

**Broward Development  
Company, LLC  
Houston, Texas**



**Air Permit Application for  
Broward-Thornborough Electric  
Generating Plant**

**ENSR Corporation  
August 2000  
Document Number 6792-123-610**



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**BUREAU OF AIR REGULATION**

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## 1.0 INTRODUCTION

Broward Development Company, L.L.C. is proposing to construct and operate a simple cycle combustion turbine peaking electric generating facility in Broward County, Florida. The Broward-Thornborough Development Company Electric Generating Facility (the Facility) will be a non-utility power generating facility (merchant plant) designed to produce electric energy for sale to the wholesale power market.

The Facility will be sited on approximately 20 acres located in Broward County, Florida (see Figure 1-1). The facility will consist of six GE LM6000 PC SPRINT® simple cycle combustion turbines with a nominal generating capacity of approximately 288 megawatts (MW). The plant will fire natural gas and low sulfur distillate fuel oil. Natural gas will be the primary fuel. Distillate fuel will be used as a back-up fuel, in the event that natural gas is unavailable to the facility. The turbines will use water injection to minimize NO<sub>x</sub> formation and good combustion practices for control of CO and VOC emissions. The turbines will be equipped with inlet air chilling and SPRINT® (SPRay INTERcooling) for power augmentation.

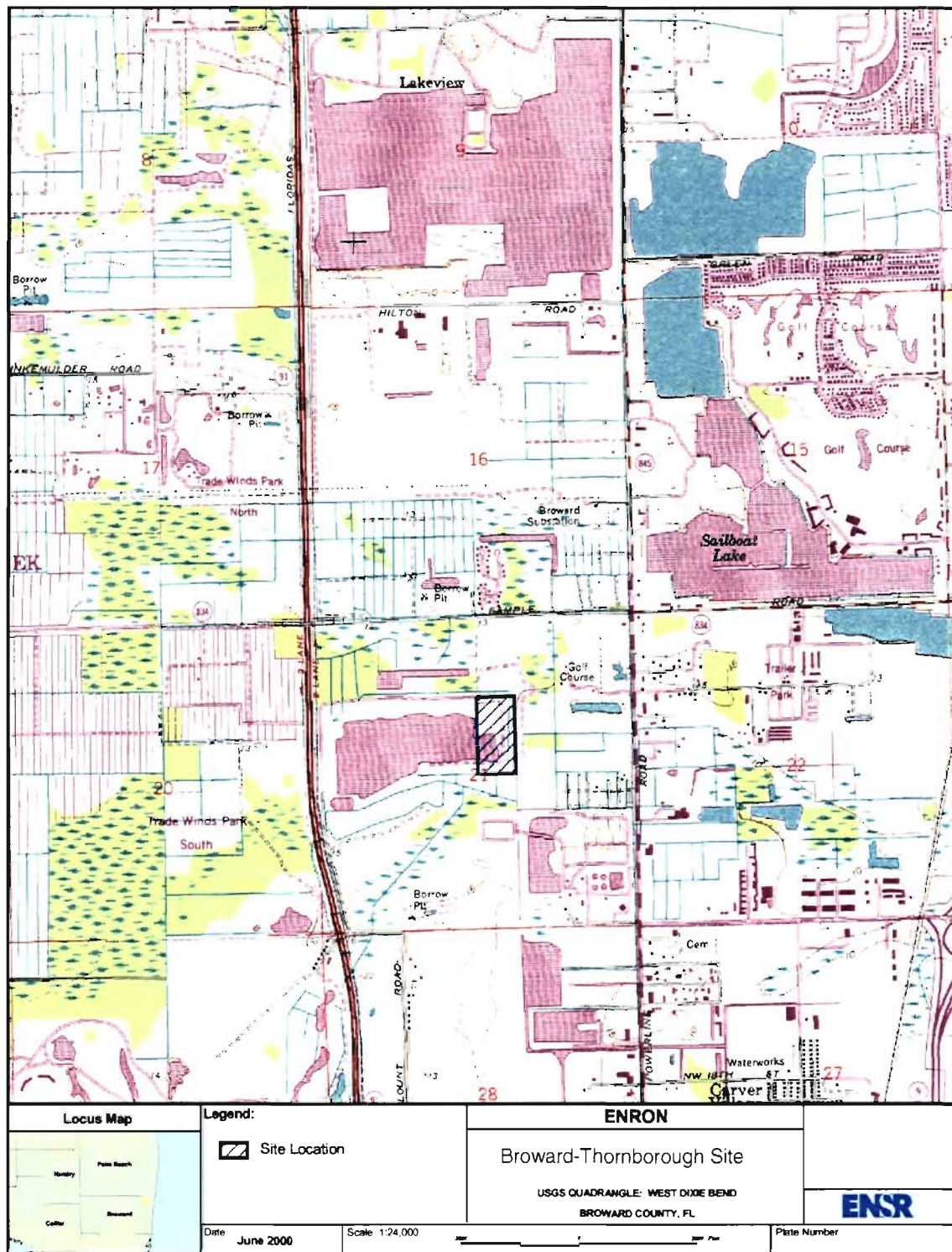
The facility is scheduled to begin producing power in June, 2001. Construction will take approximately 6 months with a planned start date of December 1, 2000 (upon receipt of all necessary local and environmental approvals).

As a peaking facility, the project will operate on an intermittent basis, primarily during periods when short-term electrical demand exceeds base load supply. Hence, the facility will run primarily during the peak demand hours of the summer months and to a limited extent on the coldest winter days. In order to be permitted as a minor source of air emissions, the facility will limit emissions of all criteria pollutants to less than 248 tons per year (TPY) by accepting an enforceable limitation on tons per year of all criteria pollutants emitted. NO<sub>x</sub> and CO have been determined to be the limiting pollutants for major source status. As such, it is proposed that NO<sub>x</sub> and CO emissions be limited to no more than 248 TPY, as measured by NO<sub>x</sub> and CO continuous emission monitoring systems.

Section 2 of this application provides a more detailed project description. Section 3 presents a summary of the project emissions and the basis and methods used to calculate emissions. The required Florida Department of Environmental Protection (FDEP) application forms are presented in Appendix A, with supporting calculations for emissions included in Appendix B. As "new affected units" under Phase II of the Acid Rain Program, the facility is required to obtain SO<sub>2</sub> allowances. The application for the Phase II Acid Rain permit will be submitted shortly after this application is filed.



**Figure 1-1 Site Location Map**





## 2.0 PROJECT DESCRIPTION

The GE LM 6000 PC SPRINT® combustion turbine (CT) is a nominal 48 MW class industrial gas turbine. The LM 6000 is a 2-shaft gas turbine engine derived from the core of the CF6-80C2 - GE's high thrust, high efficiency aircraft engine. Over eighteen hundred CF6-80C2's are in service and over 2000 more are on order or option. The CF6-80C2 has logged more than 30,000,000 flight hours in the Boeing 747 and other wide-body aircraft, with a 99.88% dispatch reliability. GE used the extensive flight experience of the CF6-80C2 to create the LM 6000. Both engines have a common design and share most major parts. The Low Pressure Turbines, High Pressure Compressors, High Pressure Turbines, and Combustors are virtually identical. This use of flight-proven parts, produced in high volume, contributes to the low initial cost and high operating efficiency of the LM6000.

The GE LM6000 PC SPRINT® enhances the efficiency and output of the LM6000 gas turbine engine by injecting micro-droplets of atomized water into the interstage air stream between the Low Pressure Compressor and the High Pressure Compressor. The SPRINT® system increases the power output by as much as 20% at 90 °F and by improving the expected heat rate from 9,330 Btu/kWh LHV to 8,984 Btu/kWh LHV at 90 °F.

The proposed facility will utilize six GE LM6000 CTs, providing a total nominal generating capacity of approximately 288 MWs. Emissions from each turbine will be vented through stacks that are 45 feet tall and 10 feet in diameter. Figure 2-1 is a conceptual drawing depicting the layout of the proposed turbine configuration, Figure 2-2 is a process flow diagram for the proposed combustion turbines.

The turbines will be equipped to fire both natural gas and fuel oil, utilizing natural gas as the primary fuel. The project will not use any other fuel source for startup, shutdown, or backup. The Facility will have the ability to utilize power from the grid for startup. Electrical power produced by the project will be interconnected to the electric grid by a transmission line to FPL's transmission line in the vicinity of the property.

The Facility will use simple cycle power generation for peaking electrical generation for periods when short-term electrical demand exceeds base load supply. Peaking units have the ability to be brought on-and off-line quickly in response to fluctuations in electrical demand. Typical startup to 100% load and shutdown from 100% load can be achieved in approximately 20 minutes .

The Facility will be permitted and operated as a synthetic minor source under the Clean Air Act by accepting a permit limitation on tons per year of criteria pollutants emitted. Figure 2-3 illustrates the relative emissions rates of criteria pollutants from the proposed turbines. Based on the proposed permit limits, the most limiting pollutants are NO<sub>x</sub> during distillate oil operation and CO during natural gas operation. Broward Development Company, LLC proposes to limit potential emissions from the Facility through the use of a Continuous Emission Monitoring System (CEMS) for NO<sub>x</sub> and CO. By

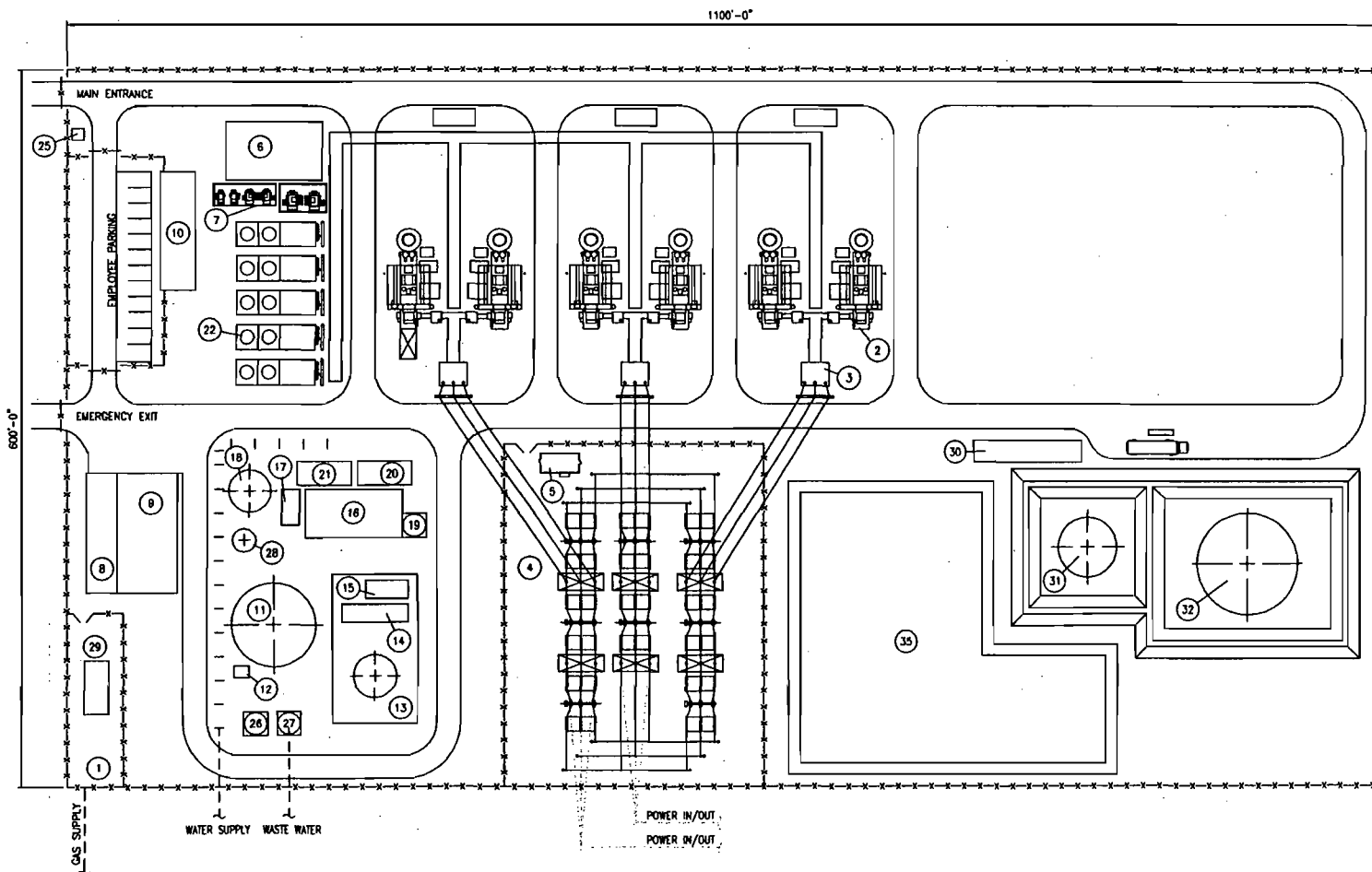


limiting emissions of NO<sub>x</sub> and CO to less than the major source threshold of 248 tons per year, it can be seen that none of the remaining criteria pollutants will exceed the 250 ton per year threshold. Although performance data has been included for operating conditions from 50% to 100% load, each CT will typically be operated at full (100%) load. Depending upon demand, all units may not be in operation.

The Facility will also incorporate two tanks used to store distillate oil for the combustion turbines and a fire-water pump engine. The on site oil storage requirements have been estimated to be a maximum of 1,500,000 gallons, with a maximum day storage tank requirement of 300,000 gallons. The working and breathing losses from the two tanks has been estimated using the Tanks 4.0 program to be 0.7 tons per year.

For emergency purposes the Facility will incorporate a fire water pump powered by a 250 hp diesel engine. The emissions from this engine have been estimated using AP-42 emission factors, assuming a maximum operation of 500 hours per year. Based on this operational limitation the fire water pump engine satisfies the applicable criteria of Rule 62-210.300(b)1 for exemption from permitting and thus has not been addressed in the Section III of the FDEP application forms. In addition, a 6 MMBtu/hour fuel gas heater will be included in the Facility design for use as a means to prevent condensation of moisture and hydrates in natural gas used in the gas turbines. This emissions unit also meets the criteria for the generic emissions unit exemption under Rule 62.210.300(b)1 and has not been included in Section III of the application forms.





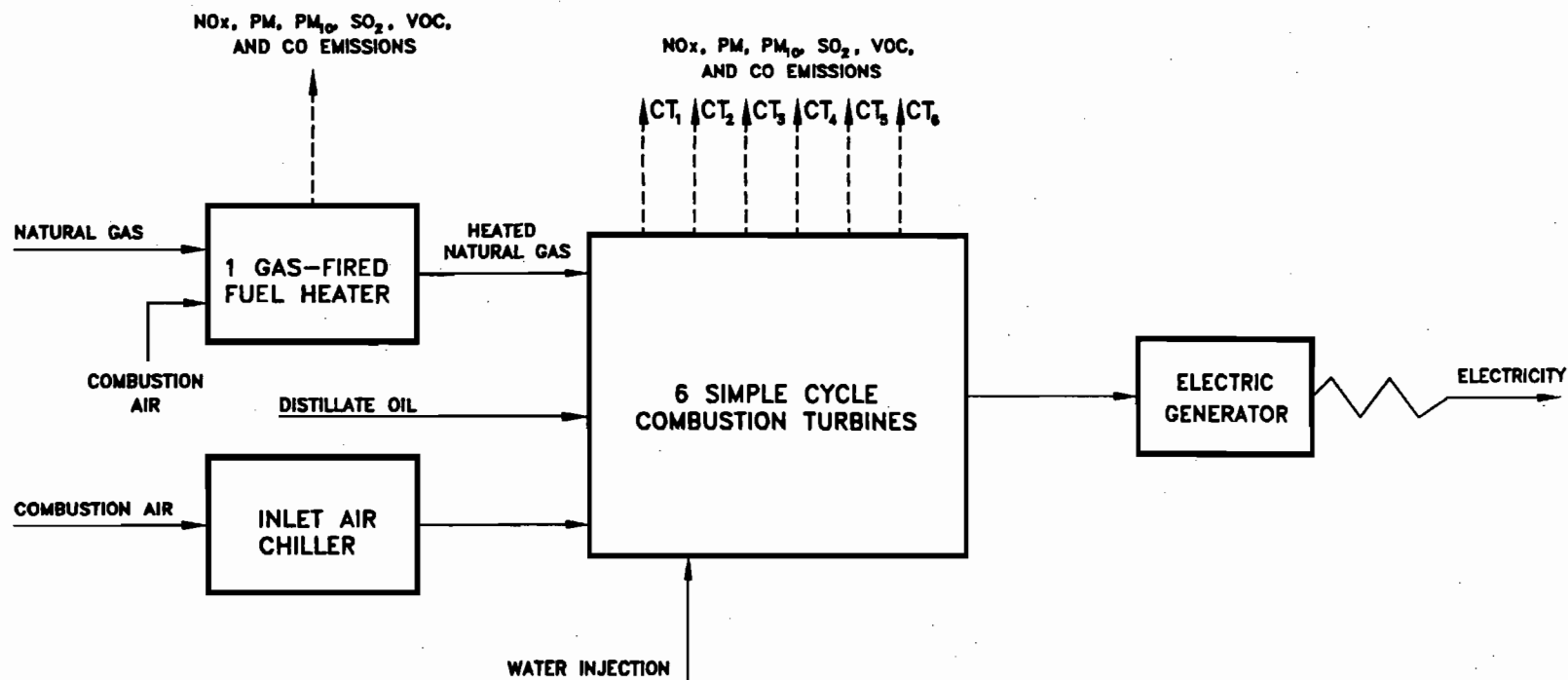
SCHEDULE OF COMPONENTS	
1	GAS RECEIVING/METERING
2	GAS TURBINE/GENERATOR
3	MAIN STEP-UP TRANSFORMER
4	SUBSTATION
5	SUBSTATION CONTROL ROOM
6	CONTROL ROOM
7	PLANT SWITCHGEAR/MCC AREA
8	SHOP
9	WAREHOUSE
10	ADMINISTRATION BUILDING
11	RAW WATER/FIRE WATER TANK
12	FIRE WATER PUMP HOUSE
13	CLARIFIER, IF REQUIRED
14	WATER FILTERS
15	CLEAR WELLS
16	WATER TREATMENT DEMINERALIZER/R.O.
17	REGENERATE STORAGE
18	DEMINERALIZED WATER TANK
19	LABORATORY
20	CHEMICAL STORAGE
21	OIL DRUM STORAGE
22	CHILLER/COOLING TOWER PACKAGE
23	NOT USED
24	PIPE/CABLE WAY
25	GUARD HOUSE
26	ONLY WATER SUMP
27	SEWAGE TREATMENT
28	NEUTRALIZATION TANK
29	FUEL GAS COMPRESSOR
30	FUEL TREATMENT/FORWARDING EQUIPMENT
31	FUEL OIL DAY TANK
32	FUEL OIL STORAGE
33	NOT USED
34	NOT USED
35	NOT USED

CONCEPTUAL



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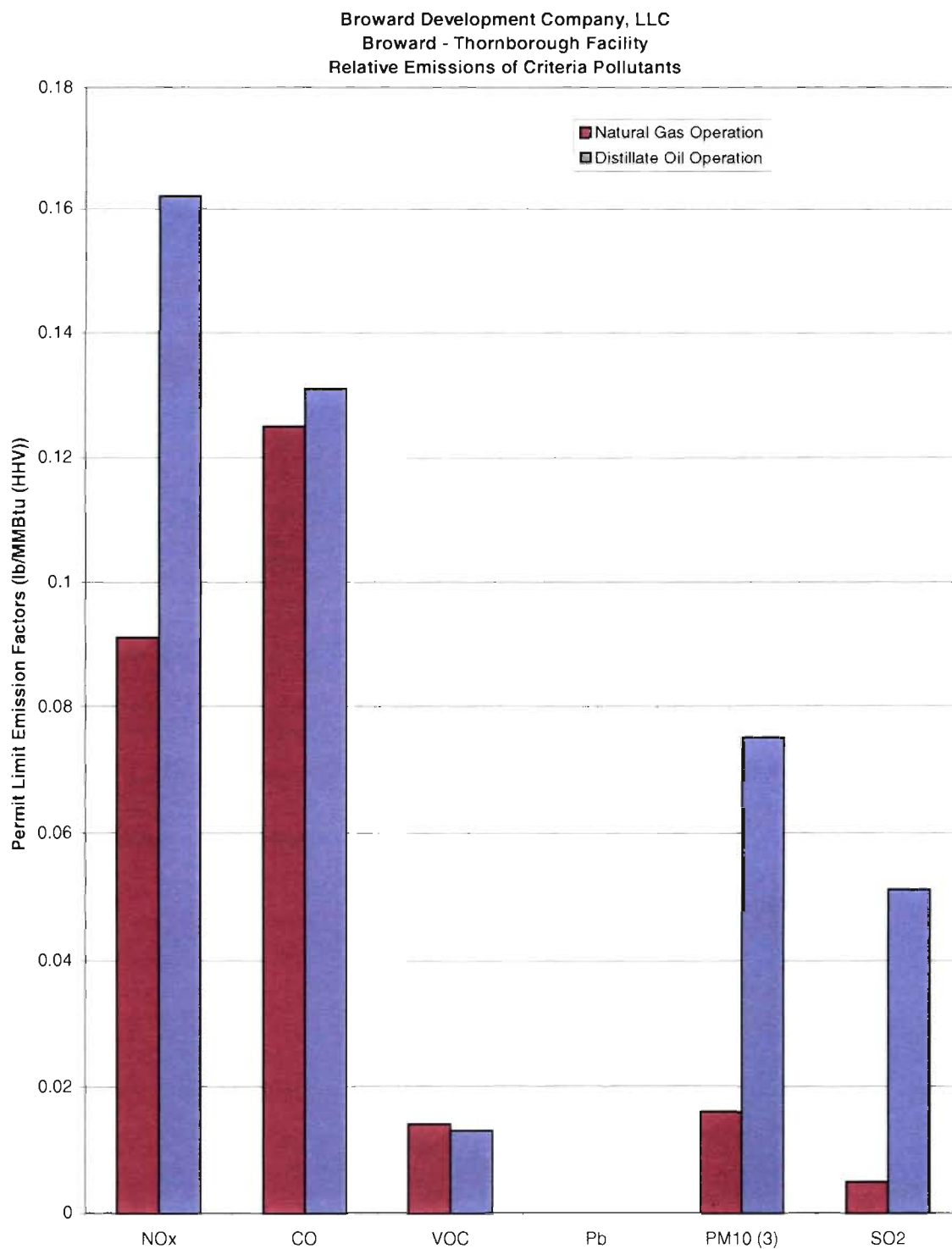
ENSR CONSULTING AND ENGINEERING

FIGURE 2-2  
**PROCESS FLOW DIAGRAM**  
 SIMPLE CYCLE COMBUSTION TURBINE  
 BROWARD DEVELOPMENT, L.L.C.

DRAWN:	JK	DATE:	6/00	PROJECT NUMBER:	REV.
APPVD:	DD	REVISED:	X	6792-123	0



Figure 2-3 CTG Relative Criteria Pollutant Emission Rates





### 3.0 EMISSIONS SUMMARY

This section discusses the basis and methods used to estimate potential emissions for the Facility.

The data used during the development of this application rely on process information developed by GE for Broward Development Company, L.L.C. The summary presented in Table 3-1 has been prepared for the six GE LM6000 PC SPRINT® combustion turbines. Similar to other machines, as combustion turbines age the performance achieved in practice will degrade from the initial condition. The most noticeable result of the aging process for combustion turbines is that the heat rate of the turbine will rise over time (i.e. efficiency will drop). The result of this aging effect is that to achieve the same electrical output more fuel will need to be consumed. To account for this aging effect the hourly emissions, presented in Table 3-1, include a 10% margin on the mass emission rate above what has been calculated from the manufacturer's performance data. This aging effect only influences the mass emission rate and not the emission concentration. The 10% margin is based on previous experience with similar combustion turbines.

Detailed emission calculations for these turbines are presented at 100%, 75%, and 50% load cases in Appendix B along with operating specifications at the following ambient conditions:

- 42°F dry bulb at 72% relative humidity,
- 90°F dry bulb at 65% relative humidity chilled to 50°F and 95% relative humidity.

The effect of the SPRINT® power augmentation system is included in both temperature cases.

#### 3.1 Criteria Pollutant Emissions

The primary emission sources at the Facility will be the six CTs. Each CT, when used, will typically operate at 100% load, but may, at times, be operated down to 50% load. The turbines will fire natural gas, supplied directly to the site by pipeline and fuel oil, provided by onsite storage. Hourly emissions from these units were calculated from manufacturers' operating parameters and guaranteed in-stack concentrations for CO, NO<sub>x</sub>, and VOC.

According to GE, limited data are available for particulate emissions; however, GE guarantees 4.5 lbs/hr per turbine while firing natural gas, including condensable and filterable particulate matter, under a load range of 50 to 100% of full load. Particulate emissions are estimated to be 20 lb/hour while firing fuel oil. As PM<sub>10</sub> emissions are based on manufacturer's guaranteed hourly emission rates, a worst case lb/MMBtu emission factor has been calculated from the lb/hr guarantee emission rate for purposes of calculating annual PM<sub>10</sub> emissions. SO<sub>2</sub> emissions were calculated using the manufacturers' supplied fuel consumption data and expected maximum fuel gas sulfur contents of 2.0 grains per 100 standard cubic feet for natural gas and 0.05% for fuel oil.



**Table 3-1 Combustion Turbine Maximum Hourly Emission Rate Summary**

Compound	Load (%)	Temperature (deg F)			
		90	42	90	42
Emissions for one GE LM 6000 Turbine - With Margin (lb/hr)					
		Natural Gas		Distillate Oil	
NOx	100	46.3	47.1	78.7	79.9
	75	36.6	36.5	62.8	62.1
	50	27.8	27.6	47.7	47.3
CO	100	63.2	64.2	63.9	64.9
	75	49.9	49.8	51.0	50.4
	50	37.9	37.6	38.7	38.4
VOC	100	7.2	7.3	6.5	6.6
	75	5.7	5.6	5.2	5.2
	50	4.3	4.1	4.0	3.9
SO2	100	2.8	2.8	24.6	25.0
	75	2.2	2.2	19.7	19.5
	50	1.7	1.7	15.0	14.9
Pb	100	0.000	0.000	0.007	0.007
	75	0.000	0.000	0.005	0.005
	50	0.000	0.000	0.004	0.004
PM10	100	5.0	5.0	22.0	22.0
	75	5.0	5.0	22.0	22.0
	50	5.0	5.0	22.0	22.0
Notes: Margin on Emissions                      10%					
Emissions for six GE LM 6000 PC SPRINT Turbines - With Margin (lb/hr)					
NOx	100	278.1	282.3	472.0	479.4
	75	219.6	219.1	376.7	372.9
	50	166.9	165.6	285.9	283.6
CO	100	379.2	385.1	383.1	389.2
	75	299.5	298.7	305.8	302.7
	50	227.6	225.9	232.1	230.2
VOC	100	43.4	43.9	39.2	39.8
	75	34.3	33.4	31.3	31.0
	50	25.8	24.8	23.7	23.5
SO2	100	16.6	16.9	147.7	150.2
	75	13.1	13.1	118.2	117.1
	50	10.0	9.9	89.8	89.2
Pb	100	0.0	0.0	0.0	0.0
	75	0.0	0.0	0.0	0.0
	50	0.0	0.0	0.0	0.0
PM10	100	29.7	29.7	132.0	132.0
	75	29.7	29.7	132.0	132.0
	50	29.7	29.7	132.0	132.0
Notes: Margin on Emissions                      10%					



Maximum hourly emission rates for each pollutant were established after reviewing the calculations for the two ambient temperatures at three turbine load conditions (50%, 75%, and 100%) that represent the range of expected operating conditions. The maximum emissions for all criteria pollutants are at 100% load, 42°F. The annual facility emissions of NO<sub>x</sub> and CO will be limited through the use of CEMS, to a maximum of 248 tons per year. Although annual operation is restricted through the use of NO<sub>x</sub> and CO CEMS rather than a fuel cap, an estimate of the maximum annual fuel consumption is used to calculate the maximum annual emissions of VOC, SO<sub>2</sub>, Pb, and PM<sub>10</sub>.

Based on the guaranteed emission concentrations, during natural gas operation CO is the limiting pollutant, while during distillate oil operation NO<sub>x</sub> is the limiting pollutant. The CO emissions presented in this application are based on a guaranteed CO emission concentration of 56 ppmvd @ 15% O<sub>2</sub>. This guaranteed concentration covers turbine operation over a broad range of ambient conditions, including extremely low temperatures that will not be experienced by a turbine used for summer peaking in Florida. At typical ambient temperatures for the Facility, Broward Development Company, L.L.C. expects actual CO emission concentrations to be substantially lower than the guaranteed emission concentration. Thus, annual emissions of VOC, SO<sub>2</sub>, Pb, and PM<sub>10</sub> have been estimated assuming NO<sub>x</sub> to be the limiting pollutant as not as much variability is expected in the NO<sub>x</sub> concentration. The data used in this analysis is presented in Appendix B. Table 3-2 presents a summary of annual emissions for the six combustion turbines, the natural gas fuel heater, the distillate oil storage tank, and the fire-water pump engine. Tables 3-4 and 3-5 provide a summary of proposed permit limits for the combustion turbines.

**Table 3-2 Annual Criteria Pollutant Emissions**

Source Name	NO <sub>x</sub> <sup>(1)</sup>	CO <sup>(1)</sup>	VOC <sup>(2)</sup>	SO <sub>2</sub> <sup>(2)</sup>	Pb <sup>(2)</sup>	PM <sup>(2)</sup>	PM <sub>10</sub> <sup>(2)</sup>
<b>Annual Emission Rates (tons/year)</b>							
LM 6000 Combustion Turbines.	245.5	247.2	41.6	85.0	0.02	125.1	125.1
Distillate Oil Storage Tank	N/A	N/A	0.7	N/A	N/A	N/A	N/A
Fire-Water Pump Engine	2.0	0.4	0.2	0.1	0.0	0.2	0.2
Natural Gas Fuel Heater	0.5	0.4	0.3	0.0	0.0	0.0	0.0
<b>Total</b>	<b>248.0</b>	<b>248.0</b>	<b>42.8</b>	<b>85.1</b>	<b>0.02</b>	<b>125.3</b>	<b>125.3</b>
Notes:							
(1) Limited by CEMS on NO <sub>x</sub> and CO.							
(2) Estimated from CEMS limitation on NO <sub>x</sub> and CO. Annual emissions of VOC, SO <sub>2</sub> , Pb, and PM/PM <sub>10</sub> increased by 10% margin.							

### 3.2 Hazardous Air Pollutant Emissions

Emissions of hazardous air pollutants (HAPs) were calculated to confirm that the Facility will not be a new major HAP source subject to preconstruction permitting under 40 CFR 63 Subpart B. HAP emissions (with the exception of formaldehyde) were derived from the April 2000 version of AP-42 Section 3.1 which provides emission factors for stationary combustion turbines. An emission factor for



formaldehyde was developed from a subset of the database used by EPA to develop the AP-42 emission factors (see Appendix B for details).

Annual HAP emissions are presented in Table 3-3. Total facility-wide emissions for all HAPs combined is 2.7 TPY with the largest single HAP being less than 1.1 TPY. Both of these values are well below the 25/10 tpy major source thresholds for HAPs.

**Table 3-3 HAP Emission Summary, Broward-Thornborough Electric Generating Facility**

Pollutant	CTG Natural Gas		CTG Distillate Oil		Facility	
	Emission Rate, Per Turbine		Emission Rate, Per Turbine		Emission Rate All CTGs	
	Max Hourly (lb/hr)	Annual (tpy)	Max Hourly (lb/hr)	Annual (tpy)	Max Hourly (lb/hr)	Annual (tpy)
1,3-Butadiene	2.01E-04	1.56E-04	7.20E-03	4.45E-03	4.32E-02	2.67E-02
Acetaldehyde	1.87E-02	1.45E-02	0.00E+00	0.00E+00	1.12E-01	8.70E-02
Acrolein	3.00E-03	2.32E-03	0.00E+00	0.00E+00	1.80E-02	1.39E-02
Benzene <sup>(a)</sup>	6.07E-03	4.70E-03	2.48E-02	1.53E-02	1.49E-01	9.17E-02
Ethylbenzene	1.50E-02	1.16E-02	0.00E+00	0.00E+00	9.00E-02	6.96E-02
Formaldehyde <sup>(b)</sup>	5.93E-02	4.59E-02	1.26E-01	7.78E-02	7.56E-01	4.67E-01
Naphthalene	6.09E-04	4.71E-04	1.58E-02	9.72E-03	9.45E-02	5.83E-02
PAHs	1.03E-03	7.98E-04	1.80E-02	1.11E-02	1.08E-01	6.67E-02
Propylene Oxide	1.36E-02	1.05E-02	0.00E+00	0.00E+00	8.15E-02	6.31E-02
Toluene <sup>(a)</sup>	3.18E-02	2.46E-02	0.00E+00	0.00E+00	1.91E-01	1.48E-01
Xylene	3.00E-02	2.32E-02	0.00E+00	0.00E+00	1.80E-01	1.39E-01
Arsenic	0.00E+00	0.00E+00	4.95E-03	3.06E-03	2.97E-02	1.83E-02
Beryllium	0.00E+00	0.00E+00	1.40E-04	8.61E-05	8.37E-04	5.17E-04
Cadmium	0.00E+00	0.00E+00	2.16E-03	1.33E-03	1.30E-02	8.00E-03
Chromium	0.00E+00	0.00E+00	4.95E-03	3.06E-03	2.97E-02	1.83E-02
Lead	0.00E+00	0.00E+00	6.30E-03	3.89E-03	3.78E-02	2.33E-02
Manganese	0.00E+00	0.00E+00	3.56E-01	2.19E-01	2.13E+00	1.32E+00
Mercury	0.00E+00	0.00E+00	5.40E-04	3.33E-04	3.24E-03	2.00E-03
Nickel	0.00E+00	0.00E+00	2.07E-03	1.28E-03	1.24E-02	7.67E-03
Selenium	0.00E+00	0.00E+00	1.13E-02	6.95E-03	6.75E-02	4.17E-02
Facility Total HAPs						2.7
Maximum Individual HAP						1.3

Proposed emission limits for the combustion turbines during natural gas and distillate oil operation are presented in Tables 3-4 and 3-5, respectively. Annual limits for VOCs, SO<sub>2</sub>, PM<sub>10</sub>, and Pb are not proposed to be included in the permit. This is because compliance with a 248 ton/year limit for NO<sub>x</sub>



and CO will insure that these other pollutants are emitted in quantities considerably lower than the 250 ton/year major source threshold.

**Table 3-4 Summary of Proposed Permit Limits for Combustion Turbine, Natural Gas Operation**

	ppmvd @ 15% O <sub>2</sub>	Lb/hr <sup>1</sup> Each Turbine	CTG Annual Tons/Yr	Control Technology	Test Method
NO <sub>x</sub>	25	47.1	245.5	Water Injection	Stack Test Ref. Method 19 & 20
CO	56	64.2	247.2	Good Combustion Practices	Stack Test Ref. Method 10 & 19
VOC	10	7.3		Good Combustion Practices	Stack Test Ref. Method 25a less Methane via bag sample & Method 18
SO <sub>2</sub>	N/A	2.8		Low Sulfur Fuel (less than 2.0 grain S/100 SCF gas)	Fuel Monitoring
PM <sub>10</sub>	N/A	5.0		Low Sulfur and Ash Fuel (less than 2.0 grain S/100 SCF gas)	Stack Test Ref. Method 5 & 202
<sup>1</sup> lb/hr for each turbine is based on 100% load at 42°F and includes a margin of 10% representing maximum potential to emit					

**Table 3-5 Summary of Proposed Permit Limits for Combustion Turbine, Distillate Oil Operation**

	Ppmvd @ 15% O <sub>2</sub>	Lb/hr <sup>1</sup> Each Turbine	CTG Annual Tons/Yr	Control Technology	Test Method
NO <sub>x</sub>	42	79.9	245.5	Water Injection	Stack Test Ref. Method 19 & 20
CO	56	64.9	247.2	Good Combustion Practices	Stack Test Ref. Method 10 & 19
VOC	10	6.6		Good Combustion Practices	Stack Test Ref. Method 25a less Methane via bag sample & Method 18
SO <sub>2</sub>	N/A	25		Low Sulfur Fuel	Fuel Monitoring
Pb	N/A	<0.01		Low Ash Fuel	N/A
PM <sub>10</sub>	N/A	22		Low Sulfur and Ash Fuel	Stack Test Ref. Method 5 & 202
<sup>1</sup> lb/hr for each turbine is based on 100% load at 42°F and includes a margin of 10% representing maximum potential to emit					



#### 4.0 REFERENCES AND BIBLIOGRAPHY

Pequot Publishing, 1997. Gas Turbine World 1997 Handbook.

Rasnic, John B., August 1987. Letter to Air Compliance Branch Chiefs, Regions I-IX, RC: NSPS Custom Fuel Monitoring.

U.S. EPA. September 1977. Standards Support and Environmental Impact Statement - Volume I: Proposed Standards of Performance for Stationary Gas Turbines. EPA 450/2-77-017a.

U.S. EPA. October 1990. New Source Review Workshop Manual. Draft.

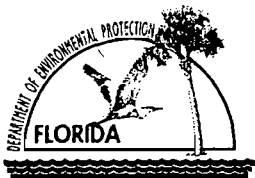
U.S. EPA. October 1996. AP-42.



**APPENDIX A**

**APPLICATION FOR AIR PERMIT – TITLE V SOURCE  
DEP FORM NO. 62-210.900(1)**





# Department of Environmental Protection

## Division of Air Resources Management

### APPLICATION FOR AIR PERMIT - TITLE V SOURCE

See Instructions for Form No. 62-210.900(1)

#### I. APPLICATION INFORMATION

##### Identification of Facility

1. Facility Owner/Company Name: <b>Broward Development Company, L.L.C.</b>	
2. Site Name: <b>Broward-Thornborough Electric Generating Plant</b>	
3. Facility Identification Number: [✓] Unknown	
4. Facility Location: Street Address or Other Locator: <b>Between Hwy 91 and Powerline Road, 0.5 miles south of Sample Rd.</b> City: <b>Pompano</b> County: <b>Broward</b> Zip Code:	
5. Relocatable Facility? [ ] Yes [✓] No	6. Existing Permitted Facility? [ ] Yes [✓] No

##### Application Contact

1. Name and Title of Application Contact: <b>Dave Kellermeyer, Director</b>	
2. Application Contact Mailing Address: Organization/Firm: <b>Broward Development Company, L.L.C.</b> Street Address: <b>1400 Smith Street</b> City: <b>Houston</b> State: <b>TX</b> Zip Code: <b>77002-7631</b>	
3. Application Contact Telephone Numbers: Telephone: <b>(713) 853-3161</b> Fax: <b>(713) 646-3037</b>	

##### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	<b>8/9/00</b>
2. Permit Number:	<b>0112505-001-AC</b>
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	



## **Purpose of Application**

### **Air Operation Permit Application**

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

- ☐ Initial Title V air operation permit for an existing facility which is classified as a Title V source.
- ☐ Initial Title V air operation permit for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number: \_\_\_\_\_

- ☐ Title V air operation permit revision to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number: \_\_\_\_\_

Operation permit number to be revised: \_\_\_\_\_

- ☐ Title V air operation permit revision or administrative correction to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. (Also check Air Construction Permit Application below.)

Operation permit number to be revised/corrected: \_\_\_\_\_

- ☐ Title V air operation permit revision for reasons other than construction or modification of an emissions unit. Give reason for the revision; e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit number to be revised: \_\_\_\_\_

Reason for revision: \_\_\_\_\_

### **Air Construction Permit Application**

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

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



**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official: <b>Janet Dietrich – Managing Director</b>
2. Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: <b>Broward Development Company, L.L.C.</b> Street Address: <b>1400 Smith Street</b> City: <b>Houston</b> State: <b>TX</b> Zip Code: <b>77002-7631</b>
3. Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: <b>(713) 853-4836</b> Fax: <b>(713) 646-3239</b>
4. Owner/Authorized Representative or Responsible Official Statement: <i>I, the undersigned, am the owner or authorized representative*(check here [ ], if so) or the responsible official (check here [✓], if so) of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.</i>  Signature <u>Janet R. Dietrich</u> Date <u>7-11-00</u>

\* Attach letter of authorization if not currently on file.

**Professional Engineer Certification**

1. Professional Engineer Name: <b>Blair Burgess</b> Registration Number: <b>45460</b>
2. Professional Engineer Mailing Address: Organization/Firm: <b>ENSR</b> Street Address: <b>2809 West Mall Drive</b> City: <b>Florence</b> State: <b>AL</b> Zip Code: <b>35630</b>
3. Professional Engineer Telephone Numbers: Telephone: <b>(256) 767-1210</b> Fax: <b>(256) 767-1211</b>



4. Professional Engineer Statement:

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

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

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

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ], 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 schedule is submitted with this application.*

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

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ], if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*

Signature

EMBOSSED METALLIC

Date

\* Attach any exception to certification statement.



**Scope of Application**

<b>Emissions Unit ID</b>	<b>Description of Emissions Unit</b>	<b>Permit Type</b>	<b>Processing Fee</b>
<b>CT001 – CT06</b>	<b>LM6000 Simple Cycle Combustion Turbines (Six identical combustion turbines)</b>	<b>AC1B</b>	<b>\$5,000</b> Similar emissions unit fee per Rule 62-4.050(4)(a)(4)
<b>T001 – T002</b>	<b>Distillate Fuel Oil Storage Tanks</b>	<b>AC1E</b>	<b>\$250</b>
<b>FWP</b>	<b>Firewater Pump Diesel Engine</b>	<b>AC1F</b>	<b>\$250</b>
<b>NGH</b>	<b>Natural Gas Fuel Heater</b>	<b>AC1F</b>	<b>\$250</b>

**Application Processing Fee**Check one: [ ☒ ] Attached - Amount: **\$5,750**[ ☐ ] Not Applicable



### Construction/Modification Information

1. Description of Proposed Project or Alterations

**Broward Development Company, L.L.C. proposes to construct and operate a peaking electrical power generating facility at a greenfield site in Broward County, Florida. The facility will consist of up to six (6) GE LM6000 combustion turbines operating in simple cycle mode; each turbine has a nominal generating capacity of 48 MW. The combustion turbines will be fired primarily with natural gas with low sulfur distillate oil as a backup fuel. NO<sub>x</sub> emissions will be controlled with water injection. Permit conditions will limit total facility annual emissions to less than 248 tons per year of any regulated air pollutant in order to be permitted as a synthetic minor source with respect to Rule 62-212.400, Prevention of Significant Deterioration. Ancillary equipment includes one 1.5 million gallon distillate oil storage tank, one 300,000 gallon distillate oil storage tank, one natural gas fuel heater and one emergency diesel fired IC engine driving a firewater pump.**

2. Projected or Actual Date of Commencement of Construction:

**December 1, 2000**

3. Projected Date of Completion of Construction:

**June 1, 2001**

### Application Comment



## A. GENERAL FACILITY INFORMATION

1. Facility UTM Coordinates: Zone: <b>17</b> East (km): <b>583.941</b> North (km): <b>2905.562</b>			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): <b>26° 16' 09"N</b> Longitude (DD/MM/SS): <b>80° 09' 34"W</b>			
3. Governmental Facility Code: <b>0</b>	4. Facility Status Code: <b>C</b>	5. Facility Major Group SIC Code: <b>49</b>	6. Facility SIC(s): <b>4911</b>
7. Facility Comment (limit to 500 characters):			

1. Name and Title of Facility Contact: <b>Dave Kellermeyer, Director</b>
2. Facility Contact Mailing Address: Organization/Firm: <b>Broward Development Company, L.L.C.</b> Street Address: <b>1400 Smith Street</b> City: <b>Houston</b> State: <b>TX</b> Zip Code: <b>77002-7631</b>
3. Facility Contact Telephone Numbers: Telephone: <b>(713) 853-3161</b> Fax: <b>(713) 646-3037</b>



### Facility Regulatory Classifications

**Check all that apply:**

1. <input type="checkbox"/> Small Business Stationary Source?	<input type="checkbox"/> Unknown
2. <input checked="" type="checkbox"/> Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)?	
3. <input type="checkbox"/> Synthetic Minor Source of Pollutants Other than HAPs?	
4. <input type="checkbox"/> Major Source of Hazardous Air Pollutants (HAPs)?	
5. <input type="checkbox"/> Synthetic Minor Source of HAPs?	
6. <input checked="" type="checkbox"/> One or More Emissions Units Subject to NSPS?	
7. <input type="checkbox"/> One or More Emission Units Subject to NESHAP?	
8. <input checked="" type="checkbox"/> Title V Source by EPA Designation?	
9. Facility Regulatory Classifications Comment (limit to 200 characters):	

### List of Applicable Regulations (Facility-wide)

[illegible]



## B. FACILITY POLLUTANTS

### **List of Pollutants Emitted**

[illegible]



## C. FACILITY SUPPLEMENTAL INFORMATION

## Supplemental Requirements

1. Area Map Showing Facility Location: [ <input checked="" type="checkbox"/> ] Attached, Document ID: <b>Fig. 1-1</b> [ <input type="checkbox"/> ] Not Applicable [ <input type="checkbox"/> ] Waiver Requested
2. Facility Plot Plan: [ <input checked="" type="checkbox"/> ] Attached, Document ID: <b>Fig. 2-1</b> [ <input type="checkbox"/> ] Not Applicable [ <input type="checkbox"/> ] Waiver Requested
3. Process Flow Diagram(s): [ <input type="checkbox"/> ] Attached, Document ID: <b>Fig. 2-2</b> [ <input type="checkbox"/> ] Not Applicable [ <input type="checkbox"/> ] Waiver Requested
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: [ <input type="checkbox"/> ] Attached, Document ID: _____ [ <input checked="" type="checkbox"/> ] Not Applicable [ <input type="checkbox"/> ] Waiver Requested
5. Fugitive Emissions Identification: [ <input type="checkbox"/> ] Attached, Document ID: _____ [ <input checked="" type="checkbox"/> ] Not Applicable [ <input type="checkbox"/> ] Waiver Requested
6. Supplemental Information for Construction Permit Application: [ <input checked="" type="checkbox"/> ] Attached, Document ID: <b>ENSR Document No. 6792-123-610</b> [ <input type="checkbox"/> ] Not Applicable
7. Supplemental Requirements Comment:



**Additional Supplemental Requirements for Title V Air Operation Permit Applications**

8. List of Proposed Insignificant Activities: <input checked="" type="checkbox"/> Attached, Document ID: <b>Section 2</b> <input type="checkbox"/> Not Applicable
9. List of Equipment/Activities Regulated under Title VI: <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Equipment/Activities On site but Not Required to be Individually Listed <input checked="" type="checkbox"/> Not Applicable
10. Alternative Methods of Operation: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
11. Alternative Modes of Operation (Emissions Trading): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
12. Identification of Additional Applicable Requirements: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
13. Risk Management Plan Verification: <input type="checkbox"/> Plan previously submitted to Chemical Emergency Preparedness and Prevention Office (CEPPO). Verification of submittal attached (Document ID: _____) or previously submitted to DEP (Date and DEP Office: _____) <input type="checkbox"/> Plan to be submitted to CEPPO (Date required: _____) <input checked="" type="checkbox"/> Not Applicable
14. Compliance Report and Plan: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
15. Compliance Certification (Hard-copy Required): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable



### III. EMISSIONS UNIT INFORMATION

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

#### A. GENERAL EMISSIONS UNIT INFORMATION (All Emissions Units)

##### Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)			
<input type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).			
<input checked="" type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.			
<input type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.			
2. Regulated or Unregulated Emissions Unit? (Check one)			
<input checked="" type="checkbox"/> The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.			
<input type="checkbox"/> The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.			
3. Description of Emissions Unit Addressed in This Section (limit to 60 characters): <b>CT001 through CT06 are identical LM6000 simple cycle combustion turbines (CT) each having a nominal rating 48 megawatts (MW). Each CT will be fired primarily with natural gas with low sulfur distillate oil as a back up fuel.</b>			
4. Emissions Unit Identification Number:		<input checked="" type="checkbox"/> No ID <input type="checkbox"/> ID	
ID: CT001 – CT06			
Unknown			
5. Emissions Unit Status Code: <b>C</b>	6. Initial Startup Date: <b>June 2001</b>	7. Emissions Unit Major Group SIC Code: <b>49</b>	8. Acid Rain Unit? <input checked="" type="checkbox"/>
9. Emissions Unit Comment: (Limit to 500 Characters) <b>Each combustion turbine (CT001 to CT06) should be considered separate emissions units. The grouping of all turbines into one Emissions Unit Information Section has been done for administrative convenience since the information required in Subsections A through J is identical for each combustion turbine.</b>			



**Emissions Unit Control Equipment**

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

**Each turbine will be equipped with water-injected combustors to control NO<sub>x</sub> formation.**

2. Control Device or Method Code(s): **028**

**Emissions Unit Details**

1. Package Unit:	
Manufacturer: <b>General Electric</b>	Model Number: <b>LM6000 PC Sprint</b>
2. Generator Nameplate Rating: <b>48 MW (nominal)</b>	
3. Incinerator Information: <b>N/A</b>	
Dwell Temperature:	°F
Dwell Time:	seconds
Incinerator Afterburner Temperature:	°F



**B. EMISSIONS UNIT CAPACITY INFORMATION  
(Regulated Emissions Units Only)**

**Emissions Unit Operating Capacity and Schedule**

1. Maximum Heat Input Rate:	<b>469 mmBtu/hr HHV (base load on natural gas @ 42°F)</b>	
2. Maximum Incineration Rate:	<b>N/A lb/hr</b>	<b>N/A tons/day</b>
3. Maximum Process or Throughput Rate:	<b>N/A</b>	
4. Maximum Production Rate:	<b>N/A</b>	
5. Requested Maximum Operating Schedule:		
	<b>24 hours/day</b>	<b>7 days/week</b>
	<b>52 weeks/year</b>	<b>8760<sup>1</sup> hours/year</b>
6. Operating Capacity/Schedule Comment (limit to 200 characters):		
	<p><b>1 – Annual operations will be limited through the use of a Continuous Emissions Monitoring System for NO<sub>x</sub> and CO.</b></p>	



**C. EMISSIONS UNIT REGULATIONS  
(Regulated Emissions Units Only)**

**List of Applicable Regulations**

40 CFR 60, Subpart A (General Provisions for New Source Performance Standards)	
40 CFR 60.332(a)(1) – NO <sub>x</sub> standards for Stationary Gas Turbines	
40 CFR 60.333 – SO <sub>2</sub> standards for Stationary Gas Turbines	
40 CFR 60.334 – Monitoring Provisions for Stationary Gas Turbines	
40 CFR Part 72 – Acid Rain Program Requirements Regulations	
40 CFR Part 73 – Acid Rain Program SO <sub>2</sub> Allowances System	
40 CFR Part 75 – Acid Rain Program Continuous Emissions Monitoring	
Rule 62-296(4)(b)1 – Visible emissions	



**D. EMISSION POINT (STACK/VENT) INFORMATION**  
**(Regulated Emissions Units Only)**

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram? <b>CT1 through CT6</b>		2. Emission Point Type Code: <b>1</b>	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): <b>Exhaust stacks for combustion turbines; one stack per turbine unit.</b>			
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: <b>N/A</b>			
5. Discharge Type Code: <b>V</b>	6. Stack Height: <b>45 feet</b>	7. Exit Diameter: <b>10 feet</b>	
8. Exit Temperature: <b>842°F (NG)</b> <b>845°F (Oil)</b>	9. Actual Volumetric Flow Rate: <b>602,800 acfm (NG)</b> <b>594,500 acfm (Oil)</b>	10. Water Vapor: <b>10.25 % (NG)</b> <b>8.3 % (Oil)</b>	
11. Maximum Dry Standard Flow Rate: <b>219,397 dscfm (NG)</b> <b>215,878 dscfm (Oil)</b>		12. Nonstack Emission Point Height: <b>N/A</b> feet	
13. Emission Point UTM Coordinates: Zone: <b>17</b> East (km): * North (km): *			
14. Emission Point Comment (limit to 200 characters):  <p align="center"><b>Exhaust temperatures and flow rates are at 100% load and 42° F operating conditions. Stack temperatures and flow rates will vary with load and ambient temperature.</b></p> <p><b>* For UTM coordinates of combustion turbine stacks, please see Attachment A.</b></p>			



**E. SEGMENT (PROCESS/FUEL) INFORMATION**  
**(All Emissions Units)**

**Segment Description and Rate:** Segment 1 of 2

1. Segment Description (Process/Fuel Type ) (limit to 500 characters): <b>Natural gas</b>		
1. Source Classification Code (SCC): <b>2-01-002-01</b>		3. SCC Units: <b>Million Cubic Feet Burned</b>
6. Maximum Hourly Rate: <b>0.4479</b>	7. Maximum Annual Rate: <b>5163.89</b>	6. Estimated Annual Activity Factor: <b>N/A</b>
7. Maximum % Sulfur: <b>2 grains/100 SCF</b>	8. Maximum % Ash: <b>N/A</b>	9. Million Btu per SCC Unit: <b>1047</b>
10. Segment Comment (limit to 200 characters): <b>Annual operation will be restricted through the use of NOx and CO CEMS. Maximum Annual Rate is an estimate only.</b>		

**Segment Description and Rate:** Segment 2 of 2

2. Segment Description (Process/Fuel Type) (limit to 500 characters): <b>No. 2 Distillate Fuel Oil</b>		
3. Source Classification Code (SCC): <b>2-01-001-0</b>		3. SCC Units: <b>Thousand Gallons Burned</b>
4. Maximum Hourly Rate: <b>3.12</b>	5. Maximum Annual Rate: <b>23120</b>	6. Estimated Annual Activity Factor: <b>N/A</b>
7. Maximum % Sulfur: <b>0.05</b>	8. Maximum % Ash: <b>Trace</b>	9. Million Btu per SCC Unit: <b>144.5</b>
10. Segment Comment (limit to 200 characters): <b>Annual operation will be restricted through the use of NOx and CO CEMS. Maximum Annual Rate is an estimate only.</b>		



### F. EMISSIONS UNIT POLLUTANTS (All Emissions Units)

[illegible]



Emissions Unit Information Section 1 of 2

Pollutant Detail Information Page 1 of 6

**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

**Potential/Fugitive Emissions**

1. Pollutant Emitted: <b>NOX</b>	2. Total Percent Efficiency of Control:
3. Potential Emissions: <b>79.9 lb/hour (per turbine) 246 tons/year (total six turbines)</b>	4. Synthetically Limited? <input checked="" type="checkbox"/>
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: <b>0.162 lb/MMBtu (HHV)</b> Reference: See Appendix B for emissions calculations	7. Emissions Method Code: <b>2</b>
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emission rate for both natural gas and distillate oil. Hourly emission rate includes a 10% margin. Annual NOx emissions will be restricted through the use of CEMS.</b>	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

**Allowable Emissions** Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: <b>ESCPD</b>	2. Future Effective Date of Allowable Emissions: <b>N/A</b>
3. Requested Allowable Emissions and Units: <b>246 tons/yr (CT1 –CT6)</b>	4. Equivalent Allowable Emissions: <b>N/A lb/hour N/A tons/year</b>
5. Method of Compliance (limit to 60 characters): <b>Direct emissions monitoring of stack emissions using Part 75-certified CEMs</b>	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	



Emissions Unit Information Section 1 of 2

Pollutant Detail Information Page 2 of 6

**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

**Potential/Fugitive Emissions**

1. Pollutant Emitted: <b>CO</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>64.9</b> lb/hour (per turbine) <b>247.2</b> tons/year (total six turbines)		4. Synthetically Limited? <input checked="" type="checkbox"/>	
5. Range of Estimated Fugitive Emissions: [ ] 1      [ ] 2      [ ] 3      _____ to _____ tons/year			
6. Emission Factor: <b>0.131 lb/MMBtu (HHV)</b>  Reference: See Appendix B for emission calculations		7. Emissions Method Code: <b>2</b>	
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emissions for both natural gas and distillate oil. Hourly emission rate includes a 10% margin. Annual CO emissions will be restricted through the use of CEMS.</b>			
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):			

**Allowable Emissions** Allowable Emissions   2   of   2  

1. Basis for Allowable Emissions Code: <b>ESCPD</b>		2. Future Effective Date of Allowable Emissions: <b>N/A</b>	
3. Requested Allowable Emissions and Units: <b>248 tons/yr (CT1 – CT6)</b>		4. Equivalent Allowable Emissions: <b>N/A lb/hour      N/A tons/year</b>	
5. Method of Compliance (limit to 60 characters): <b>Direct emissions monitoring of stack emissions using certified continuous emissions monitors on each turbine stack</b>			
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):			



Emissions Unit Information Section 1 of 2

Pollutant Detail Information Page 3 of 6

**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

**Potential/Fugitive Emissions**

1. Pollutant Emitted: <b>PM</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>22.0 lb/hour(per turbine) 125.07 tons/year (total six turbines)</b>		4. Synthetically Limited? <input checked="" type="checkbox"/>	
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year			
6. Emission Factor: <b>0.034 lb/MMBtu (HHV)</b> Reference: See Appendix B for emissions calculations		7. Emissions Method Code: <b>2</b>	
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emission rate for both natural gas and distillate oil. Hourly emission rate includes a 10% margin.</b>			
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):			

**Allowable Emissions** Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_ N/A

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



Emissions Unit Information Section 1 of 2

Pollutant Detail Information Page 4 of 6

**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

Potential/Fugitive Emissions

1. Pollutant Emitted: <b>PM10</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>22.0 lb/hour (per turbine) 125.07 tons/year (total six turbines)</b>		4. Synthetically Limited? <input checked="" type="checkbox"/>	
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year			
6. Emission Factor: <b>0.034 lb/MMBtu (HHV)</b>  Reference: <b>See Appendix B for emissions calculations</b>		7. Emissions Method Code: <b>2</b>	
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emission rate for both natural gas and distillate oil. Hourly emission rate includes a 10% margin.</b>			
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):			

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_ **N/A**

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



Emissions Unit Information Section 1 of 2

Pollutant Detail Information Page 5 of 6

**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

**Potential/Fugitive Emissions**

1. Pollutant Emitted: <b>SO2</b>		2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>25 lb/hour (per turbine) 85.03 tons/year (total six turbines)</b>		4. Synthetically Limited? <input checked="" type="checkbox"/>	
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year			
6. Emission Factor: <b>0.051 lb/MMBtu (HHV)</b> Reference: See Appendix B for emissions calculations		7. Emissions Method Code: <b>2</b>	
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emission rate for both natural gas and distillate oil. Hourly emission rate includes a 10% margin.</b>			
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):			

**Allowable Emissions** Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_ N/A

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



# Emissions Unit Information Section 1 of 2

## Pollutant Detail Information Page 6 of 6

### G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION

(Regulated Emissions Units -

Emissions-Limited and Preconstruction Review Pollutants Only)

#### Potential/Fugitive Emissions

1. Pollutant Emitted: <b>VOC</b>	2. Total Percent Efficiency of Control:	
3. Potential Emissions: <b>7.3</b> lb/hour (per turbine) <b>41.6</b> tons/year (total six turbines)		4. Synthetically Limited? <input checked="" type="checkbox"/>
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year		
6. Emission Factor: <b>0.014 lb/MMBtu (HHV)</b> Reference: See Appendix B for emissions calculations		7. Emissions Method Code: <b>2</b>
8. Calculation of Emissions (limit to 600 characters):  <b>Hourly emission rate is based on worst case emission rate for both natural gas and distillate oil. Hourly emission rate includes a 10% margin.</b>		
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):		

Allowable Emissions Allowable Emissions \_\_\_\_\_ of \_\_\_\_\_ N/A

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



**H. VISIBLE EMISSIONS INFORMATION**  
**(Only Regulated Emissions Units Subject to a VE 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. Requested Allowable Opacity: Normal Conditions: <b>20</b> %      Exceptional Conditions:      % Maximum Period of Excess Opacity Allowed:      min/hour	
4. Method of Compliance: <b>EPA Reference Method 9</b>	
5. Visible Emissions Comment (limit to 200 characters): <b>The general visible emission standard requirements of Rule 62-296.320(4)(b)1, F.A.C. applies to each turbine stack.</b>	

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

**Continuous Monitoring System:** Continuous Monitor   1   of   1  

1. Parameter Code: <b>EM</b>	2. Pollutant(s): <b>NOX and CO</b>
3. CMS Requirement:	<input checked="" type="checkbox"/> Rule (NOX) <input checked="" type="checkbox"/> Other (CO)
4. Monitor Information: <b>TBD</b> Manufacturer: <b>TBD</b> Model Number: <b>TBD</b> Serial Number: <b>TBD</b>	
5. Installation Date: <b>Prior to start up</b>	6. Performance Specification Test Date: <b>90 days after unit commences commercial operation in accordance with 40 CFR 75.4(b)(2)</b>
7. Continuous Monitor Comment (limit to 200 characters): <b>Annual emissions of NO<sub>x</sub> and CO from the facility will be limited to a maximum of 248 tons per year. Compliance with these annual limits will be demonstrated using continuous emissions monitoring systems for NO<sub>x</sub> and CO.</b>	



**J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION  
(Regulated Emissions Units Only)**

**Supplemental Requirements**

1. Process Flow Diagram [✓] Attached, Document ID: <b>Fig. 2-2</b> [ ] Not Applicable [ ] Waiver Requested
2. Fuel Analysis or Specification [✓] Attached, Document ID: <b>App. B</b> [ ] Not Applicable [ ] Waiver Requested
3. Detailed Description of Control Equipment [ ] Attached, Document ID: _____ [✓] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID: _____ [✓] Not Applicable [ ] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID: _____ [ ] Previously submitted, Date: _____ [✓] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID: _____ [✓] Not Applicable [ ] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID: _____ [✓] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [✓] Attached, Document ID: <b>ENSR Doc. No. 6792-123-610</b>
9. Other Information Required by Rule or Statute [ ] Attached, Document ID: _____ [✓] Not Applicable
10. Supplemental Requirements Comment:



**Additional Supplemental Requirements for Title V Air Operation Permit Applications**

11. Alternative Methods of Operation [ ] Attached, Document ID: _____ [✓] Not Applicable
12. Alternative Modes of Operation (Emissions Trading) [ ] Attached, Document ID: _____ [✓] Not Applicable
13. Identification of Additional Applicable Requirements [ ] Attached, Document ID: _____ [✓] Not Applicable
14. Compliance Assurance Monitoring Plan [ ] Attached, Document ID: _____ [✓] Not Applicable
15. Acid Rain Part Application (Hard-copy Required) [ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a)) Attached, Document ID: _____ [ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) Attached, Document ID: _____ [ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.) Attached, Document ID: _____ [ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) Attached, Document ID: _____ [ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) Attached, Document ID: _____ [ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) Attached, Document ID: _____ [ ] Not Applicable



### III. TANK EMISSIONS UNIT INFORMATION

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

#### A. GENERAL EMISSIONS UNIT INFORMATION (All Emissions Units)

##### Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in This Section: (Check one)			
<input type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).			
<input checked="" type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.			
<input type="checkbox"/> This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.			
2. Regulated or Unregulated Emissions Unit? (Check one)			
<input type="checkbox"/> The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.			
<input checked="" type="checkbox"/> The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.			
3. Description of Emissions Unit Addressed in This Section (limit to 60 characters): <b>Distillate fuel oil storage tanks</b>			
4. Emissions Unit Identification Number:		<input checked="" type="checkbox"/> No ID <input type="checkbox"/> ID Unknown	
ID: <b>T001, T002</b>			
5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
<b>C</b>	<b>June 2001</b>	<b>49</b>	<input type="checkbox"/>
9. Emissions Unit Comment: (Limit to 500 Characters)			
<b>T001 - main storage tank</b> <b>T002 - day storage tank.</b>			



## Emissions Unit Information Section 2 of 2

### Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method):

None

2. Control Device or Method Code(s):

### Emissions Unit Details

1. Package Unit:

Manufacturer:

Model Number:

2. Generator Nameplate Rating:

MW

3. Incinerator Information:

Dwell Temperature:

°F

Dwell Time:

seconds

Incinerator Afterburner Temperature:

°F



## B. EMISSIONS UNIT CAPACITY INFORMATION

### (Regulated Emissions Units Only)

### **Emissions Unit Operating Capacity and Schedule**

1. Maximum Heat Input Rate:	N/A mmBtu/hr
2. Maximum Incineration Rate:	N/A lb/hr                      N/A tons/day
3. Maximum Process or Throughput Rate:	<b>24,300,000 gal/year</b>
4. Maximum Production Rate:	N/A
5. Requested Maximum Operating Schedule:	
	<b>24 hours/day                      7 days/week</b>
	<b>52 weeks/year                      8760 hours/year</b>
6. Operating Capacity/Schedule Comment (limit to 200 characters):	



### C. EMISSIONS UNIT REGULATIONS (Regulated Emissions Units Only)

### List of Applicable Regulations

[illegible]



**D. EMISSION POINT (STACK/VENT) INFORMATION**  
**(Regulated Emissions Units Only)**

**Emission Point Description and Type**

1. Identification of Point on Plot Plan or Flow Diagram? <b>T001 + T002</b>		2. Emission Point Type Code: <b>4</b>	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): <b>N/A</b>			
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: <b>N/A</b>			
5. Discharge Type Code: <b>V</b>	6. Stack Height: <b>N/A</b> feet	7. Exit Diameter: <b>N/A</b> feet	
8. Exit Temperature: <b>N/A</b>	9. Actual Volumetric Flow Rate: <b>N/A</b>	10. Water Vapor: <b>N/A</b>	
11. Maximum Dry Standard Flow Rate: <b>N/A</b> dscfm		12. Nonstack Emission Point Height: <b>N/A</b> feet	
13. Emission Point UTM Coordinates: Zone: <b>17</b> East (km): * North (km): *			
14. Emission Point Comment (limit to 200 characters):  * <b>For UTM coordinates of Distillate oil tanks, please see Attachment A.</b>			



**E. SEGMENT (PROCESS/FUEL) INFORMATION**  
**(All Emissions Units)**

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

1. Segment Description (Process/Fuel Type) (limit to 500 characters):  <b>Distillate fuel oil storage tanks</b>		
2. Source Classification Code (SCC): <b>40301021</b>		3. SCC Units: <b>Thousand Gallons Throughput</b>
4. Maximum Hourly Rate: <b>N/A</b>	5. Maximum Annual Rate: <b>24,300,000</b>	6. Estimated Annual Activity Factor: <b>N/A</b>
7. Maximum % Sulfur: <b>N/A</b>	8. Maximum % Ash: <b>N/A</b>	9. Million Btu per SCC Unit: <b>N/A</b>
10. Segment Comment (limit to 200 characters):		

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

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



### F. EMISSIONS UNIT POLLUTANTS (All Emissions Units)

[illegible]



**G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION**  
**(Regulated Emissions Units -**  
**Emissions-Limited and Preconstruction Review Pollutants Only)**

**Potential/Fugitive Emissions**

1. Pollutant Emitted: <b>VOC</b>	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour                      tons/year	4. Synthetically Limited? <input type="checkbox"/> <input type="checkbox"/>
5. Range of Estimated Fugitive Emissions: [ ] 1            [ ] 2            [ ] 3            _____ to _____ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):  <b>Potential VOC emissions from distillate fuel oil storage tanks are less than 5 tons per year (less than the threshold amount for reporting in this subsection). See Appendix B for emission calculations.</b>	

**Allowable Emissions** Allowable Emissions 1 of 1 N/A

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



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

**Visible Emissions Limitation:** N/A

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: [ ] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: %      Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment (limit to 200 characters):	



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

**Continuous Monitoring System: N/A**

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



### J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION (Regulated Emissions Units Only)

**Supplemental Requirements N/A**

1. Process Flow Diagram	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
2. Fuel Analysis or Specification	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
3. Detailed Description of Control Equipment	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
4. Description of Stack Sampling Facilities	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
5. Compliance Test Report	<input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Previously submitted, Date: _____ <input type="checkbox"/> Not Applicable		
6. Procedures for Startup and Shutdown	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
7. Operation and Maintenance Plan	<input type="checkbox"/> Attached, Document ID: _____	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Waiver Requested
8. Supplemental Information for Construction Permit Application	<input type="checkbox"/> Attached, Document ID: _____		
9. Other Information Required by Rule or Statute	<input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable		
10. Supplemental Requirements Comment:			



**Additional Supplemental Requirements for Title V Air Operation Permit Applications**

11. Alternative Methods of Operation <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
12. Alternative Modes of Operation (Emissions Trading) <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
13. Identification of Additional Applicable Requirements <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
14. Compliance Assurance Monitoring Plan <input type="checkbox"/> Attached, Document ID: _____ <input type="checkbox"/> Not Applicable
15. Acid Rain Part Application (Hard-copy Required)  <input type="checkbox"/> Acid Rain Part - Phase II (Form No. 62-210.900(1)(a)) Attached, Document ID: _____  <input type="checkbox"/> Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) Attached, Document ID: _____  <input type="checkbox"/> New Unit Exemption (Form No. 62-210.900(1)(a)2.) Attached, Document ID: _____  <input type="checkbox"/> Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) Attached, Document ID: _____  <input type="checkbox"/> Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) Attached, Document ID: _____  <input type="checkbox"/> Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) Attached, Document ID: _____  <input type="checkbox"/> Not Applicable



**ATTACHMENT A**



## UTM COORDINATES

<u>Emission Source/ID Number</u>	<u>UTM Easting(km)</u>	<u>UTM Northing(km)</u>
Combustion Turbines CT1-CT6	583.884	2905.529
	583.884	2905.552
	583.884	2905.575
	583.884	2905.597
	583.884	2905.620
	583.884	2905.643
Distillate Oil Storage Tanks T001 and T002	583.962	2905.702
	583.966	2905.743



**APPENDIX B**  
**EMISSION CALCULATIONS**



## ENSR

Broward Development Company, L.L.C.  
 Broward - Thornborough Facility  
 GE LM 6000 SPRINT Simple Cycle Emissions  
 EMISSIONS COMPUTATION PER SINGLE CTG  
 GAS Fired CTG

Date 6/29/00  
 Author MDK Griffin  
 Revision 2

## CASE NUMBER and OPERATION CONDITIONS

- (1) AMBIENT TEMPERATURE, °F  
 (1) RELATIVE HUMIDITY, %  
 CTG LOAD  
 SPRINT STATUS  
 CHILLER STATUS  
 (1) CTG EFFECTIVE INLET TEMPERATURE, °F  
 (1) CTG EFFECTIVE INLET RELATIVE HUMIDITY, %  
 (1) CTG GROSS POWER OUTPUT, kW  
 (1) CTG FUEL CONSUMPTION, MMBtu/hr LHV  
 (1) CTG FUEL CONSUMPTION, lb/hr  
 CTG FUEL CONSUMPTION, MMBtu/hr HHV  
 (1) CTG EXHAUST GAS FLOW RATE, 1000 lb/hr  
 (1) STACK TEMPERATURE, °F

## CTG STACK EXHAUST ANALYSIS (%VOL)

- (1) ARGON + NITROGEN  
 (1) OXYGEN  
 (1) CARBON DIOXIDE  
 (1) WATER  
 TOTAL  
 CTG EXHAUST MOLECULAR WEIGHT  
 CTG EXHAUST GAS FLOW RATE, lb mol/hr  
 CTG EXHAUST GAS FLOW RATE, DRY, lb mol/hr

## EXH. PARAMETERS @ STACK

- (5) STACK DIAMETER, ft  
 MOLECULAR WEIGHT  
 STACK EXHAUST GAS FLOW RATE, lb/hr  
 SPECIFIC VOLUME, ft³/lb  
 VOLUMETRIC FLOW, acfm  
 EXIT VELOCITY, ft/sec  
 ACTUAL O₂ DRY  
 MOLES EXHAUST GAS per HOUR WET  
 MOLES EXHAUST GAS per HOUR DRY

## NOx EMISSION CALCULATION

- (1) LIMIT, ppmVd @ 15% O₂  
 LIMIT, ppmVd  
 CORRESPONDING MASS RATE, lb/hr as NO₂  
 CORRESPONDING EMISSIONS FACTOR, lb/MMBtu HHV

## CO EMISSION CALCULATION

- (8) LIMIT, ppmVd @ 15% O₂  
 CTG Exhaust, ppmVd  
 CTG MASS RATE, lb/hr  
 CTG EMISSIONS FACTOR, lb/MMBtu HHV

## PARTICULATE EMISSION CALCULATION

- (2) CTG EXHAUST, lb/hr  
 CORRESPONDING EMISSIONS FACTOR, lb/MMBtu HHV

## VOC EMISSION CALCULATION

- (3) LIMIT, ppmVd @ 15% O₂  
 CTG Exhaust, ppmVd  
 CTG MASS RATE, lb/hr  
 CTG EMISSIONS FACTOR, lb/MMBtu HHV

## Pb EMISSION CALCULATION

- Pb EMISSION FACTOR, lb/MMBtu  
 STACK EMISSIONS, lb/hr

## SO₂ EMISSION CALCULATION

- (4) CTG EMISSIONS, lb/hr  
 CTG EMISSIONS FACTOR, lb/MMBtu HHV  
 STACK EMISSIONS, ppmVd @ ACTUAL O₂  
 STACK EMISSIONS, ppmVd @ 15% O₂

## SITE CONDITIONS

- FUEL TYPE  
 FUEL LHV, Btu/lb  
 FUEL LHV, Btu/SCF  
 FUEL HHV, Btu/SCF  
 FUEL SULFUR CONTENT [grains per 100 SCF]

Natural Gas  
 19000  
 946  
 1047  
 2

## CONTROL EQUIPMENT LIMITS

- NOx PERMIT LIMIT, ppmVd @ 15% O₂

25

## Notes

- 1 Based on GE LM6000-PC SPRINT data provided in e-mail from Dave Kellermeyer (e-mail dated May 12, 2000).  
 2 PM10 Emission rate based on data provided in e-mail from Dave Kellermeyer April 19, 2000  
 3 VOC Emission limit based on data provided in e-mail from Dave Kellermeyer April 19, 2000  
 4 SO₂ emissions calculated based on fuel sulfur content of 2 grains per 100 standard cubic feet.  
 5 Stack diameter based on conversation with Dave Kellermeyer June 14, 2000  
 6 CO emissions limit based on guaranteed value.

1	2	3	4	5	6
90	42	90	42	90	42
65%	72%	65%	72%	65%	72%
100%	100%	75%	75%	50%	50%
ON	ON	OFF	OFF	OFF	OFF
ON	OFF	ON	OFF	OFF	OFF
50	42	75	42	90	42
65%	72%	65%	72%	65%	72%
48,097	49,044	36,153	36,890	24,027	24,522
416	423	330	329	251	249
21,919	22,282	17,347	17,316	13,195	13,111
461	489	365	364	277	276
1,056	1,072	827	981	785	860
847	842	829	760	810	703
28.154	73.23%	73.48%	72.83%	74.46%	73.27%
31.998	12.02%	12.89%	13.51%	14.22%	15.18%
44.009	3.36%	3.36%	3.02%	2.87%	2.72%
18.015	10.58%	10.25%	10.64%	8.43%	9.80%
	100.10%	100.09%	100.00%	99.99%	100.00%
	28.14	28.17	28.07	28.30	28.14
	37,497	38,042	33,035	34,652	27,905
	33,528	34,141	29,519	31,730	25,170
	10	10	10	10	10
	28.14	28.17	28.07	28.30	28.14
	1,055,075	1,071,756	927,360	980,640	765,180
	33.9	33.7	33.4	31.4	32.9
	598,093	602,782	516,881	512,683	431,177
	126.49	127.91	109.89	108.79	91.50
	14.5%	14.5%	15.1%	15.5%	15.7%
	37,497	38,042	33,035	34,652	27,905
	33,528	34,141	29,519	31,730	25,170
	25.0	25.0	25.0	25.0	25.0
	27.3	27.2	24.5	22.7	21.8
	42.1	42.8	33.3	33.2	25.3
	0.091	0.091	0.091	0.091	0.091
	50	50	50	50	50
	61.2	61.0	54.9	50.9	48.9
	57.5	58.3	45.4	45.3	34.5
	0.125	0.125	0.124	0.124	0.124
	4.5	4.5	4.5	4.5	4.5
	0.010	0.010	0.012	0.012	0.018
	10.0	10.0	10.0	10.0	10.0
	10.9	10.9	9.8	9.1	8.7
	6.8	6.8	5.2	5.1	3.9
	0.014	0.014	0.014	0.014	0.014
	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0
	2.513	2.555	1.989	1.985	1.513
	0.005	0.005	0.005	0.005	0.005
	1.170	1.168	1.052	0.977	0.938
	1.071	1.072	1.073	1.074	1.075



ENSR  
Broward Development Company, L.L.C.  
Broward - Thornborough Facility  
GE LM 6000 SPRINT Simple Cycle Emissions  
EMISSIONS COMPUTATION PER SINGLE CTG  
Oil Fired CTG

Date 4/29/00  
Author MDK Griffin  
Revision 2

CASE NUMBER and OPERATION CONDITIONS

- (1) AMBIENT TEMPERATURE, °F  
(1) RELATIVE HUMIDITY, %  
CTG LOAD  
SPRINT STATUS  
CHILLER STATUS  
(1) CTG EFFECTIVE INLET TEMPERATURE, °F  
(1) CTG EFFECTIVE INLET RELATIVE HUMIDITY, %  
(1) CTG NET POWER OUTPUT, kW  
(1) CTG FUEL CONSUMPTION, MMBtu/hr LHV  
(1) CTG FUEL CONSUMPTION, lb/hr  
CTG FUEL CONSUMPTION, MMBtu/hr HHV  
(1) CTG EXHAUST GAS FLOW RATE, 1000 lb/hr  
(1) STACK TEMPERATURE, °F

1	2	3	4	5	6
80	42	80	42	80	42
65%	72%	85%	72%	85%	72%
100%	100%	76%	75%	50%	50%
ON	ON	OFF	OFF	OFF	OFF
YES	NO	YES	NO	NO	NO
50	42	77	42	80	42
95%	72%	99%	72%	95%	72%
46,923	47,877	35,480	35,907	23,440	23,938
412	419	330	327	251	249
22,401	22,777	17,823	17,764	13,620	13,523
443	450	354	351	269	267
1,052	1,069	920	972	780	858
850	845	838	783	817	708

CTG STACK EXHAUST ANALYSIS (%VOL)

- (1) ARGON  
(1) NITROGEN + ARGON  
(1) OXYGEN  
(1) CARBON DIOXIDE  
(1) WATER  
TOTAL  
CTG EXHAUST MOLECULAR WEIGHT  
CTG EXHAUST GAS FLOW RATE, lb mol/hr  
CTG EXHAUST GAS FLOW RATE, DRY, lb mol/hr  
ACTUAL O2% DRY FROM CTG

39.948	0.89%	0.95%	0.89%	0.89%	0.87%	0.89%
28.013	72.86%	73.15%	72.19%	74.08%	72.75%	74.72%
31.996	13.17%	13.24%	13.57%	14.36%	14.51%	15.30%
44.009	4.43%	4.43%	4.02%	3.80%	3.62%	3.30%
18.015	8.04%	8.30%	9.35%	8.85%	6.47%	6.78%
	100.08%	100.07%	99.99%	99.99%	99.99%	99.99%
	28.52	28.55	28.36	28.61	28.42	28.66
	36,879	37,426	32,428	33,981	27,440	29,851
	33,693	34,320	29,397	31,653	25,115	28,125
	14.42%	14.44%	14.97%	15.45%	15.63%	16.23%

EXH. PARAMETERS @ STACK

- (5) STACK DIAMETER, ft  
MOLECULAR WEIGHT  
EXHAUST GAS FLOW RATE, lb/hr  
SPECIFIC VOLUME, ft³/lb  
VOLUMETRIC FLOW, acfm  
EXIT VELOCITY, ft/sec  
ACTUAL O2% DRY  
MOLES EXHAUST GAS per HOUR WET  
MOLES EXHAUST GAS per HOUR DRY

1	2	3	4	5	6
10	10	10	10	10	10
28.52	28.55	28.36	28.61	28.42	28.66
1,051,723	1,068,877	919,800	972,360	779,760	856,080
33.5	33.4	33.4	31.2	32.8	29.7
587,685	594,458	512,127	505,639	426,334	424,201
124.71	126.15	108.68	107.30	90.47	90.02
14.4%	14.4%	15.0%	15.5%	15.6%	16.2%
36,879	37,426	32,428	33,981	27,440	29,851
33,693	34,320	29,397	31,653	25,115	28,125

NOx EMISSION CALCULATION

- (1) CTG, ppmVd @ 15% O2  
CTG, ppmVd  
CTG, lb/hr as NO2  
CORRESPONDING EMISSIONS FACTOR, lb/MMBtu HHV

1	2	3	4	5	6
42	42	42	42	42	42
46.1	46.0	42.2	38.6	37.5	33.2
71.5	72.6	57.1	56.5	43.3	43.0
0.1615	0.1613	0.1611	0.1610	0.1609	0.1608

CO EMISSION CALCULATION

- (6) CTG, ppmVd @ 15% O2  
CTG Exhaust, ppmVd  
CTG MASS RATE, lb/hr  
CTG EMISSIONS FACTOR, lb/MMBtu HHV

1	2	3	4	5	6
58	56	58	55	58	66
61.5	61.3	56.3	51.7	50.0	44.3
58	58	46	46	35	35
0.1311	0.1310	0.1308	0.1307	0.1307	0.1305

PARTICULATE EMISSION CALCULATION

- (2) CTG EXHAUST, lb/hr  
CORRESPONDING EMISSIONS FACTOR, lb/MMBtu HHV

1	2	3	4	5	6
20	20	20	20	20	20
0.0452	0.0444	0.0565	0.0570	0.0743	0.0748

VOC EMISSION CALCULATION

- (3) VOC CTG, ppmVd @ 15% O2  
VOC CTG, ppmVd  
CTG Exhaust, ppmVd  
CTG MASS RATE, lb/hr  
CTG EMISSIONS FACTOR, lb/MMBtu HHV

1	2	3	4	5	6
10	10	10	10	10	10
11.0	11.0	10.0	9.2	8.9	7.9
10.0	10.0	9.1	8.6	8.2	7.4
5.9	6.0	4.7	4.7	3.6	3.6
0.0134	0.0134	0.0134	0.0134	0.0134	0.0133

Pb EMISSION CALCULATION

- Pb EMISSION FACTOR - OIL, lb/MMBtu  
STACK EMISSIONS, lb/hr

1	2	3	4	5	6
0.000014	0.000014	0.000014	0.000014	0.000014	0.000014
0.006	0.006	0.005	0.005	0.004	0.004

SO2 EMISSION CALCULATION

- (4) CTG EMISSIONS, lb/hr  
CORRESPONDING EMISSIONS FACTOR, lb/MMBtu HHV

1	2	3	4	5	6
22.378	22.754	17.905	17.736	13.606	13.509
0.0505	0.0505	0.0505	0.0505	0.0505	0.0506

SITE CONDITIONS

- FUEL TYPE  
FUEL LHV, Btu/lb  
FUEL HHV, Btu/lb  
FUEL LHV, Btu/SCF  
FUEL HHV, Btu/SCF  
FUEL SULFUR CONTENT (grains per 100 SCF)  
FUEL SULFUR CONTENT (wt%)

Natural Gas	Distillate Oil
	19400
	19764
827	
1028	
2	
	0.05%

CONTROL EQUIPMENT LIMITS

- NOx PERMIT LIMIT, ppmVd @ 15% O2

42

Lead Emission Factor for Oil AP-42 04/00 - Section 3.1

Emission Factor, lb/MMBtu

1.40E-05

Notes

- Based on GE LM6000-PC SPRINT data provided in e-mail from Dave Kellermeyer (e-mail dated May 12, 2000).
- PM10 emission rate assumed to be double the natural gas PM10 emission rate.
- VOC Emission limit based on data provided in e-mail from Dave Kellermeyer April 19, 2000
- SO2 emissions calculated based on fuel sulfur content of 0.05 wt %.
- Stack diameter based on conversation with Dave Kellermeyer June 14, 2000
- CO emissions limit based on guaranteed value.



## CALCULATIONS AND COMPUTATIONS

Project: Broward Development Company L.L.C., Broward - Thornborough Facility  
 Project Number: 6792-123-610 Computed by: C. Godleski Date: 6/15/00  
 Subject: Natural Gas Heater - Emission Calculations Checked by: B. Burgess Date: 6/28/00

Emission Source:	Natural Gas Heater
Heat Input (MMBtu/hr):	6
Number of Units:	1
Sulfur Content of Fuel (grains/scf):	0.02
Fuel Heating Value, HHV (Btu/scf):	1047
LHV (Btu/scf):	946
Operating Hours per Year:	1500
Fuel Feed Rate (scf/HR):	5731

Compound	Emission Factor (a) (Lbs/MMBtu)	Emission Rate - per Unit	
		Hourly (b) (Lbs/Hr)	Annual (c) (Tons/Year)
Nitrogen Oxides	0.102	0.612	0.459
Carbon Monoxide	0.09	0.54	0.405
Volatile Organic Carbon	0.06	0.36	0.27
Sulfur Oxides (d)	0.003	0.016	0.012
Particulate	0.01	0.06	0.045

**Notes:**

- (a) Emission Factors based on the information supplied by ENRON on 8/11/99.
- (b) Hourly Emission Rate (Lbs/Hr) = (Heat Input \* Emission Factor)
- (c) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) \*  
(Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)
- (d) Sulfur Oxides Emission Rate (Lbs/Hr) based on the sulfur content of the fuel.



# CALCULATIONS AND COMPUTATIONS

Project: Broward Development Company, L.L.C., Broward - Thornborough Facility

Project Number: 6792-123-610

Computed by: M. Griffin

Date: 5/30/00

Subject: Fire-Water Pump Emission Calculations

Checked by: B. Burgess

Date: 6/28/00

Emission Source: Fire-Water Pump Engine

Source Type: Diesel Fueled Reciprocating Engine  
250 Horsepower

Operating Hours per Year: 500

Compound	Emission Factor (a)		Emission Rate	
	(Lbs/hp hr)	(lb/MMBtu)	Hourly (b) (Lbs/Hr)	Annual (c) (Tons/Year)
Nitrogen Oxides	0.031		7.8	2.0
Carbon Monoxide	0.00668		1.7	0.4
Volatile Organic Carbon	0.00247		0.6	0.2
Sulfur Oxides	0.00205		0.5	0.1
Particulate	0.0022		0.6	0.2
Benzene	6.53E-06	9.33E-04	1.63E-03	4.08E-04
Toluene	2.86E-06	4.09E-04	7.16E-04	1.79E-04
Xylenes	2.00E-06	2.85E-04	4.99E-04	1.25E-04
Propylene	1.81E-05	2.58E-03	4.52E-03	1.13E-03
1,3-Butadiene	2.74E-07	3.91E-05	6.84E-05	1.71E-05
Formaldehyde	8.26E-06	1.18E-03	2.07E-03	5.16E-04
Acetaldehyde	5.37E-06	7.67E-04	1.34E-03	3.36E-04
Acrolein	6.48E-07	9.25E-05	1.62E-04	4.05E-05
PAH	1.18E-06	1.68E-04	2.94E-04	7.35E-05

Total HAPS 5.6 lb/year

## Notes:

- (a) Emission Factors from AP-42, Section 3.3, Table 3.3-1
- (b) Hourly Emission Rate (Lbs/Hr) = (Emission Factor, Lbs/BHP) \* (Horsepower, BHP)
- (c) Annual Emission Rate (Tons/Yr) = (Hourly Emission Rate, Lbs/Hr) \*  
(Hour of Operation Per Year, Hr/Yr) / (2,000 Lbs/Ton)



Annual Emissions Calculation

Broward Development Company, L.L.C., Broward - Thornborough Facility

Pollutant	CTG Natural Gas Short Term Emission Limits			CTG Distillate Oil Short Term Emission Limit			Compliance Method	Fuel Use Calculation			Annual Emissions			
								Maximum CTG Emissions for Minor Source <sup>(2)</sup>	Natural Gas Annual Fuel Use <sup>(6)</sup>	Distillate Oil Annual Fuel Use <sup>(6)</sup>	Natural Gas Fired CTGs <sup>(7)</sup>	Distillate Oil Fired CTGs <sup>(7)</sup>	Worst Case CTG Emissions <sup>(5)</sup>	Ancillary Equipment Emissions
	ppmvd @ 15% O <sub>2</sub>	lb/MMBtu (HHV)	Max lb/hr <sup>(1)</sup>	ppmvd @ 15% O <sub>2</sub>	lb/MMBtu (HHV)	Max lb/hr <sup>(1)</sup>		tons/year	MMBtu/yr (HHV)	MMBtu/yr (HHV)	(tpy)	(tpy)	(tpy)	(tpy)
NOx	25	0.091	47.1	42	0.162	79.9	CEMS	245.5	5,395,604	3,030,864	245.5	245.5	245.5	2.5
CO	56	0.125	64.2	56	0.131	64.9	CEMS	247.2	3,955,200	3,774,046	247.2	198.5	247.2	0.8
VOC	10	0.014	7.3	10	0.013	6.6	Fuel Tracking	218.8	31,257,143	33,661,538	37.8	19.7	41.58	1.2
Pb	N/A	0	0	N/A	0.000014	0.007	Fuel Tracking	220	N/A	N/A	0	0.02	0.022	0.0
PM10 <sup>(3)</sup>	N/A	0.016	5	N/A	0.075	22	Fuel Tracking	219.8	27,475,000	5,861,333	43.2	113.7	125.07	0.2
SO2	N/A	0.005	2.8	N/A	0.051	25	Fuel Tracking	219.9	87,960,000	8,623,529	13.5	77.3	85.03	0.1
Minimum Fuel Cap <sup>(4)</sup>									3,955,200	3,030,864	Margin 10%			

Notes

(1) Maximum hourly emission rate includes 10% margin.

(2) CTG Emissions = Total Facility Emissions - Fire Water Pump Engine Emissions

(3) PM10 emissions limited based on lb/hr emission rate, lb/MMBtu value calculated only for demonstration of compliance with Minor Source Status.

(4) NOx and CO limited based on CEMS. Fuel cap calculated to estimate emissions of VOC, PM10, and SO2. Minimum Fuel Cap is used for all pollutants.

(5) Worst Case of Natural Gas and Distillate Oil Case. VOC, PM10, and SO2 emissions include a margin of 10%.

(6) [Annual Fuel Use (MMBtu/yr (HHV))] = [Maximum CTG Emissions (tons/year)] x [2,000 lb/ton] / [Emission Factor (lb/MMBtu (HHV))]

(7) [CTG Annual Emissions (tons/year)] = [Minimum Fuel Cap (MMBtu/yr (HHV))] \* [Emission Factor (lb/MMBtu (HHV))] / [2,000 lb/ton]



**Broward Development Company, L.L.C., Broward - Thornborough Facility  
NSPS NO<sub>x</sub> Emission Standard Calculation**

<b>Turbine General Electric Model LM 6000</b>	
<b>Fuel Natural Gas</b>	
Nominal Maximum Electrical Capacity	48.0 MW
Maximum Energy Input	423 MMBtu/hr (LHV) 446,891,394 kJ/hr
Heat Rate	8,820 Btu/kWh 9.3 kJ/Wh
NSPS Subpart GG NO <sub>x</sub> Limit	0.0116% Volume % NO <sub>x</sub> @ 15% O <sub>2</sub> 116 ppmvd @ 15% O <sub>2</sub>

<b>Turbine General Electric Model LM 6000</b>	
<b>Fuel Distillate Oil</b>	
Nominal Maximum Electrical Capacity	48 MW
Maximum Energy Input	419 MMBtu/hr (LHV) 442,404,310 kJ/hr
Heat Rate	8,754 Btu/kWh 9.2 kJ/Wh
NSPS Subpart GG NO <sub>x</sub> Limit	0.0117% Volume % NO <sub>x</sub> @ 15% O <sub>2</sub> 117 ppmvd @ 15% O <sub>2</sub>



Calculations and Computations																		
HAP Emissions from Combined Cycle CTG Facility																		
Project:		Broward Development Company L.L.C., Broward - Thornborough Facility										Computed by: M. Griffin		Date: 5/12/00				
Project Number:		6792-123-610										Checked by: B.Burgess		Date: 6/28/00				
Subject:		Natural Gas/Distillate Oil Fired Turbine Non-Criteria Regulated Pollutant Emissions Calculations																
Pollutant	Type <sup>(a)</sup>	Emission Factor			Emission Factor			CTG Natural Gas Combustion		Distillate Oil		CTG Natural Gas		CTG Distillate Oil		Facility		Facility
		AP-42 Section 3.1 04/00 - Combustion Turbine Natural Gas			AP-42 Section 3.1 04/00 - Combustion Turbine No. 2 Fuel Oil			Maximum Heat Input,	Average Heat Input,	Maximum Heat Input,	Average Heat Input,	Emission Rate, Per Turbine		Emission Rate, Per Turbine		Emission Rate All CTGs		
		(lb/10 <sup>6</sup> scf)	(lb/MMBtu) <sup>(d)</sup>	Rating	(lb/10 <sup>6</sup> gallons)	(lb/MMBtu) <sup>(d)</sup>	Rating	per turbine (MMBtu/Hr) <sup>(b)</sup>	per turbine (MMBtu/Hr) <sup>(c)</sup>	per turbine (MMBtu/Hr) <sup>(b)</sup>	per turbine (MMBtu/Hr) <sup>(c)</sup>	Hourly <sup>(e)</sup> (lb/hr)	Annual <sup>(f)</sup> (tpy)	Hourly <sup>(e)</sup> (lb/hr)	Annual <sup>(f)</sup> (tpy)	Hourly <sup>(e)</sup> (lb/hr)	Annual <sup>(f)</sup> (tpy)	
1,3-Butadiene	HAP		4.30E-07	D		1.60E-05	D	469	469	450	450	2.01E-04	1.56E-04	7.20E-03	4.45E-03	4.32E-02	2.67E-02	No
Acetaldehyde	HAP		4.00E-05	C				469	469	450	450	1.87E-02	1.45E-02	0.00E+00	0.00E+00	1.12E-01	8.70E-02	No
Acrolein	HAP		6.40E-06	C				469	469	450	450	3.00E-03	2.32E-03	0.00E+00	0.00E+00	1.80E-02	1.39E-02	No
Benzene <sup>(a)</sup>	HAP	1.36E-02	1.30E-05			5.50E-05	C	469	469	450	450	6.07E-03	4.70E-03	2.48E-02	1.53E-02	1.49E-01	9.17E-02	No
Ethylbenzene	HAP		3.20E-05	C				469	469	450	450	1.50E-02	1.16E-02	0.00E+00	0.00E+00	9.00E-02	6.96E-02	No
Formaldehyde <sup>(a)</sup>	HAP	1.32E-01	1.27E-04			2.80E-04	B	469	469	450	450	5.93E-02	4.59E-02	1.26E-01	7.78E-02	7.56E-01	4.67E-01	No
Naphthalene	HAP		1.30E-06	C		3.50E-05	C	469	469	450	450	6.09E-04	4.71E-04	1.58E-02	9.72E-03	9.45E-02	5.83E-02	No
PAHs	HAP		2.20E-06	C		4.00E-05	C	469	469	450	450	1.03E-03	7.98E-04	1.80E-02	1.11E-02	1.08E-01	6.67E-02	No
Propylene Oxide	HAP		2.90E-05	D				469	469	450	450	1.36E-02	1.05E-02	0.00E+00	0.00E+00	8.15E-02	6.31E-02	No
Toluene <sup>(a)</sup>	HAP	7.10E-02	6.79E-05					469	469	450	450	3.18E-02	2.46E-02	0.00E+00	0.00E+00	1.91E-01	1.48E-01	No
Xylene	HAP		6.40E-05	C				469	469	450	450	3.00E-02	2.32E-02	0.00E+00	0.00E+00	1.80E-01	1.39E-01	No
Arsenic	HAP			E		1.10E-05	D	469	469	450	450	0.00E+00	0.00E+00	4.95E-03	3.06E-03	2.97E-02	1.83E-02	No
Beryllium	HAP					3.10E-07	D	469	469	450	450	0.00E+00	0.00E+00	1.40E-04	8.61E-05	8.37E-04	5.17E-04	No
Cadmium	HAP			E		4.80E-06	D	469	469	450	450	0.00E+00	0.00E+00	2.16E-03	1.33E-03	1.30E-02	8.00E-03	No
Chromium	HAP					1.10E-05	D	469	469	450	450	0.00E+00	0.00E+00	4.95E-03	3.06E-03	2.97E-02	1.83E-02	No
Lead	HAP			E		1.40E-05	D	469	469	450	450	0.00E+00	0.00E+00	6.30E-03	3.89E-03	3.78E-02	2.33E-02	No
Manganese	HAP			E		7.90E-04	D	469	469	450	450	0.00E+00	0.00E+00	3.56E-01	2.19E-01	2.13E+00	1.32E+00	No
Mercury	HAP			E		1.20E-06	D	469	469	450	450	0.00E+00	0.00E+00	5.40E-04	3.33E-04	3.24E-03	2.00E-03	No
Nickel	HAP					4.60E-06	D	469	469	450	450	0.00E+00	0.00E+00	2.07E-03	1.28E-03	1.24E-02	7.67E-03	No
Selenium	HAP					2.50E-05	D	469	469	450	450	0.00E+00	0.00E+00	1.13E-02	6.95E-03	6.75E-02	4.17E-02	No
Annual Fuel Use (MMBtu/yr)																		
CTG Natural Gas Maximum <sup>(g)</sup>		4,350,720																
CTG Distillate Oil Maximum <sup>(g)</sup>		3,333,951																
Number of CTGs per Facility		6																
Facility Total HAPs 2.7																		
Maximum Individual HAP 1.3																		
Natural Gas Heating Value 1047 Btu/SCF (HHV)																		
Notes:																		
(a) Type = NC for Non-Criteria Pollutants, HAP/POM for compounds included as polycyclic organic matter or HAP for Hazardous Air Pollutant.																		
(b) Maximum heat input rate for turbine is based on HHV data at an ambient temperature of 42°F and base load operating conditions.																		
(c) Average heat input rate is based on data at an average ambient temperature of 42°F and base load operating conditions.																		
(d) Emission Factor (lb/MMBtu) = (Emission Factor, lb/10 <sup>6</sup> scf) / (Heat Value Btu/scf)																		
(e) Hourly Emission Rate (lb/hr) = [Heat Input (MMBtu/Hr) * Emission Factor (lb/MMBtu)]																		
(f) Annual Emission Rate (tons/year) = [Annual Heat Input (MMBtu/Yr) * Emission Factor (lb/MMBtu)] / (2,000 lb/ton)]																		
(g) Emission Factors from CARB CATEF emission factor database for natural gas fired combustion turbines.																		
(h) Modified from AP-42 Section 3.1 emissions database for aero derivative turbines.																		
(i) Annual Fuel Use increased by 10% margin.																		



**Table**  
**AP-42 Emission Factor for Formaldehyde Emissions from Natural Gas Fired Combustion Turbine**

ID Number	Facility	Turbine	Turbine Rating	Turbine Load	AP-42 Expected			GE LM2500	
					AP-42	Final Value	AP-42, Less Outliers	GE LM2500 Turbines	GE LM2500 Turbines - Less Outliers
					(lb/Mmcuft)	(lb/Mmcuft)	(lb/Mmcuft)	(lb/Mmcuft)	(lb/Mmcuft)
11	Gilroy Energy Co./Gilroy, CA	General Electric Frame 7	87 MW	NR	0.72	0.72	0.72		
12.1	Sithe Energies, 32nd St. Naval S/San Diego, CA	General Electric MS6000	44 MW	100	0.11	0.11	0.11		
13.1	SD Gas & Electric Co./San Diego, CA	General Electric 5221	17 MW	95	0.48	0.48	0.48		
15.1	Modesto Irrigation District/Mclure/Modesto, CA	General Electric Frame 7B	50 MW	100	0.14	0.14	0.14		
16	Willamette Industries, Inc./Oxnard, CA	General Electric LM2500-PE	67.4 MW	33	0.04	0.04	0.04	0.04	0.04
18	Sycamore Cogen. Co./Bakersfield, CA	General Electric Frame 7	75 MW	100	0.09	0.09	0.09		
2	Calpine / Agnews Cogen./San Jose, CA	General Electric LM5000	23.33 MW	100	0.06	0.06	0.06	0.06	0.06
21	Dexzel Inc./Bakersfield, CA	General Electric LM2500	29.1 MW	77	0.03	0.03	0.03	0.03	0.03
22	Procter & Gamble Manufacturing/Sacramento, CA	General Electric LM2500	20.5 MW	95	0.09	0.09	0.09	0.09	0.09
23	Chevron Inc./Gaviota, CA	Allison K501	2.5 MW	NR	3.57	3.57	3.57		
25 <sup>2</sup>	Eli / Stewart & Stevenson/Berkeley, CA	General Electric LM2500	25 MW	NR	0.48	0.48	0.48	0.48	
26	Calpine Corp./Sumas, WA	General Electric MS7001EA	87.83 MW	100	0.01	0.01	0.01		
27	Sargent Canyon Cogen/Bakersfield, CA	General Electric Frame 6	42.5 MW	50	0.06	0.06	0.06		
28	Watsonville Cogen, Partnership/Watsonville, CA	General Electric LM 2500	24 MW	100	0.09	0.09	0.09	0.09	0.09
3.1	Southern Cal. Edison Co./Long Beach, CA	Brown-Boveri-Sulzer 11-D	61.75 MW	107	1.33	1.33	1.33		
313.1.1	NR/NR	General Electric Frame 3	7.7 MW	100	0.27	0.27	0.27		
313.1.2	NR/NR	General Electric Frame 3	7.7 MW	25	0.43	0.43	0.43		
313.2.1	NR/NR	Solar T12000	9.4 MW	100	0.02	0.02	0.02		
313.2.2	NR/NR	Solar T12000	9.4 MW	25	9.62	9.62	9.62		
315.1	NR/NR	General Electric LM1500	10.6 MW	100	4.27	4.27	4.27		
315.2	NR/NR	General Electric LM1500	10.6 MW	25	25.91	25.91			
4.1.2x <sup>1</sup>	Southern Cal. Edison Co./Coolwater, CA	Westinghouse PACE520	63 MW	100	38.96				
4.2	Southern Cal. Edison Co./Coolwater, CA	Westinghouse PACE520	63 MW	100	0.35	0.35	0.35		
6.2	Imperial Irrigation D / Choachella/Imperial, CA	General Electric NS5000P	46.3 MW	100	0.31	0.31	0.31		
7	Bonneville Pacific Corp./Somis, CA	Solar Mars	9 MW	100	0.74	0.74	0.74		
9	WSPA/SWEPI GT/Bakersfield, CA	Allison 501 KB5	4 MW	85	0.01	0.01	0.01		
Mean (lb/Mmcuft)					3.39	1.97	0.97	0.13	0.06
Std Dev					8.98	5.41	2.13	0.17	0.03

**Notes:**

<sup>1</sup> Formaldehyde data point was an outlier. Retest of the same turbine (ID Number 4.2) generated formaldehyde data more consistent with other formaldehyde data in the database.

<sup>2</sup> The data point for the Eli/Stewart & Stevenson facility was calculated from three "non-detects"; the Test Method employed an unusually high detection limit.



**TANKS 4.0**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	Broward-Thornborough Main Storage Tank
City:	Deerfield Beach
State:	FL
Company:	Broward Development Company, LLC
Type of Tank:	Vertical Fixed Roof Tank
Description:	Distillate Oil Storage Tank

**Tank Dimensions**

Shell Height (ft):	40.00
Diameter (ft):	85.00
Liquid Height (ft):	36.00
Avg. Liquid Height (ft):	32.00
Volume (gallons):	1,425,000.00
Turnovers:	17.05
Net Throughput (gal/yr):	24,300,000.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Roof Characteristics**

Type:	Cone
Height (ft):	54.00
Slope (ft/ft) (Cone Roof):	1.27

**Breather Vent Settings**

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: West Palm Beach, Florida (Avg Atmospheric Pressure = 14.75 psia)



## TANKS 4.0

### Emissions Report - Detail Format

### Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jan	71.89	67.27	76.51	74.74	0.0095	0.0082	0.0110	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Feb	72.69	67.68	77.70	74.74	0.0098	0.0083	0.0114	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Mar	74.77	69.73	79.82	74.74	0.0104	0.0089	0.0122	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Apr	76.65	71.30	82.01	74.74	0.0110	0.0093	0.0130	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	May	78.57	73.45	83.69	74.74	0.0117	0.0100	0.0137	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Jun	79.75	74.89	84.60	74.74	0.0121	0.0104	0.0141	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Jul	80.53	75.53	85.52	74.74	0.0124	0.0107	0.0145	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Aug	80.52	75.72	85.32	74.74	0.0124	0.0107	0.0144	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Sep	79.81	75.47	84.15	74.74	0.0122	0.0106	0.0139	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Oct	77.87	73.73	82.01	74.74	0.0115	0.0101	0.0130	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Nov	75.11	71.02	79.20	74.74	0.0105	0.0093	0.0119	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Dec	72.81	68.52	77.10	74.74	0.0098	0.0085	0.0112	130.0000			188.00	Option 5: A=12.101, B=8907



# TANKS 4.0 Emissions Report - Detail Format Detail Calculations (AP-42)

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	30.2056	30.5426	36.0976	39.2333	40.6276	38.1902	41.5875	39.7604	33.7010	31.3236	27.7662	28.4582
Vapor Space Volume (cu ft):	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448
Vapor Density (lb/cu ft):	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002
Vapor Space Expansion Factor:	0.0309	0.0338	0.0339	0.0361	0.0342	0.0322	0.0332	0.0317	0.0283	0.0269	0.0267	0.0283
Vented Vapor Saturation Factor:	0.9871	0.9867	0.9859	0.9850	0.9841	0.9835	0.9832	0.9832	0.9835	0.9845	0.9857	0.9867
Tank Vapor Space Volume												
Vapor Space Volume (cu ft):	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448	147,537.0448
Tank Diameter (ft):	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000
Vapor Space Outage (ft):	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000
Tank Shell Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Average Liquid Height (ft):	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000
Roof Outage (ft):	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000
Roof Outage (Cone Roof)												
Roof Outage (ft):	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000	18.0000
Roof Height (ft):	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000	54.0000
Roof Slope (ft/ft):	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700	1.2700
Shell Radius (ft):	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000	42.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Daily Avg. Liquid Surface Temp. (deg. R):	531.5594	532.3604	534.4432	536.3228	538.2400	539.4187	540.1989	540.1925	539.4829	537.5424	534.7800	532.4804
Daily Average Ambient Temp. (deg. F):	65.1000	66.2000	70.0000	73.3500	77.6500	80.6000	82.2000	82.5000	81.6000	77.8000	72.2500	67.3500
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,037.1556	1,273.2045	1,579.0528	1,881.0938	1,899.8128	1,810.9772	1,867.7685	1,764.6557	1,531.1450	1,331.2649	1,092.6779	985.7579
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0309	0.0338	0.0339	0.0361	0.0342	0.0322	0.0332	0.0317	0.0283	0.0269	0.0267	0.0283
Daily Vapor Temperature Range (deg. R):	18.4729	20.0285	20.1883	21.4100	20.4911	19.4203	19.9786	19.1998	17.3683	16.5608	16.3611	17.1482
Daily Vapor Pressure Range (psia):	0.0028	0.0031	0.0033	0.0037	0.0037	0.0036	0.0038	0.0037	0.0032	0.0029	0.0027	0.0026
Breather Vent Press. Setting Range (psia):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0082	0.0083	0.0089	0.0093	0.0100	0.0104	0.0107	0.0107	0.0106	0.0101	0.0093	0.0085
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0110	0.0114	0.0122	0.0130	0.0137	0.0141	0.0145	0.0144	0.0139	0.0130	0.0119	0.0112
Daily Avg. Liquid Surface Temp. (deg. R):	531.5594	532.3604	534.4432	536.3228	538.2400	539.4187	540.1989	540.1925	539.4829	537.5424	534.7800	532.4804
Daily Min. Liquid Surface Temp. (deg. R):	526.9412	527.3533	529.3961	530.9703	533.1172	534.5636	535.2043	535.3925	535.1408	533.4022	530.6897	528.1934
Daily Max. Liquid Surface Temp. (deg. R):	536.1776	537.3676	539.4903	541.6753	543.3628	544.2737	545.1936	544.9924	543.8249	541.6826	538.8703	536.7675
Daily Ambient Temp. Range (deg. R):	18.8000	19.4000	17.6000	17.3000	15.9000	15.0000	15.4000	15.0000	14.0000	14.2000	15.5000	17.3000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9871	0.9867	0.9859	0.9850	0.9841	0.9835	0.9832	0.9832	0.9835	0.9845	0.9857	0.9867
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Vapor Space Outage (ft):	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000	26.0000



# **TANKS 4.0** **Emissions Report - Detail Format** **Detail Calculations (AP-42)- (Continued)**

Working Losses (lb):	59.6105	61.1326	65.2513	69.1761	73.3916	76.0940	77.9307	77.9153	76.2436	71.8323	65.9398	61.3634
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Net Throughput (gal/mo.):	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000
Annual Turnovers:	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526	17.0526
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000	1,425,000.000
Maximum Liquid Height (ft):	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000	36.0000
Tank Diameter (ft):	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000	85.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	89.8162	91.6752	101.3490	108.4094	114.0192	114.2842	119.5182	117.6757	109.9447	103.1559	93.7060	89.8216



**TANKS 4.0**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

Emissions Report for: January , February , March , April , May , June , July , August , September , October , November , December

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	835.88	417.49	1,253.38



**TANKS 4.0**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	Broward-Thornborough Fuel Oil Day Tank
City:	Deerfield Beach
State:	FL
Company:	Broward Development Company, LLC
Type of Tank:	Vertical Fixed Roof Tank
Description:	Distillate Oil Day Storage Tank

**Tank Dimensions**

Shell Height (ft):	24.00
Diameter (ft):	50.00
Liquid Height (ft):	21.00
Avg. Liquid Height (ft):	21.00
Volume (gallons):	285,000.00
Turnovers:	85.26
Net Throughput (gal/yr):	24,300,000.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Roof Characteristics**

Type:	Cone
Height (ft):	32.00
Slope (ft/ft) (Cone Roof):	1.28

**Breather Vent Settings**

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: West Palm Beach, Florida (Avg Atmospheric Pressure = 14.75 psia)



# TANKS 4.0 Emissions Report - Detail Format Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jan	71.89	67.27	76.51	74.74	0.0095	0.0082	0.0110	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Feb	72.69	67.68	77.70	74.74	0.0098	0.0083	0.0114	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Mar	74.77	69.73	79.82	74.74	0.0104	0.0089	0.0122	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Apr	76.65	71.30	82.01	74.74	0.0110	0.0093	0.0130	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	May	78.57	73.45	83.69	74.74	0.0117	0.0100	0.0137	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Jun	79.75	74.89	84.60	74.74	0.0121	0.0104	0.0141	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Jul	80.53	75.53	85.52	74.74	0.0124	0.0107	0.0145	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Aug	80.52	75.72	85.32	74.74	0.0124	0.0107	0.0144	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Sep	79.81	75.47	84.15	74.74	0.0122	0.0106	0.0139	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Oct	77.87	73.73	82.01	74.74	0.0115	0.0101	0.0130	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Nov	75.11	71.02	79.20	74.74	0.0105	0.0093	0.0119	130.0000			188.00	Option 5: A=12.101, B=8907
Distillate fuel oil no. 2	Dec	72.81	68.52	77.10	74.74	0.0098	0.0085	0.0112	130.0000			188.00	Option 5: A=12.101, B=8907



# TANKS 4.0 Emissions Report - Detail Format Detail Calculations (AP-42)

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	5.5278	5.5903	6.6099	7.1869	7.4455	7.0008	7.6250	7.2900	6.1779	5.7396	5.0847	5.2089
Vapor Space Volume (cu ft):	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372
Vapor Density (lb/cu ft):	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002
Vapor Space Expansion Factor:	0.0309	0.0338	0.0339	0.0361	0.0342	0.0322	0.0332	0.0317	0.0283	0.0269	0.0267	0.0283
Vented Vapor Saturation Factor:	0.9932	0.9930	0.9925	0.9921	0.9916	0.9913	0.9911	0.9911	0.9913	0.9918	0.9924	0.9930
Tank Vapor Space Volume												
Vapor Space Volume (cu ft):	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372	26,834.4372
Tank Diameter (ft):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Vapor Space Outage (ft):	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667
Tank Shell Height (ft):	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000	24.0000
Average Liquid Height (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Roof Outage (ft):	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667
Roof Outage (Cone Roof)												
Roof Outage (ft):	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667	10.6667
Roof Height (ft):	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000	32.0000
Roof Slope (ft/ft):	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800	1.2800
Shell Radius (ft):	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000	25.0000
Vapor Density												
Vapor Density (lb/cu ft):	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Daily Avg. Liquid Surface Temp. (deg. R):	531.5594	532.3604	534.4432	536.3228	538.2400	539.4187	540.1989	540.1925	539.4829	537.5424	534.7800	532.4804
Daily Average Ambient Temp. (deg. F):	65.1000	66.2000	70.0000	73.3500	77.6500	80.6000	82.2000	82.5000	81.6000	77.8000	72.2500	67.3500
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067	534.4067
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,037.1556	1,273.2045	1,579.0528	1,881.0938	1,899.8128	1,810.9772	1,867.7685	1,764.6557	1,531.1450	1,331.2649	1,092.6779	985.7579
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0309	0.0338	0.0339	0.0361	0.0342	0.0322	0.0332	0.0317	0.0283	0.0269	0.0267	0.0283
Daily Vapor Temperature Range (deg. R):	18.4729	20.0285	20.1883	21.4100	20.4911	19.4203	19.9786	19.1998	17.3683	16.5608	16.3611	17.1482
Daily Vapor Pressure Range (psia):	0.0028	0.0031	0.0033	0.0037	0.0037	0.0036	0.0038	0.0037	0.0032	0.0029	0.0027	0.0026
Breather Vent Press. Setting Range (psia):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0082	0.0083	0.0089	0.0093	0.0100	0.0104	0.0107	0.0107	0.0106	0.0101	0.0093	0.0085
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0110	0.0114	0.0122	0.0130	0.0137	0.0141	0.0145	0.0144	0.0139	0.0130	0.0119	0.0112
Daily Avg. Liquid Surface Temp. (deg R):	531.5594	532.3604	534.4432	536.3228	538.2400	539.4187	540.1989	540.1925	539.4829	537.5424	534.7800	532.4804
Daily Min. Liquid Surface Temp. (deg R):	526.9412	527.3533	529.3961	530.9703	533.1172	534.5636	535.2043	535.3925	535.1408	533.4022	530.6897	528.1934
Daily Max. Liquid Surface Temp. (deg R):	536.1776	537.3676	539.4903	541.6753	543.3628	544.2737	545.1936	544.9924	543.8249	541.6826	538.8703	536.7675
Daily Ambient Temp. Range (deg. R):	18.8000	19.4000	17.6000	17.3000	15.9000	15.0000	15.4000	15.0000	14.0000	14.2000	15.5000	17.3000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9932	0.9930	0.9925	0.9921	0.9916	0.9913	0.9911	0.9911	0.9913	0.9918	0.9924	0.9930
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Vapor Space Outage (ft):	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667	13.6667



**TANKS 4.0**  
**Emissions Report - Detail Format**  
**Detail Calculations (AP-42)- (Continued)**

Working Losses (lb):	30.9092	31.6984	33.8340	35.8691	38.0549	39.4562	40.4085	40.4005	39.5337	37.2464	34.1910	31.8181
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0095	0.0098	0.0104	0.0110	0.0117	0.0121	0.0124	0.0124	0.0122	0.0115	0.0105	0.0098
Net Throughput (gal/mo.):	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000	2,025,000.000
Annual Turnovers:	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632	85.2632
Turnover Factor:	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185	0.5185
Maximum Liquid Volume (gal):	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000	285,000.0000
Maximum Liquid Height (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Tank Diameter (ft):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	36.4370	37.2887	40.4439	43.0560	45.5004	46.4569	48.0335	47.6905	45.7117	42.9859	39.2757	37.0270



**TANKS 4.0**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

Emissions Report for: January , February , March , April , May , June , July , August , September , October , November , December

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	433.42	76.49	509.91





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**Enron North America Corp.**

P.O. Box 1188

Houston, TX 77251-1188

**RECEIVED**

**AUG 23 2000**

**BUREAU OF AIR REGULATION**

August 21, 2000

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Al Linero, PE  
Administrator, New Source Review Section  
Florida Department of Environmental Protection  
2600 Blair Stone Road, MS#5505  
Tallahassee, FL 32399-2400

RE: Medley Electric Generating Plant  
Midway-St. Lucie Electric Generating Plant  
Broward-Thornborough Electric Generating Plant  
Applications for Air Construction Permit  
Request to Terminate Application Review

Dear Mr. Linero:

On July 19, 2000 Enron North America submitted permit applications for air construction permits for the Medley and Midway-St. Lucie Electric Generating Facilities. A permit application for the Broward-Thornborough Electric Generating Plant was submitted on August 9, 2000. At the time of application submittal, the fees for permit review were also submitted. These applications were submitted in anticipation of achieving a June, 2001 startup date at one or more of these sites.

After a recent evaluation of the environmental and land use approvals required for these sites, we have decided that developing these projects for a start date in calendar year 2001 is not realistic. As a result, we are advising the Florida Department of Environmental Protection (DEP) to halt review of these permit applications.

It is our intention to continue development of these sites for projects that would be commercially viable in the year 2002. However, it is possible that for this later start date we would employ combustion turbine configurations that differ from those identified in the applications we have submitted. As a result, we feel that it would not be productive to receive permits for the LM6000 configuration.



Mr. A. A. Linero  
August 21, 2000  
Page 2

Please feel free to contact me at (713) 853-3161 if you have any questions regarding this request.

Sincerely,  
Enron North America

A handwritten signature in black ink that reads "David A. Kellermeyer". The signature is fluid and cursive, with a long horizontal stroke extending from the end of the name.

David A. Kellermeyer  
Director

cc: Greg Krause  
Steve Krinsky





---

## Facsimile Cover Sheet

**To:** Al Linero  
**Company:** Florida DEP  
**Phone:** (850) 921-9523  
**Fax:** (850) 922-6979

**From:** Dave Kellermeyer  
**Company:** Enron North America  
**Phone:** (713) 853-3161  
**Fax:** (713) 646-3037

**Date:** 08/21/00  
**Pages including this  
cover page:** 3

**Comments:**

Al-

Please see attached re: pending permit applications.

Dave Kellermeyer





**Enron North America Corp.**

P.O. Box 1188  
Houston, TX 77251-1188

August 21, 2000

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

Mr. Al Linero, PE  
Administrator, New Source Review Section  
Florida Department of Environmental Protection  
2600 Blair Stone Road, MS#5505  
Tallahassee, FL 32399-2400

RE: Medley Electric Generating Plant  
Midway-St. Lucie Electric Generating Plant  
Broward-Thornborough Electric Generating Plant  
Applications for Air Construction Permit  
Request to Terminate Application Review

Dear Mr. Linero:

On July 19, 2000 Enron North America submitted permit applications for air construction permits for the Medley and Midway-St. Lucie Electric Generating Facilities. A permit application for the Broward-Thornborough Electric Generating Plant was submitted on August 9, 2000. At the time of application submittal, the fees for permit review were also submitted. These applications were submitted in anticipation of achieving a June, 2001 startup date at one or more of these sites.

After a recent evaluation of the environmental and land use approvals required for these sites, we have decided that developing these projects for a start date in calendar year 2001 is not realistic. As a result, we are advising the Florida Department of Environmental Protection (DEP) to halt review of these permit applications.

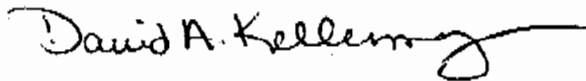
It is our intention to continue development of these sites for projects that would be commercially viable in the year 2002. However, it is possible that for this later start date we would employ combustion turbine configurations that differ from those identified in the applications we have submitted. As a result, we feel that it would not be productive to receive permits for the LM6000 configuration.



Mr. A. A. Linero  
August 21, 2000  
Page 2

Please feel free to contact me at (713) 853-3161 if you have any questions regarding this request.

Sincerely,  
Enron North America

A handwritten signature in black ink, reading "David A. Kellermeyer". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

David A. Kellermeyer  
Director

cc: Greg Krause  
Steve Krinsky





**Enron North America Corp.**

P.O. Box 1188

Houston, TX 77251-1188

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**AUG 09 2000**

**BUREAU OF AIR REGULATION**

August 8, 2000

Mr. Al Linero, P.E.  
Administrator, New Source Review Section  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

RE: Broward Development Company, LLC  
Permit Application for Broward-Thornborough Electric Generating Plant

Dear Mr. Linero:

On behalf of Broward Development Company, LLC, enclosed are four (4) copies of an air permit application for the Broward-Thornborough Electric Generating Plant in Broward County, Florida. This application is for a non-PSD permit for a simple cycle combustion turbine power plant consisting of 6 LM6000 dual-fuel units. Separate copies of this application are being sent to the Southeast District of the DEP as well as to the local air quality agency in Broward County.

If you have any questions, please don't hesitate to call me at (713) 853-3161.

Sincerely,  
Enron North America

A handwritten signature in black ink that reads "David A. Kellermeyer". The signature is fluid and cursive, with a long horizontal line extending from the end of the name.

David A. Kellermeyer  
Director

Enclosures

cc: Mr. Lennon Anderson, Southeast District  
Mr. Jarrett Mack, Air Quality Division, Broward County  
*Bruce Nelson*