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TO: Theresa Heron / Betty Adams
COMPANY: Florida Department of Environmental Reg
FAX NUMBER: 904-922-6979
TELEPHONE NUMBER: 904-488-1344
FROM: Amy Carlson
EXTENSION: 7425 LOCATION: PSCS
NUMBER OF PAGES, INCLUDING THIS COVER SHEET: 2
SUBJECT: Waiver

B&V PROJECT: 17645
B&V PHASE: 130
B&V FILE: 32.0000
DATE: 11/5/92

MESSAGE: Please call if you have any questions.

CC:

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WAIVER OF 90 DAY TIME LIMIT
UNDER SECTIONS 120.60(2) and 403.0876, FLORIDA STATUTES

License (Permit, Certification) Application No. AC49-205703 PSD-FL-182

Applicant's Name: Kissimmee Utility Authority

With regard to the above referenced application, the applicant hereby with full knowledge and understanding of applicant's rights under Sections 120.60(2) and 403.0876, Florida Statutes, waives the right to have the application approved or denied by the State of Florida Department of Environmental Regulation within the 90 day time period prescribed by law. Said waiver is made freely and voluntarily by the applicant, with full knowledge, and without any pressure or coercion by anyone employed by the State of Florida Department of Environmental Regulation.

This waiver shall expire on the 20 day of November 19 92.

The undersigned is authorized to make this waiver on behalf of the applicant.

David M Lefebvre
Signature

David M. Lefebvre
Name (Please Type or Print)

Revised April, 1990

Technical Evaluation
and
Preliminary Determination

Kissimmee Utility Authority
Kissimmee, Osceola County, Florida

40 MW Simple Cycle Combustion Gas Turbine
120 MW Combined Cycle Combustion Gas Turbine

Permit Number: AC49-205703
PSD-FL-182

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

November 18, 1992

SYNOPSIS OF APPLICATION

I. NAME AND ADDRESS OF APPLICANT

Kissimmee Utility Authority
1701 West Carroll Street
Kissimmee, Florida 34741

II. REVIEWING AND PROCESS SCHEDULE

Date of Receipt of Application: November 15, 1991 (original application); June 2, 1992 (revised application).

Completeness Review: Department letter dated June 30, 1992.

Response to Incompleteness Letters: Company letters received on July 30, August 17, and October 8, 1992.

Application Completeness Date: August 17, 1992.

III. FACILITY INFORMATION

III.1 **Facility Location**

This facility is located near Intercession City, Osceola County, Florida. The UTM coordinates are Zone 17, 447.722 km East and 3127.685 km North.

III.2 **Facility Identification Code (SIC)**

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

Industry Group No. 491 - Combination Electric, Gas and Other Utility Services.

Industry Group No. 4911 - Electric and Other Services Combined.

III.3 **Facility Category**

Kissimmee Utility Authority (KUA) proposed project near Intercession City is classified as a major emitting facility. The proposed project, construction of a 40 MW simple cycle combustion turbine (SCCT) and a 120 MW combined cycle combustion turbine (CCCT), will increase emissions by 611 tons per year (TPY) of nitrogen oxides (NO_x); 18 TPY of sulfur dioxide (SO_2); 276 TPY of carbon monoxide (CO); 73 TPY of particulate matter (PM); 16 TPY of volatile organic compounds (VOC); 0.001 TPY of beryllium; 0.01 TPY compliance with all applicable provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; 17-2.660: Standards of Performance for New Stationary Sources (NSPS); 17-2.700: Stationary Point Source Emission Test Procedures; and, 17-4.130: Plant Operation-Problems.

The source shall be in compliance with the New Source Performance Standards for Gas Turbines, Subpart GG, Appendix A, which is contained in 40 CFR 60, and is adopted by reference in F.A.C. Rule 17-2.660.

VI. SOURCE IMPACT ANALYSIS

VI.1 **Emission Limitations**

The operation of this combined cycle system facility burning No. 2 fuel oil and natural gas will produce emissions of NO_x, SO_2, CO, sulfuric acid mist, PM, As, Fluorines (F), Be, Pb and Hg. The impact of these pollutant emissions are below the Florida ambient air quality standards (AAQS) and/or the acceptable ambient concentration levels (AAC). Table 1 and 2 list each contaminant and its maximum expected emission rates for each type of combustion gas turbine.

VI.2 **Air Toxics Evaluation**

The operation of the sources will produce emissions of chemical compounds that may be toxic in high concentrations. The emission rates of these chemicals shall not create ambient concentrations greater than the No-Threat-Level (NTL) listed in the Department's air toxic list. This project is in compliance with the Department's air toxic guidelines.

VI.3 **Air Quality Analysis**

a. Introduction

The operation of the proposed facility will result in emissions increases which are projected to be greater than the PSD significant emission rates for the following pollutants: NO_x, SO_2, PM, PM_{10}, Be, CO, VOC, and H_2SO_4 mist. Therefore, the project is subject to the PSD NSR requirements contained in F.A.C. Rule 17-2.500(5) for these pollutants. Part of these requirements is an air quality impact analysis for these pollutants which includes the following:

- An analysis of existing air quality;
- A PSD increment analysis (for SO_2, PM, PM_{10}, and NO_2);
- An ambient Air Quality Standards analysis (AAQS);
- An analysis of impacts on soils, vegetation, visibility

of lead; 0.002 TPY of mercury; and 2 TPY of sulfuric acid mist if operated at 8,260 hours per year on gas and 500 hours per year on fuel oil (0.05% S) for each turbine fired at base load for ISO ambient conditions. If the gas pipeline extension is not in place by 1995, then the CTs will operate a maximum of 1000 hours per year on fuel oil. Emission increases in this situation will be 635 TPY of NO_x, 36 TPY of SO_2, 435 TPY of CO, 76 TPY of PM, 17 TPY of VOC, 0.002 TPY of Be, 0.02 TPY of Pb, 0.004 TPY of Hg, 4 TPY of H_2SO_4.

IV. PROJECT DESCRIPTION

Kissimmee Utility Authority proposes to operate two combustion gas turbines: 1) a 40 MW SCCT, GE LM6000, and 2) a 120 MW CCCT consisting of one 80 MW combustion turbine (CT), GE PG7111EA, one 40 MW steam turbine (ST), and one unfired heat recovery steam generator (HRSG) and ancillary equipment. The first unit is planned for initial operation on or about October, 1993, followed by the second unit planned for initial operation on or about January, 1995. The CTs will have the capability to fire either natural gas or No. 2 fuel oil. Water injection or low NO_x combustors will be used to control nitrogen oxides (NO_x) emissions and low sulfur fuel (0.05% S) will be fired to control sulfur dioxide (SO_2) emissions. The CCCT will intermittently operate in a simple cycle (or by-pass mode) when the HRSG is down for maintenance and/or repair.

V. RULE APPLICABILITY

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, Chapters 17-2 and 17-4, Florida Administrative Code (F.A.C.), and 40 CFR (July, 1990 version).

The plant is located in an area designated attainment for all criteria pollutants in accordance with F.A.C. Rule 17-2.420.

The proposed project will be reviewed under F.A.C. Rule 17-2.500(5), New Source Review (NSR) for Prevention of Significant Deterioration (PSD), because it will be a major new stationary source. This review consists of a determination of Best Available Control Technology (BACT) and unless otherwise exempted, an analysis of the air quality impact of the increased emissions. The review also includes an analysis of the project's impacts on soils, vegetation and visibility; along with air quality impacts resulting from associated commercial, residential and industrial growth.

The proposed source shall be in compliance with all applicable provisions of F.A.C. Chapters 17-2 and 17-4 and the 40 CFR (July, 1992 version). The proposed source shall be in satisfy the ambient monitoring analysis requirement. Background SO_2 values of 63 ug/m^3, 3-hr average; 19 ug/m^3, 24-hr average; and 5 ug/m^3, annual average, were based on these data. This site is located 38.6 km away from the project.

c. Modeling Method

The EPA-approved Industrial Source Complex Short-Term (ISCST) dispersion model was used by the applicant to predict the impact of the proposed project on the surrounding ambient air. All recommended EPA default options were used. Downwash parameters were used because the stacks were less than the good engineering practice (GEP) stack height. Five years of sequential hourly surface and mixing depth data from the Orlando/Tampa, Florida National Service (NWS) stations collected during 1982 through 1986 were used in the model. Since five years of data were used, the highest-second-high (HSH) short-term predicted concentrations are compared with the appropriate ambient air quality standards or PSD increments. For the annual averages, the highest predicted yearly average was compared with the standards. The highest impacts were used for comparison with the PSD significant impact levels.

d. Modeling Results

The applicant first evaluated the potential increase in ambient ground-level concentrations associated with the project to determine if these predicted ambient concentration increases would be greater than specified PSD significant impact levels for SO_2, CO, NO_x, PM and PM_{10}. This evaluation was based on the proposed SCCT unit operating at 100% load and the proposed CCCT unit operating at load conditions of peak, 100, 75, 50 and 25 percent. The modeling was performed using the highest pollutant emissions and lowest stack exit temperatures at 20°F design condition coupled with the lowest exit gas flow rates at 102°F design condition to maximize predicted impacts. The applicant modeled emissions based on the use of fuel oil with a maximum sulfur content of 0.3%. However, the applicant will use a cleaner fuel oil with a maximum of 0.05% sulfur content in order to comply with PSD Class I increments. All significant impact, NAAQS, and PSD Class II increment analyses are based on the use of 0.3% sulfur fuel oil; therefore, the modeled results show higher impacts than actually expected and the results are conservative. The maximum predicted concentrations occur for different load conditions based upon which pollutant is being considered. Dispersion modeling was performed with polar receptors placed along the 36 standard radial directions (10 degrees apart) surrounding the proposed units at the following downwind distances: (1) intervals of 100 meters from 200 to 1,500 meters; (2) intervals of 250 meters from 1,500 to 3,000 meters; (3) 500 meter intervals from 3 to 5 kilometers; (4) 1 kilometer intervals from 5 to 15 kilometers, and (5) 20 and 25 kilometers.

and growth-related air quality impacts; and,
- A Good Engineering Practice (GEP) stack height determination.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses are based on air quality dispersion modeling completed in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the proposed project, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A brief description of the modeling methods used and results of the required analyses follow. A more complete description is contained in the permit application on file.

b. Analysis of the Existing Air Quality

Preconstruction ambient air quality monitoring may be required for pollutants subject to PSD review. However, an exemption to the monitoring requirement can be obtained if the maximum air quality impact resulting from the projected emissions increase, as determined through air quality modeling, is less than a pollutant-specific de minimus concentration. The predicted maximum concentration increase for each pollutant subject to PSD (NSR) is given below:

	SO_2	TSP & PM_{10}	NO_2	CO	Be
PSD de minimus Concentra. (ug/m^3)	13	10	14	575	.001
Averaging Time	24-hr	24-hr	Annual	8-hr	24-hr
Maximum Predicted Impact (ug/m^3)	73.6	4.8	0.7	473.7	0.00059

There are no monitoring de minumus concentrations for H_2SO_4 mist and VOC emissions. As shown above, the predicted impacts for TSP/PM_{10}, NO_2, CO, and Be are all less than the corresponding de minimus concentrations; therefore, no preconstruction monitoring is required for these pollutants. Since the predicted SO_2 impact is greater than the de minimus concentration, a preconstruction ambient monitoring analysis would generally be required for SO_2. However, the Department determined that the use of existing FDER air quality monitoring data collected in 1991 from the Winter Park SO_2 monitoring site in Orange County would be appropriate to

The nearest PSD Class I area is the Chassahowitzka National Wilderness Area located 115 km from the facility. The predicted impact of the proposed project on this area was evaluated by using the long range transport model Mesopuff II to predict maximum increment consumptions by the source alone and by comparing these predicted values to the appropriate recommended significance levels to determine whether further modeling was necessary. The significance levels used by the Department were the more stringent National Park Service (NPS) recommended levels. The predicted maximum NO_2 increment consumption was less than the significance level. Therefore, no further modeling for NO_2 was required. In addition, the predicted maximum SO_2 annual average increment consumption by the source alone was also below the NPS significance level. However, the predicted maximum SO_2 24-hour and 3-hour concentrations from the project alone were predicted to be greater than the NPS levels when 0.3% sulfur fuel oil was used. The applicant further evaluated the SO_2 short term impacts on the Class I area by using Mesopuff II and modeling the inventory of all PSD increment consuming and expanding sources on days when the predicted impacts from the project were greater than significant. The results of the modeling for at least one period showed that cumulative source impacts would be above Class I PSD increments. Therefore, the project's fuel sulfur content was limited to 0.05% so that all project impacts would be below the NPS significance levels during all periods and at all PSD Class I receptors.

Sulfuric acid mist and beryllium are noncriteria pollutants, which means that neither national AAQS nor PSD Significant Impacts have been defined for these pollutants. However, the Department does have a draft Air Toxics Permitting Strategy, which defines no threat levels for these pollutants. The Department and the applicant have used the same modeling procedure described above for the screening analysis to evaluate the maximum increase in ground level concentration of these pollutants for comparison with the no-threat levels. The results of this analysis are shown below:

Avg. Time	H_2SO_4 Mist 24-hr	Be Annual
No Threat-Level (ug/m^3)	2.38	0.00042
Max. Concentration Increase	1.35	0.000011

All of these values are less than their respective no-threat levels.

In addition, rectangular receptors were placed in 250 meter intervals along the property boundary where public access is restricted. The results of this modeling presented below show that the increases in ambient ground-level concentrations for all averaging times are less than the PSD significant impact levels for CO, NO_x, PM and PM_{10}.

	SO_2			NO_2	CO		PM and PM_{10}	
Avg. Time	Annual	3-hr	24-hr	Annual	1-hr	8-hr	Ann.	24-hr
PSD Sign. Level (ug/m^3)	1.0	25.0	5.0	1.0	2000	500	1.0	5.0
Ambient Conc. Increase (ug/m^3)	1.4	187.1	73.6	0.7	1675.8	473.7	0.1	4.8

Therefore, further dispersion modeling for comparison with AAQS and PSD increment consumption were not required for CO, NOx, PM and PM_{10}. However, the results also show that the increases in maximum ambient ground level concentrations for all averaging times for SO_2 were greater than the PSD significant impact levels, thus requiring the applicant to do a full impact analysis for SO_2. The significant impact area for the facility was determined to be 20 km; therefore, all sources within 70 km of the facility were evaluated by the applicant. The results of these analyses for SO_2 and their comparison with the appropriate standards and increments are summarized in the following tables. The tables show that the maximum predicted SO_2 concentrations are all less than the appropriate AAQS and PSD increments.

AAQS Analysis (all values in ug/m^3)

Avg. Time	Annual	3-hr	24-hr
Maximum Predicted Concentration	19.9	355.7	97.6
Includes Background Value of:	5	63	19
AAQS	60	1300	260

Cumulative PSD Class II
Increment Analysis (all values in ug/m^3)

Avg. Time	Annual	3-hr	24-hr
Max. Predicted Consumption Conc.	3.6	130.1	48.6
Increment	20	512	91

e. Additional Impacts Analysis

A Level-1 screening analysis using the EPA model, VISCREEN was used to determine any potential adverse visibility impacts on the Class I Chassahowitzka National Wilderness Area. Based on this analysis, the maximum predicted visual impacts due to the proposed project are less than the screening criteria both inside and outside the Class I area. A comprehensive air quality related values (AQRV) analysis for this Class I area was performed by the applicant.

In addition, the maximum predicted concentrations from NOx, CO, SO_2, PM and PM_{10} are predicted to be less than the AAQS, including the national secondary standards designed to protect public welfare-related values. As such, no harmful effects on soil and vegetation are expected in the area of the project. Also, the proposed modification will not significantly change employment, population, housing or commercial/industrial development in the area to the extent that a significant air quality impact will result.

VII. CONCLUSION

Based on the information provided by Kissimmee Utility Authority, the Department has reasonable assurance that the proposed installation of the 120 MW CCCT and the 40 MW SCCT, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645.130
B&V File 32.0000
October 7, 1992

RECEIVED
OCT 8 1992
Bureau of
Air Regulation

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

Subject: PSD Permit Application
Supplemental Emissions Data

Attention: Mr. C. H. Fancy, P.E.

Gentlemen:

Enclosed are the emissions data for the Cane Island Combustion Turbine project as requested by Theresa Heron of your office. Specifically, the emissions data for the simple and combined cycle turbines operating at ISO ambient conditions under various fuel use scenarios are included. Theresa also requested that the project site's latitude and longitude be provided. The site latitude and longitude are given below.

Site latitude: 28° 16' 40"
Site longitude: 81° 30' 32"

If you have additional questions regarding the emission and stack parameters for this project, please call me at (913) 339-2164 or Amy Carlson at (913) 339-7425.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

alc
Enclosure

cc: Mr. Ben Sharma, Kissimmee Utility Authority
T. Heron
C. Holladay
C. Collins, C Dist
G. Harper, EPA
B. Mitchell, NPS

KISSIMMEE - CANE ISLAND
ISO COMBUSTION TURBINE EMISSIONS

B&V PROJECT 17645.130
10/07/92

POLLUTANT	FUEL		GE LM6000 SCCT	GE 7EA CCCT (25 ppm NOx w/ Quiet Combustor and Water Injection) PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD
SO2	GAS	lb/h	nil	nil	nil	nil	nil	nil
		hr/yr	8760	8760	8760	8760	8760	8760
		ton/yr	0.0	0.0	0.0	0.0	0.0	0.0
	FUEL OIL	lb/h	20	56	52	40	30	20
		hr/yr	8760	8760	8760	8760	8760	8760
		tons/yr	87.6	245.3	227.8	175.2	131.4	87.6
	COMBINED (prior to 1995)	GAS hr/yr	7760			N/A		
		OIL hr/yr	1000					
		tons/yr	10.0					
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	8260	8260	8260	8260	8260	8260
		OIL hr/yr	500	500	500	500	500	500
		tons/yr	5.0	14.0	13.0	10.0	7.5	5.0
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	7760	7760	7760	7760	7760	7760
		OIL hr/yr	1000	1000	1000	1000	1000	1000
		tons/yr	10.0	28.0	26.0	20.0	15.0	10.0
NOx	GAS	lb/h	36	106	98	76	56	95
		hr/yr	8760	8760	8760	8760	8760	8760
		ton/yr	157.7	464.3	429.2	332.9	245.3	416.1
	FUEL OIL	lb/h	63	183	168	131	97	141
		hr/yr	8760	8760	8760	8760	8760	8760
		tons/yr	275.9	801.5	735.8	573.8	424.9	617.6
	COMBINED (prior to 1995)	GAS hr/yr	7760			N/A		
		OIL hr/yr	1000					
		tons/yr	171.2					
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	8260	8260	8260	8260	8260	8260
		OIL hr/yr	500	500	500	500	500	500
		tons/yr	164.4	483.5	446.7	346.6	255.5	427.6
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	7760	7760	7760	7760	7760	7760
		OIL hr/yr	1000	1000	1000	1000	1000	1000
		tons/yr	171.2	502.8	464.2	360.4	265.8	439.1
PARTICULATES	GAS	lb/h	9	5	5	5	5	5
		hr/yr	8760	8760	8760	8760	8760	8760
		ton/yr	39.4	21.9	21.9	21.9	21.9	21.9
	FUEL OIL	lb/h	12	15	15	15	15	15
		hr/yr	8760	8760	8760	8760	8760	8760
		tons/yr	52.6	65.7	65.7	65.7	65.7	65.7
	COMBINED (prior to 1995)	GAS hr/yr	7760			N/A		
		OIL hr/yr	1000					
		tons/yr	40.9					
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	8260	8260	8260	8260	8260	8260
		OIL hr/yr	500	500	500	500	500	500
		tons/yr	40.2	24.4	24.4	24.4	24.4	24.4
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	7760	7760	7760	7760	7760	7760
		OIL hr/yr	1000	1000	1000	1000	1000	1000
		tons/yr	40.9	26.9	26.9	26.9	26.9	26.9

POLLUTANT	FUEL		GE LM6000 SCCT	GE 7EA CCCT (25 ppm NOx w/ Quiet Combustor and Water Injection) PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD
VOC	GAS	lb/h	1.4	2	2	45	86	NA
		hr/yr	8760	8760	8760	8760	8760	8760
		ton/yr	6.1	8.8	8.8	197.1	376.7	NA
	FUEL OIL	lb/h	3	5	5	5	5	4
		hr/yr	8760	8760	8760	8760	8760	8760
		tons/yr	13.1	21.9	21.9	21.9	21.9	17.5
	COMBINED (prior to 1995)	GAS hr/yr	7760					
		OIL hr/yr	1000			N/A		
		tons/yr	6.9					
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	8260	8260	8260	8260	8260	8260
		OIL hr/yr	500	500	500	500	500	500
		tons/yr	6.5	9.5	9.5	187.1	356.4	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	7760	7760	7760	7760	7760	7760
		OIL hr/yr	1000	1000	1000	1000	1000	1000
		tons/yr	6.9	10.3	10.3	177.1	336.2	NA
CO	GAS	lb/h	40	21	21	924	1602	64
		hr/yr	8760	8760	8760	8760	8760	8760
		ton/yr	175.2	92.0	92.0	4,047.1	7,016.8	280.3
	FUEL OIL	lb/h	76	21	22	120	309	27
		hr/yr	8760	8760	8760	8760	8760	8760
		tons/yr	332.9	92.0	96.4	525.6	1,353.4	118.3
	COMBINED (prior to 1995)	GAS hr/yr	7760					
		OIL hr/yr	1000			N/A		
		tons/yr	193.2					
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	8260	8260	8260	8260	8260	8260
		OIL hr/yr	500	500	500	500	500	500
		tons/yr	184.2	92.0	92.2	3,846.1	6,693.5	271.1
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	7760	7760	7760	7760	7760	7760
		OIL hr/yr	1000	1000	1000	1000	1000	1000
		tons/yr	193.2	92.0	92.5	3,645.1	6,370.3	261.8

			GE 7EA CCCT (25 ppm NOx with Dry Low NOx I Combustor)					GE 7EA CCCT (15 ppm NOx with Dry Low NOx II Combustor)				
POLLUTANT	FUEL		PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD	PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD
SO2	GAS	lb/h	NA	nil	nil	nil	nil	NA	nil	nil	nil	nil
		hr/yr		8760	8760	8760	8760	0	8760	8760	8760	0
		ton/yr	NA	0.0	0.0	0.0	0.0	NA	0.0	0.0	0.0	0.0
	FUEL OIL	lb/h	NA	51	41	30	20	NA	52	42	34	NA
		hr/yr		8760	8760	8760	8760	0	8760	8760	8760	0
		tons/yr	NA	223.4	179.6	131.4	87.6	NA	227.8	184.0	148.9	NA
	COMBINED (prior to 1995)	GAS hr/yr										
		OIL hr/yr			N/A					N/A		
		tons/yr										
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	NA	8260	8260	8260	8260	NA	8260	8260	8260	NA
		OIL hr/yr		500	500	500	500	0	500	500	500	0
		tons/yr	NA	12.8	10.3	7.5	5.0	NA	13.0	10.5	8.5	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	NA	7760	7760	7760	7760	NA	7760	7760	7760	NA
		OIL hr/yr		1000	1000	1000	1000	0	1000	1000	1000	0
		tons/yr	NA	25.5	20.5	15.0	10.0	NA	26.0	21.0	17.0	NA
NOx	GAS	lb/h	NA	88	72	54	107	NA	53	44	35	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		ton/yr	NA	385.4	315.4	236.5	468.7	NA	232.1	192.7	153.3	NA
	FUEL OIL	lb/h	NA	166	133	NA	NA	NA	170	138	111	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		tons/yr	NA	727.1	582.5	NA	NA	NA	744.6	604.4	486.2	NA
	COMBINED (prior to 1995)	GAS hr/yr										
		OIL hr/yr			N/A					N/A		
		tons/yr										
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	NA	8260	8260	8260	8260	NA	8260	8260	8260	NA
		OIL hr/yr		500	500	500	500	0	500	500	500	0
		tons/yr	NA	404.9	330.6	NA	NA	NA	261.4	216.2	172.3	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	NA	7760	7760	7760	7760	NA	7760	7760	7760	NA
		OIL hr/yr		1000	1000	1000	1000	0	1000	1000	1000	0
		tons/yr	NA	424.4	345.9	NA	NA	NA	290.6	239.7	191.3	NA
PARTICULATES	GAS	lb/h	NA	7	7	7	7	NA	7	7	7	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		ton/yr	NA	30.7	30.7	30.7	30.7	NA	30.7	30.7	30.7	NA
	FUEL OIL	lb/h	NA	15	15	15	15	NA	15	15	15	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		tons/yr	NA	65.7	65.7	65.7	65.7	NA	65.7	65.7	65.7	NA
	COMBINED (prior to 1995)	GAS hr/yr										
		OIL hr/yr			N/A					N/A		
		tons/yr										
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	NA	8260	8260	8260	8260	NA	8260	8260	8260	NA
		OIL hr/yr		500	500	500	500	0	500	500	500	0
		tons/yr	NA	32.7	32.7	32.7	32.7	NA	32.7	32.7	32.7	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	NA	7760	7760	7760	7760	NA	7760	7760	7760	NA
		OIL hr/yr		1000	1000	1000	1000	0	1000	1000	1000	0
		tons/yr	NA	34.7	34.7	34.7	34.7	NA	34.7	34.7	34.7	NA

POLLUTANT	FUEL		GE 7EA CCCT (25 ppm NOx with Dry Low NOx I Combustor) PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD	GE 7EA CCCT (15 ppm NOx with Dry Low NOx II Combustor) PEAK LOAD	100% LOAD	75% LOAD	50% LOAD	25% LOAD
VOC	GAS	lb/h	NA	2	1	1	6	NA	2	2	3	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		ton/yr	NA	8.8	4.4	4.4	26.3	NA	8.8	8.8	13.1	NA
	FUEL OIL	lb/h	NA	5	NA	NA	NA	NA	5	6	9	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		tons/yr	NA	21.9	NA	NA	NA	NA	21.9	26.3	39.4	NA
	COMBINED (prior to 1995)	GAS hr/yr										
		OIL hr/yr			N/A					N/A		
		tons/yr										
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	NA	8260	8260	8260	8260	NA	8260	8260	8260	NA
		OIL hr/yr		500	500	500	500	0	500	500	500	0
		tons/yr	NA	9.5	NA	NA	NA	NA	9.5	9.8	14.6	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	NA	7760	7760	7760	7760	NA	7760	7760	7760	NA
		OIL hr/yr		1000	1000	1000	1000	0	1000	1000	1000	0
		tons/yr	NA	10.3	NA	NA	NA	NA	10.3	10.8	16.1	NA
CO	GAS	lb/h	NA	43	34	35	738	NA	54	85	104	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		ton/yr	NA	188.3	148.9	153.3	3,232.4	NA	236.5	372.3	455.5	NA
	FUEL OIL	lb/h	NA	43	NA	NA	NA	NA	65	84	104	NA
		hr/yr	0	8760	8760	8760	8760	0	8760	8760	8760	8760
		tons/yr	NA	188.3	NA	NA	NA	NA	284.7	367.9	455.5	NA
	COMBINED (prior to 1995)	GAS hr/yr										
		OIL hr/yr			N/A					N/A		
		tons/yr										
	COMBINED (after 1995 w/ expansion)	GAS hr/yr	NA	8260	8260	8260	8260	NA	8260	8260	8260	NA
		OIL hr/yr		500	500	500	500	0	500	500	500	0
		tons/yr	NA	188.3	NA	NA	NA	NA	239.3	372.1	455.5	NA
	COMBINED (after 1995 w/o expansion)	GAS hr/yr	NA	7760	7760	7760	7760	NA	7760	7760	7760	NA
		OIL hr/yr		1000	1000	1000	1000	0	1000	1000	1000	0
		tons/yr	NA	188.3	NA	NA	NA	NA	242.0	371.8	455.5	NA

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0402
August 14, 1992

RECEIVED
AUG 17 1992
Division of Air Resources Management

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

Subject: Supplemental Information

Attention: Mr. C. H. Fancy, P.E.

Gentlemen:

Enclosed are the results of additional dispersion modeling performed for the bypass stack operation of the Cane Island Combustion Turbine Project proposed by the Kissimmee Utility Authority to further supplement its Authority To Construct/PSD permit application (PSD-FL-182/AC 49-205703). The modeling results demonstrate that ambient air quality impacts are lower for bypass stack operation than for normal combined cycle operation of the project.

We believe these results will allow you to add bypass stack operation to our project. If you have any questions concerning these results, please call me at (913) 339-2164 or Amy Carlson at (913) 339-7425. Thank you for your cooperation in this matter.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

Enclosure

cc: Mr. Ben Sharma, Kissimmee Utility Authority

FEDERAL EXPRESS

[redacted]

QUESTIONS? CALL 800-238-5355 TOLL FREE.

2681272704

AIRBILL
PACKAGE TRACKING NUMBER 2681272704

RECIPIENT'S COPY

[redacted]

1 From (Your Name) Please Print: ... L. Carlson
Date: 8/14/92
Your Phone Number (Very Important): (913) ...
Company
Department/Floor No.
Street Address
City
State
ZIP Required

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)
7645.130

2 To (Recipient's Name) Please Print: Mr. Ch. H. Fancy
Recipient's Phone Number (Very Important): (904) ...
Company: Florida Department of Environmental ... Bureau of Air Regulation
Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes): Twin Towers Office Bldg. 2600 Blairst...
City: Tallahassee ...
State
ZIP Required: 32399-...

H IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address
City
State
ZIP Required

3 PAYMENT
1 ☐ Bill Sender
2 ☐ Bill Recipient's FedEx Acct No
3 ☐ Bill 3rd Party FedEx Acct No
4 ☐ Bill Credit Card
5 ☐ Cash/Check

[redacted]

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)	Standard Overnight (Delivery by next business afternoon† No Saturday delivery†)
11 ☐ YOUR PACKAGING	51 ☐ YOUR PACKAGING
16 ☐ FEDEX LETTER*	56 ☐ FEDEX LETTER*
12 ☐ FEDEX PAK*	52 ☐ FEDEX PAK*
13 ☐ FEDEX BOX	53 ☐ FEDEX BOX
14 ☐ FEDEX TUBE	54 ☐ FEDEX TUBE
Economy Two Day (Delivery by second business day †)	**Government Overnight** (Restricted for authorized users only)
30 ☐ ECONOMY	46 ☐ GOV'T LETTER
	41 ☐ GOV'T PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☐ TWO-DAY FREIGHT**

† Delivery commitment may be later in some areas
*Declared Value Limit $500
**Call for delivery schedule

5 DELIVERY AND SPECIAL HANDLING (Check services required)
1 ☐ HOLD FOR PICK-UP (Fill in Box H)
2 ☒ DELIVER WEEKDAY
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐
6 ☐ DRY ICE lbs
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES | WEIGHT In Pounds Only | YOUR DECLARED VALUE
Total | Total | Total

DIM SHIPMENT (Chargeable Weight)
☐ lbs
x x

Received At
1 ☐ Regular Stop
2 ☐ On-Call Stop
3 ☐ Drop Box
4 ☐ B.S.C.
5 ☐ Station

Emp. No.
Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg To Del ☐ Chg To Hold
Street Address
City State Zip
Received By:
X
Date/Time Received FedEx Employee Number

7 Release Signature:

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 2/92
PART #137204 FXEM 6/92
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KISSIMMEE UTILITY AUTHORITY
CANE ISLAND
Bypass Stack Air Dispersion Modeling Evaluation

1.0 Introduction

Kissimmee Utility Authority (KUA) submitted a Prevention of Significant Deterioration (PSD) permit application to the Florida Department of Environmental Regulation in June, 1992. The PSD permit application was for 160 megawatts (MW) of combustion turbine electric generating capacity at their Cane Island site near Intercession City, Florida. Specifically, the project consists of one 40 MW General Electric LM-6000 simple cycle combustion turbine and one 120 MW nominal combined cycle combustion turbine (CCCT) plus a heat recovery steam generator (HRSG) and steam turbine generator. The CTs will fire natural gas as the primary fuel with No. 2 fuel oil as the secondary fuel. The PSD permit application did not expressly indicate the presence of a bypass stack on the combined cycle unit. The CCCT will intermittently operate in a simple cycle (or bypass mode) when the HRSG is down for maintenance and/or repair. Because the CCCT exhaust could be routed through the bypass stack, screening-level modeling was conducted to demonstrate that the air quality pollutant impacts from the bypass stack (i.e., simple cycle mode) would be less than the impacts from the HRSG stack (i.e., combined cycle mode). The air dispersion modeling which predicted the entire facility air quality impacts, including impacts from the HRSG stack, was submitted in June with the PSD permit application. The results of that modeling demonstrated that the proposed project would comply with all applicable air quality standards and increments.

2.0 Modeling Input and Model Selection

A GEP analysis was conducted for the project. The analysis demonstrated that the GEP stack height for both the bypass and HRSG stack is 150 feet, based upon the HRSG building having a height of 60 feet and a maximum projected width of 65.8 feet. Therefore, building downwash parameters were input into the model. Because two types of combustors for the CCCT are being considered, emission and stack parameters for both types of combustors were modeled. The stack parameters for the CCCT were given in the PSD permit application and are given in Tables 1 and 2, along with the bypass stack parameters for the dry low NO_x and quiet combustors, respectively.

The emission and stack parameters given in the tables were input into the EPA approved SCREEN model. The SCREEN model is a PC-compatible companion to the revised screening procedures document entitled Screening Procedures for Estimating the Air Quality Impact of Stationery Sources, EPA-450/4-88-010. SCREEN conservatively predicts 1-hour pollutant impacts assuming worst-case meteorological conditions in the simple terrain. Building dimensions and the rural modeling option were input into the model. The SCREEN model predicts impacts at receptors out to a maximum of 50 kilometers from the source. Thus, a computer generated receptor array out to 50 kilometers was used for the modeling.

A one gram per second nominal emission rate was used for the modeling. The stack pollutant emissions for both the bypass (simple cycle) and HRSG (combined cycle) modes of operation are equivalent. Thus, higher nominal impacts from a particular mode of operation would also result in higher actual pollutant impacts compared to the alternative mode of operation. Therefore, this comparative analysis was solely based upon nominal emission rates and impacts.

3.0 Air Dispersion Modeling Results

The results of the modeling are summarized in Table 3. The modeling output and associated FDER forms are attached to this document. As shown, the maximum 1-hour bypass stack impacts are less than the HRSG stack impacts for every load and both combustor types. The impacts at 50 kilometers were also given to demonstrate that at long range distances from the facility, the bypass impacts are less than the HRSG impacts.

The PSD application submitted to the FDER in June demonstrated that the entire facility, including the CCCT operating in combined cycle mode, would comply with all air quality standards and increments. This modeling analysis demonstrated that the CCCT operating in simple cycle mode (i.e., bypass mode) would have even lower ground level impacts. Therefore, the facility will comply with all applicable air quality standards independent of the mode of operation for the CCCT.

Table 1
Stack and Emission Parameters for
Bypass stack and HRSG stack with Quiet Combustor

		25 Percent Load		50 Percent Load		75 Percent Load		100 Percent Load		Peak Load	
Stack Parameters		**Bypass**	**HRSG**	**Bypass**	**HRSG**	**Bypass**	**HRSG**	**Bypass**	**HRSG**	**Bypass**	**HRSG**
Stack Height,ft		75	100	75	100	75	100	75	100	75	100
Stack Diameter, ft		14	16	14	16	14	16	14	16	14	16
Stack Velocity, fpm		5,087	2,690	6,288	3,240	7,317	3,270	8,462	3,300	8,886	3,320
Stack Temp, F		582	260	609	260	775	260	953	260	1015	260
Downwash Parameters											
Building Height, ft		60	60	60	60	60	60	60	60	60	60
Width, ft		65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8
Emission Parameters											
SO2, lb/h	(gas)	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
	(oil)	121	121	183	183	250	250	325	325	355	355
NOx, lb/h	(gas)	96	96	59	59	82	82	108	108	117	117
	(oil)	150	150	102	102	142	142	187	187	204	204
PM, lb/h	(gas)	5	5	5	5	5	5	5	5	5	5
	(oil)	15	15	15	15	15	15	15	15	15	15
VOC, lb/h	(gas)	*	*	135	135	55	55	2	2	1.6	1.6
	(oil)	5	5	7.5	7.5	5	5	5	5	4	4
CO, lb/h	(gas)	75	75	2010	2010	1185	1185	23	23	23	23
	(oil)	30	30	384	384	170	170	24	24	24	24

*data not available

Table 2
Stack and Emission Parameters for
Bypass stack and HRSG stack with Dry Low NO_x Combustor

		25 Percent Load		50 Percent Load		75 Percent Load		100 Percent Load	
Stack Parameters		Bypass	HRSG	Bypass	HRSG	Bypass	HRSG	Bypass	HRSG
Stack Height,ft		75	100	75	100	75	100	75	100
Stack Diameter, ft		14	16	14	16	14	16	14	16
Stack Velocity, fpm		5,074	2,641	5,960	2,663	7,030	2,689	8,439	3,290
Stack Temp, F		599	260	774	260	981	260	954	260
Downwash Parameters									
Building Height, ft		60	60	60	60	60	60	60	60
Width, ft		65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8
Emissions Parameters									
SO2, lb/h	(gas)	nil	nil	nil	nil	nil	nil	nil	nil
	(oil)	122	122	184	184	255	255	322	322
NOx, lb/h	(gas)	95	95	56	56	77	77	97	97
	(oil)	*	*	*	*	145	145	185	185
PM, lb/h	(gas)	7	7	7	7	7	7	7	7
	(oil)	15	15	15	15	15	15	15	15
VOC, lb/h	(gas)	6	6	1.6	1.6	1.6	1.6	2	2
	(oil)	*	*	*	*	*	*	5	5
CO, lb/h	(gas)	672	672	37	37	37	37	47	47
	(oil)	*	*	*	*	*	*	47	47

* data not available

Table 3

One-Hour Pollutant Impacts from HRSG Stack or Bypass Stack
for Nominal 1 u/s Emission Rate
(Mg/m^3)

		HRSG STACK			BYPASS STACK		
Combustor Type	**Load**	**Maximum Impact**	**Distance to Maximum (m)**	**Impact at 50 km**	**Maximum Impact**	**Distance to Maximum (m)**	**Impact 50 km**
Quiet	25%	22.25	55.0	.405	14.86	114.0	.280
Dry Low NOx	25%	22.77	55.0	.408	14.91	113.0	.278
Quiet	50%	17.17	55.0	.376	10.34	121.0	.240
Dry Low NOx	50%	22.54	55.0	.407	11.67	111.0	.229
Quiet	75%	16.93	55.0	.375	7.06	117.0	.197
Dry Low NOx	75%	22.28	55.0	.405	8.29	107.0	.188
Quiet	100%	16.69	55.0	.374	4.27	112.0	.163
Dry Low NOx	100%	16.77	55.0	.374	4.32	112.0	.164
Quiet	Peak	16.52	55.0	.373	3.46	109.0	.153

4. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 65 (100) (75 BYPASS) ft. Stack Diameter: 10 (16) (14 BYPASS) ft.

Gas Flow Rate: 450,000 (660,000) (781,000 BYPASS) ACFM ______ DSCFM Gas Exit Temperature: 713 (260) (582 BYPASS)

Water Vapor Content: ______ % Velocity: 95 (54) (84.6 BYPASS) FPS

SCCT (CCCT)

SECTION IV: INCINERATOR INFORMATION

N/A

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (lbs/hr)							

Description of Waste ______

Total Weight Incinerated (lbs/hr) ______ Design Capacity (lbs/hr) ______

Approximate Number of Hours of Operation per day ______ day/wk ______ wks/yr. ______

Manufacturer ______

Date Constructed ______ Model No. ______

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

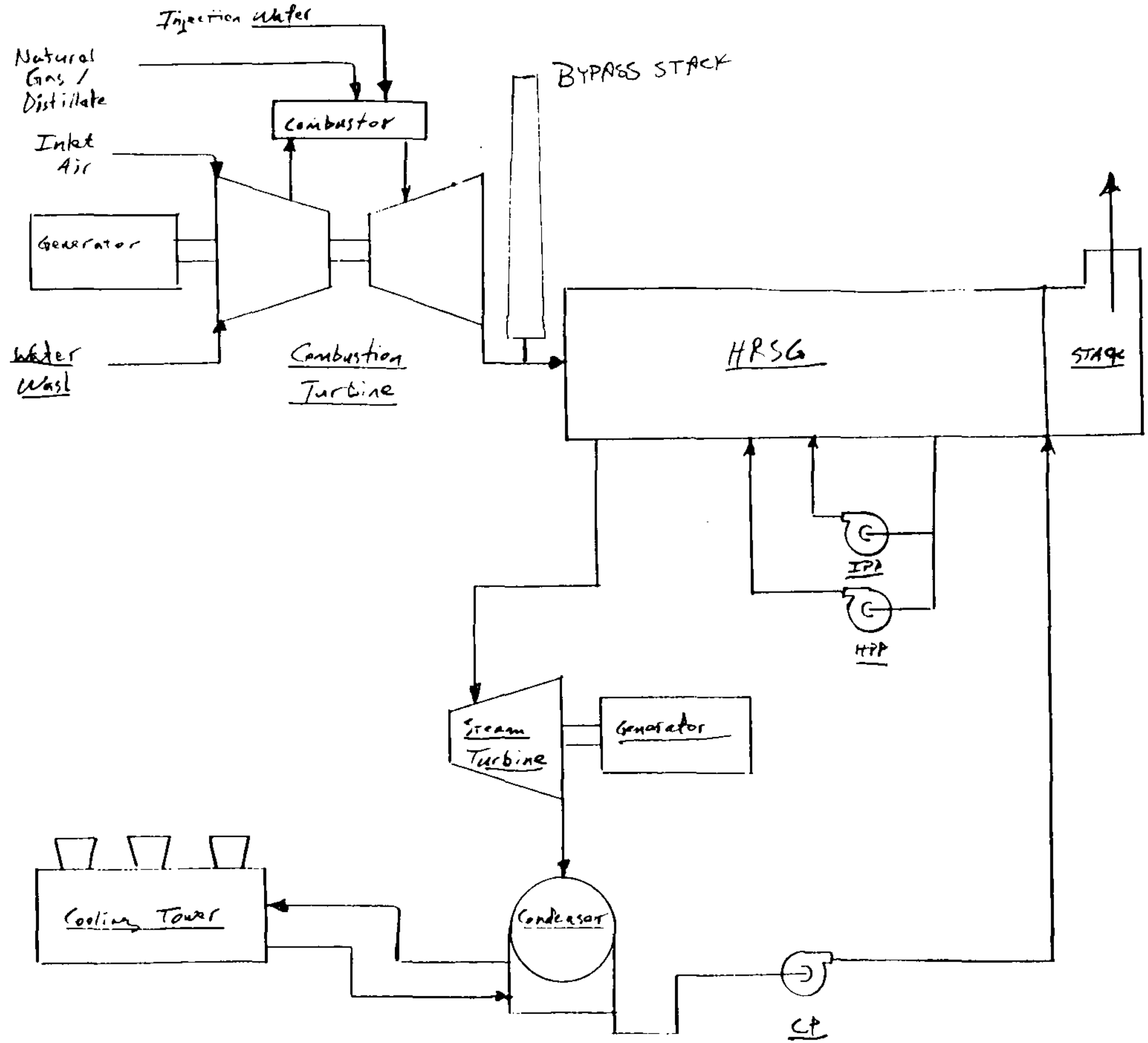
Gas Flow Rate: ______ ACFM ______ DSCFM* Velocity: ______ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

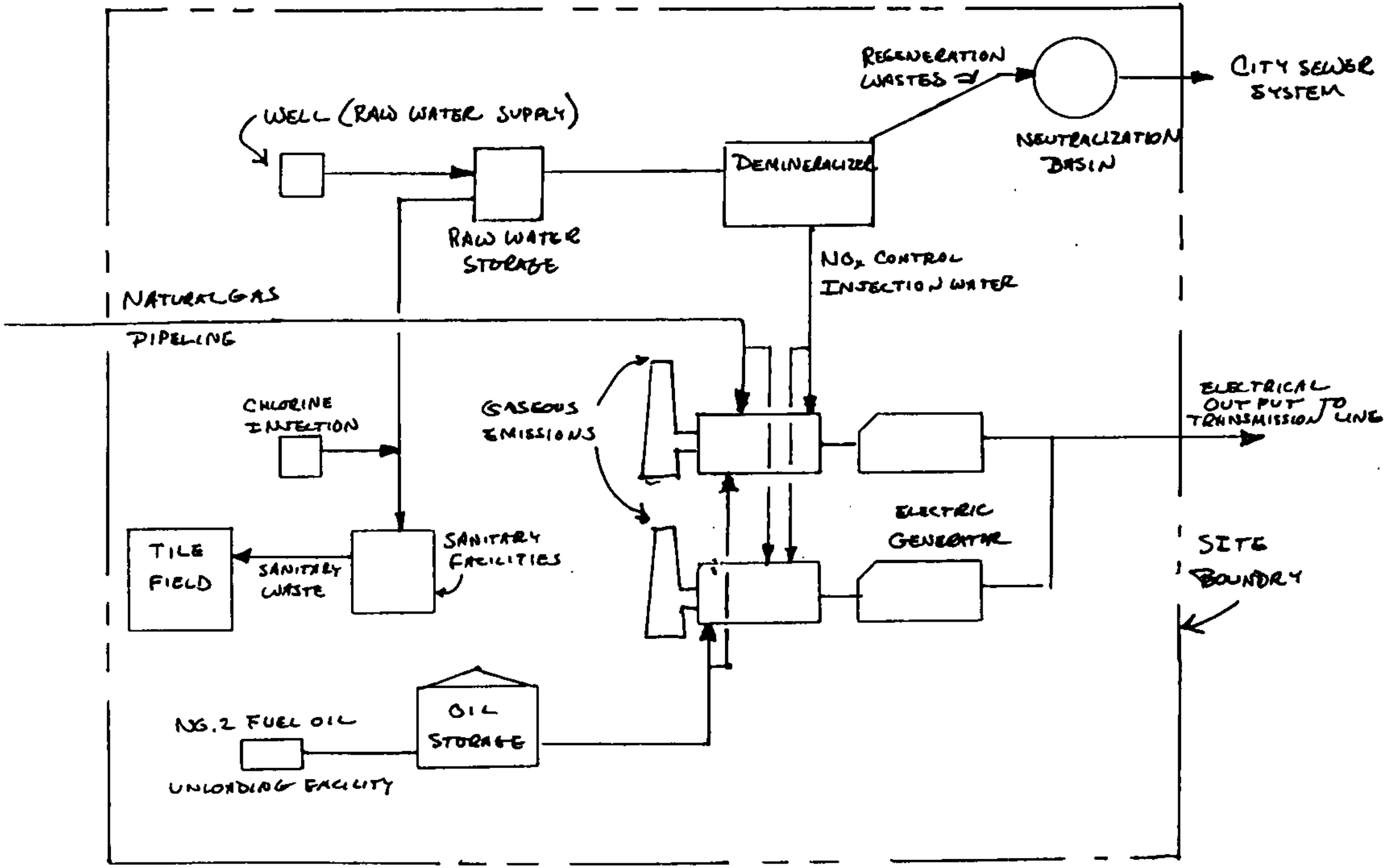
Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ______

Process Flow Diagram
In Support of the Florida Department of Environmental Regulation
Permit to Construct



REVISED, SUPERSEDED, AND VOID CALCULATIONS MUST BE CLEARLY IDENTIFIED, INITIALED, AND DATED BY THE RESPONSIBLE INDIVIDUAL.



Process Flow Diagram
In Support of the Florida Department of Environmental Regulation
Permit to Construct

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0402
July 30, 1992

RECEIVED

JUL 30 1992

Division of Air
Resources Management

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

Subject: Authority To Construct/PSD Permit Application

Attention: Mr. C. H. Fancy, P.E.

Gentlemen:

Enclosed is the response of Kissimmee Utility Authority to the questions in your June 30, 1992 letter concerning the Authority To Construct/PSD permit application (PSD-FL-182/AC 49-205703) filed for its Cane Island Combustion Turbine Project.

Also enclosed are the three manufacturers brochures and a 3.5" disk containing the MESOPUFF II computer runs/files you requested.

We believe these responses fully address your questions. If you have any questions concerning these responses, please call me at (913) 339-2164 or Amy Carlson at (913) 339-7425. Thank you for your cooperation in this matter.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

Enclosure

cc: Mr. Ben Sharma, Kissimmee Utility Authority
J. Heron
C. Holladay
C. Collins, C. Dist
J. Harper, EPA
C. Shaver, NPS

Additional Information Requested for Revised Kissimmee Utility Authority Prevention of Significant Deterioration Permit Application

DER Form 17-1.202 (1)

1. *Complete page 1 of 12.*

   DER Form 17-1.202, page 1 has been completed and is attached to this document. However, please note KUA has moved into its new office building at 1701 West Carroll Street in Kissimmee, zip code 34741. Please use this new address in future correspondence with KUA.

2. *Page 3 of 12, Section E: What is the maximum requested operating time for this facility? How many hours on oil? How many hours on gas?*

   As given in the form, the requested total operational hours for the equipment is 8,760 hours/year. The project will either fire natural gas or No. 2 fuel oil. The pollutant emissions resulting from No. 2 fuel oil firing are greater than the natural gas emissions. The supporting air quality impact analyses were all based on each turbine operating 8,760 hours/year firing No. 2 fuel oil (worst-case impacts). Therefore, the requested permitted equipment operating hours are 8,760 hours per year for each turbine firing either natural gas or No. 2 fuel oil.

3. *Page 4 of 12, Pollutant Information: Show basis of emission rate calculations (lb/hr, ton/yr, lb/MMBtu, ppmv) for each of the pollutants emitted by this project. Use the low heating value (LHV) of the fuels, different percentage loads and proposed operating hours (for oil and gas) in the calculations.*

   Manufacturer's performance data were used to determine pollutant emission rates for the turbines. These data are attached to this document.

4. *Page 5 of 12: What is the maximum sulfur content of the No. 2 fuel oil that will be used, 0.05 percent or 0.3 percent sulfur by weight? Please clarify:*

As given in the "fuel analysis - percent sulfur information" on page 5, the maximum percent sulfur in the no. 2 fuel oil is 0.05 percent.

BACT Analysis

1. *It appears the cost effectiveness ($/tons removed) presented on using SCR technology is high when compared to similar projects. To document this estimate, please expand the BACT analysis for NO_x. Include a table summarizing the emission reductions, economic, energy, and environmental impacts of the control technology chosen vs. the SCR technology rejected.*

The costs included with the SCR technology are comparable to similar estimates completed for other BACT proposals. The operating costs may be conservative when considering only natural gas firing. However, the use of No. 2 fuel oil as an alternative fuel requires additional operating costs as compared to the natural gas. A two year life expectancy for the catalyst has been used to account for the use of oil. Additional water treatment and injection costs have also been included to cool the exhaust gas prior to reaching the SCR. These costs were required for the PG7111(EA) combined cycle steam since it may operate in simple cycle mode for given periods.

NO_x Control Comparison
Turbine: PG7111(AE)
Fuel: Natural Gas

	Dry Low NO_x Burners	SCR (After Dry Low NO_x Burners)
Guaranteed NO_x Emission	25 ppm	5 ppm
Emission Reductions	N/A	25 to 5 ppm
Percent Removal	N/A	80
Ton Removed per year	N/A	298
Energy Penalty, (btu/kwh)	50	58
Economics	see item 3 below	see item 3 below

Environmental Impacts	1. None	1. Use of hazardous materiais (ammonia) 2. Hazardous waste generation - spent catalyst 3. Ammonia discharge from stack 4. SO_3 formation in SCR

NO$_x$ Control Comparison
Turbine: LM6000
Fuel: Natural Gas

	Water Injection	SCR (After Water Injection)
Guaranteed NO$_x$ Emission	25 ppm	5
Emission Reductions	N/A	25 to 5 ppm
Percent Removal	N/A	80
Ton Removed per year	N/A	116
Energy Penalty, (btu/kwh)	410	58
Economics	see item 3 below	see item 3 below
Environmental Impacts	1. Water usage	1. Use of hazardous material (ammonia) 2. Hazardous waste generation - spent catalyst 3. Ammonia discharge from stack 4. SO_3 formation in SCR

2. *Section 4.2.3.(2): What is the net energy penalty in millions cu. ft. of natural gas per year associated with the use of the water injection/low NO$_x$ burners design and the use of a SCR system? Show the basis of these calculations.*

The net energy penalties for each system were calculated based on turbine manufacturer information, typical natural gas parameters, and a 100 percent unit capacity factor. Based on these conditions, the natural gas penalties for the LM6000 were 99 million and 115 million cubic feet per year, respectively, with water injection and with SCR and water injection. The natural gas penalties for the PG7111(EA) type combustion turbine were 42 million and 91 million cubic feet of gas, respectively, for the dry low NO_x burner option.

The attached "Natural Gas Usage Penalty" sheets provide the details and basis of the manner in which these penalties were calculated.

3. *Section 4.2.5.(3): What is the cost effectiveness ($/ton NO_x removed) of the proposed water injection/low NO_x burner technology?*

The cost effectiveness of the proposed technologies is not applicable since these technologies represent the least stringent BACT control technology for each respective combustion turbine as is discussed below.

PG7111(EA)

In order to meet the NSPS standards of 75 ppm NO_x some type of control technology must be applied to the combustion turbine exhaust. Low NOx burners, which lower emission rates to 25 ppm, are available on this combustion turbine. This low cost option for controlling emissions is now the least stringent method of meeting NSPS limits.

As an alternative, water injection could be utilized to decrease emissions. Operation of combustion turbines with water injection has proven that NO_x emission rates can be reduced to 25 ppm at a nominal cost as compared to a reduction to only 75 ppm. The cost of the water injection due to heat rate penalty and water treatment costs, however, places the water injection technology as a higher cost alternative to meet the 25 ppm achievable by the dry low NO_x burners. Therefore, the dry low NO_x burners are the least stringent BACT.

LM6000

In order to meet the NSPS standards of 75 ppm NO_x, some type of control technology must be applied to the combustion turbine exhaust. Since low NO_x burners are not available on this combustion turbine, water injection represents the best manner to achieve emission levels complying with the NSPS standard of 75 ppm. Operational experience from other combustion turbines can be applied to this turbine which indicates that water injection can reduce NO_x emissions to 25 ppm on a long-term basis. Since the additional water injection cost to reduce NO_x emissions to 25 ppm is nominal, water injection to control NO_x emissions to 25 ppm represents the least stringent BACT technology available.

Alternate Technologies
Fuel: Natural Gas

Technology	Emissions Primary Control Only (ton/yr)	Emissions SCR with Prim. Cont. (ton/yr)	Levelized Cost ($/Yr)	Cost Effectiveness ($/ton NO_x removed)
(PG7111 EA) SCR With Dry Low NO_x Burner	372 (@ 25 ppm)	74 (@ 5 ppm)	2,994,000	9879
(LM6000) SCR with Water Injection	145 (@ 25 ppm)	29 (@ 5 ppm)	1,592,000	13700

4. *Section 4.2.5.(4): What is the efficiency of these turbines? Calculate Y (refer) to the NSPS, Subpart GG.*

Estimated PG7111(EA) heat rate performance (Y) is as follows:

PG7111(EA)
COMBUSTION TURBINE PERFORMANCE
(100% LOAD)

AMBIENT TEMPERATURE (F)	HEAT RATE (Y) (KJ/watt-hour) GAS	OIL
20	10.81	11.28
72	11.17	11.60
102	11.52	11.87

Note: Manufacturer's dry low NOx burner performance data.

LM6000
COMBUSTION TURBINE PERFORMANCE
(100% LOAD)

AMBIENT TEMPERATURE (F)	HEAT RATE (Y) (KJ/watt-hour) GAS	OIL
59	9.67	9.78
95	10.11	10.25

Note: Manufacturer's water injection performance data.

5. *Submit an emissions test data for each type of turbine.*

The LM6000 type combustion turbines have not been commercially operated, therefore, emission tests are not available.

Attempts are currently being made to locate applicable emission test results for the PG7111(EA) CTG.

General

6. *Submit a flow diagram of the proposed cogeneration system (simple and combined cycle units). Include all stacks associated with this system.*

A simple cycle process flow diagram for the GE LM-6000 machine was provided with the original application. Because the simple cycle and combined cycle turbines function independently from one another, only the combined cycle process flow diagram for the GE 7EA machine was provided in the revised application. Both of these flow diagrams are included with this document.

7. *Submit a manufacturer's specifications manual for the proposed gas turbines.*

A manufacturer's specifications manual is included with this document.

8. *Heat Recovery Steam Generator: Submit manufacturer's name, model number, generator name, plate rating (gross MW), maximum steam production rate (lb/hr and/or horsepower).*

Manufacturer: Vogt or equivalent
Model No: MSG
Maximum Steam Rating: 275,000 lb/hr-HP
60,000 lb/hr-IP
HRGs typically not specified by generator name and plate rating.

9. *Steam Turbine Generator: What is the nominal power (MW) output of this steam turbine? What is the steam input to this turbine?*

Steam Turbine Generator nominal power (MW) output: 40 MW
Steam Turbine Generator steam input: 275,000 lb/hr HP steam plus
60,000 lb/hr IP steam

10. *Storage Tanks: What is the estimated annual throughput and type of air pollution control for the tanks?*

For the 7EA: 73,000,000 gal/yr - Fixed roof (vented)
For the LM6000: 25,900,000 gal/yr - Fixed roof (vented)

What are the estimated emissions?

The combined vented and working loss of VOCs from the small fuel oil tank associated with the LM6000 is 0.008 g/s. These values were conservatively calculated based on 8,760 hours per year of fuel oil firing and AP-42 emission factors.

Modeling--Chassahowitzka Class I Area

11. *Please provide an NO_2 PSD Class I analysis for the project. If the project's predicted NO_2 impact at the Chassahowitzka National Wilderness Area is greater than the National Park Service (NPS) recommended significance level of 0.025 ug/m^3, annual average, please provide a cumulative NO_2 Class I analysis.*

Air dispersion modeling, utilizing the long-range transport model MESOPUFF-II was performed to determine the project's NO_x impacts on Chassahowitzka National Wildlife Refuge (NWR). Chassahowitzka NWR is the nearest Prevention of Significant Deterioration (PSD) Class I area to the project site, located 115 kilometers west of the site. The National Park Service (NPS) has tentatively established air quality significant impact thresholds for PSD Class I areas. For NO_x impacts, the significant impact level is 0.025 ug/m^3 on an annual basis. For projects with ambient air quality impacts above this significance level, NPS usually requests PSD permit applicants to perform cumulative source modeling to demonstrate compliance with the PSD Class I NO_x increment (i.e., 2.5 ug/m^3 on an annual basis).

For the air dispersion modeling of project impacts on the PSD Class I area, the MESOPUFF-II model was used. MESOPUFF-II is a short-term, Gaussian, puff superposition model designed to account for temporal and spatial dispersion mechanisms along a variable trajectory. A continuous plume is simulated as a series of discrete puffs. Each puff is directed independently from other puffs and is influenced by multipoint horizontal and two-level vertical gridded wind fields. MESOPUFF-II is capable of accounting for puff growth, chemical transformation, dry deposition, and precipitation scavenging.

The MESOPUFF-II model is comprised of four separate programs; READ56, a preprocessor for the upper air data; MESOPAEII, a preprocessor which combines the upper air and surface data; MESOPUFF-II, the main program which computes impacts at specified receptors from single or multiple sources; and MESOFILE, a postprocessor which yields output for various averaging periods. The latest version of MESOPUFF-II (Version 4) was obtained from EPA-Research Triangle Park (RTP).

For the MESOPUFF-II modeling, several regulatory default options were employed. These options were selected based on guidance from the EPA document, User's Guide to the MESOPUFF-II Model and Related Programs, 1984, and A Modeling Protocol for Applying MESOPUFF-II to Long Range Transport Problems, July 1988. In addition, guidance was also obtained from EPA-RTP, EPA Region IV, and the FDER. The modeling options are described in Table 1.

It should be noted that the MESOPAC-II program terminates under situations where the calculated mechanical mixing height is greater than the actual 700 millibar geopotential height. In this situation, a vertically averaged wind field cannot be calculated for the upper wind field. The 1988 MESOPUFF-II modeling protocol suggests that the mixing height should be limited to 4,000 meters to prevent model termination. However, when this is done the model terminates for some months due to low geopotential heights and the higher calculated mixing heights.

In some cases, the central Florida mixing heights are about 2,900 meters to 3,500 meters. In these cases, the program would terminate because a higher mixing height would be calculated. Therefore, per guidance from EPA-RTP, EPA Region IV, and FDER, the mixing heights were limited to values less than the

700 mb geopotential heights on a monthly basis. The mixing heights were limited 2,900 to 4,000 meters.

The MESOPUFF-II model utilizes three nested cartesian coordinate grid systems. The outergrid--the meteorological grid--must be of sufficient size to encompass the coordinates of all of the meteorological stations considered. The next grid, which must be equal to or smaller than the meteorological grid, is the computational grid. This grid defines the outer boundary of computational calculations. Once a puff is transported beyond these boundaries, it is no longer considered in the computations. This grid must include all sources, as well as gridded and discrete receptor locations. The third grid--the sampling grid--is a subset of the computational grid and defines the cartesian coordinate locations used to estimate impacts. The FDER provided a set of 13 discrete receptors defining the western and northern boundaries of Chassahowitzka Wildlife Refuge. Because only discrete receptors were used, the sampling grid was not needed to perform the modeling.

Coordinates for the various grids are given in Table 2. The coordinates are incorporated into the modeling as relative coordinates. The southwest corner of the grid (285 km E, 3000 km N) is designated as 1.0, 1.0; with the northeast corner (535 km E, 3,300 km N) designated as 25.0, 30.0.

One year of surface and upper air data (1986) were obtained for several stations in the region. Surface data were obtained for the Tampa, Orlando, and Gainesville, Florida stations. Upper air data was obtained from the Ruskin (Tampa) upper air station.

As part of the completeness determination for this application, the FDER concluded that a NO_x increment consumption analysis must be performed for the nearest PSD Class I area. Therefore, MESOPUFF-II was used with one year of meteorological data (1986) from regionally located stations to determine the project's NO_x impacts on the Chassahowitzka Wildlife Refuge. The maximum 3-hour and 24-hour impacts were compared to the National Park Service "significance" levels. These levels have not been promulgated by EPA or FDER,.

but have been unofficially adopted by FDER. These levels were arbitrarily calculated as:

Table 1
MESOPUFF-II Modeling Options

MESOPUFF-II Program	Option Description	Modeled Input	Reference
READ56	Top Pressure Level	700 mb	a
	Missing Data	Pressure level eliminated if missing geopotential height	a
MESOPAC-II	Wind Speed Measurement Height	default	a
	Von Karman constant	default	a
	Friction Velocity	default	a
	Mixing Height Constants	defaults	a
	Wind Field Variables	defaults	a
	Surface Roughness	determined from land	a
	Length	use category	a
	Heat Flux Adjustments	not used	a
	Radiation Reduction Factors	default	a
	Heat Flux Constants	default	a
MESOPUFF-II	Puff Release Rate	4/hour	a
	Minimum Sampling Rate	2	a
	Variable Sampling Option	True--2 m/s	a
	Minimum Age of Puffs	900 seconds	a
	Vertical Concentration	initial Gaussian distrib.	a
	Distribution	in vertical	a
	Chemical Transformation	Set to True Default values used	b
	Dry Deposition	Set to True Default values used	b
	Wet Removal	Not used	a
	Three Vertical Layer	Not used	a

[a]EPA, A Modeling Protocol for Applying MESOPUFF-II to Long Range Transport Problems, **July 1988**.

[b]Telephone conversation with Cleve Holladay and Tom Rogers of Florida Department of Environmental Regulations.

$$\frac{\text{PSD Class II Significant Level}}{\text{AAQS}} \times \text{PSD Class I Increment}$$

Thus, the annual NO_x significant value is 0.025 ug/m^3.

The PC-based model was run for monthly periods. The average annual impact of each receptor was calculated by the following formula.

Time Weighted Annual Average (ug/m^3) =

$$\Sigma \text{ (Monthly Concentration ug/m}^3\text{)} \times \frac{\text{No. Days/Month}}{365}$$

The monthly and annual averages are given in Table 3. As shown in the table, the NO_x annual impacts at all PSD Class I receptors are below the NPS significant impact levels. Therefore, the project will not significantly impact ambient air quality within Chassahowitzka NWR and a cumulative source analysis is not necessary.

12. *Based on verbal communication with the NPS, please expand the Air Quality Related Values (AQRVs) analysis to include aquatic impacts.*

In north Florida, salt marshes and estuaries are well protected in a nearly unbroken crescent that extends along the Gulf coast from St. Marks National Wildlife Refuge southward to Chassahowitzka National Wildlife Refuge. This system is an example of an inshore marine habitat, where sea water is diluted by land runoff. The refuge, being part of this open estuarine system, is supplied by freshwater from the Chassahowitzka River. Chassahowitzka Springs, a first magnitude artesian spring with an average discharge of 3.94 cubic meters per second, gives rise to the river.

Sulfur Dioxide

A literature search was conducted to determine the effects of deposition of airborne pollutants on aquatic resources. No information was found regarding the effects of sulfur dioxide on coastal waters. The probable reason for limited

Table 2
MESOPUFF-II Grids and Receptor Locations

Receptor	UTM Coordinates	Relative Coordinates
Meteorological Grid	285 km E to 535 km E	1.0 to 25.0
	3,000 km N to 3,300 km N (10 km spacing)	1.0 to 30.0
Computational Grid	285 km E to 535 km E	1.0 to 25.0
	3,000 km N to 3,300 km N (10 km spacing)	1.0 to 30.0
Discrete Receptors	340.3 km E, 3165.7 km N	6.53, 17.57
	340.3 km E, 3167.7 km N	6.53, 17.77
	340.3 km E, 3169.8 km N	6.57, 18.19
	340.7 km E, 3171.9 km N	6.53, 17.98
	342.0 km E, 3174.0 km N	6.70, 18.40
	343.0 km E, 3176.2 km N	6.80, 18.62
	343.7 km E, 3178.3 km N	6.87, 18.83
	342.4 km E, 3180.6 km N	6.74, 19.06
	341.1 km E, 3183.4 km N	6.61, 19.34
	339.0 km E, 3183.4 km N	6.40, 19.34
	336.5 km E, 3183.4 km N	6.15, 19.34
	334.0 km E, 3183.4 km N	5.90, 19.34
	331.5 km E, 3183.4 km N	5.65, 19.34

Table 3
NO_x Concentrations at Chassahowitzka National Wildlife Refuge Concentrations in ug/m^3

Receptor	Jan	Feb	Mar	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
1	0.0161	0.0076	0.0083	0.0074	0.0138	0.0092	0.0015	0.0022	0.0179	0.0158	0.0156	0.0052	0.00873
2	0.0110	0.0079	0.0070	0.0069	0.0125	0.0080	0.00042	0.0031	0.0115	0.0165	0.0195	0.0065	0.00806
3	0.0085	0.0063	0.0043	0.0059	0.0116	0.0071	0.00010	0.0048	0.0128	0.0144	0.0190	0.0069	0.00761
4	0.0146	0.0079	0.0080	0.0070	0.0136	0.0089	0.00106	0.0023	0.0149	0.0158	0.0156	0.0054	0.00833
5	0.0091	0.0079	0.0061	0.0069	0.0120	0.0077	0.00024	0.0039	0.0113	0.0169	0.0219	0.0070	0.00814
6	0.0096	0.0052	0.0042	0.0056	0.0113	0.0063	0.00008	0.0041	0.0130	0.0124	0.0166	0.0067	0.00710
7	0.0129	0.0080	0.0075	0.0068	0.0131	0.0084	0.00069	0.0026	0.0128	0.0161	0.0169	0.0059	0.00810
8	0.0083	0.0073	0.0051	0.0066	0.0117	0.0074	0.00014	0.0045	0.0118	0.0162	0.0216	0.0072	0.00799
9	0.0107	0.0041	0.0043	0.0053	0.0106	0.0052	0.00007	0.0036	0.0135	0.0102	0.0143	0.0064	0.00656
10	0.0117	0.0045	0.0045	0.0059	0.0103	0.0050	0.00006	0.0032	0.0125	0.0109	0.0155	0.0073	0.00675
11	0.0131	0.0049	0.0049	0.0065	0.0099	0.0048	0.00006	0.0029	0.0114	0.0117	0.0172	0.0091	0.00709
12	0.0145	0.0052	0.0054	0.0072	0.0094	0.0044	0.00006	0.0026	0.0102	0.0124	0.0193	0.0113	0.00745
13	0.0155	0.0054	0.0057	0.0079	0.0090	0.0041	0.00006	0.0024	0.0092	0.0130	0.0217	0.0137	0.00785

data is that SO_4 is a major dissolved constituent of seawater (2.712 g/kg, 28.9 mM, 39% free ion). Since sulfate is a major component of seawater, the additional amount of sulfate that enters the ecosystem from anthropogenic sources most likely has no effect.

In coastal areas where sediments contain appreciable concentrations of organic matter, the dominant process in the decomposition of this matter is bacterial sulfate reduction. The reduction process is anaerobic and releases hydrogen sulfide. The sulfide is reoxidized back to sulfate as it moves out of the sediments into an oxygenated environment.

Estuaries and coastal waters receive substantial amounts of weathered material (and anthropogenic inputs) from terrestrial ecosystems and from the exchange with sea water. As a result, they tend to be well buffered. Acidification seems not to be a concern in any of these areas. In addition, the KUA project will have insignificant air quality impacts on the area. Therefore, the effects on the aquatic system will be negligible.

Nitrogen Oxides

Estuarine and coastal water ecosystems exist at the transition between freshwater systems and open oceans. These transition zones share some characteristics with freshwater and marine systems, but they also have some unique properties that cause them to respond differently to nitrogen dioxide deposition. These transition zones are subject to natural processes, such as tidal flows and salinity changes, which are not observed in other aquatic systems.

Estuaries and coastal waters receive substantial amounts of weathered material (and anthropogenic inputs) from terrestrial ecosystems and from exchange from sea water. As a result, they tend to be well buffered. Acidification is not considered a concern in any of these areas. However, these same inputs make them very prone to the effects of eutrophication. Eutrophication of these areas creates anoxic bottom waters, blooms of nuisance algae, and replacement of economically-important species with less-important species (Jaworski 1981; Mearns et al. 1982). Eutrophication has been suggested as the causal factor in the disappearance of the striped bass (Morone saxatilis) fishery in Chesapeake Bay (Price et al. 1985). The increasing spatial extent of anoxic bottom waters during the summer is the proposed reason for this disappearance (Officer et al. 1984). Blooms of algae in the Gulf of Mexico were responsible for the deaths of approximately 100 tons of fish daily in 1971. The blooms have been linked to eutrophic conditions caused by high nutrient conditions (Paerl 1988).

The link between nitrogen deposition and the eutrophication of estuaries and coastal waters depends on two factors. The first factor is whether the productivity of these systems is limited by nitrogen availability. Ryther and Dustan (1971) concluded that nitrogen is the critical limiting factor to algal growth and eutrophication in coastal marine waters (Hecky and Kilham 1988). The second factor is whether nitrogen deposition is a major source of nitrogen to the system. In many cases, the supply of nitrogen from deposition is minor when compared to other anthropogenic sources.

The most complete studies to estimate the relative importance of atmospheric deposition to the overall nitrogen budget of an estuary or coast ecosystem were completed for the Chesapeake Bay (Fisher et al. 1988; Tyler 1988). Both reports concluded that atmospheric deposition (25-40 percent of total inputs) contributed significantly to the nitrogen budget in those aquatic systems.

Seawater typically has the following concentrations inorganic nitrogen: (NO_3-: 60-2,400 ug/kg, NH_4^+: <2-40 ug/kg, and NO_2^-: <4-170 ug/kg) (Berner and Berner 1987). This is equivalent to 60-2,400 g/m^3 NO_3, <2-40 g/m^3 NH_4+, and <4-170 g/m^3 NO_2-. The KUA project will contribute insignificant amounts of NO_x to the Class I airshed (i.e., <0.025 ug/m^3 on an annual basis). Therefore, the project will not significantly affect aquatic systems in the Chassahowitzka NWR.

Sources:

Berner, E. K., and R. A. Berner 1987. The Global Water Cycle. Englewood Cliffs, NJ: Prentice-Hall.

Fisher, D., J. Ceraso, T. Mathew, and M. Oppenheimer. 1988. Polluted coastal waters: the role of acid rain. New York, NY: Environmental Defense Fund.

Hecky, R. E., and P. Kilham. 1988. Nutrient limitation of phytoplankton in freshwater and marine environments: a review of recent evidence on the effects of enrichment. Limnol. Oceanogr. 33: 796-822.

Jaworski, N. A. 1981. Sources of nutrients and the scale of eutrophication problems in estuaries. In: B. J. Neilson and L. E. Cronin, eds. Estuaries and nutrients. Clifton, NJ: Humana Press, pp. 83-110.

Mearns, A. J., E. Haines, G. S. Kleppel, R. A. McGrath, J. J. A. McLaughlin, D. A. Segar, J. H. Sharp, J. J. Walsh, J. Q. Word, D. K. Young, and M. W. Young. 1982. Effects of nutrients and carbon loadings on communities and ecosystems. In: G. F. Mayer, ed. Ecological stress and the New York Bight: science and management: proceedings of a symposium on the ecological effects of environmental stress: June 1979. New York, NY. Columbia, S.C.:Estuarine Research Federation; pp.. 53-65.

Officer, C. B., R. B. Biggs, J. L. Taft, L. E. Cronin, M. A. Tyler, and W. R. Boynton. 1984. Cheasapeake Bay anoxia; origin, development, and significance. Science 223: 22-27.

Paerl, H. W. 1988. Nuisance phytoplankton blooms in coastal, estuarine, and inland waters. Limnol. Oceanogr. 33: 823-847.

Price, K. S.; D. A. Flemer, J. L. Taft, G. B. Mackiernan, W. Nehlsen, R. B. Biggs, N. H. Burger, and D. A. Blaylock. 1985. Nutrient enrichment of Chesapeake Bay and its impact on the habitat of striped bass: a speculative hypothesis. Trans. Am. Fish. Soc. 114: 97-106.

Ryther, J. H., and W. M. Dunstan. 1971. Nitrogen, phosphorus, and eutrophication in the coastal marine environment. Science 171: 1008-1013.

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Owner Kissimmee Utilities Power | Computed By R. Lausman
Plant Cane Island | Unit | Date 7/27 1992
Project No. 17645 | File No. | Checked By
Title Natural Gas Usage Penalty | Date 19
Page 1 of 4

Purpose: Calculate Net Energy Penalty in millions cu. ft. of natural gas per year for control technologies.

Reference:
1) GE Turbine Information FAX, 7/21/92, John Sanders (GE) to Rick Lausman (B&V)
2) GE Turbine Information FAX, 8/28/91 Dick Schubert (GE) to Nick Althauser (B&V)
3) Perry's Chemical Engineer's Handbook 6th Edition
4) GE Turbine Information Letter, 1-3-90 M. Morris (GE) to C. H. Fritz (B&V) B&V Project 16582.40.0000

Basis: Operating Hours - 8760 hr/yr
Spec. Vol. Natural Gas = 24.8 cu ft/lb (Ref 3.)
LHV of Natural Gas = 21515 BTU/lb Ref. 1

LM6000 Natural Gas Penalty - Water Injection

From Ref. 1&2 for 95°F ambient inlet temperature

	HEAT Rate BTU/Kwh	OUTPUT Kw
With Water Injection @ 25 ppm NO_x	9590	29,760
Uncontrolled Emissions	9260	29,930
Difference	330	

Use Lower Output Rating as conservative basis

$330 \frac{btu}{Kwh} * 8760 \frac{hr}{yr} * 29760\ Kw = 8.60 \times 10^{10} \frac{btu}{yr}$

$8.60\ BTU/yr * \frac{1\ lb}{21515\ BTU} * 24.8 \frac{cu\ ft}{lb} = 9.92 \times 10^{7} \frac{cu\ ft}{yr}$

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LM 6000 NATURAL GAS PENALTY - SCR W/ Water Injection

Assumption: Estimated Net Power Reduction Due to SCR is 0.55%

USE 95°F Performance Information

Net Power Decrease 0.0055 * 29760 = 164 Kw

29760
164

Revised Total Net Output = 29,596 Kw

Revise Heat Rate for lower Power Output as compared to base performance for water injection at 25 ppm.

$$9590\ BTU/Kwh * \left(\frac{29760}{29596}\right) = 9643\ BTU/Kwh$$

HEAT Rate Penalty: 9643
9260
= 383 BTU/Kwh

$$383\ BTU/Kwh * 8760\ \frac{hr}{yr} * 29760\ Kw = 9.99 \times 10^{10}\ BTU/yr$$

$$9.99 \times 10^{10}\ \frac{BTU}{yr} * \frac{1}{21,515}\ \frac{lb}{BTU} * 24.8\ \frac{cu\,ft}{lb} = 1.15 \times 10^{8}\ \frac{BTU}{yr}$$

PG 7111(EA) Natural Gas Penalty - Dry Low NOx Burners

Performance data for combustion turbine with uncontrolled emissions is unavailable for Kissimmee project. Use data for PG 7111(EA) from Ref. 4. Heat Rate penalty should be equivalent between two cases.

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Use data for: 59 °F ambient temperature
Lower exhaust gas temperature (978 - 986 °F)

	HEAT RATE BTU/KWh	Output KW
Dry Low NO_x Burners (25 ppm NO_x)	10,530	83,080
Uncontrolled Emissions	10,480	83,500
	50 BTU/KWh	

$50 \frac{btu}{KWh} * 8760 \frac{hr}{yr} * 83,080\ KW = 3.64 \times 10^{10} \frac{BTU}{Yr}$

$3.64 \times 10^{10} \frac{BTU}{yr} * \frac{1\ lb}{21,515\ btu} * \frac{24.8\ cu\,ft}{lb} = 4.195 \times 10^{7} \frac{cu\,ft}{yr}$

PG 7111(EA) Natural Gas Penalty - SCR w/ Dry Low NO_x Burners

Assumption: Estimated Net Power Reduction Due to SCR is 0.55%

Using 59°F Ambient Temperature Data

Net Power Decrease: 83,080 * 0.0055 = 457 Kw

83,080
− 457
Revised Total Net Output 82,623 Kw

Revised Heat Rate $10,530 * \left(\frac{83,080}{82,623}\right) = 10,588 \frac{BTU}{Kw}$

Total HEAT RATE PENALTY
10588
− 10480
1.08 BTU/KWh

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Owner: Kissimmee Utilities Power | Computed By: R Lausman
Plant: Cane Island | Unit: | Date: 7/27 1992
Project No.: 17645 | File No.: | Checked By:
Title: Natural Gas Usage Penalty | Date: 19
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PG 7111(EA) Natural Gas Penalty - SCR w/ Dry Low NOx Burners - (Cont)

HEAT Rate Penalty = 108 Btu/kWh

$$108 \frac{Btu}{kWh} * 83{,}080\ kW * 8760 \frac{hr}{yr} = 7.86 \times 10^{10} \frac{Btu}{yr}$$

$$7.86 \times 10^{10} \frac{Btu}{yr} * \frac{1}{21515} \frac{lb}{btu} * 24.8 \frac{cu\ ft}{lb} = 9.06 \times 10^{7} \frac{cu\ ft}{yr}$$

Results:

Case	Natural Gas Penalty (cu ft/yr)	Differential Penalty
LM6000 w/ Water Injection	9.92×10^{7}	1.58×10^{7}
LM 6000 w/ SCR & Water Inject.	1.15×10^{8}	
PG 7111 (EA) w/ Dry Low NOx Burner	4.20×10^{7}	4.84×10^{7}
PG 7111 (EA) w/ SCR & Dry Low NOx Burner	9.06×10^{7}	

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

June 30, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. A. K. Sharma
Director of Power Supply
Kissimmee Utility Authority
P. O. Box 423219
Kissimmee, Florida 34742-3219

Dear Mr. Sharma:

Re: Kissimmee Utilities Authority
PSD-FL-182; AC 49-205703

The Department has received the application for a permit to construct a 180 MW cogeneration system at the Kissimmee Utilities Power Authority (KUPA) facility in Intercession City, Osceola County, Florida. Based on our initial review of your proposal, we have determined that additional information is needed in order to process this application. Please complete the application by supplying the information requested below:

DER Form 17-1.202(1)

1. Complete page 1 of 12.

2. Page 3 of 12, Section E: What is the maximum requested operating time for this facility? How many hours on oil? How many hours on gas?

3. Page 4 of 12, Pollutant Information: Show basis of emission rate calculations (lb/hr, ton/yr ,lb/MMBtu, ppmv) for each of the pollutants emitted by this project. Use the low heating value (LHV) of the fuels, different percentage loads and proposed operating hours (for oil and gas) in the calculations.

4. Page 5 of 12: What is the maximum sulfur content of the No. 2 fuel oil that will be used, 0.05% or 0.3% sulfur by weight? Please clarify.

BACT ANALYSIS

1. It appears the cost effectiveness ($/tons removed) presented on using SCR technology is high when compared to similar projects. To document this estimate, please expand the BACT analysis for

NO_x. Include a table summarizing the emission reductions, economic, energy, and environmental impacts of the control technology chosen vs. the SCR technology rejected.

2. Section 4.2.3.(2): What is the net energy penalty in millions cu. ft. of natural gas per year associated with the use of the water injection/low NO_x burners design and the use of a SCR system? Show the basis of these calculations.

3. Section 4.2.5.(3): What is the cost effectiveness (\$/ton NO_x removed) of the proposed water injection/low NO_x burner technology?

4. Section 4.2.5.(4): What is the efficiency of these turbines? Calculate Y (refer to the NSPS, Subpart GG).

5. Submit an emissions test data for each type of turbine.

GENERAL

6. Submit a flow diagram of the proposed cogeneration system (simple and combined cycle units). Include all stacks associated with this system.

7. Submit a manufacturer's specifications manual for the proposed gas turbines.

8. Heat Recovery Steam Generator: Submit manufacturer's name, model number, generator name, plate rating (gross MW), maximun steam production rate (lb/hr and/or horsepower).

9. Steam Turbine Generator: What is the nominal power (MW) output of this steam turbine? What is the steam input to this turbine?

10. Storage Tanks: What is the estimated annual throughput and type of air pollution control for the tanks? What are the estimated emissions?

MODELING - CHASSAHOWITZKA CLASS I AREA

11. Please provide an NO_2 PSD Class I analysis for the project. If the project's predicted NO_2 impact at the Chassahowitzka National Wilderness Area is greater than the National Park Service (NPS) recommended significance level of 0.025 ug/m^3, annual average, please provide a cumulative NO_2 Class I analysis.

12. Based on verbal communication with the NPS, please expand the Air Quality Related Values (AQRVs) analysis to include aquatic impacts.

Should you have any questions on this matter, please contact Teresa (review engineer) or Cleve Holladay (meteorologist) at (904) 488-1344 or write to me at the above address. The processing of your application will continue once this information is received.

Sincerely,

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

CHF/TH/plm

cc: T. A. Kaczmarski, B & V FAX
Charles Collins, CD
Reading File
Cleve Holladay } 6-30-92 RAH
Teresa Heron

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

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

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Mr. A. K. Sharma
Director of Power Supply
Kissimmee Utility Auth.
PO Box 423219
Kissimmee, Fl 34742-3219

4a. Article Number
P 710 058 498

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

7. Date of Delivery
JUL - 6 1992

5. Signature (Addressee)

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

6. Signature (Agent)
J. Boyd

PS Form 3811, October 1990 ★U.S. GPO: 1990—273-861 **DOMESTIC RETURN RECEIPT**

P 710 058 498

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

UNITED STATES POSTAL SERVICE

Sent to: AK Sharma	
Street & No: Kissimmee UA	
P.O., State & ZIP Code: Kiss, Fl	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$
Postmark or Date: 6-30-92	

AC 49-205703
PSO-FI-182

PS Form 3800, June 1990

Florida Department of Environmental Regulati

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

Lawton Chiles, Governor

Carol M. Browner, Sec

FAX TRANSMITTAL COVER

DATE: 30 June 92

TO: Amy CARLSON
Black + Veatch
Kansas City, Mo

PHONE: 913-339-7425

FAX: 913-339-2934

NUMBER OF PAGES TRANSMITTED (INCLUDING COVER SHEET) 4

* * * * * *

FROM: Cleve Holladay
Bureau of Air Regulation

PHONE: SUNCOM 278-1344 OR (904) 488-1344

FAX: (904) 922-6979

PLEASE CONTACT AT ABOVE NUMBER IF TRANSMISSION IS INCOMPLETE OR UNREADABLE.

COMMENTS:
KUA letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

RECEIVED
JUN 22 1992
Division of Air
Resources Management

JUN 16 1992

4APT-AEB

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

RE: Kissimmee Utility Authority, Cane Island Project
(PSD-FL-182)

Dear Mr. Fancy:

This is to acknowledge receipt of the application for a Prevention of Significant Deterioration (PSD) permit for the above referenced facility's proposed construction, and your letter to the applicant, dated January 3, 1992, requesting additional modeling information. The facility will consist of two identical simple cycle combustion turbines, each nominally rated at 40 megawatts of electrical generating capacity, designed to fire either natural gas or No. 2 distillate fuel oil.

The applicant proposes to limit NO_x emissions through the use of maximum water injection, to limit SO_2 and H_2SO_4 emissions through limiting the sulfur content of the No. 2 distillate fuel oil, to limit CO and VOC emissions through the use of efficient combustion, to limit PM/PM_{10} and Be emissions through efficient combustion and the use of clean fuels.

We have reviewed the package as submitted and have the following comment concerning air modeling. You have requested an air quality related analysis and cumulative Class I increment analysis, to be based on a calculation distance of 115 kilometers (km), rather than the 150 km distance used in the application. In addition, the applicant will need to complete a visibility analysis using the corrected distance of 115 km.

We have no adverse comments on the remainder of the package. Thank you for the opportunity to review and comment on this package. If you have any questions or comments, please contact either Mr. Lew Nagler for modeling/monitoring or Mr. Scott Davis of my staff at (404) 347-5014.

Sincerely yours,

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

cc: J. Heron
C. Holladay
C. Collins, C Dist.
C. Shaver, NPS
A. Sharma, KUA
CHF/PL

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0600
June 22, 1992

Florida Department of Environmental Regulations
Bureau of Air Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Subject: Additional Copies of PSD Permit Permit Application for KUA Cane Run Facility

Attention: Mr. C. H. Fancy

Gentlemen:

Enclosed are four additional copies of the Revised Prevention of Significant Deterioration permit application for the Cane Island Combustion Turbine Project. These additional copies were requested by Cleve Holladay on June 22, 1992. One copy of the application has also been provided to the National Park Service.

If you have any questions, please call Amy L. Carlson at Black & Veatch (913) 339-7425 or me at (913) 339-2164.

Very truly yours,

BLACK & VEATCH

Amy L Carlson
David M. Lefebvre for

alc
Enclosures

cc: A. K. Sharma, (KUA) w/o enclosures

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0600
June 12, 1992

RECEIVED
JUN 15 1992
Bureau of
Air Regulation

Florida Department of Environmental Regulations
Bureau of Air Regulation
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Subject: Revised PSD Permit Application

Attention: Mr. C. H. Fancy

Gentlemen:

On behalf of Kissimmee Utility Authority, Black & Veatch is submitting the Revised Prevention of Significant Deterioration (PSD) permit application for the Cane Island Combustion Turbine Project. The previous application was submitted in November 1991 to the FDER. That application was based on approximately 80 MW of simple cycle combustion turbine capacity. This application includes the ambient air quality impact analysis for 160 MW of combustion turbine power generation.

Enclosed are two (2) copies of the application and the associated diskette and paper copies of the air dispersion modeling output. If you have any questions regarding the application, please call Amy L. Carlson at Black & Veatch (913) 339-7425 or me at (913) 339-2164.

Very truly yours,

BLACK & VEATCH

Amy Carlson
David M. Lefebvre for

alc
Enclosures

cc: A. K. Sharma, Director of Power Supply (KUA)
J. Heron
C. Holladay
C. Collins, C Dist
G. Harper, EPA
C. Shaver, NPS

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

DER Form #
Form Title
Effective Date
DER Application No.

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Combustion Turbines Simple and Combined Cycle [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Kissimmee Utility Authority COUNTY: Osceola

Identify the specific emission point source(s) addressed in this application (i.e. L Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired)

SOURCE LOCATION: Street N/A City Intercession

UTM: East 447.722 km North 3127.685 km

Latitude 28 ° 16 ' 35 "N Longitude 81 ° 32 ' 00

APPLICANT NAME AND TITLE: Kissimmee Utility Authority

APPLICANT ADDRESS: Post Office Box 423219 102 Lakeshore Boulevard Kissimmee FL 34

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Kissimmee Utility Au

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. I agree to maintain and operate the pollution control source and pollution facilities in such a manner as to comply with the provision of Chapter 403, Statutes, and all the rules and regulations of the department and revisions the also understand that a permit, if granted by the department, will be non-trans and I will promptly notify the department upon sale or legal transfer of the pe establishment.

*Attach letter of authorization

Signed: A K Sharma

A. K. Sharma Director of Power Supply
Name and Title (Please Type)
Kissimmee Utility Authority
Date: 6/10/92 Telephone No. 407-847-60

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.

This is to certify that the engineering features of this pollution control proj been designed/examined by me and found to be in conformity with modern eng. principles applicable to the treatment and disposal of pollutants characterized permit application. There is reasonable assurance, in my professional judgmen

1 See Florida Administrative Code Rule 17-2.100(57) and (104)

1.1 ESTIMATED PERFORMANCE - PG7111(EA)

LOAD CONDITION		BASE	BASE	BASE
AMBIENT TEMP.	- Deg F.	102	72	20
OUTPUT	- kW	72530.	82490.	98040.
HEAT RATE (LHV)	- Btu/kWh	11300.	11050.	10750.
HEAT CONS. (LHV) X10-6	- Btu/h	819.6	911.5	1053.9
EXHAUST FLOW X10-3	- lb/h	2134.0	2324.0	2623.0
EXHAUST TEMP	- Deg F.	1012.	989.	953.
EXHAUST HEAT X10-6	- Btu/h	509.5	551.2	625.3
WATER FLOW	- lb/h	29560.	42590.	53570.
NOX	- ppmvd @ 15% O2	42.	42.	42.
NOX AS NO2	- lb/h	145.	162.	187.
CO	- ppmvd	10.	10.	10.
CO	- lb/h	19.	21.	24.
UHC	- ppmvw	7.	7.	7.
UHC	- lb/h	8.	9.	10.
VOC	- ppmvw	3.5	3.5	3.5
VOC	- lb/h	4.	4.5	5.
SO2	- ppmvw	54.	55.	56.
SO2	- lb/h	253.	281.	325.
SO3	- ppmvw	2.	3.	3.
SO3	- lb/h	17.	19.	22.
SULFUR MIST	- lb/h	27.	30.	34.
PART	- lb/h	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.				
ARGON		0.87	0.87	0.88
NITROGEN		71.53	72.84	73.55
OXYGEN		12.81	12.98	12.99
CARBON DIOXIDE		4.17	4.29	4.40
WATER		10.63	9.02	8.18

SITE CONDITIONS

ELEVATION	- ft.	70
SITE PRESSURE	- psia	14.66
INLET LOSS	- in. Water	2.5
EXHAUST LOSS	- in. Water	5.5
RELATIVE HUMIDITY	- %	60
FUEL TYPE	-	[redacted] DISTILLATE
FUEL LHV	- Btu/lb	[redacted]
APPLICATION	-	[redacted] GENERATOR
COMBUSTION SYSTEM	-	[redacted] QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS.
FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.
IPS-8749 JPT 4/6/92

1.2 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	BASE	BASE
AMBIENT TEMP.	– Deg F.	102	72	20
OUTPUT	– kW	72010.	81880.	97360.
HEAT RATE (LHV)	– Btu/kWh	11260.	11000.	10700.
HEAT CONS. (LHV) X10–6	– Btu/h	810.8	900.7	1041.8
EXHAUST FLOW X10–3	– lb/h	2129.0	2318.0	2616.0
EXHAUST TEMP	– Deg F.	1013.	990.	954.
EXHAUST HEAT X10–6	– Btu/h	508.0	549.1	623.2
WATER FLOW	– lb/h	24660.	36500.	46370.
NOX	– ppmvd @ 15% O2	42.	42.	42.
NOX AS NO2	– lb/h	144.	160.	185.
CO	– ppmvd	20.	20.	20.
CO	– lb/h	38.	42.	47.
UHC	– ppmvw	7.	7.	7.
UHC	– lb/h	8.	9.	10.
VOC	– ppmvw	3.5	3.5	3.5
VOC	– lb/h	4.	4.5	5.
SO2	– ppmvw	53.	54.	56.
SO2	– lb/h	250.	278.	322.
SO3	– ppmvw	3.	3.	2.
SO3	– lb/h	17.	18.	21.
SULFUR MIST	– lb/h	26.	29.	34.
PART	– lb/h	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.				
ARGON		0.86	0.88	0.88
NITROGEN		71.81	73.16	73.89
OXYGEN		12.93	13.12	13.13
CARBON DIOXIDE		4.14	4.25	4.37
WATER		10.26	8.59	7.73

SITE CONDITIONS		
ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	[redacted] DISTILLATE
FUEL LHV	– Btu/lb	18467
APPLICATION	–	[redacted] COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS. FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.
IPS–8749 JPT 4/6/92

1.3 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	– Deg F.	102	102	102	102
OUTPUT	– kW	72010.	53990.	36020.	18010.
HEAT RATE (LHV)	– Btu/kWh	11260.	12240.	13760.	19280.
HEAT CONS. (LHV) X10–6	– Btu/h	810.8	660.8	495.6	347.2
EXHAUST FLOW X10–3	– lb/h	2129.0	1742.0	1731.0	1722.0
EXHAUST TEMP	– Deg F.	1013.	1037.	855.	698.
EXHAUST HEAT X10–6	– Btu/h	508.0	432.5	344.2	269.1
WATER FLOW	– lb/h	24660.	16960.	7160.	0.
NOX	– ppmvd @ 15% O2	42.	42.	*	*
NOX AS NO2	– lb/h	144.	116.	*	*
CO	– ppmvd	20.	*	*	*
CO	– lb/h	38.	*	*	*
UHC	– ppmvw	7.	*	*	*
UHC	– lb/h	8.	*	*	*
VOC	– ppmvw	3.5	*	*	*
VOC	– lb/h	4.	*	*	*
SO2	– ppmvw	53.	53.	40.	28.
SO2	– lb/h	250.	204.	153.	107.
SO3	– ppmvw	3.	3.	2.	2.
SO3	– lb/h	17.	13.	10.	7.
SULFUR MIST	– lb/h	26.	21.	16.	11.
PART	– lb/h	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.86	0.87	0.88	0.89
NITROGEN		71.81	72.01	73.08	73.94
OXYGEN		12.93	13.06	14.91	16.55
CARBON DIOXIDE		4.14	4.09	3.07	2.16
WATER		10.26	9.97	8.06	6.46

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	[redacted] DISTILLATE
FUEL LHV	– Btu/lb	18467
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS. FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
* DATA NOT AVAILABLE
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.4 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	– Deg F.	72	72	72	72
OUTPUT	– kW	81880.	61450.	40940.	20470.
HEAT RATE (LHV)	– Btu/kWh	11000.	11820.	13080.	17820.
HEAT CONS. (LHV) X10–6	– Btu/h	900.7	726.3	535.5	364.8
EXHAUST FLOW X10–3	– lb/h	2318.0	1868.0	1851.0	1835.0
EXHAUST TEMP	– Deg F.	990.	1014.	822.	660.
EXHAUST HEAT X10–6	– Btu/h	549.1	461.3	360.9	277.6
WATER FLOW	– lb/h	36500.	25810.	12130.	0.
NOX	– ppmvd @ 15% O2	42.	42.	*	*
NOX AS NO2	– lb/h	160.	127.	*	*
CO	– ppmvd	20.	*	*	*
CO	– lb/h	42.	*	*	*
UHC	– ppmvw	7.	*	*	*
UHC	– lb/h	9.	*	*	*
VOC	– ppmvw	3.5	*	*	*
VOC	– lb/h	4.	*	*	*
SO2	– ppmvw	54.	54.	40.	28.
SO2	– lb/h	278.	224.	165.	113.
SO3	– ppmvw	3.	3.	2.	1.
SO3	– lb/h	18.	15.	11.	7.
SULFUR MIST	– lb/h	29.	24.	17.	12.
PART	– lb/h	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.88	0.87	0.89	0.91
NITROGEN		73.16	73.40	74.73	75.94
OXYGEN		13.12	13.24	15.27	17.10
CARBON DIOXIDE		4.25	4.22	3.13	2.15
WATER		8.59	8.27	5.98	3.90

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	[redacted] DISTILLATE
FUEL LHV	– Btu/lb	18467
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS. FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
* DATA NOT AVAILABLE
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.5 ESTIMATED PERFORMANCE - PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	- Deg F.	102	102	102	102
OUTPUT	- kW	70640.	53000.	35340.	17660.
HEAT RATE (LHV)	- Btu/kWh	10930.	11960.	13600.	19410.
HEAT CONS. (LHV) X10-6	- Btu/h	772.1	633.9	480.6	342.8
EXHAUST FLOW X10-3	- lb/h	2099.0	1720.0	1720.0	1720.0
EXHAUST TEMP	- Deg F.	1016.	1038.	849.	690.
EXHAUST HEAT X10-6	- Btu/h	501.1	427.6	339.5	266.0
NOX	- ppmvd @ 15% O2	25.	25.	25.	72.
NOX AS NO2	- lb/h	78.	63.	47.	95.
CO	- ppmvd	20.	20.	20.	420.
CO	- lb/h	38.	31.	31.	672.
UHC	- ppmvw	7.	7.	7.	30.
UHC	- lb/h	8.	7.	7.	30.
VOC	- ppmvw	1.4	1.4	1.4	6.
VOC	- lb/h	1.6	1.4	1.4	6.
PART	- lb/h	7.0	7.0	7.0	7.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.88	0.87	0.88	0.89
NITROGEN		72.58	72.57	73.12	73.61
OXYGEN		13.47	13.52	15.13	16.57
CARBON DIOXIDE		3.05	3.03	2.29	1.63
WATER		10.02	10.01	8.58	7.30

SITE CONDITIONS

ELEVATION	- ft.	70
SITE PRESSURE	- psia	14.66
INLET LOSS	- in. Water	2.5
EXHAUST LOSS	- in. Water	5.5
RELATIVE HUMIDITY	- %	60
FUEL TYPE	-	CUST GAS
FUEL LHV	- Btu/lb	21060
APPLICATION	-	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	-	DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
IPS-8749
JPT 4-9-92

1.6 ESTIMATED PERFORMANCE - PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%	PEAK
AMBIENT TEMP.	- Deg F	20	20	20	20	20
OUTPUT	- kW	100060.	75080.	50050.	25020.	108130.
HEAT RATE (LHV)	- Btu/kWh	10700.	10980.	12030.	15780.	10770.
HEAT CONS. (LHV) X10-6	- Btu/h	1070.6	824.4	602.1	394.8	1164.6
EXHAUST FLOW X10-3	- lb/h	2621.0	2594.0	2574.0	2040.0	2632.0
EXHAUST TEMP	- Deg F.	951.	772.	605.	581.	1014.
EXHAUST ENERGY X10-6	- Btu/h	630.3	499.5	384.3	291.1	682.5
WATER FLOW	- lb/h	57740.	36290.	22070.	0.	67250.
NOX	- ppmvd @ 15% O2	25.	25.	25.	63.	25.
NOX AS NO2	- lb/h	108	82.	59.	96.	117.
CO	- ppmvd	10.	495.	840.	40.	10.
CO	- lb/h	23.	1185.	2010.	75.	23.
UHC	- ppmvw	7.	190.	480.	*	7.
UHC	- lb/h	10.	270.	685.	*	8.
VOC	- ppmvw	1.4	40.	95.	*	1.4
VOC	- lb/h	2.0	55.	135.	*	1.6
PART	- lb/h	5.0	5.0	5.0	5.0	5.0
EXHAUST ANALYSIS % VOL.						
ARGON		0.87	0.89	0.91	0.92	0.87
NITROGEN		72.63	74.17	75.37	76.69	72.00
OXYGEN		12.82	14.73	16.42	17.44	12.13
CARBON DIOXIDE		3.39	2.64	1.94	1.61	3.65
WATER		10.29	7.57	5.36	3.34	11.35

SITE CONDITIONS

ELEVATION	- ft.	70
SITE PRESSURE	- psia	14.66
INLET LOSS	- in. Water	2.5
EXHAUST LOSS	- in. Water	5.5
RELATIVE HUMIDITY	- %	60
FUEL TYPE	-	CUST GAS
FUEL LHV	- Btu/lb	21060
APPLICATION	-	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	-	QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
* DATA NOT AVAILABLE.
IPS-8749
JPT 4-9-92

1.7 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%	PEAK
AMBIENT TEMP.	– Deg F .	102	102	102	102	102
OUTPUT	– kW	74760.	56050.	37350.	18690.	81850.
HEAT RATE (LHV)	– Btu/kWh	11260.	11820.	13300.	18490.	11210.
HEAT CONS. (LHV) X10–6	– Btu/h	841.8	662.5	496.8	345.6	917.5
EXHAUST FLOW X10–3	– lb/h	2137.0	2122.0	2111.0	1753.0	2144.0
EXHAUST TEMP	– Deg F.	1010.	851.	702.	677.	1072.
EXHAUST ENERGY X10–6	– Btu/h	515.5	420.4	333.5	265.2	557.2
WATER FLOW	– lb/h	37150.	23400.	14220.	0.	43990.
NOX	– ppmvd @ 15% O2	25.	25.	25.	49.	25.
NOX AS NO2	– lb/h	85	66.	49.	66.	92.
CO	– ppmvd	10.	230.	375.	35.	10.
CO	– lb/h	19.	440.	710.	55.	19.
UHC	– ppmvw	7.	75.	115.	7.	7.
UHC	– lb/h	9.	85.	130.	7.	7.
VOC	– ppmvw	1.4	15.	25.	1.4	1.4
VOC	– lb/h	1.8	20.	30.	1.4	1.4
PART	– lb/h	5.0	5.0	5.0	5.0	5.0
EXHAUST ANALYSIS % VOL.						
ARGON		0.85	0.87	0.86	0.88	0.84
NITROGEN		70.44	71.67	72.64	73.66	69.89
OXYGEN		12.54	14.20	15.72	16.62	11.86
CARBON DIOXIDE		3.23	2.56	1.93	1.61	3.50
WATER		12.94	10.71	8.85	7.23	13.92

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	CUST GAS
FUEL LHV	– Btu/lb	21060
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
IPS–8749
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1.8 ESTIMATED PERFORMANCE - PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%	PEAK
AMBIENT TEMP.	- Deg F .	72	72	72	72	72
OUTPUT	- kW	82490.	61900.	41250.	20620.	89940.
HEAT RATE (LHV)	- Btu/kWh	11050.	11480.	12760.	17500.	11060.
HEAT CONS. (LHV) X10-6	- Btu/h	911.5	710.6	526.4	360.9	994.7
EXHAUST FLOW X10-3	- lb/h	2324.0	2301.0	2286.0	1869.0	2335.0
EXHAUST TEMP	- Deg F.	989.	824.	667.	641.	1051.
EXHAUST ENERGY X10-6	- Btu/h	551.2	446.1	349.5	273.3	596.5
WATER FLOW	- lb/h	42590.	24440.	13680.	0.	51800.
NOX	- ppmvd @ 15% O2	42.	42.	42.	88.	42.
NOX AS NO2	- lb/h	162	125.	91.	129.	177.
CO	- ppmvd	10.	50.	135.	15.	10.
CO	- lb/h	21.	105.	280.	30.	21.
UHC	- ppmvw	7.	7.	7.	7.	7.
UHC	- lb/h	9.	9.	9.	7.	7.
VOC	- ppmvw	3.5	3.5	3.5	3.5	3.5
VOC	- lb/h	4.5	4.5	4.5	3.5	3.5
SO2	- ppmvw	55.	43.	32.	27.	59.
SO2	- lb/h	281.	219.	162.	111.	307.
SO3	- ppmvw	3.	2.	2.	1.	4.
SO3	- lb/h	19.	15.	11.	8.	20.
SULFUR MIST	- lb/h	30.	23.	17.	12.	32.
PART	- lb/h	15.0	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.						
ARGON		0.87	0.89	0.91	0.90	0.8
NITROGEN		72.84	74.15	75.07	75.98	72.2
OXYGEN		12.98	14.75	16.33	17.21	12.2
CARBON DIOXIDE		4.29	3.36	2.50	2.09	4.6
WATER		9.02	6.85	5.19	3.82	9.9

SITE CONDITIONS

ELEVATION	- ft.	70
SITE PRESSURE	- psia	14.66
INLET LOSS	- in. Water	2.5
EXHAUST LOSS	- in. Water	5.5
RELATIVE HUMIDITY	- %	60
FUEL TYPE	-	[redacted] DISTILLATE
FUEL LHV	- Btu/lb	18467
APPLICATION	-	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	-	[redacted] QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS.
FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.10 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%	PEAK
AMBIENT TEMP.	– Deg F	20	20	20	20	20
OUTPUT	– kW	98040.	73510.	49000.	24530.	106270.
HEAT RATE (LHV)	– Btu/kWh	10750.	11010.	12080.	16020.	10820.
HEAT CONS. (LHV) X10–6	– Btu/h	1053.9	809.3	591.9	393.0	1149.8
EXHAUST FLOW X10–3	– lb/h	2623.0	2593.0	2572.0	2042.0	2637.0
EXHAUST TEMP	– Deg F.	953.	775.	609.	582.	1015.
EXHAUST ENERGY X10–6	– Btu/h	625.3	496.6	383.6	290.9	677.3
WATER FLOW	– lb/h	53570.	30020.	16600.	0.	65050.
NOX	– ppmvd @ 15% O2	42.	42.	42.	94.	42.
NOX AS NO2	– lb/h	187	142.	102.	150.	204.
CO	– ppmvd	10.	70.	160.	15.	10.
CO	– lb/h	24.	170.	384.	30.	24.
UHC	– ppmvw	7.	7.	10.	7.	7.
UHC	– lb/h	10.	10.	15.	10.	8.
VOC	– ppmvw	3.5	3.5	5.	3.5	3.5
VOC	– lb/h	5.	5.	7.5	5.	4.
SO2	– ppmvw	56.	44.	32.	27.	61.
SO2	– lb/h	325.	250.	183.	121.	355.
SO3	– ppmvw	3.	2.	2.	1.	3.
SO3	– lb/h	22.	16.	12.	8.	23.
SULFUR MIST	– lb/h	34.	26.	19.	13.	37.
PART	– lb/h	15.0	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.						
ARGON		0.88	0.90	0.92	0.94	0.88
NITROGEN		73.55	75.04	76.06	77.04	72.88
OXYGEN		12.99	14.91	16.58	17.49	12.25
CARBON DIOXIDE		4.40	3.42	2.51	2.09	4.76
WATER		8.18	5.73	3.93	2.45	9.23

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60 [redacted]
FUEL TYPE	–	[redacted] DISTILLATE
FUEL LHV	– Btu/lb	[redacted]8467
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS.
FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.11 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%	PEAK
AMBIENT TEMP.	– Deg F.	102	102	102	102	102
OUTPUT	– kW	72530.	54370.	36300.	18130.	79540.
HEAT RATE (LHV)	– Btu/kWh	11300.	11880.	13390.	18920.	11250.
HEAT CONS. (LHV) X10–6	– Btu/h	819.6	645.9	486.1	343.0	894.8
EXHAUST FLOW X10–3	– lb/h	2134.0	2119.0	2109.0	1755.0	2142.0
EXHAUST TEMP	– Deg F.	1012.	854.	705.	678.	1074.
EXHAUST ENERGY X10–6	– Btu/h	509.5	417.5	332.5	264.6	550.8
WATER FLOW	– lb/h	29560.	16310.	8640.	0.	36680.
NOX	– ppmvd @ 15% O2	42.	42.	42.	67.	42.
NOX AS NO2	– lb/h	145	113.	84.	94.	159.
CO	– ppmvd	10.	50.	120.	15.	10.
CO	– lb/h	19.	95.	220.	25.	19.
UHC	– ppmvw	7.	7.	7.	7.	7.
UHC	– lb/h	8.	8.	8.	7.	7.
VOC	– ppmvw	3.5	3.5	3.5	3.5	3.5
VOC	– lb/h	4.0	4.	4.	3.5	3.5
SO2	– ppmvw	54.	42.	32.	27.	58.
SO2	– lb/h	253.	199.	150.	106.	276.
SO3	– ppmvw	2.	3.	2.	2.	3.
SO3	– lb/h	17.	14.	10.	7.	18.
SULFUR MIST	– lb/h	27.	21.	16.	11.	29.
PART	– lb/h	15.0	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.						
ARGON		0.87	0.86	0.88	0.90	0.86
NITROGEN		71.53	72.61	73.36	74.00	71.01
OXYGEN		12.81	14.45	15.90	16.67	12.12
CARBON DIOXIDE		4.17	3.29	2.48	2.09	4.52
WATER		10.63	8.79	7.38	6.35	11.49

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	[redacted] DISTILLATE
FUEL LHV	– Btu/lb	18467
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] QUIET COMBUSTOR

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS.
FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.12 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	– Deg F.	20	20	20	20
OUTPUT	– kW	97360.	73020.	48710.	24350.
HEAT RATE (LHV)	– Btu/kWh	10700.	11310.	12260.	16270.
HEAT CONS. (LHV) X10–6	– Btu/h	1041.8 ✓	825.9	597.2	396.2
EXHAUST FLOW X10–3	– lb/h	2616.0	2053.0	2029.0	2007.0
EXHAUST TEMP	– Deg F.	954.	981.	774.	599.
EXHAUST HEAT X10–6	– Btu/h	623.2	511.3	391.2	294.7
WATER FLOW	– lb/h	46370.	32900.	15050.	0.
NOX	– ppmvd @ 15% O2	42.	42.	*	*
NOX AS NO2	– lb/h	185.	145.	*	*
CO	– ppmvd	20.	*	*	*
CO	– lb/h	47.	*	*	*
UHC	– ppmvw	7.	*	*	*
UHC	– lb/h	10.	*	*	*
VOC	– ppmvw	3.5	*	*	*
VOC	– lb/h	5.	*	*	*
SO2	– ppmvw	56.	56.	41.	28.
SO2	– lb/h	322.	255.	184.	122.
SO3	– ppmvw	2.	3.	2.	1.
SO3	– lb/h	21.	17.	13.	8.
SULFUR MIST	– lb/h	34.	27.	19.	13.
PART	– lb/h	15.0	15.0	15.0	15.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.88	0.89	0.90	0.92
NITROGEN		73.89	74.09	75.65	77.02
OXYGEN		13.13	13.18	15.41	17.40
CARBON DIOXIDE		4.37	4.38	3.20	2.15
WATER		7.73	7.47	4.84	2.51

SITE CONDITIONS		
ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	[redacted] DISTILLATE ✓
FUEL LHV	– Btu/lb	[redacted]
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	[redacted] DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
DISTILLATE FUEL IS ASSUMED TO HAVE 0.015% FUEL BOUND NITROGEN, OR LESS.
FUEL BOUND NITROGEN AMOUNTS GREATER THAN 0.015% WILL ADD TO THE REPORTED NOx VALUE.
* DATA NOT AVAILABLE
SULFUR EMISSIONS ARE BASED ON 0.3% TOTAL SULFUR CONTENT.

1.13 ESTIMATED PERFORMANCE - PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	- Deg F.	20	20	20	20
OUTPUT	- kW	94420.	70810.	47210.	23580.
HEAT RATE (LHV)	- Btu/kWh	10250.	10910.	12040.	16480.
HEAT CONS. (LHV) X10-6	- Btu/h	967.8	772.5	568.4	388.6
EXHAUST FLOW X10-3	- lb/h	2561.0	2013.0	2009.0	2005.0
EXHAUST TEMP	- Deg F.	959.	987.	768.	589.
EXHAUST HEAT X10-6	- Btu/h	608.8	500.7	383.8	290.0
NOX	- ppmvd @ 15% O2	25.	25.	25.	72.
NOX AS NO2	- lb/h	97.	77.	56.	95.
CO	- ppmvd	20.	20.	20.	420.
CO	- lb/h	47.	37.	37.	672.
UHC	- ppmvw	7.	7.	7.	30.
UHC	- lb/h	10.	8.	8.	30.
VOC	- ppmvw	1.4	1.4	1.4	6.
VOC	- lb/h	2.	1.6	1.6	6.
PART	- lb/h	7.0	7.0	7.0	7.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.90	0.91	0.92	0.92
NITROGEN		75.47	75.45	76.11	76.68
OXYGEN		14.00	13.96	15.81	17.44
CARBON DIOXIDE		3.18	3.20	2.35	1.61
WATER		6.45	6.49	4.81	3.35

SITE CONDITIONS

ELEVATION	- ft.	70
SITE PRESSURE	- psia	14.66
INLET LOSS	- in. Water	2.5
EXHAUST LOSS	- in. Water	5.5
RELATIVE HUMIDITY	- %	60
FUEL TYPE	-	CUST GAS
FUEL LHV	- Btu/lb	21060
APPLICATION	-	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	-	DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
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1.14 ESTIMATED PERFORMANCE – PG7111(EA)

LOAD CONDITION		BASE	75%	50%	25%
AMBIENT TEMP.	– Deg F.	72	72	72	72
OUTPUT	– kW	79550.	59650.	39800.	19910.
HEAT RATE (LHV)	– Btu/kWh	10590.	11460.	12870.	18030.
HEAT CONS. (LHV) X10–6	– Btu/h	842.4	683.6	512.2	359.0
EXHAUST FLOW X10–3	– lb/h	2274.0	1837.0	1835.0	1833.0
EXHAUST TEMP	– Deg F.	994.	1018.	817.	651.
EXHAUST HEAT X10–6	– Btu/h	538.6	452.9	354.9	273.9
NOX	– ppmvd @ 15% O2	25.	25.	25.	72.
NOX AS NO2	– lb/h	85.	68.	50.	95.
CO	– ppmvd	20.	20.	20.	420.
CO	– lb/h	41.	33.	34.	672.
UHC	– ppmvw	7.	7.	7.	30.
UHC	– lb/h	9.	7.	7.	30.
VOC	– ppmvw	1.4	1.4	1.4	6.
VOC	– lb/h	1.8	1.4	1.4	6.
PART	– lb/h	7.0	7.0	7.0	7.0
EXHAUST ANALYSIS % VOL.					
ARGON		0.89	0.90	0.90	0.90
NITROGEN		74.48	74.48	75.08	75.61
OXYGEN		13.89	13.91	15.62	17.13
CARBON DIOXIDE		3.10	3.09	2.31	1.62
WATER		7.64	7.62	6.09	4.74

SITE CONDITIONS

ELEVATION	– ft.	70
SITE PRESSURE	– psia	14.66
INLET LOSS	– in. Water	2.5
EXHAUST LOSS	– in. Water	5.5
RELATIVE HUMIDITY	– %	60
FUEL TYPE	–	CUST GAS
FUEL LHV	– Btu/lb	21060
APPLICATION	–	7A6 AIR COOLED GENERATOR
COMBUSTION SYSTEM	–	DRY LOW NOX I

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.
IPS–8749
JPT 4–9–92

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

RECEIVED

JAN 28 1992

Division of Air Resources Management

Kissimmee Utility Authority
Cane Island Combustion Turbine Project

B&V Project 17645
B&V File 32.0200
January 20, 1992

Florida Department of Environmental Regulation
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Subject: PSD Class I Air Modeling

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

Gentlemen:

Black & Veatch received your January 3, 1992, letter to Mr. A. K. Sharma (KUA) requesting additional information for the Cane Island project PSD permit application to be considered complete. The additional information requested includes PSD Class I increment consumption and air quality related value (AQRV) analyses at Chassahowitzha National Wilderness Area. In a January 9, 1992, telephone conversation with Black & Veatch, Cleve Holladay (FDER) detailed the following steps for performing the PSD Class I increment analysis.

1) Air dispersion modeling using ISCST will be performed for the proposed project sources to determine project impacts at nine FDER-provided receptors for Chassahowitzha National Wilderness Area. Modeling will be based on five years of hourly surface meteorological data and upper data (1982-1986). The highest impacts will be compared with the National Park Service (NPS) "significant" impact levels. These levels are derived by dividing the EPA significant impact levels by the AAQS, and then multiplying by the PSD Class I increments. The analysis must be conducted for every pollutant which has significant emission rates above EPA significant annual emission thresholds for which PSD Class I increments exist. If the project's impacts are less than the NPS significant impact levels, then the analysis is concluded for that pollutant. If the impacts are greater, then Step 2 must be performed.

BLACK & VEATCH
P.O Box No. 8405
Kansas City, Missouri 64114

MR C H FANCY, CHIEF
BUREAU OF AIR REGULATION
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FL 32399-2400

2) Air dispersion modeling will be performed for the FDER-provided emissions inventory using ISCST and the nine FDER-provided receptors. If exceedances of the PSD Class I increment are modeled, then the project impacts alone will be modeled with ISCST at the exceedance receptors during the periods which the exceedances occurred. If the project's impacts on the exceedance receptors are less than the NPS significant levels, then the analysis is concluded. If not, then Step 3 must be performed.

3) Air dispersion modeling will be performed for the FDER-provided emissions inventory using MESOPUFF II and a FDER-provided receptor grid. The impacts will be compared with the PSD Class I increments. For all periods and receptors with modeled exceedances, the project sources will be modeled with MESOPUFF II. If the project's impacts on the exceedance receptors are less than the NPS significant levels, then the analysis is concluded.

Cleve has already provided a listing of the nine Chassahowitzha receptors. However, a listing of the emissions inventory for the sources to be included in the PSD Class I analysis is needed. Please provide this listing to Amy Carlson of Black & Veatch as soon as it is available.

Cleve stated that the NPS may not require a detailed AQRV from the Cane Island project due to its size, distance from the Class I area, and the forthcoming AQRV submittals for the Chassahowitzha National Wilderness Area from larger sources. Cleve indicated that he will verify this with the NPS and contact Black & Veatch with additional information.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

alc

cc: Mr. A. K. Sharma, KUA
J. Reynolds
C. Holladay
C. Collins, C Dist.
J. Harper, EPA
C. Shaver, NPS
CHF/BA/PL

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

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

1. [x] Addressee's Address
2. [ ] Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. A. K. Sharma
Director of Power Supply
Kissimmee Utility Authority
P.O. Box 423219
Kissimmee, FL 34742-3219

4a. Article Number

P 832 538 759

4b. Service Type

[ ] Registered [ ] Insured
[x] Certified [ ] COD
[ ] Express Mail [ ] Return Receipt for Merchandise

7. Date of Delivery

5. Signature (Addressee)

D. Boyd

6. Signature (Agent)

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

PS Form **3811**, October 1990 ☆U.S. GPO: 1990—273-861 **DOMESTIC RETURN RECEIPT**

P 832 538 759

Certified Mail Receipt

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

UNITED STATES POSTAL SERVICE

Sent to: Mr. A. K. Sharma	
Street & No.: Director of Power Supply, Kissimmee Utility Authority	
P.O., State & ZIP Code: P.O. Box 423219, Kissimmee, FL 34742-3219	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Address of Delivery	
TOTAL Postage & Fees	$
Postmark or Date: mailed: 1/3/92 AC 49-205703 PSD-FL-182	

PS Form **3800**, June 1990

File Copy

Florida Department of Environmental Regulation

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

Lawton Chiles, Governor

Carol M. Browner, Secretary

January 3, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. A. K. Sharma
Director of Power Supply
Kissimmee Utility Authority
P. O. Box 423219
Kissimmee, Florida 34742-3219

Dear Mr. Sharma:

Re: Permit Application AC 49-205703, PSD-FL-182

This is to provide notice that additional information is required for processing the subject application. Please evaluate the impact of this project on the Class I Chassahowitzka National Wilderness Area located approximately 115 km west of the project. This evaluation should include cumulative PM/PM_{10}, SO_2 and NO_x Class I increment analyses, as required by the National Park Service. An expanded air quality related analysis (AQRV) should be done since there are no significant impact levels for this analysis. The AQRV analysis includes impacts to soils, vegetation and wildlife.

If you have questions or need further information, please contact John Reynolds or Cleve Holladay at (904) 488-1344 or write to me at the above address.

Sincerely,

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

CHF/JR/plm

c: C. Collins, CD
J. Harper, EPA
C. Shaver, NPS
M. Moussa, P.E.
Reading File
John Reynolds
Cleve Holladay } 1/3/92 RH