/> Other
3. Allowable Opacity: Normal Conditions: <b>20 %</b> Exceptional Conditions: <b>100 %</b> Maximum Period of Excess Opacity Allowed: <b>60 min/hour</b>	
4. Method of Compliance: <b>EPA Method 9 Visible Emission Test upon 100 hours of operation for up to four representative gas turbines at 90 to 100% load.</b>	
5. Visible Emissions Comment: <b>Rule 62-296.320 (4) (b). Excess emissions allowed for startup, shutdown, and malfunction for 2 hours per 24 hours, pursuant to Rule 62-210.700(1).</b>	

**Visible Emissions Limitation:** Visible Emissions Limitation \_\_\_\_ of \_\_\_\_

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: <input type="checkbox"/> Rule <input type="checkbox"/> Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**H. CONTINUOUS MONITOR INFORMATION**

Complete if this emissions unit is or would be subject to continuous monitoring.

**Continuous Monitoring System:** Continuous Monitor \_\_\_\_ 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:	

**Continuous Monitoring System:** Continuous Monitor \_\_\_\_ 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:	

**EMISSIONS UNIT INFORMATION**

Section [1] of [1]  
Gas Turbines

**I. EMISSIONS UNIT ADDITIONAL INFORMATION****Additional Requirements for All Applications, Except as Otherwise Stated**

1. Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input checked="" type="checkbox"/> Attached, Document ID: <u>CT-EU1-11</u> <input type="checkbox"/> Previously Submitted, Date _____
2. Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input checked="" type="checkbox"/> Attached, Document ID: <u>CT-EU1-12</u> <input type="checkbox"/> Previously Submitted, Date _____
3. Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date _____
4. Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date _____ <input checked="" type="checkbox"/> Not Applicable (construction application)
5. Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date _____ <input checked="" type="checkbox"/> Not Applicable
6. Compliance Demonstration Reports/Records <input type="checkbox"/> Attached, Document ID: _____ Test Date(s)/Pollutant(s) Tested: _____ <input type="checkbox"/> Previously Submitted, Date: _____ Test Date(s)/Pollutant(s) Tested: _____ <input type="checkbox"/> To be Submitted, Date (if known): _____ Test Date(s)/Pollutant(s) Tested: _____ <input checked="" type="checkbox"/> Not Applicable  Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7. Other Information Required by Rule or Statute <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable

## EMISSIONS UNIT INFORMATION

Section [1] of [1]  
Gas Turbines

### Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable

### Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
2. Compliance Assurance Monitoring <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
3. Alternative Methods of Operation <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
4. Alternative Modes of Operation (Emissions Trading) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
5. Acid Rain Part Application <input type="checkbox"/> Certificate of Representation (EPA Form No. 7610-1) <input type="checkbox"/> Copy Attached, Document ID: _____ <input type="checkbox"/> Acid Rain Part (Form No. 62-210.900(1)(a)) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input type="checkbox"/> Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input type="checkbox"/> New Unit Exemption (Form No. 62-210.900(1)(a)2.) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input type="checkbox"/> Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input type="checkbox"/> Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input type="checkbox"/> Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously Submitted, Date: _____ <input checked="" type="checkbox"/> Not Applicable



**EMISSIONS UNIT INFORMATION**

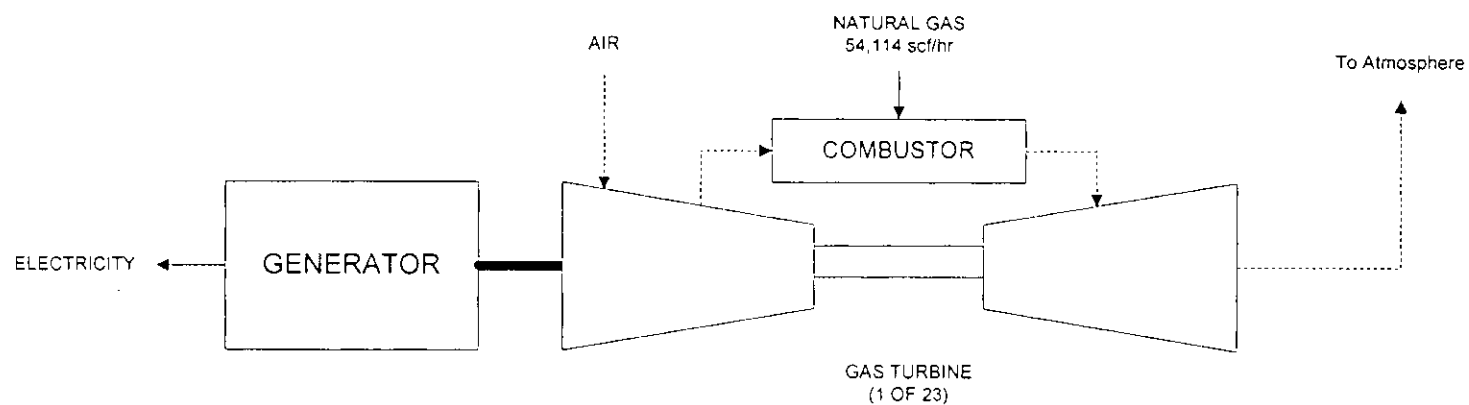
Section [1] of [1]

Gas Turbines

**Additional Requirements Comment**

--

**ATTACHMENT CT-EU1-I1**  
**PROCESS FLOW DIAGRAM**



Attachment CT-EU1-I1  
Gas Turbine Process Flow Diagram

Process Flow Legend  
Solid/Liquid ———→  
Gas .....→



**ATTACHMENT CT-EU1-I2**  
**FUEL ANALYSIS AND SPECIFICATION**

## ATTACHMENT CT-EU1-I2

## FUEL ANALYSIS AND SPECIFICATION

Fuel Type (typical analysis of constituents)

Natural Gas (Hopkins)

Heat Content Btu per scf (min/max/ave) 1033 / 1061 /

1047

CO2 Mole % (min/max/ave) 0.871 / 1.139 / 0.96

N2 Mole % (min/max/ave) 0.334 / 0.505 / 0.42

Specific Gravity 0.586 / 0.608 / 0.60

Methane Mole % (min/max/ave) 92.775 / 95.653 / 94.41

Ethane Mole % (min/max/ave) 2.328 / 3.994 / 3.07

Propane Mole % (min/max/ave) 0.403 / 1.003 / 0.70

I-butane Mole % (min/max/ave) 0.086 / 0.239 / 0.16

N-butane Mole % (min/max/ave) 0.082 / 0.225 / 0.14

I-pentane Mole % (min/max/ave) 0.031 / 0.063 / 0.05

N-pentane Mole % (min/max/ave) 0.02 / 0.039 / 0.03

C6 Mole % (min/max/ave) 0.053 / 0.096 / 0.07

C7 Mole % (min/max/ave) 0 / 0 / 0

H2 Mole % (min/max/ave) 0 / 0 / 0

Helium Mole % (min/max/ave) 0 / 0 / 0

Oxygen Mole % (min/max/ave) 0 / 0 / 0

FGT

Last Updated

4/15/2004 2:00

Total Sulfur	Total Sulfur
Previous Day Avg	Previous Day Avg
ppm	Grains/hcf

Station Name	04/13/2004	04/13/2004
Perry 36" Stream #1	1.223	0.076
Perry 30" Stream #2	2.054	0.128
Perry 24" Stream #3	2.199	0.137
Brooker 24" Stream	4.129	0.258

← DATA FOR HOPKINS

Florida Gas makes no warranty or representation whatsoever as to the accuracy of the This information is provided on a best efforts basis and is an estimate.

The information is not used for billing purposes.

Florida Gas is not responsible for any reliance on this information by any party.

## Stream History

Gas Day	Index	Perry 36" Stream #1 15SA36PSUL.A	Perry 36" Stream #1	Perry 30" Stream #2 15SA30PSUL.A	Perry 30" Stream #2
		Avg ppm	Avg Grains/hcf	Avg ppm	Avg Grains/h
04/12/2004	33	1.283	0.080	2.179	0.136
04/11/2004	32	1.709	0.107	2.845	0.178
04/10/2004	31	1.399	0.087	2.193	0.137
04/09/2004	30	0.958	0.060	1.850	0.116
04/08/2004	29	0.958	0.060	1.850	0.116
04/07/2004	28	1.360	0.085	2.555	0.160
04/06/2004	27	1.300	0.081	2.565	0.160
04/05/2004	26	1.256	0.079	2.187	0.137
04/04/2004	25	1.303	0.081	2.129	0.133
04/03/2004	24	2.291	0.143	4.710	0.294
04/02/2004	23	1.478	0.092	2.758	0.172
04/01/2004	22	0.927	0.058	2.394	0.150
03/31/2004	21	0.627	0.039	2.265	0.142
03/30/2004	20	0.788	0.049	2.343	0.146
03/29/2004	19	0.831	0.052	1.575	0.098
03/28/2004	18	0.784	0.049	1.788	0.112
03/27/2004	17	0.883	0.055	2.224	0.139
03/26/2004	16	0.896	0.056	1.925	0.120
03/25/2004	15	1.049	0.066	1.887	0.118
03/24/2004	14	1.274	0.080	2.520	0.157
03/23/2004	13	1.777	0.111	3.651	0.228
03/22/2004	12	0.935	0.058	3.044	0.190
03/21/2004	11	0.738	0.046	1.553	0.097
03/20/2004	10	0.916	0.057	1.793	0.112
03/19/2004	9	1.003	0.063	2.538	0.159
03/18/2004	8	0.981	0.061	2.766	0.173
03/17/2004	7	0.981	0.061	2.766	0.173
03/16/2004	6	0.981	0.061	2.766	0.173
03/15/2004	5	0.981	0.061	2.766	0.173
03/14/2004	4	0.981	0.061	2.766	0.173
03/13/2004	3	0.695	0.043	1.365	0.085
03/12/2004	2	0.704	0.044	1.283	0.080
03/11/2004	1	0.759	0.047	1.801	0.113

DATA FOR  
HOPKINS

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## PART II

## 1.0 INTRODUCTION

City of Tallahassee (City), Electric Utilities owns and operates the Arvah B. Hopkins and Purdom Generating Stations. On February 14, 2004, Purdom Unit 8, a nominal 250-megawatt (MW) combined cycle unit, was damaged requiring significant repairs. A few months will be required to repair the unit and return it to full generating capacity. The City, in anticipation of increased demand during the upcoming summer months and limited in its ability to import power from the grid, is proposing to temporarily install 23 natural gas-fired turbines, each with a generation capacity of 5.5 MW at the Arvah B. Hopkins Generating Station. The Arvah B. Hopkins Generating Station is located on Route 4, Box 450, 1125 Geddie Road (County Road 1585), Tallahassee, Leon County, Florida. These units would be operated only in the event of a shortfall of electricity through production or import.

The permitting of the Project in Florida requires an air construction permit. To assist in performing the necessary permitting, Golder Associates Inc. (Golder) was contracted to prepare the necessary permit applications and determining the Project's applicability to any state and federal new source review (NSR) regulation, including prevention of significant deterioration (PSD) and nonattainment review requirements.

The requested operational conditions for the proposed Project will classify the facility as a "minor source" and therefore will not trigger PSD review.

The air permit application is divided into three major sections.

- Section 2.0 presents a description of the facility, including air emissions and stack parameters.
- Section 3.0 provides a review of the regulatory requirements applicable to the proposed Project.



## **2.0 PROJECT DESCRIPTION**

### **2.1 SITE DESCRIPTION**

The Project site is shown in Figure 2-1. The Hopkins facility is situated on a 231-acre site, located west of Tallahassee in a rural area, on the east side of Geddie Road. The Hopkins facility is classified as a major source for both Title V and PSD permitting purposes, as well as, a major source of Hazardous Air Pollutants (HAPs). Currently, the Hopkins facility consists of two fossil fuel-fired steam generators and two combustion turbines.

### **2.2 GAS TURBINES**

The proposed project will be the temporary installation and operation of 23 nominal 5.5-MW, Model Taurus 60 gas turbines manufactured by Solar Turbines Inc. These proposed gas turbines will be exclusively fired on natural gas. The annual operation for these units is based on limiting the total operating hours of all 23 gas turbines to 11,500 hours. By limiting the operating hours, annual emissions of all criteria pollutants will be below significant emission rates. The proposed gas turbines are mounted on trailer beds. As such, no permanent installation will be required.

A mechanical description and supporting data for the Solar Taurus turbines are presented in Appendix A.

Natural gas is already available at the requisite pressure and quantity at the Hopkins facility. As such, no additional infrastructure to support additional natural gas delivery to the site is anticipated at this time.

Air emissions control will consist of dry/low NO<sub>x</sub> burners. Good combustion practices and the use of natural gas will also minimize potential emissions of particulate matter less than 10 microns (PM<sub>10</sub>), carbon monoxide (CO), volatile organic compounds (VOC).

### **2.3 PROPOSED SOURCE EMISSIONS AND STACK PARAMETERS**

Design information and stack parameters for the Solar Taurus 60 gas turbines operating at 100% load condition are presented in Table 2-1. Maximum hourly and annual emission rate estimates for the gas turbines operating at 100-percent load conditions are presented in Table 2-2. Background data for these calculations, from Solar Turbines Inc., is presented in Appendix A.

To limit annual NO<sub>x</sub> emissions to below PSD significant emission rates, the total number of hours the gas turbines will be operated is limited. Based on an estimated maximum hourly NO<sub>x</sub> emission rate of 5.84 pounds per hour (lb/hr) per unit, the gas turbines could operate nearly 13,700 hours without exceeding the NO<sub>x</sub> significant emission rate of 40 TPY. However, to maintain an adequate margin below the NO<sub>x</sub> significant emission rate, the City is requesting a permit limit to restrict the total number of hours the gas turbines are allowed to operate to 11,500 hours. As shown in Table 2-2 restricting the total number of hours of operation to 11,500 hours limits potential NO<sub>x</sub> emissions to 33.58 TPY. As shown in Table 2-2, NO<sub>x</sub> is the limiting pollutant with regards to PSD significant emission rates.

Table 2-1. Design Information and Stack Parameters for the City of Tallahassee  
Solar Taurus 60 Combustion Turbines

Parameter	Taurus 60 One Unit	Taurus 60 23 Units
<b>Engine Performance</b>		
Gross power output (kW) - Solar (2004)	5,495	126,385
Net power output (kW) - Solar (2004)	5,300	121,900
Net Heat rate (Btu/kWh, LHV) - Solar (2004)	11,900	
(Btu/kWh, HHV) - Solar (2004)	13,209	
Heat Input (MMBtu/hr, LHV) - calculated	63.07	1,451
(MMBtu/hr, HHV) - calculated	70.01	1,610
Fuel heating value (Btu/lb, LHV) - estimated	18,739	
(Btu/lb, HHV) - provided	20,800	
(HHV/LHV)	1.11	
<b>Engine Exhaust Flow</b>		
Temperature (°F)	910	
Exhaust flow (lb/hr) - provided	173,787	
Exhaust flow (acfm)	101,623	
<b>Fuel Usage</b>		
Fuel usage (lb/hr)= Heat Input (MMBtu/hr) x 1,000,000 Btu/MMBtu (Fuel Heat Content, Btu/lb (LHV))		
Heat input (MMBtu/hr, LHV)	63.07	
Heat content (Btu/lb, LHV)	18,739	
Fuel usage (lb/hr) - calculated	3,366	
Fuel usage (scf/hr) - calculated	66,674.0	
<b>Stack and Exit Gas Conditions</b>		
Stack height (ft)	24.0	
Diameter (ft)	3.5	
Velocity (ft/sec)= Volume flow (acfm) / [((diameter) <sup>2</sup> /4) x 3.14159] / 60 sec/min		
Volume flow (acfm)	101,623	
Diameter (ft)	3.5	
Velocity (ft/sec) - calculated	176.0	
Velocity (m/sec) - calculated	53.7	

Note: Universal gas constant= 1,545 ft-lb(force)/°R; atmospheric pressure= 2.116.8 lb(force)/ft<sup>2</sup>.

Source: Solar, 2004; Golder, 2004.

Table 2-2. Maximum Emissions for Criteria Pollutants for the City of Tallahassee  
Solar Taurus 60 Combustion Turbines

Parameter	Taurus 60 One Unit	Taurus 60 23 Units
Hours of Operation	500	11,500
PM <sub>10</sub> based on Solar (2002)		
Emission rate		
(lb/hr)	1.20	27.60
(TPY) - based on provided value	0.30	6.90
Sulfur Dioxide (lb/hr)= Fuel Oil (lb/hr) x sulfur content (gr/100 cf) x (lb SO <sub>2</sub> /lb S) /100 (b)		
Fuel use (cf/hr)	66,674	
Fuel Sulfur content (grains/100 scf)	2	
lb SO <sub>2</sub> /lb S (64/32)	2	
Emission rate (lb/hr)- calculated	0.38	8.76
(TPY) - based on caculated value	0.10	2.19
Nitrogen Oxides based on 25 ppmvd (Solar 2004)		
Emission rate (lb/hr)- provided	5.84	134.32
(TPY) - based on provided value	1.46	33.58
Carbon Monoxide based on 50 ppmvd (Solar 2004)		
Emission rate (lb/hr)- provided	7.11	163.53
(TPY) - based on provided value	1.78	40.88
VOCs (lb/hr) based on AP-42 (Solar 2004)		
Emission rate (lb/MMBtu)	0.0021	
(lb/hr) - calculated	0.15	3.38
(TPY) based on calculated value	0.04	0.85
Sulfuric Acid Mist = SO <sub>2</sub> emission rate (lb/hr) x conversion rate of SO <sub>2</sub> to H <sub>2</sub> SO <sub>4</sub> (%) x MW H <sub>2</sub> SO <sub>4</sub> /MW SO <sub>2</sub> (98/64) (b)		
SO <sub>2</sub> emission rate (lb/hr)	0.38	
lb H <sub>2</sub> SO <sub>4</sub> /lb SO <sub>2</sub> (98/64)	1.53	
Conversion to H <sub>2</sub> SO <sub>4</sub> (%)	10	
Emission Rate (lb/hr)- calculated	0.058	1.34
(TPY) based on calculated value	0.015	0.34

Note: ppmvw= parts per million, volume wet; O<sub>2</sub>= oxygen.

Source: Solar, 2004; Golder, 2004.

### **3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY**

The following discussion pertains to the federal and state air regulatory requirements and their applicability to the proposed simple-cycle reciprocating engines.

#### **3.1 NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS (AAQS)**

The existing applicable National and Florida AAQS are presented in Table 3-1. National primary AAQS were promulgated to protect the health of the general public, including the young, elderly, and those with respiratory ailments. National secondary AAQS were promulgated to protect the public welfare, including consideration of economic interests, vegetation, visibility, and other factors, with an adequate margin of safety from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

Florida has adopted EPA's primary and secondary AAQS in Chapter 62-204, Florida Administrative Code (F.A.C.). In addition, Florida has additional AAQS for SO<sub>2</sub> of 60 and 260 micrograms per cubic meter (µg/m<sup>3</sup>) for the annual and 24-hour averaging periods, respectively, not to be exceeded more than once per year.

#### **3.2 GENERAL PSD AND PERMITTING REQUIREMENTS**

##### **3.2.1 PSD REQUIREMENTS**

Under federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the CAA must be reviewed and a pre-construction permit issued. Florida's State Implementation Plan, which contains PSD regulations, has been approved by EPA; therefore, PSD approval authority has been granted to the Florida Department of Environmental Protection (FDEP).

A "major facility" is defined as any one of 28 named source categories that have the potential to emit 100 TPY or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment.

A "major modification" is defined under PSD regulations as a change at an existing major facility that increases emissions by greater than significant amounts. PSD significant emission rates are shown in Table 3-2.

EPA has promulgated as regulations certain increases above an air quality baseline concentration level of SO<sub>2</sub>, PM<sub>10</sub>, and nitrogen dioxide (NO<sub>2</sub>) concentrations that would constitute significant deterioration. The EPA Class designations and allowable PSD increments are presented in Table 3-1. The State of Florida has adopted the EPA Class designations and allowable PSD increments for SO<sub>2</sub>, PM<sub>10</sub>, and NO<sub>2</sub> increments.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 CFR 52.21, *Prevention of Significant Deterioration of Air Quality*. The State of Florida has adopted PSD regulations by reference [Rule 62-212.400 F.A.C.]. Major facilities and major modifications are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts:

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

In addition to these analyses, a new facility or emission unit also must be reviewed with respect to Good Engineering Practice (GEP) stack height regulations.

### **3.2.2 FLORIDA AIR PERMITTING REQUIREMENTS**

The FDEP regulations require any new source to obtain an air permit prior to construction. Major new sources must meet the appropriate PSD and nonattainment requirements as discussed previously. Required permits and approvals for air pollution sources include NSR for nonattainment areas, PSD, NSPS, National Emission Standards for Hazardous Air Pollutants (NESHAP), Permit to Construct, and Permit to Operate. The requirements for construction permits and approvals are contained in Rules 62-4.030, 62-4.050, 62-4.052, 62-4.210, and 62-210.300(1), F.A.C. Specific emission standards are set forth in Chapter 62-296, F.A.C.

### **3.3 NEW SOURCE PERFORMANCE STANDARDS**

The New Source Performance Standards (NSPS) are a set of national emission standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated."

The proposed Project will be subject to one NSPS. The proposed gas turbines will be subject to 40 CFR Part 60, Subpart GG. The gas turbines will be operated to meet the applicable NSPS limits. For NO<sub>x</sub>, the applicable NSPS limit is 96 parts per million by volume dry (ppmvd) corrected to 15 percent O<sub>2</sub>. The manufacturer has stated that the units will meet 25 ppmvd corrected to 15 percent O<sub>2</sub>.

### **3.4 SOURCE APPLICABILITY**

#### **3.4.1 AREA CLASSIFICATION**

The Project site is located in Leon County, which has been designated by EPA and FDEP as an attainment area for all criteria pollutants. Leon County and surrounding counties are designated as PSD Class II areas for SO<sub>2</sub>, PM<sub>10</sub>, and NO<sub>2</sub>.

#### **3.4.2 PSD REVIEW**

The Project is a minor modification to a major facility. The City is proposing to restrict the total operation of the gas turbines to 11,500 hours. The restriction on hours of operation limits emission of NO<sub>x</sub> and all other criteria pollutants to below significant emission rates. As such, new source review, under PSD provisions, is not applicable to this project, and it can be permitted as a minor modification to a major facility.

#### **3.4.3 OTHER CLEAN AIR ACT REQUIREMENTS**

The 1990 CAA Amendments established a program to reduce potential precursors of acidic deposition. The Acid Rain Program was delineated in Title IV of the CAA Amendments and required EPA to develop the program. EPA's final regulations were promulgated on January 1, 1993, and included permit provisions (40 CFR Part 72), allowance system (Part 73), continuous emission monitoring (Part 75), excess emission procedures (Part 77), and appeal procedures (Part 78).

EPA's Acid Rain Program applies to all existing and new utility units except those serving a generator less than 25 MW, existing simple-cycle CT, and certain non-utility facilities; units that fall under the program are referred to as affected units. The EPA regulations would not be applicable to the proposed gas turbines due to their name plate rating of 5.5 MW each, which is below EPA's Acid Rain Program applicability rating of 25 MW or greater.

The EPA has promulgated emissions standards for HAPs for various industrial categories, including combustion turbines. These new NESHAPs that result from the 1990 CAA Amendments are based on the use of Maximum Achievable Control Technology (MACT). The adopted standards are contained in 40 CFR 63, Subpart VVVV. New and reconstructed sources that emit more than 10 TPY of a single HAP or 25 TPY of total HAPs or are located at facilities that do emit HAPs above these thresholds are subject to this MACT. Existing units are not required to meet the NESHAP requirements (40 CFR 63.690). Since the proposed gas turbines were constructed in 2000, they are considered to be "existing" and are not considered new under the standard. The proposed gas turbines are therefore not subject to the NESHAP.



Table 3-1. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

Pollutant	Averaging Time	AAQS ( $\mu\text{g}/\text{m}^3$ )		Florida	PSD Increments ( $\mu\text{g}/\text{m}^3$ )		Significant Impact Levels ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>
		Primary Standard	Secondary Standard		Class I	Class II	
Particulate Matter <sup>c</sup> (PM <sub>10</sub> )	Annual Arithmetic Mean	50	50	50	4	17	1
	24-Hour Maximum	150	150	150	8	30	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum	365	NA	260	5	91	5
	3-Hour Maximum	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone <sup>c</sup>	8-Hour Maximum <sup>d</sup>	157	157	157	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	1.5	NA	NA	NA

Note: Particulate matter (PM<sub>10</sub>) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.

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

<sup>a</sup> Short-term maximum concentrations are not to be exceeded more than once per year.

<sup>b</sup> Maximum concentrations are not to be exceeded.

<sup>c</sup> On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, PM<sub>2.5</sub> standards were introduced with a 24-hour standard of 65  $\mu\text{g}/\text{m}^3$  (3-year average of 98<sup>th</sup> percentile) and an annual standard of 15  $\mu\text{g}/\text{m}^3$  (3-year average at community monitors). These standards have been stayed by a court case against EPA and implementation of these standards are many years away pending EPA appeal.

<sup>d</sup> 0.08 ppm; achieved when 3-year average of 99<sup>th</sup> percentile is 0.08 ppm or less. These have been stayed by a court case against EPA. EPA is appealing. The 1-hour standard of 0.12 ppm is still applicable. FDEP has not yet adopted the new standards.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.

40 CFR 50; 40 CFR 52.21.

Chapter 62-272, F.A.C.

Table 3-2. PSD Significant Emission Rates and *De Minimis* Monitoring Concentrations

Pollutant	Regulated Under	Significant Emission Rate (TPY)	<i>De Minimis</i> Monitoring Concentration <sup>a</sup> (µg/m <sup>3</sup> )
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter [PM(TSP)]	NSPS	25	10, 24-hour
Particulate Matter (PM <sub>10</sub> )	NAAQS	15	10, 24-hour
Nitrogen Dioxide	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY <sup>b</sup>
Lead	NAAQS	0.6	0.1, 3-month
Sulfuric Acid Mist	NSPS	7	NM
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Mercury	NESHAP	0.1	0.25, 24-hour
MWC Organics	NSPS	3.5x10 <sup>-6</sup>	NM
MWC Metals	NSPS	15	NM
MWC Acid Gases	NSPS	40	NM
MSW Landfill Gases	NSPS	50	NM

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

NAAQS = National Ambient Air Quality Standards.

NM = No ambient measurement method established; therefore, no *de minimis* concentration has been established.

NSPS = New Source Performance Standards.

NESHAP = National Emission Standards for Hazardous Air Pollutants.

g/m<sup>3</sup> = micrograms per cubic meter.

MWC = Municipal waste combustor.

MSW = Municipal solid waste.

<sup>a</sup> Short-term concentrations are not to be exceeded.

<sup>b</sup> No *de minimis* concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.

<sup>c</sup> Any emission rate of these pollutants.

Sources: 40 CFR 52.21.

Rule 62-212.400.

## **APPENDIX A**

### **MECHANICAL DESCRIPTION AND SUPPORTING DATA FOR SOLAR TURBINE INC. MODEL TAURUS 60 GAS TURBINES**

**Solar Taurus 60 Gas Turbine**

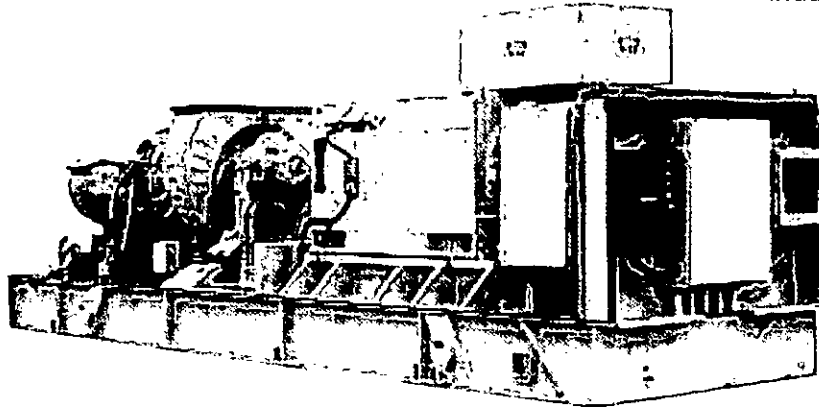
Year Constructed:	2001
NSPS Testing Performed:	Yes
Equipped with CEMS:	No
Combustor Type:	Lean Premix with DLE ("SoloNOx")
Fuel Type:	Natural Gas
MW:	5.2
Stack Height Above Grade:	23'-11.5"
Stack Diameter:	3'-6"
Exhaust Temperature:	910F
Exhaust Flow Rate:	173,787 to 174,798 lbm/hr
Maximum Heat Input Rate:	53.1 mmbtu/unit-hr @ 90F
NOx emissions:	25 ppmvd or 5.84 lb/hr (max at ISO)
CO emissions:	50 ppmvd or 7.11 lb/hr (max at ISO)
PMtotal Emissions:	1.2 lb/hr
VOC Emissions:	2.5 ppmvd or 0.204 lbm/hr (@ ISO)

# Solar Turbines

A Caterpillar Company

## TAURUS 60 Gas Turbine Generator Set

Industrial/Utility Grade



### Features

- Industrial Gas Turbine Package
- Compact, Integrated Package Providing Ease of Installation
- Factory Tested
- Dry, Low Emission (SoLoNOx™) Combustion Available
- Onskid Microprocessor-Control with Auto Sync Capability
- Multiple Fuel Capability

### Package Arrangement

#### Gas Turbine

- Taurus™ 60 Industrial, Single-Shaft
- Axial Compressor – 12 Stages
- Annular Combustion Chamber
  - 12 Fuel Injectors
- Coatings
  - Compressor: Inorganic Aluminum
  - Turbine and Nozzle Blades: Precious Metal Diffusion Aluminide
- Proximity Probe Vibration Transducers

#### Main Reduction Drive

- Epicyclic
  - 1800 or 1500 rpm
  - Acceleration Vibration Transducers

#### Generator

- Salient Pole, 3 Phase, 6 Wire, Wye Connected, Synchronous with Brushless Exciter
- Open Drip-Proof Construction
- Sleeve Bearings
- Velocity Vibration Transducers
- Solid-State Voltage Regulation with Permanent Magnet Generator
- NEMA Class F Insulation with F Rise
- Continuous Duty Rating

#### Package

- Steel Base Frame with Drip Pans
- Direct-Drive AC Start System
- Natural Gas Fuel System

#### Control System

- Microprocessor-Based PLC
- Generator Control
- Vibration and Temperature Monitoring
- Auto Synchronizing
- Integrated Lube Oil System
  - Turbine-Driven Lube Pump
  - AC Pre/Post Lube Pump
  - Backup Lube Pump
  - Air/Oil Cooler
  - Integral Lube Oil Tank
  - Lube Oil Tank Heater
  - Lube Oil Filter

#### Documentation

- Drawings
- Quality Control Data Book
- Inspection and Test Plan
- Test Reports
- O&M Manuals
- Factory Testing of Turbine and Package

#### Optional Equipment/Services

- Generator Options:
  - WP11, TEWAC
  - Standby Duty Rating
  - Standard Voltages:
    - 3300, 6600, 11,000 50 Hz;
    - 4160, 6900, 12,470, 13,800 60 Hz
- Fuel Systems
  - Liquid
  - Dual (Gas/Liquid)

#### SoLoNOx, Dry, Low Emission

- Alternate Fuels (such as naphtha, propane, low Btu)

#### Lube Oil System

- Water/Oil Lube Cooler
- Electrostatic Demister
- Duplex Lube Oil Filters

#### Control System

- Remote Display/Control Terminal
- Heat Recovery Application Interface
- Serial Link Supervisory Interface
- KW Control
- KVAR/Power Factor Control
- Turbine Performance Map
- Historical Displays
- Printer/Logger
- Predictive Emissions Monitoring
- Field Programming Terminal

#### Accessory Equipment

- 24-VDC Battery/Charger System
- Turbine Cleaning System: On-Crank and On-line
- Package Lifting Kit

#### Weatherproof Acoustic Enclosure

#### Ancillary Equipment: Various Air Inlet and Exhaust Systems

- Inlet and Exhaust Silencers
- Self-Cleaning or Prefilter/Barrier Air Inlet Filter
- Inlet Evaporative Cooler
- Inlet Chiller Coils
- Ancillary Support Frame

# Solar Turbines

A Caterpillar Company

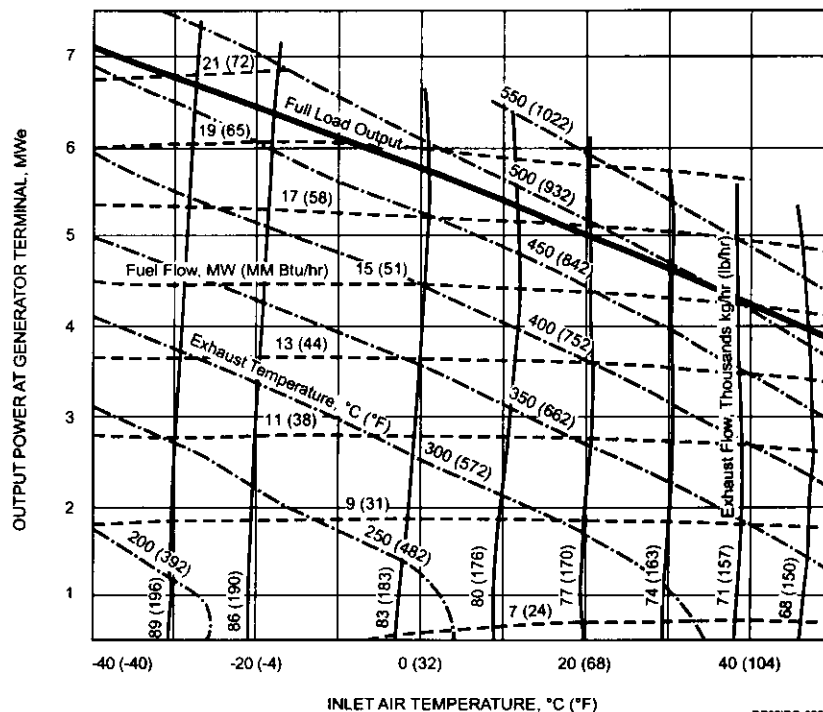
## TAURUS 60 Gas Turbine Generator Set

### Nominal Performance\*

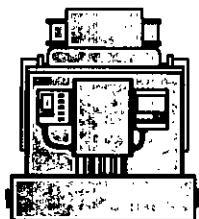
Output Power, kWe ISO: 15°C (59°F), sea level	5200
Heat Rate, kJ/kWe-hr (Btu/kWe-hr)	11 882 (11,263)
Exhaust Flow, kg/hr (lb/hr)	79 284 (174,798)
Exhaust Temperature, °C (°F)	486 (906)

\* No inlet or exhaust losses  
Relative humidity 60%  
Natural gas fuel with  
LHV = 31.5 to 43.3 MJ/nm<sup>3</sup>  
(800 to 1100 Btu/scf)

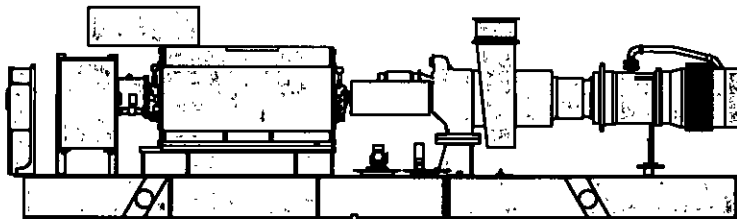
### Available Performance



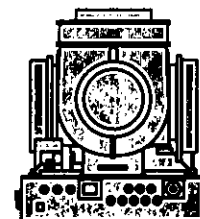
### Typical Service Connections



Forward End



Left Side



Aft End

DS601PG-003M

#### Forward End

- Turbine Control Box

Length: 9754 mm (32' 0")
Width: 2438 mm (8' 0")
Height: 2591 mm (8' 6")
Approx. Weight: 29 300 kg (64,590 lb)

#### Left Side

- Lube Oil: Drain, Vent, Cooler
- Generator Control Box, Power
- Generator Drip Pan Drain
- AC Power
  - Lube Tank Heater
  - Pre/Post Lube Pump
  - Backup Lube Pump

#### Right Side

- AC Power - Start Motor
- Generator Monitor Box

#### Aft End

- Fuel Inlet
- Turbine Cleaning
- Fuel Filter, Combustor and Exhaust Collector Drains
- Auxiliary Air (optional) for:
  - Liquid Fuel Atomizing
  - Self-Cleaning Filter
- AC Power
  - Liquid Fuel Pump (optional)
- Package Ground

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P.O. Box 85376  
San Diego, CA 92186-5376

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DS601PG(5200)/1100/5M

### FOR MORE INFORMATION

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# EXCHANGE FLEET

## Solar Turbines

A Caterpillar Company

At Solar, we value your business and are committed to providing high quality total support. In order to be the complete solution provider and to ensure quality of support for more than 11,000 Solar® turbomachinery packages sold worldwide, we offer the Exchange Fleet Program. This program provides an option when considering your overhaul needs. You can rely on Solar to support you whether your needs are urgent or routine.



With over 500 different engine configurations to support, only Solar as the OEM has the capability to provide for every possible requirement. We carry more than \$100,000,000 of inventory in our exchange fleet, ensuring the commitment and quality Solar provides for unmatched customer support.

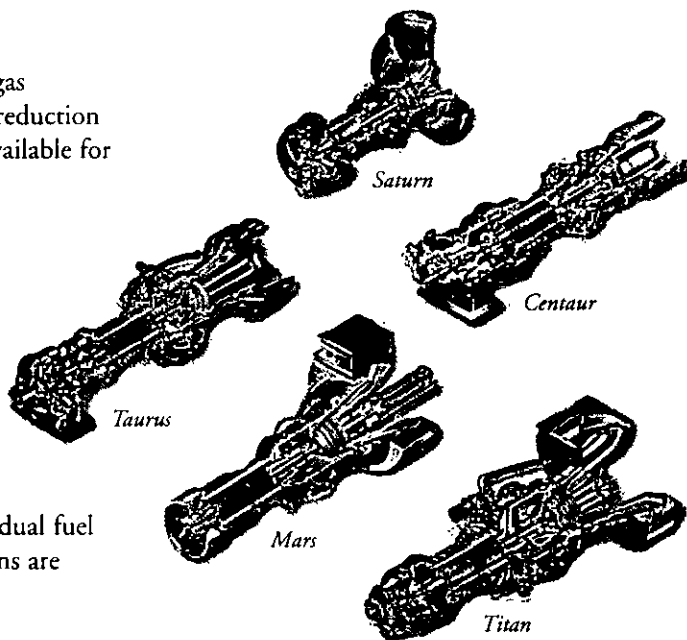
Solar delivers over 650 exchange engines every year, so when you accept an exchange engine from Solar you know you are getting quality from a company that has the ability to support all of your needs. We neither waffle nor make excuses - "We Deliver." With your original purchase, Solar promised to provide quality support programs - the exchange fleet is one of the many ways that we make good on this promise. We are committed to continuing this support throughout the life of your equipment.

### WHAT IS COVERED

Solar's Exchange Fleet includes gas producers, accessory gearboxes, reduction gearboxes and power turbines available for all models including:

- Saturn® 10
- Saturn 20
- Centaur® 40
- Centaur 50
- Taurus™ 60
- Taurus 70
- Mars® 90
- Mars 100
- Titan™ 130

Standard, SoLoNO<sub>x</sub>™, liquid or dual fuel combustion system configurations are available on most models.



# Solar Turbines

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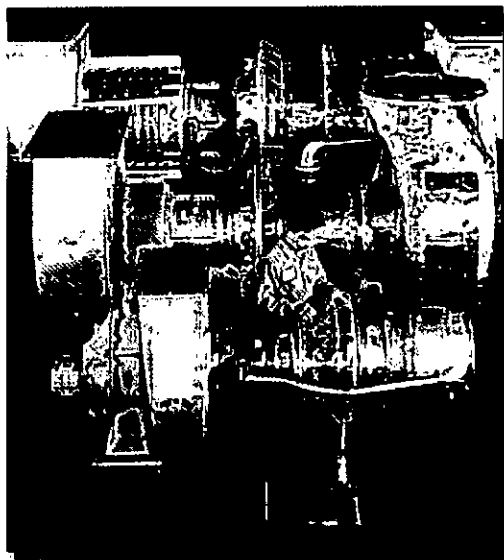
[www.solarturbines.com](http://www.solarturbines.com)

## LEASE ENGINE PROGRAM

Solar recognizes that in some instances, an exchange engine may not be the best solution for your specific operational requirements. For these special circumstances, Solar has developed a Lease Engine Program to better suit your needs. This is yet another example of Solar's flexible approach in providing you consistent, complete and premier-quality support - the complete solution.

## AVAILABILITY

To plan for a scheduled overhaul by exchange, Solar requires 60-day notice in order to ensure the correct equipment configuration is available when and where you need it. If you have an emergency requirement, however, Solar can immediately expedite an exchange engine from anywhere in the world where we have the required equipment. This is the level of support our customers demand and expect - and Solar, as the OEM solution provider, can deliver.



## ADDITIONAL INFORMATION

For more information about our Exchange Fleet, contact Solar's Field Office nearest you or visit our website at [www.solarturbines.com](http://www.solarturbines.com)



## SoLoNOx Products – Emissions in Non-SoLoNOx Modes

Leslie Witherspoon  
Solar Turbines Incorporated

### PURPOSE

Solar's dry-low NOx emissions systems (SoLoNOx) have been developed to provide the lowest emissions possible during normal operating conditions. In order to optimize the performance of the turbine, the combustion and fuel systems are designed to reduce NOx, CO and unburned hydrocarbons (UHC) without penalizing stability or transient capabilities. At very low load and cold temperature extremes, the SoLoNOx system must be controlled differently in order to assure stable operation. These required adjustments to the engine controls at extreme conditions cause emissions to increase. Emission warranty limitations are, therefore, imposed for load (50 to 100%) and for cold ambient temperatures (>0°F).

The purpose of this PIL is to provide emissions estimates for NOx, CO and UHC at these off-design conditions.

### COLD AMBIENT EMISSIONS ESTIMATES

Solar's standard temperature range warranty for SoLoNOx engines is >0°F. At ambient temperatures below 0°F, the unit is no longer in SoLoNOx mode and emissions are expected to be higher than when operating in SoLoNOx mode. At ambient temperatures below 0°F, many of Solar's tur-

bine engine models are controlled to increase pilot fuel from approximately 3 to 10% of the total fuel flow to improve flame stability. Without this increase in pilot fuel at temperatures below 0°F, the engines may exhibit combustor rumble since operation may be near the lean stability limit.

For permitting purposes, customers have used the New Source Performance Standard (NSPS) levels, 40 CFR 60, subpart GG for a conservative NOx emission estimate at ambient temperatures below 0 °F. Table 4 herein summarizes NSPS NOx emission levels for Solar's equipment.

In some cases, either the customer or regulatory agency desires a "less conservative" estimate of actual emissions for when the turbine is not operating in SoLoNOx mode. For such instances, the following actual emission estimates are provided. "Expected" emissions are extrapolated from San Diego factory tests and may vary at these extreme temperatures and as a result of variations in other parameters such as fuel composition, fuel quality, etc. Emission warranties cannot be offered for ambient temperatures below 0°F.

For **SoLoNOx engine models**, except for *Centaur 40* and *Mars 90*, expected emissions (ppm corrected to 15% O<sub>2</sub>) as a function of ambient temperature are given in Table 1.

**Table 1. Expected Emissions below 0°F (except for Centaur 40 and Mars 90)**

Ambient	Fuel System	Fuel	NOx, ppm	CO, ppm	UHC, ppm
0°F to -20°F	Gas only (50 to 100% load)	Gas	42	100	50
		Gas	72	100	50
	Dual fuel (80 to 100% load)	Liquid	120	150	75
Below -20°F	Gas only (50 to 100% load)	Gas	120	150	75
		Gas	120	150	75
	Dual fuel (80 to 100% load)	Liquid	120	150	75

For **Centaur 40** and **Mars 90** engine models, expected emissions (ppm corrected to 15% O<sub>2</sub>) as a function of ambient temperature are given in Table 2.

Some regulatory agencies in states with colder winter climates (primarily Alaska and Wyoming) have started to ask about cold ambient temperature restrictions and corresponding emissions below 0°F. In all cases to date, the regulatory agency did not require a certain emission level to be met, but merely asked what emissions are expected so that emissions could be appropriately estimated for annual emissions inventory purposes and NSR applicability issues.

Some customers have used the permitting strategy of installing digital thermometers to record ambient temperature. The amount of time is recorded that the ambient temperature falls below 0°F. The amount of time below 0°F is then used with the emission estimates shown above to estimate "actual" emissions.

For customers who wish to permit at a single emission rate over all temperatures, inlet air heating can be used to raise the engine inlet air temperature (T1) above 0°F. With inlet air heating to keep T1 above 0 °F, standard emission warranty levels may be offered.

### EMISSIONS ESTIMATES AT LESS THAN 50% LOAD

At operating loads <50%, SoLoNOx engines are controlled to increase stability and transient response capability. The control steps that are required affect emissions in two ways: 1) pilot fuel flow is increased, increasing NO<sub>x</sub> emissions, and 2) airflow through the combustor is increased, increasing CO emissions. Note that 50% load is an approximation and that engine controls are triggered either by power output for single-shaft engines or gas producer speed for two-shaft engines.

For permitting purposes, Solar has historically recommended the use of New Source Performance Standard (NSPS) levels, 40 CFR 60, subpart GG for conservative NO<sub>x</sub> emission estimates outside the typical load range warranty. (Table 4 herein summarizes NSPS NO<sub>x</sub> emission levels for Solar's equipment.)

In some cases, either the customer or regulatory agency desires a "less conservative" estimate of actual emissions for when the turbine is not operating in SoLoNOx mode. For such instances, the actual emission, ±20%, are estimated based on a combination of empirical calculations and the limited test data available. Table 3 provides esti-

**Table 2. Expected Emissions below 0°F for Centaur 40 and Mars 90 Engines**

Ambient	Fuel System	Fuel	NOx, ppm	CO, ppm	UHC, ppm
Below 0°F	Gas only (50 to 100% load) <i>Centaur 40 and Mars 90</i>	Gas	120	150	75
	Dual fuel (80 to 100% load) <i>Centaur 40</i> (Dual fuel not applicable for <i>Mars 90</i> )	Gas or Liquid	120	150	75

**Table 3. Estimated Emissions**

Engine Load	NOx, ppm	CO, ppm	UHC, PPM
Less than 50%	70	2200	300
Idle	50	3500	500

**Table 4. NSPS Limits (NO<sub>x</sub>, ppmv @ 15% O<sub>2</sub>)**

Product		Gas Fuel	Gas Fuel >1/3 Power to Grid	Liquid Fuel <sup>a,b</sup>	Liquid Fuel <sup>a,b</sup> >1/3 Power to Grid
Titan 130-19500	GSC	209 <sup>a</sup>	105 <sup>a</sup>	205	102
	CS/MD	214 <sup>a</sup>		210	
Mars 100-15000	GSC	209 <sup>c</sup>	105 <sup>a</sup>	207	104
	CS/MD	203 <sup>c</sup>		201	
Mars 90-13000	GSC	205 <sup>c</sup>		197	
	CS/MD	199 <sup>c</sup>		193	
Taurus 70-10300	GSC	212 <sup>a</sup>		210	
	CS/MD	207 <sup>a</sup>		201	
Taurus 60-7300, -7800	GSC	190 <sup>c</sup> /193 <sup>c</sup>		188/191	
	CS/MD	190 <sup>c</sup> /193 <sup>c</sup>		188/191	
Mercury 50	<b>EXEMPT</b>				
Centaur 50-6200, -6100	GSC	184 <sup>c</sup>		183	
	CS/MD	180 <sup>c</sup>		177	
Centaur 40-4700	GSC	182 <sup>c</sup>		179	
	CS/MD	167 <sup>c</sup>		165	
Saturn 20-1600	GSC	156 <sup>c</sup>		155	
	CS/MD	150 <sup>c</sup>		150	

<sup>a</sup> SoLoNO<sub>x</sub>, water injection, or add-on control is required to meet NSPS

<sup>b</sup> Fuel bound nitrogen content assumed to be <0.015% by volume

<sup>c</sup> Conventional turbine meets NSPS

mates of NO<sub>x</sub>, CO, and UHC emissions when operating below 50% load and above -20°F. The estimated emissions can be assumed to vary linearly as load is decreased from just below 50% load to idle.

natural gas. At ambient temperatures below -20°F, the NO<sub>x</sub> emission estimate is 120 ppmv for loads <50%. For liquid fuel operation below 80% load, emissions documentation is in progress.

The above values apply for any product for gas only or dual fuel systems using pipeline quality

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## Volatile Organic Compound, Sulfur Dioxide, and Formaldehyde Emission Estimates

Leslie Witherspoon  
Solar Turbines Incorporated

### PURPOSE

The purpose of this PIL is to summarize methods available to estimate emissions of volatile organic compounds (VOC), sulfur dioxide (SO<sub>2</sub>), and formaldehyde from gas turbines. Most customers are required to estimate emissions of these pollutants during the air permitting process.

### INTRODUCTION

In absence of site specific or representative source test data, Solar refers customers to a United States Environmental Protection Agency (EPA) document titled "AP-42," or other appropriate EPA reference documents. AP-42 is a collection of emission factors for different emission sources. The emission factors found in AP-42 are a generally accepted way of estimating emissions when more representative data are not available. The most recent version of AP-42 (dated April 2000) can be found at <http://www.epa.gov/ttn/chief/ap42/index.html>.

Solar does not typically warranty the emission rates for VOC, SO<sub>2</sub>, or formaldehyde.

### Volatile Organic Compounds

Most permitting agencies require gas turbine users to estimate emissions of VOC, a subpart of the unburned hydrocarbon (UHC) emissions, during the air permitting process. Volatile organic compounds, non-methane hydrocarbons (NMHC), and reactive organic gases (ROG) are some of the many ways of referring to the non-methane (and non-ethane) portion of an "unburned hydrocarbon" emission estimate.

For natural gas fuel, most Solar customers use 10-20% of the UHC emission rate to represent VOC emissions. The estimate of 10-20% is based on a ratio of total non-methane hydrocarbons to total organic compounds. The use of

10-20% provides a conservative estimate and has been accepted by permitting authorities over the years. The 10% level assumption is most commonly used by customers in the air permitting process.

For liquid fuel, it is appropriate to estimate that 100% of the UHC emission estimate is VOC.

### Sulfur Dioxide

Sulfur dioxide emissions are produced by conversion of sulfur in the fuel to SO<sub>2</sub>. Since Solar does not control the amount of sulfur in the fuel, we are unable to generically predict SO<sub>2</sub> emissions. Customers generally estimate SO<sub>2</sub> emissions with a mass balance calculation by assuming that any sulfur in the fuel will convert to SO<sub>2</sub>.

As an alternative to a mass balance calculation, EPA's AP-42 document can be used. AP-42 (Table 3.1-2a., April 2000) suggests emission factors of 0.0034 lb/MMBtu for gas fuel (HHV) and 0.033 lb/MMBtu for liquid fuel (HHV).

### Formaldehyde

In gas turbines, formaldehyde emissions are a result of incomplete combustion. Formaldehyde in the exhaust stream is unstable and very difficult to measure. In addition to turbine characteristics including combustor design, size, maintenance history, and load profile, the formaldehyde emission level is also affected by:

- Ambient Temperature
- Humidity
- Atmospheric Pressure
- Fuel Quality
- Formaldehyde Concentration in the Ambient Air

- Test Method Measurement Variability
- Operational factors

Table 1 summarizes total hazardous air pollutants (HAP) and formaldehyde emission factors for gas turbines < 50MW in size. The emission factor data is taken from an EPA memo: "Revised HAP Emission Factors for Stationary Combustion Turbines, 8/22/03". The emission factors in the memo are a compilation of the HAP data EPA collected during the Maximum Achievable Control Technology (MACT) standard development process. The emission factor documentation shows there is a high degree of

variability in formaldehyde emissions from gas turbines, depending on the manufacturer, rating size of equipment, combustor design, and testing events. To estimate formaldehyde emissions from gas turbines, users should use the emission factor(s) that best represent the gas turbines actual/planned operating profile.

The 95% Upper Confidence of Mean and 95% Upper Confidence of Data emission factors from the August 22, 2003, memo are shown in Table 1. The EPA memo also presents HAP emission factors in the following categories: mean, median, maximum, and minimum.

**Table 1. EPA's Total HAP and Formaldehyde Emission Factors for <50 MW Lean Premix Gas Turbines burning Natural Gas.**

(Source: Revised HAP Emission Factors for Stationary Combustion Turbines, OAR-2002-0060, IV-B-09, 8/22/03)

Pollutant	Engine Load	95% Upper Confidence of Mean (lb/MMBtu HHV)	95% Upper Confidence of Data (lb/MMBtu HHV)	Memo Reference
Total HAP	> 90%	0.00144	0.00258	Table 19
Total HAP	All	0.00160	0.00305	Table 16
Formaldehyde	> 90%	0.00127	0.00241	Table 19
Formaldehyde	All	0.00143	0.00288	Table 16

Table 2 summarizes approximate ton per year formaldehyde emissions from Solar's current production models based on the 95% Upper

Confidence of Data emission factors as shown in Table 1 and ISO condition fuel flow data.

**Table 2. Formaldehyde Emissions Estimates for Solar's Products (59°F, 60% RH, sea level, no losses)**

Solar Turbine Model	Fuel Input, MMBtu/hr LHV (HHV)	Formaldehyde Emission Estimate, tpy	
		Using the 95% Upper Confidence of Data Emission Factor - All Loads	Using the 95% Upper Confidence of Data Emission Factor - > 90% Load
Saturn 20	16.8 (18.5)	0.23	0.20
Centaur 40	42.7 (47.0)	0.59	0.50
Centaur 50	50.3 (55.3)	0.70	0.58
Taurus 60	58.1 (63.9)	0.81	0.67
Taurus 70	71.9 (79.1)	1.00	0.83
Mars 90	99.2 (109.1)	1.38	1.15
Mars 100	111.5 (122.7)	1.55	1.29
Titan 130	132.0 (154.2)	1.83	1.53

In August, 2003, EPA finalized the combustion turbine Maximum Achievable Control Technology (MACT) standard. A gas turbine will be considered "new" if it is part of a project that commenced construction (enter into a contractual agreement) after January 14, 2003. "New" turbines at major sources of hazardous air pollutants (HAP), >10 tpy of a single HAP, >25 tpy of all HAPs, will need to comply with the MACT standard of 91 ppb.

As you can see from Table 2 it is unlikely that any multiple unit Solar turbine project will be a major source of HAPs. However, if a gas turbine is placed at a site that is a major source of HAPs due to other emission sources at the site

(most vulnerable customers include compressor stations with reciprocating engine base, chemical plants, and refineries), then the gas turbine MACT standard will be applicable.

If the MACT is applicable, new gas turbines will be required to meet 91 ppb formaldehyde. Source test data to date do not indicate that mid-range industrial gas turbines can meet the formaldehyde standard without the use of an oxidation catalyst. In fact, the preamble to the final MACT standard noted that the 91 ppb value is "post control", e.g. a measured level after a CO oxidation catalyst. With this in mind, Solar will not warranty formaldehyde at the 91 ppb level.

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## Particulate Matter Emission Estimates

Leslie Witherspoon  
Solar Turbines Incorporated

### PURPOSE

Most air permitting agencies require customers to provide particulate matter emission estimates for air permitting purposes. While Solar does not normally warrant particulate matter emissions, we do recommend methods to estimate and refer to United States Environmental Protection Agency (U.S. EPA) documents to enable permitting. Solar also recommends methods for testing and provides data from customer source testing that has been performed to date.

A few regulatory agencies include a particulate matter testing requirement in the air permit. Recent testing programs / studies show that there is significant variability from test to test. The source test results give credence to the argument that particulate matter from natural gas fired combustion sources is difficult to accurately measure and that the measured results are not representative of actual particulate matter emitted.

### BACKGROUND

Particulate matter emissions from natural gas combustion are negligible. Sources of particulate matter emissions from gas turbines include fuel-bound sulfur, carbon, inlet air, and other sources (e.g., artifact sulfate formation, compressor / lubricating oils). The primary contributor of particulate matter emissions from a gas turbine is assumed to be fuel-bound sulfur. Inlet air quality is assumed to have no significant impact on particulate matter emissions from gas turbines.

Solar has not historically warranted particulate matter emissions because limited data existed to support a warranty and gas turbine manufacturer's are unable to control many of the operating conditions that may affect particulate matter emissions.

### Particulate Matter Definition

National Ambient Air Quality Standards (NAAQS) for particulate matter were first set in 1971. Total suspended particulate (TSP) was the first indicator used to represent suspended particles in the ambient air. Since July 1, 1987, however, the Environmental Protection Agency (EPA) has used the indicator PM<sub>10</sub>, which includes only the particles with aerodynamic diameter smaller than 10 micrometers. PM<sub>10</sub> (coarse particles) come from sources such as windblown dust from the desert or agricultural fields and dust kicked up on unpaved roads by vehicular traffic.

The EPA is adding a new PM<sub>2.5</sub> ambient air standard. PM<sub>2.5</sub> includes particles with an aerodynamic diameter less than 2.5 micrometers. PM<sub>2.5</sub> (fine particles) are generally emitted from activities such as industrial and residential combustion and from vehicular exhaust. Fine particles are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds, emitted by combustion activities, are transformed by chemical reactions in the air.

All particulate matter from gas turbine exhaust is less than one micrometer (micron) in diameter. Thus, the emission rates of TSP, PM<sub>10</sub>, and PM<sub>2.5</sub> from gas turbines are theoretically equivalent.

### Recommended Particulate Matter Emission Factor

When necessary to support the air permitting process, Solar refers customers to EPA's AP-42 document, which is a collection of emission factors for different emission sources. The emission factors found in AP-42 are an accepted way of estimating emissions when more representative data are not available.

Solar recommends using the PM<sub>10</sub> emission factor found in Table 3.1-1 in the October 1996 (10/96) version of AP-42. The values in the October 1996 version for PM<sub>10</sub> are very similar to Solar's customer average PM<sub>10</sub> source test data plus a margin of three standard deviations. The recommended emission factors are 0.0419 lb/MMBtu fuel input (HHV) for natural gas fired turbines and 0.061 lb/MMBtu fuel input (HHV) for distillate oil fired turbines. The aforementioned emission levels are only for engine operation on standard pipeline quality natural gas fuel and/or standard quality diesel No. 2 liquid fuel. Alternate or unique fuels cannot be expected to yield the same results.

While AP-42 has been updated since 1996 for gas turbines (Table 3.1-2a, April 2000), the older version better represents Solar's size class of gas turbine using available source test methods.

Discussions with state environmental agencies indicate that the best available control technology (BACT) for particulate matter emissions from turbines is the use of natural gas and/or good combustion practices. No combustion techniques or control technologies are required for control of particulate emissions from gas turbines.

#### Test Method Recommendation

For customers who conduct emission source tests for particulate matter, Solar recommends that EPA Methods 201, "Determination of PM<sub>10</sub>

Emissions, Exhaust Gas Recycle Procedure," and 201A, "Determination of PM<sub>10</sub> Emissions, Constant Sampling Rate Procedure, 40 CFR 60, Part 60, Appendix A," be used to measure the "front half." "Front half" represents filterable particulate matter. EPA Method 8, "Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources, 40 CFR 60, Part 60, Appendix A," (with nitrogen purge) should be used to measure the "back half." "Back half" measurements represent the condensable portion of particulate matter. EPA Method 5, "Determination of Particulate Emissions from Stationary Sources, 40 CFR 60, Part 60, Appendix A," which measures the front and back halves, may be substituted. The testing should include three test runs for a minimum of four hours each.

Solar recommends using the aforementioned test methods until a more representative test method is developed; i.e., the dilution tunnel method that is under development.

#### Solar's Customer Particulate Matter Source Test Summary

Solar has collected 17 customer PM<sub>10</sub> source tests on gas fuel. The average emission rate is 0.017 lb/MMBtu (HHV). The range of data is from 0.012 to 0.0296 lb/MMBtu (HHV). For liquid fuel, the average customer source test data is 0.033 lb/MMBtu (HHV). The average represents 12 test runs ranging from 0.0107 to 0.0553 lb/MMBtu (HHV).

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