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Company: FDEP, Tallahassee
Date: August 28, 2000

From: David Buff
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Our ref:
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RE: 0037545-0300

Total pages (including cover): 12
Hard copy to follow ☐

MESSAGE

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MEMORANDUM

TO: Jeff Koerner/Cleve Holliday/Fdep Tallahassee August 26, 2000

FR: David A. Buff, Golder Associates

RE: OSCEOLA POWER- SIMULTANEOUS OPERATIONS EXTENSION Project No. 0037545-0300

Attached is an excerpt from the 1995 amendment application for Osceola Power. This application requested higher heat input rates for Osceola Power, and resulted in Permit No. AC50-269980;PSD-FL-197A being issued. The most recent simultaneous operations modeling analysis was contained in this amendment application, and is attached. Please review this modeling to determine if it is acceptable for the current amendment request. It was acceptable at the time in 1995.

cc: Bill Tarr
Carlos Rionda
Jorge Cabrera
James Meriwether
David Dee

APPLICATION TO AMEND PSD PERMIT FOR OSCEOLA POWER LIMITED PARTNERSHIP

PAHOKEE, FLORIDA
APRIL 1995

Prepared For:

Osceola Power Limited Partnership
P.O. Box 86
South Bay, Florida 33493

Prepared By:

KBN Engineering and Applied Sciences, Inc.
6241 NW 23rd Street
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April 1995
14380C

time. These arsenic impacts are based on a conservative analysis which assumes 2.4 percent of the wood waste steam for the facility is treated wood. The annual ARC for arsenic is 0.00023 $\mu g/m^3$.

Review of the modeling results for arsenic show that the annual ARC is predicted to be met at a distance of 4 km and beyond from the cogeneration facility. There are no residences or other public or private buildings, other than Osceola Farms buildings, located within 4 km of the proposed facility. This area consists totally of sugar cane fields. In addition, the ARC is based on a 1 in 1 million risk of cancer. EPA has promulgated risk factors for toxic substances, including arsenic, based on a 1 in 100,000 risk of cancer. The predicted maximum annual impact of arsenic of 0.00026 $\mu g/m^3$ is well below the EPA promulgated level of 0.0023 $\mu g/m^3$ based on 1 in 100,000 risk. Based on these considerations, no adverse effects due to the cogeneration facility are expected.

4.10 OPERATION OF COGENERATION BOILERS IN CONJUNCTION WITH EXISTING OSCEOLA BOILERS

During initial startup of the cogeneration facility prior to commercial operation, it is possible the cogeneration boilers may be operated when the Osceola sugar mill boilers are also operating. This situation may arise when performance tests and debugging activities are conducted at the cogeneration facility.

It is expected that such operations will occur no more than 120 calendar days during the initial 12-months following cogeneration plant startup. This will not be a consecutive 120 day period, but will instead consist of intermittent periods of performance testing and debugging until commercial operation begins. During these 120 calendar days, only biomass or No. 2 fuel oil will be burned in the cogen boilers. Coal will not be burned during this period. Simultaneous operation of the existing and new facilities will only occur during the crop season, because the existing Osceola sugar mill boilers do not operate during the seven-month off-season.

The testing of the cogeneration boilers prior to commercial operation will be performed in isolation (i.e., no steam being sent to the sugar mill) or in the cogeneration mode (i.e., with steam being sent to the sugar mill). When operating in isolation, the maximum short-term (i.e., 3-hour) steam load that can be accommodated totally within the cogeneration facility is both boilers operating at full load (1,012,000 lb/hr steam). On a 24-hour average basis, the maximum steam load will be limited to 570,000 lb/hr steam.

In order to investigate the potential air quality impacts of this situation, air dispersion modeling of the cogen boilers for biomass burning conditions was performed (i.e., emissions and gas flow rate are different than under coal burning conditions). Emissions equivalent to two boilers at full load were modeled for the 1-, 3- and 8-hour averaging times, and emissions equivalent to 570,000 lb/hr steam were modeled for the 24-hour and annual averaging times (Table 4-20). The results of this analysis are presented in Table 4-21. As shown, the maximum cogen facility impacts are all less than the air quality significant impact levels. This demonstrates that the cogen facility, when operated at or below these steam rates, will not contribute significantly to any existing air quality impacts (e.g., those due to the existing sugar mill boilers).

Class I PSD impacts were also analyzed for this case of simultaneous operation during the crop season. Presented in Table 4-22 are the predicted Class I impacts of the cogeneration boilers only burning biomass with 1) two boilers operating at full load for the 3-hour averaging time, and 2) with a total of 570,000 lb/hr steam for the 24-hour and annual averaging times. As shown, all impacts except the SO_2 24-hour and 3-hour impacts are below the National Park Service significance levels. Therefore, simultaneous operation of the existing boilers and cogen boilers during the crop season will not cause or contribute to any PSD Class I increment violations for PM or NO_x in the Class I area.

A comparison of the SO_2 emissions for the Class I modeling and the potential case of simultaneous operation is presented in Table 4-23. As shown, for Osceola Farms the PSD baseline SO_2 emissions are 335.3 lb/hr. Future SO_2 emissions for Osceola Power in the Class I modeling analysis (with coal) are 1,272 lb/hr, whereas for simultaneous operation the total SO_2 emissions (with biomass) will be 719.1 lb/hr, maximum 3-hour averaging time. Thus, SO_2 emissions during the proposed simultaneous operations are reduced by 553 lb/hr compared to the Class I modeling and therefore PSD Class I impacts should be reduced for this case.

The cogeneration facility may also be tested at times when the cogeneration plant is operated in the cogeneration mode. During this mode, steam will be sent from the cogen facility to the sugar mill, and the sugar mill boilers steam production will be reduced by an equal amount. Under

Table 4-20. Cogen Facility Emissions When Burning Biomass, Osceola Power

Boiler	Design Steam Rate Per Boiler (lb/hr)	Design Heat Input Per Boiler (MMBTU/HR)	Biomass Emission Factor (lb/MMBtu)				Biomass Emissions (lb/hr)				Biomass Emissions (lb/1000 lb steam)			
			SO2	NOx	PM	CO	SO2	NOx	PM	CO	SO2	NOx	PM	CO
							Maximum 3-Hour Load Case							
1	506,000	760	0.10	0.116	0.03	0.35	76.0	88.2	22.8	266.0	0.150	0.174	0.045	0.526
2	506,000	760	0.10	0.116	0.03	0.35	76.0	88.2	22.8	266.0	0.150	0.174	0.045	0.526
Total	1,012,000	1,520					152.0	176.3	45.6	532.0				
							Maximum 24-Hour (570,000) lb/hr Steam Case							
1	506,000	760	0.10	0.116	0.03	0.35	76.0	88.2	22.8	266.0	0.150	0.174	0.045	0.526
2	64,000	100	0.10	0.116	0.03	0.35	10.0	11.6	3.0	35.0	0.156	0.181	0.047	0.547
Total	570,000	860					86.0	99.8	25.8	301.0				

Note: All figures derived from permit application.

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Table 4-21. Maximum Impacts of Osceola Cogeneration Facility Only When Operating Simultaneously With Existing Boilers

Parameter	Pollutant			
Emission Rate [1]	SO2	NOx	CO	PM
1-hour, 3-hour, 8-hour (lb/hr)	152.0	--	532.0	--
1-hour, 3-hour, 8-hour (g/s)	19.2	--	67.0	--
24-hour and Annual (lb/hr)	86.0	99.8	--	25.8
24-hour and Annual (g/s)	10.8	12.6	--	3.3
Maximum Impacts and Significance Levels ($\mu g/m^3$) [2]				
Annual Max Impact	0.35	0.40	--	0.10
Sig. Level	1	1	--	1
24-hour Max Impact	4.4	--	--	1.3
Sig. Level	5	--	--	5
8-hour Max Impact	--	--	38.3	--
Sig. Level	--	--	500	--
3-hour Max Impact	16.2	--	--	--
Sig. Level	25	--	--	--
1-hour Max Impact	--	--	119.8	--
Sig. Level	--	--	2,000	--

Notes:

[1] Burning biomass with emissions equivalent to two boilers at full load (1,012,000 lb/hr steam) for 3-hour averaging time and 570,000 lb/hr total steam rate for 24-hour and annual averaging time.

[2] Maximum impacts are based on cogeneration facility only operating during sugar mill season, October 1 through April 30. Impacts are the maximum refined impacts predicted using 1982 - 1986 meteorological data from West Palm Beach.
Signifigance Levels are PSD Class II Significant Levels.

Table 4-22. Maximum Impacts of Osceola Cogeneration Facility Only When Operating Simultaneously with Existing Boilers – Class I Area

	Emission Rate[1]			Maximum Impacts (µg/m³)[2]			Nat'l Park Service Sig. Levels (µg/m³)		
Pollutant	Averaging Time	(lb/hr)	(g/s)	Annual	24-hour	3-hour	Annual	24-hour	3-hour
SO2	3-hour	152.0	19.2	--	--	1.06	--	--	0.48
SO2	24-hour, Annual	86.0	10.8	0.006	0.159	--	0.03	0.07	--
NOx	Annual	99.8	12.6	0.007	--	--	0.025	--	--
PM	24-hour, Annual	25.8	3.3	0.002	0.048	--	0.1	0.33	--

Notes

[1] Burning biomass, with emissions equivalent to two boilers at full load (1,012,000 lb/hr steam) for 3-hour averaging time and 570,000 steam for 24-hour and annual averaging times.

[2] Based on cogeneration facility operating during sugar mill crop season, 10/1 – 4/30.
Impacts based on highest concentration predicted using 1982-86 meteorological data.

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Table 4-23. SO2 Emissions for Osceola Power Used in PSD Class I Analysis

Source	Basis of Class 1 Modeling (lb/hr)	Simultaneous Operation of Existing/Cogen Boilers (lb/hr)
	PSD Baseline	PSD Baseline
Boiler 1	40.2	40.2
Boiler 2	129.5	129.5
Boiler 3	57.6	57.6
Boiler 4	108.0	108.0
Boiler 5	--	--
Boiler 6	--	--
Boiler 10	--	--
Boiler 11	--	--
Boiler 12	--	--
Boiler 14	--	--
Boiler 15	--	--
Boiler 16	--	--
Totals	335.3	335.3
	Future	Future
Boiler 1	--	--
Boiler 2	--	77.9
Boiler 3	--	36.5
Boiler 4	--	77.9
Boiler 5	--	139.1
Boiler 6	--	235.7
Boiler 10	--	--
Boiler 11	--	--
Boiler 12	--	--
Boiler 14	--	--
Boiler 15	--	--
Boiler 16	--	--
Cogen Boilers	1,272.0 *	152.0 **
Totals	1,272.0	719.1

* Cogen facility boilers operating on 100% coal.
** Cogen boilers operating on biomass and at full load.

these conditions, air emissions and air impacts due to the existing Osceola Farms boilers will be reduced. For each lb of steam generated, emissions are higher from the existing boilers than from the cogen boilers. The calculation of maximum emissions from the existing boilers is presented in Table 4-24, and those for the cogen boilers are shown in Table 4-20. The comparison of emissions from the existing and cogen boilers is presented in Table 4-25.

In addition, the cogeneration stacks (200 ft) are higher than the existing boiler stacks (90 ft) and the cogeneration boiler exhaust gases (295°F) are of greater temperature than the existing boilers exhaust gases (150°F), and therefore the cogen boilers provide much greater dispersion of emissions. This demonstrates that any operation of the cogen boilers which sends steam to the sugar mill will only reduce total emissions and impacts.

Table 4-24. Existing Boiler Emissions, Osceola Sugar Mill

Boiler	Design Steam Rate (lb/hr)	Design Heat Input (MMBtu/hr)	Fuel Oil gal/hr	Fuel Oil MMBtu/hr	Bagasse MMBtu/hr	Bagasse lb/hr(dry)	Emission Factor (lb/MMBtu) Fuel Oil	Emission Factor (lb/MMBtu) Bagasse	Emissions Oil (lb/hr)	Emissions Bagasse+ (lb/hr)	Emissions Total (lb/hr)	Emissions Total (lb/MMBtu)	Emissions Total (lb/1000 lb steam)
						WORST CASE 24-HOUR SO2 EMISSIONS							
2	140,000	272	117	17.6	254.4	31,805	2.62	0.125	46.1	31.8	77.9	0.286	0.56
3	150,000	292	0	0.0	292.0	36,500	--	0.125	0.0	36.5	36.5	0.125	0.24
4	140,000	272	117	17.6	254.4	31,805	2.62	0.125	46.1	31.8	77.9	0.286	0.56
5	165,000	321	264	39.6	281.4	35,173	2.62	0.125	103.9	35.2	139.1	0.433	0.84
6	195,000	379	502	75.4	303.6	37,951	2.62	0.125	197.7	38.0	235.7	0.622	1.21
Totals		1,536	1,000	150.1	1,385.9	173,235			393.8	173.2	567.0		
						WORST CASE 24-HOUR NOx EMISSIONS							
2	140,000	272	117	17.6	254.4	31,805	0.446	0.235	7.8	59.8	67.6	0.249	0.48
3	150,000	292	0	0.0	292.0	36,500	--	0.16 [1]	0.0	46.7	46.7	0.160	0.31
4	140,000	272	117	17.6	254.4	31,805	0.446	0.235	7.8	59.8	67.6	0.249	0.48
5	165,000	321	264	39.6	281.4	35,173	0.446	0.235	17.7	66.1	83.8	0.261	0.51
6	195,000	379	502	75.4	303.6	37,951	0.400 [1]	0.16 [1]	30.2	48.6	78.7	0.208	0.40
Totals		1,536	1,000	150.1	1,385.9	173,235			63.5	281.0	344.5		
						WORST CASE 24-HOUR PM EMISSIONS							
2	140,000	272	0	0.0	272.0	34,000	0.1 [1]	0.20 [1]	0.0	54.4	54.4	0.200	0.39
3	150,000	292	0	0.0	292.0	36,500	--	0.20 [1]	0.0	58.4	58.4	0.200	0.39
4	140,000	272	0	0.0	272.0	34,000	0.1 [1]	0.30 [1]	0.0	81.6	81.6	0.300	0.58
5	165,000	321	0	0.0	321.0	40,125	0.1 [1]	0.20 [1]	0.0	64.2	64.2	0.200	0.39
6	195,000	379	0	0.0	379.0	47,375	0.1 [1]	0.15 [1]	0.0	56.9	56.9	0.150	0.29
Totals		1,536	0	0.0	1,536.0	192,000			0.0	315.5	315.5		
						WORST CASE 24-HOUR CO EMISSIONS							
2	140,000	272	0	0.0	272.0	34,000	0.033	3.625	0.0	986.0	986.0	3.625	7.04
3	150,000	292	0	0.0	292.0	36,500	--	3.625	0.0	1,058.5	1,058.5	3.625	7.06
4	140,000	272	0	0.0	272.0	34,000	0.033	3.625	0.0	986.0	986.0	3.625	7.04
5	165,000	321	0	0.0	321.0	40,125	0.033	3.625	0.0	1,163.6	1,163.6	3.625	7.05
6	195,000	379	0	0.0	379.0	47,375	0.033	3.625	0.0	1,373.9	1,373.9	3.625	7.05
Totals		1,536	0	0.0	1,536.0	192,000			0.0	5,568.0	5,568.0		

+ Assumes 50% SO2 removal when burning bagasse.

Notes:

[1] Permit Limit applied where more restrictive.

Notes: No 6 Fuel Oil-- 18,300 Btu/lb
8.2 lb/gal
2.4 % sulfur

NOx = 67 lb/1000 gal
CO = 5 lb/1000 gal
PM = 0.1 lb/MMBtu

Bagasse -- 8,000 Btu/lb (dry)
0.1% sulfur, max (dry)

NOx = 0.235 lb/MMBtu
CO = 29 lb/ton (wet)
PM = 0.15, 0.2 or 0.3 lb/MMBtu

Table 4-25. Comparison of Existing Boiler and Cogen Facility Emissions, Osceola

	Existing Boilers*		Cogen Boilers (Biomass)	
Pollutant	lb/MMBtu	lb/1000 lb steam	lb/MMBtu	lb/1000 lb steam
SO2	0.125	0.24	0.10	0.15
NOx	0.16	0.31	0.116	0.174
PM	0.15	0.27	0.03	0.045
CO	3.625	5.66	0.35	0.526

* Lowest emission rate for any of the existing boilers.