



Reedy Creek Energy Services

17 May 2006

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Mr. Al Linero, P.E.
Florida Department of Environmental Protection
Division of Air Resource Management
111 South Magnolia Drive, Suite 23
Tallahassee, Florida 32301

BUREAU OF AIR REGULATION

Re: Reedy Creek Improvement District
LM6000 Repowering Project
FDEP Air Permit No. 0950111-025-AC
Request for Permit Revision – Heat Input Increase and Emissions Averaging

Dear Mr. Linero:

The Department issued Air Construction Permit No. 0950111-025-AC dated June 13, 2005 to the Walt Disney World Company, Reedy Creek Improvement District (RCID) authorizing the installation and initial operation of a replacement LM6000 PC gas turbine. The purpose of this letter is to request a revision to Air Construction Permit No. 0950111-025-AC to allow for an increase in permitted capacity and to clarify the calculation and recording of the NO_x four-hour rolling average.

Heat Input

Section 3, Condition No. 6 of Air Construction Permit No. 0950111-025-AC limits the LM6000 gas turbine maximum heat input to 480 million British thermal units per hour on a higher heating value basis (mmBtu/hr, HHV) at a compressor inlet temperature of 30°F and full load operation. Initial operation of the LM6000 gas turbine indicates that this maximum heat input, which was based on gas turbine vendor projections, under estimates the actual performance of the LM6000 unit by approximately five percent.

Accordingly, RCID requests that Condition No. 6 be revised to show a maximum heat input of 505 mmBtu/hr, HHV at 30°F and full load operation. Based on preliminary emissions testing, there is sufficient margin in the emission estimates for nitrogen oxides (NO_x) and carbon monoxide (CO) such that no changes to the current permit limits for these two air contaminants are necessary.

Increasing the maximum hourly heat input rate will result in a corresponding increase in maximum hourly fuel consumption. Revised Table 3-1 (PSD Netting Analysis), Table B2A (hourly PM/PM₁₀, SO₂, H₂SO₄, and Pb emission rates), Table B5 (annual emission rates), and Table B7 (fuel flow rates) are attached for your review. These revised tables reflect an increase in maximum heat input from 480 to 505 mmBtu/hr for Operating Scenarios 2 and 6. As shown on revised Table 3-1, the net changes in emissions remain below the PSD significant emission rate thresholds for major modifications.

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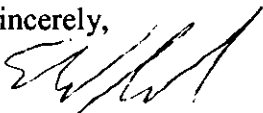
NOx Four Hour Rolling Average Calculations and Recording

Section 3, Condition No. 20 and No. 20(e) of Air Construction Permit No. 0950111-025-AC defines the calculation and recording of emissions averages. These permit conditions are being met in all respects. However, operation of the system has revealed that the data recording software of the Continuous Emissions Monitoring System (CEMS) is not currently extracting the excess emissions due to startup/shutdown/malfunction (SU/SD/M) from the calculation of the NOx four hour rolling average. RCID proposes to modify the software to perform this extraction so that four hour rolling averages are posted in two ways: To show all emissions in the four hour rolling average in compliance with NSPS limits as shown in Permit Section 4, Appendix E, and; Show four hour rolling averages with excess emissions due to SU/SD/M extracted in compliance with the four hour rolling average limits listed in Permit Condition 10. These modifications to the software will ensure accurate and complete recordkeeping that will assist with operation in compliance with all permit conditions. Therefore we respectfully request adoption of the protocol discussed in detail in the attachment "Proposed Paragraph 20(e) - Emissions Averages".

In summary, RCID requests that Section 3, Condition No. 6 of Air Construction Permit No. 0950111-025-AC be revised to show a maximum heat input of 505 mmBtu/hr, HHV at 30°F and full load operation and to replace the existing Section 3, Condition 20(e) with the proposed Condition 20(e). No other changes to Air Construction Permit No. 0950111-025-AC are requested.

Please contact me at (407) 824-4943 if you have any questions regarding this permit revision request.

Sincerely,



Edward Godwin, P.E.
Chief Mechanical Engineer
Reedy Creek Energy Services

Attachments

cc: Mr. Leonard Kozlov
Program Administrator
Air Resources Management
Florida Department of Environmental Protection
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Table 3-1. LM6000 Repowering Project - PSD Netting Analysis (Revised April 2006)

	LM5000 Historical Emissions						Diesel Generators	LM5000 ^(b)	Net Change (tpy)	PSD Threshold (tpy)	% of PSD Threshold (%)	PSD Review (Y/N)
	1999	2000	2001	2002	2003	02,03 Avg						
Natural Gas Usage (10 ⁶ ft ³)	1,973.34	1,862.46	1,565.26	2,340.08	1,450.63	1,895.36	N/A	4,256.6	N/A	N/A	N/A	N/A
Heat Content (Btu/ft ³)	1,041.55	1,031.87	1,044.20	1,036.99	1,042.00	1,039.50	N/A	1,040.0	N/A	N/A	N/A	N/A
Sulfur Content (gr S/100 ft ³)	0.1552	0.1552	0.0957	0.0983	0.0924	0.0954	N/A	2.00	N/A	N/A	N/A	N/A
Natural Gas Density (lb/ft ³) ^(a)	0.0451	0.0451	0.0451	0.0451	0.0451	0.0451	N/A	0.0452	N/A	N/A	N/A	N/A
Wt % S	0.00049	0.00049	0.00030	0.00031	0.00029	0.00030	N/A	0.00632	N/A	N/A	N/A	N/A
Oil Usage (10 ³ gal)	54.0	0.0	54.0	0.0	0.0	0.0	10.2	1,741.2	N/A	N/A	N/A	N/A
Heat Content (10 ⁶ Btu/10 ³ gal)	138.585		138.585					137.761	N/A	N/A	N/A	N/A
Oil Density (lb/gal)	7.022		7.022					7.05	N/A	N/A	N/A	N/A
Wt % S	0.0372		0.0372				0.05	0.10	N/A	N/A	N/A	N/A
NO _x ^(b) (ton/yr)	186.9	163.1	133.1	203.0	130.2	166.6	1.77	195.7	30.9	40.0	77.2	N
CO ^(c) (ton/yr)	4.2	3.9	3.0	8.8	3.7	6.3	0.14	55.2	49.0	100.0	49.0	N
SO ₂ ^(b) (ton/yr)	0.7	0.6	0.4	0.8	0.4	0.6	0.18	23.8	23.4	40.0	58.5	N
H ₂ SO ₄ ^(d) (ton/yr)	0.0860	0.0740	0.0490	0.0980	0.0490	0.0740	0.02	2.9	2.8	7.0	40.7	N
PM ₁₀ ^(c) (ton/yr)	2.5	2.3	2.1	3.1	2.1	2.6	0.06	16.1	13.6	15.0	90.4	N
PM ^(c) (ton/yr)	2.5	2.3	2.1	3.1	2.1	2.6	0.06	16.1	13.6	25.0	54.2	N
Pb ^(d) (ton/yr)	0.00005	0.00000	0.00005	0.00000	0.00000	0.00003	0.00	0.0027	0.003	0.6	0.4	N
VOC ^(b) (ton/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.42	6.1	6.5	40.0	16.3	N

(a) Based on natural gas specific gravity of 0.59.

(b) Acid Rain Program data.

(c) Annual Operating Report (AOR) data.

(d) Based on 8.0% conversion of fuel sulfur to SO₂ and 100% conversion of SO₂ to H₂SO₄.

(e) Use of April 2000 AP-42 factor for distillate oil (1.4 x 10⁻⁵ lb/10⁶ Btu); negligible Pb emissions assume for natural gas combustion.

(f) Heat input increased to 505 x 10⁶ Btu/hr, HHV for Scenarios 2 and 6.

Sources: ECT, 2006.

RCES, 2006.

Table B5. RCES LM6000 Repowering Project - Revised April 2006
Annual Criteria and H₂SO₄ Emission Rates
0.1 % S Fuel Oil, 475 hr/yr

Annual Profile	Scenario	Operating Hours (hrs/yr)	Emission Rates													
			NO _x		CO		VOC		PM/PM ₁₀		SO ₂		H ₂ SO ₄		Lead	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
1	1	100	42.0	2.10	8.1	0.40	1.10	0.06	3.0	0.15	2.6	0.13	0.3	0.02	0.0002	0.00001
	2	36	74.0	1.33	2.4	0.04	4.90	0.09	15.5	0.28	51.7	0.93	6.3	0.11	0.0071	0.00013
	6	7,164	43.0	154.03	5.1	18.26	0.41	1.48	3.0	10.75	2.8	9.95	0.3	1.22	0.0002	0.00087
	13	1,110	16.0	8.88	6.2	3.41	0.68	0.38	3.0	1.67	1.0	0.55	0.1	0.07	0.0001	0.00005
	15	300	72.3	10.85	2.4	0.36	4.80	0.72	13.6	2.04	45.4	6.81	5.6	0.83	0.0062	0.00093
	17	50	-	0.04	-	0.16	1.10	0.03	3.0	0.08	2.8	0.07	0.3	0.01	0.0002	0.00001
	Totals	8,760	N/A	177.22	N/A	22.63	N/A	2.75	N/A	14.96	N/A	18.43	N/A	2.26	N/A	0.0020
2	2	475	74.0	17.58	2.4	0.57	4.9	1.16	15.5	3.68	51.7	12.28	6.3	1.50	0.0071	0.00168
	6	8,285	43.0	178.13	5.1	21.12	0.4	1.71	3.0	12.43	2.8	11.50	0.3	1.41	0.0002	0.00101
	Totals	8,760	N/A	199.70	N/A	21.69	N/A	2.88	N/A	16.91	N/A	13.73	N/A	2.91	N/A	0.0027
3	3	8,760	16.0	70.08	12.6	55.19	0.7	2.98	3.0	13.14	1.00	4.37	0.12	0.54	0.0001	0.00038
	Totals	8,760	N/A	70.08	N/A	55.19	N/A	2.98	N/A	13.14	N/A	4.37	N/A	0.54	N/A	0.00038
4	2	475	74.0	17.58	2.4	0.57	4.9	1.16	15.5	3.68	51.7	12.28	6.3	1.50	0.0071	0.00168
	4	8,285	41.7	172.74	4.9	20.13	1.2	4.97	3.0	12.43	2.5	10.47	0.3	1.28	0.0000	0.00000
	Totals	8,760	N/A	190.32	N/A	20.70	N/A	6.13	N/A	16.11	N/A	22.74	N/A	2.79	N/A	0.0017
	Max.			195.70		55.19		6.13		16.11		23.78		2.91		0.0027

Notes:
Bold and shaded tpy values represent highest for all annual profiles.
Heat input increased to 505 x 10⁶ Btu/hr, HHV for Scenarios 2 and 6.

Sources: ECT, 2006.
GE, 2006.
RCES, 2006.

**Table B7. RCES LM6000 Repowering Project - Revised April 2006
CT Fuel Flow Rate Data**

Scenario	Ambient Temp. (°F)	CT Inlet Temp. (°F)	Fuel Type (Gas/Oil)	Generator Output (kW)	Load ¹ (%)	Heat Input - LHV ² (MMBtu/hr)	Heat Input - HHV ^{2,5} (MMBtu/hr)	Fuel Rate (lb/hr)	Fuel Rate (lb/sec)	Fuel Rate ³ (10 ⁶ ft ³ /hr)	Fuel Rate ⁴ (10 ³ gal/hr)
1	30.0	30.0	Gas	50,242	100	421.9	467.8	20,346	5.652	0.450	N/A
2	30.0	30.0	Oil	50,210	100	475.5	505.0	25,843	7.179	N/A	3.666
3	30.0	30.0	Gas	13,000	26	163.8	181.6	7,900	2.194	0.175	N/A
4	60.4	57.9	Gas	48,684	97	414.7	459.8	19,999	5.555	0.442	N/A
5	60.4	60.4	Gas	48,645	97	415.3	460.5	20,027	5.563	0.443	N/A
6	60.4	48.0	Gas	50,729	101	455.5	505.0	21,979	6.105	0.486	N/A
7	62.3	60.5	Gas	48,230	96	411.3	456.0	19,836	5.510	0.439	N/A
8	62.3	62.3	Gas	48,367	97	413.3	458.2	19,928	5.536	0.441	N/A
9	70.1	65.9	Gas	47,254	95	404.1	448.0	19,486	5.413	0.431	N/A
10	68.4	68.4	Gas	18,812	38	202.6	224.6	9,768	2.713	0.216	N/A
11	73.9	73.9	Gas	18,812	38	202.2	224.2	9,750	2.708	0.216	N/A
12	75.0	75.0	Gas	18,812	38	202.1	224.1	9,745	2.707	0.215	N/A
13	70.0	70.0	Gas	13,000	26	163.5	181.3	7,885	2.190	0.174	N/A
14	83.5	50.0	Gas	49,957	100	425.6	471.9	20,526	5.702	0.454	N/A
15	83.5	50.0	Oil	48,547	97	417.5	443.4	22,691	6.303	N/A	3.219
16	83.0	83.0	Gas	13,000	26	163.2	173.3	7,872	2.187	0.174	N/A
Max. - Gas				50,729		455.5	505.0	21,979	6.105	0.486	N/A
Max. - Oil				50,210		475.5	505.0	25,843	7.179	N/A	3.666

¹ Based on 100 % load = 50,000 kW.

² Based on HHV/LHV ratio of 1.108742 (gas) and 1.06201 (oil).

³ Based on natural gas density of 0.04523 lb/ft³.

⁴ Based on distillate fuel oil density of 7.04986 lb/gal.

⁵ Heat input increased to 505 x 10⁶ Btu/hr. HHV for Scenarios 2 and 6.

Sources: ECT, 2006.

GE, 2006.

RCES, 2006.

**Table B2a. RCES LM6000 Repowering Project - Revised April 2006
CT Hourly Criteria and H₂SO₄ Emission Rates**

Scenario	Ambient Temp. (°F)	CT Inlet Temp. (°F)	Fuel Type (Gas/Oil)	Nominal Load (%)	PM/PM ₁₀ ¹		SO ₂ ²		H ₂ SO ₄ ³		Pb ^{4,5}	
					(lb/hr)	(g/sec)	(lb/hr)	(g/sec)	(lb/hr)	(g/sec)	(lb/hr)	(g/sec)
1	30.0	30.0	Gas	100	3.0	0.38	2.57	0.32	0.31	0.040	0.00022	0.000028
2 ⁶	30.0	30.0	Oil	100	15.5	1.95	51.69	6.51	6.33	0.798	0.00707	0.000891
3	30.0	30.0	Gas	25	3.0	0.38	1.00	0.13	0.12	0.015	0.00009	0.000011
4	60.4	57.9	Gas	100	3.0	0.38	2.53	0.32	0.31	0.039	0.00022	0.000028
5	60.4	60.4	Gas	100	3.0	0.38	2.53	0.32	0.31	0.039	0.00022	0.000028
6 ⁶	60.4	48.0	Gas	100	3.0	0.38	2.78	0.35	0.34	0.043	0.00024	0.000031
7	62.3	60.5	Gas	100	3.0	0.38	2.51	0.32	0.31	0.039	0.00022	0.000028
8	62.3	62.3	Gas	100	3.0	0.38	2.52	0.32	0.31	0.039	0.00022	0.000028
9	70.1	65.9	Gas	100	3.0	0.38	2.46	0.31	0.30	0.038	0.00022	0.000027
10	68.4	68.4	Gas	40	3.0	0.38	1.23	0.16	0.15	0.019	0.00011	0.000014
11	73.9	73.9	Gas	40	3.0	0.38	1.23	0.16	0.15	0.019	0.00011	0.000014
12	75.0	75.0	Gas	40	3.0	0.38	1.23	0.16	0.15	0.019	0.00011	0.000014
13	70.0	70.0	Gas	25	3.0	0.38	1.00	0.13	0.12	0.015	0.00009	0.000011
14	83.5	50.0	Gas	100	3.0	0.38	2.59	0.33	0.32	0.040	0.00023	0.000029
15	83.5	50.0	Oil	100	13.6	1.72	45.38	5.72	5.56	0.700	0.00621	0.000782
16	83.0	83.0	Gas	25	3.0	0.38	0.99	0.13	0.12	0.015	0.00009	0.000011
Max. - Gas					3.0	0.38	2.78	0.35	0.34	0.04	0.00024	0.00003
Max. - Oil					15.5	1.95	51.69	6.51	6.33	0.80	0.00707	0.00089

¹ Filterable PM, as measured by EPA Reference Method 5.

² Based on natural gas sulfur content of 2.0 gr/100 ft³ and distillate fuel oil sulfur content of 0.1 weight % sulfur.

³ Based on 8.0% conversion of fuel S to SO₂ and 100% conversion of SO₂ to H₂SO₄.

⁴ Natural Gas - Table 1.4-2., AP-42, July 1998.

⁵ Distillate Fuel Oil - Table 3.1-2a, AP-42, April 2000.

⁶ Heat input increased to 505 x 10⁶ Btu/hr, HHV for Scenarios 2 and 6.

Sources: ECT, 2006.

GE, 2006.

Proposed Section 3, Condition 20(e), Emissions Averages

- e. *Emissions Averages.* The emissions data shall be reduced to 1-hour averages. Compliance with the NOx standards shall be demonstrated based on a 4-hour rolling average of the 1-hour emissions averages consistent with the requirements in NSPS Subpart GG and as defined herein. The NOx CEM shall express 1-hour emission averages and 4-hour rolling averages in terms of "ppmvd corrected to 15% oxygen". An hour during which any amount of oil is fired shall be attributed to "oil firing". If an operational period includes both gas firing and oil firing, the 4-hour emissions standard shall be prorated based on the emissions standard for each fuel and the number of hours of firing attributed to each fuel. Upon a request from the Compliance Authority, the NOx emission rate shall be corrected to ISO conditions to demonstrate compliance with the applicable standards of 40 CFR 60.332.

For the purpose of recording one-hour NOx averages and four-hour rolling NOx averages in compliance with Section 4, Appendix E and NSPS Subpart GG (40 CFR60.332) emissions limits, all valid CEMS NOx emissions data shall be used.

For the purpose of recording one-hour NOx averages and four-hour rolling NOx averages in compliance with the limits of Section 3, Condition 10; NOx average emissions shall be calculated to exclude periods of excess emissions due to startup/shutdown/malfunction (SU/SD/M) provided the permittee remains in compliance with the conditions of Section 3, Conditions 12, 13, and 14. For the purpose of determining and recording periods of excess emissions and calculating and recording NOx average emissions, the following procedures shall be used.

- I. NOx emissions (including SU/SD/M) will be evaluated and recorded in 1-minute intervals.
- II. NOx emissions data collected during periods of SU/SD/M (in 1-minute intervals, up to a total of 2 hours in a rolling 24-hour period) will be extracted prior to calculating hourly emission concentrations for determination of compliance with the 4-hour rolling average limit. Only data obtained during the described episode (startup, shutdown, or malfunction) may be excluded. These excluded periods will be identified and recorded as excess emissions (and attributed to SU/SD/M) if the averages of the excluded periods are above the rolling average limits for the particular fuel. This information will be reported in the Quarterly Excess Emissions Reports, along with the time, duration, and average NOx ppmvd, corrected to 15% O₂.
- III. After the SU/SD/M periods have been extracted (in 1-minute intervals up to a total of 2 hours in a rolling 24-hour period), hourly averages will be calculated for determination of compliance with the NOx emission limit. A valid hourly average must have at least two valid data points at least 15 minutes apart (of non-excluded data); if there is insufficient data, the balance of the clock hour will be ignored.
- IV. Determination of the 4-hour rolling average period begins after the extraction of SU/SD/M data and are determined without regard to calendar days.