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Golder Associates

December 7, 2001

0037584

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RECEIVED
DEC 10 2001
BUREAU OF AIR REGULATION

Attention: Mr. Jeff Koerner, P.E.

RE: OKEELANTA POWER COGENERATION FACILITY
ARMS FACILITY ID NO. 0990332
PROJECT NO. 0990332-014-AC/PSD-FL-196M
APPLICATION TO MODIFY CO AND SO_2 EMISSIONS STANDARDS

Dear Mr. Koerner:

Okeelanta Power Limited Partnership (OkPLP) has received the Department's letters dated July 11, 2001 and November 29, 2001 requesting additional information in regards to modifying the CO and SO_2 emissions standards for the three cogeneration boilers. In the letter dated July 11, a request was made (comment No. 5) for an updated SO_2 air quality modeling analysis. This request was further discussed in the November 29 letter.

Per your request, an SO_2 air quality impact analysis was performed. The modeling analysis including the report, tables, modeling methodology, and results is attached. Supportive modeling files have been emailed to Cleve Holladay of your staff.

If you have any questions, please call me at (352) 336-5600 or email me at dave_buff@golder.com.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

David A. Buff, P.E., Q.E.P.
Principal Engineer
Florida P.E. #19011
SEAL

Enclosure

DB/FH/jkw

cc: Gus Cepero
James Meriwether
David Dee
Bill Tarr
Fawn Howard

C. Holladay
[illegible], PB Co.
D. Knowles, SD
G. Worley, EPA
J. Bunyak, NPS

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AIR QUALITY IMPACT ANALYSIS
FOR SULFUR DIOXIDE
OKEELANTA POWER L.P.
SOUTH BAY, FLORIDA

Prepared For:

Okeelanta Power, L.P.
21250 U.S. Highway 27
South Bay, Florida 33493

Prepared By:

Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

December 2001
0037584Y

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1.0 AIR QUALITY IMPACT ANALYSIS FOR SULFUR DIOXIDE

Golder Associates Inc. (Golder), on behalf of Okeelanta Power L.P. (OkPLP), has performed additional air quality impact analyses for sulfur dioxide (SO_2) at the request of the Florida Department of Environmental Protection (FDEP). These analyses were based on modeling OkPLP's expected future maximum SO_2 emissions together with other SO_2 emission sources within the modeling and screening areas. The modeling area extended out to 8 kilometers (km), which is the distance at which the increase in SO_2 impacts are predicted to be below the 3-hour, 24-hour, and annual significant impact levels of 1, 5, and 25 micrograms per cubic meter ($\mu g/m^3$), respectively. Therefore, the screening area extended out to 58 km i.e., 50 km beyond the modeling area.

As shown in these analyses, OkPLP's SO_2 impacts, together with those from background SO_2 emission sources, are predicted to be below the national and state ambient air quality standards (AAQS), prevention of significant deterioration (PSD) Class II increments, and PSD Class I increments. The following summary provides a description of the methods and assumptions used to estimate total SO_2 air quality concentrations for OkPLP and other sources.

1.1 AIR MODELING METHODS AND APPROACH

SO_2 concentrations predicted in areas within 50 km of the OkPLP facility were predicted with the Industrial Source Complex Short-term (ISCST3, Version 00101) dispersion model (EPA, 2001) and 5 years of meteorological data from the National Weather Service (NWS) office at Palm Beach International Airport. The 5-year period of meteorological data was from 1987 through 1991. Generally, when using 5-years of meteorological data for the analysis, the highest annual and highest, second-highest (HSH) short-term concentrations are to be compared to the applicable AAQS and allowable PSD increments. The HSH is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with most air quality standards and all allowable PSD increments, which permit a short-term average concentration to be exceeded once per year at each receptor.

For predicting maximum impacts at the Everglades National Park (NP) PSD Class I area, the California Puff (CALPUFF) modeling system was used. CALPUFF, Version 5.4 (EPA, 2000), is a

Langrangian puff model that is recommended by the FDEP, in coordination with the Federal Land Manager (FLM) for the Everglades NP, for predicting pollutant impacts at PSD Class I areas that are beyond 50 km from the project site. For this project, CALPUFF was used in a refined mode using a CALMET-developed wind field domain covering South Florida. A more detailed discussion of CALPUFF and the CALMET wind field used for the analysis is provided in Appendix A.

1.1.1 SIGNIFICANT IMPACT ANALYSIS

For the significant impact analysis, the difference between the future and actual SO_2 emissions of the OkPLP boilers were modeled. The maximum 3-hour, 24-hour, and annual concentrations are compared to the Class II significant impact levels in the vicinity of the plant, and to the Class I significant impact levels at the PSD Class I area. For all averaging times in which the predicted concentration is greater than the applicable significant impact level, further modeling is required. The Class II modeling area is also determined from the Class II significant impact analysis.

1.1.2 AAQS ANALYSIS

For the AAQS analysis, the future SO_2 emissions of the OkPLP boilers are modeled with background emission facilities. A non-modeled background concentration is added to the maximum predicted air quality to determine a total air quality concentration. The maximum annual and HSH short-term total concentrations are compared to the AAQS.

1.1.3 PSD CLASS II ANALYSIS

For the PSD Class II increment analysis, the future SO_2 emissions along with the PSD baseline source emissions of the OkPLP site are modeled with background emission facilities. The maximum annual and HSH short-term total concentrations are compared to the PSD Class II increments.

1.1.4 PSD CLASS I ANALYSIS

For the PSD Class I increment analysis, the future SO_2 emissions along with the PSD baseline source emissions of the OkPLP site are modeled with background emission facilities (all PSD sources within 150 km). The maximum annual and HSH short-term total concentrations are compared to the PSD Class I increments.

1.1.5 VISIBILITY ANALYSIS

The regional haze analysis was performed using the latest regulatory guidance as provided in the FLM's Air Quality Related Value Work Group (FLAG) Phase I report (December 2000). Using the hourly meteorological and relative humidity data used with the CALPUFF model, the daily change in background extinction is computed. Based on the recommendations of the FLAG Phase I Report (December 2000), the regional haze analysis considered only the maximum 24-hour increase in SO_2 emissions due to the proposed project. The hygroscopic and dry non-hygroscopic components used for calculating the daily background extinction coefficients for the Everglades NP were obtained from the FLAG document. For this analysis, the hygroscopic and dry non-hygroscopic components were 0.9 and 8.5 inverse millimeters (mm^{-1}), respectively.

2.0 EMISSION INVENTORY

The current and future maximum SO_2 emissions for the OkPLP boilers are presented in Table 2-1. Stack and operating parameters are presented in Table 2-2. The current actual SO_2 emissions data were based on current permit limits, AOR data, and Continuous Emissions Monitoring System (CEMS) data. Future maximum SO_2 emissions were based on expected future maximum emissions and the maximum annual heat input rate. Stack and operating data were obtained from the Title V permit application (1999).

Current actual hourly and future maximum hourly sulfuric acid mist (SAM) emissions are presented in Table 2-1. SAM emissions were based on SO_2 emissions and then converted to SAM assuming a 5-percent conversion of SO_2 to sulfur trioxide (SO_3), and using the ratio of the molecular weights of SAM to gaseous sulfate (98/80).

The emission inventories for background facilities were developed from databases obtained from the DEP, previous air modeling studies performed by Golder, and air permit data. All background sources in these inventories were located inside the modeling area.

For sources located in the screening area (defined as 50 km beyond the modeling area), a technique was used for eliminating sources in the modeling analyses if the source's emissions do not meet an emission criterion. This technique, which is approved for use by the FDEP and the U.S. Environmental Protection Agency, is the Screening Threshold method, developed by the North Carolina Department of Natural Resources and Community Development. The method is designed to objectively eliminate from the emission inventory those sources that are unlikely to have a significant interaction with the source undergoing evaluation. In general, sources that should be considered in the modeling analyses are those with emissions greater than a screening threshold value (in TPY) that is calculated by the following criteria:

$$Q = 20 \times D$$

where Q = the screening threshold value (TPY), and

D = The distance (km) from the proposed facility to the source undergoing evaluation for short-term analysis, or

The distance (km) from the edge of the proposed facility's significant impact area to the source undergoing evaluation for long-term (annual) analysis.

For this analysis, the long-term criterion was used since fewer facilities would be eliminated than with the short-term criterion. Also, the total emissions from a facility were used rather than emissions from individual sources for comparison to the screening threshold value. These methods result in a more conservative approach to produce higher-than-expected concentrations. Those facilities with maximum allowable emissions that are below the calculated *screening threshold* were eliminated from further consideration in the AAQS modeling analyses. However, certain large sources (<1,000 TPY) located beyond the screening area were also included in the modeling, based on EPA comments.

A summary of the facilities considered for inclusion in the AAQS and PSD Class II modeling analyses is presented in Table 2-3. This summary identifies facilities located within the modeling area and screening area. The facilities that were not included in the modeling analyses because SO_2 emissions were less than the screening threshold criteria are also identified.

A summary of the facilities considered for inclusion in the PSD Class I modeling analysis is presented in Table 2-4. This summary identifies all facilities located within 150 km of the PSD Class I area.

A summary of the stack, operating, and emission data for sources used in the modeling analyses is presented in Table 2-5.

3.0 RECEPTOR LOCATIONS

The maximum concentrations in the vicinity of OkPLP were predicted in a receptor grid that contained 573 discrete receptors. The discrete receptors included 393 receptors, separated by 100-meter spacing, located along OkPLP's property line and 180 additional offsite receptors in radials at 10-degree intervals and at distances of 4.0, 5.0, 6.0, 7.0, and 8.0 km from the cogeneration Boiler B's stack. A summary of the property boundary receptors is presented in Table 3-1. A plot of the property boundary, receptors, and building locations is presented in Figure 3-1. A summary of the Everglades NP Class I area receptors used in the PSD Class I increment analysis is presented in Table 3-2.

4.0 BUILDING DOWNWASH EFFECTS FOR OKPLP

All significant building structures within OkPLP's property boundary were determined by a site plot plan. The plot plan was presented in the original application (Attachment OC-FI-C2). A total of four building structures were evaluated. All building structures were processed in the EPA Building Input Profile (BPIP, Version 95086) program to determine direction-specific building heights and projected widths for each 10-degree azimuth direction for each source that was included in the modeling analysis. A listing of dimensions for each structure is presented in Table 4-1. A plot of the building dimensions and the cogeneration Boiler B stack location (the modeling origin) is presented in Figure 4-1.

5.0 BACKGROUND CONCENTRATIONS

To estimate the total SO_2 air quality concentrations, 3-hour, 24-hour, and annual background concentrations were added to the modeling results. The background concentration is considered to be the air quality concentration contributed by sources not included in the modeling evaluation. Because other background sources were modeled, a background value was used that was considered to be realistic but still conservative.

A summary of the SO_2 ambient monitoring data, in the vicinity of OkPLP for 1997 through 2000 is presented in Table 5-1. The SO_2 monitors nearest to the site are monitor ID 4150-001-J02, located at 300 North US 27 in South Bay and monitor ID 3840-004-G02 and 12-099-3004, located at 1050 15th Street in Riviera Beach. In this analysis, background concentrations were selected based on the second-highest concentrations measured from the nearest monitor located at 300 North US 27 in South Bay, since this monitor is much closer to OkPLP and is located in a more rural area of Palm Beach County.

For 1997, the second-highest of the 3-hour and 24-hour concentrations and the annual average concentration at this monitor was 47, 13, and 5 micrograms per cubic meter ($\mu g/m^3$), respectively. These background levels were added to the refined model-predicted concentrations to estimate total SO_2 air quality levels for comparison to the AAQS.

6.0 SUMMARY OF RESULTS

6.1 SIGNIFICANT IMPACT ANALYSES

The maximum SO_2 impacts due to the proposed increase in emissions at OkPLP compared to the Class II significant impact levels, are presented in Table 6-1. Based on the Class II significant impact analysis results, AAQS and PSD Class II increment analyses must be performed.

The maximum SO_2 impacts due to the increase in emissions compared to the Class I significant impact levels are presented in Table 6-2. Based on the Class I significant impact analysis results, a full PSD Class I increment analysis must be performed for the 24-hour averaging time.

6.2 AAQS ANALYSIS

A summary of the HSH 3-hour, HSH 24-hour, and maximum annual average SO_2 concentrations predicted in the AAQS screening analysis is presented in Table 6-3. Based on the screening results, modeling refinements were performed for all averaging times. The results of the refined modeling analyses, from this analysis, are summarized in Table 6-4. For the AAQS analysis, the HSH 3-hour, HSH 24-hour, and maximum annual average SO_2 concentrations due to all sources, including background concentrations, are 248.6, 74.2, and 15.7 $\mu g/m^3$, respectively. These concentrations are all well below the AAQS of 1,300; 260; and 60 $\mu g/m^3$, respectively.

6.3 PSD CLASS II ANALYSIS

A summary of the HSH 3-hour, HSH 24-hour, and maximum annual average SO_2 screening results predicted in the PSD Class II increment analysis is presented in Table 6-5. Based on the screening results, modeling refinements were performed for the 3-hour and 24-hour averaging times. Maximum annual concentrations were predicted to be less than zero at all receptors. The results of the refined modeling analyses from this analysis are summarized in Table 6-6. For this analysis, the HSH 3-hour and HSH 24-hour average SO_2 concentrations due to all sources are 46.0 and 10.7 $\mu g/m^3$, respectively. These concentrations are well below the PSD increments of 512 and 91 $\mu g/m^3$, respectively.

6.4 PSD CLASS I ANALYSIS

A summary of the HSH 24-hour average SO_2 results predicted at the Everglades NP PSD Class I area is presented in Table 6-7. For this analysis, the HSH 24-hour average SO_2 concentration due to all sources is 3.47 $\mu g/m^3$. This concentration is below the PSD Class I increment of 5 $\mu g/m^3$.

Based on these air modeling results, the maximum SO_2 concentrations from OkPLP and other SO_2 emission sources will comply with the AAQS and PSD Class I and II increments.

7.0 VISIBILITY ANALYSIS

A refined regional haze analysis was performed for the proposed project. The SO_2 and sulfuric acid mist emissions used in the regional haze analysis were presented in Table 2-1. The maximum predicted 24-hour visibility degradation due to the proposed increase in emissions was 1.38 percent. Since this predicted visibility degradation is well below the criteria level of 5 percent, it can be concluded that the proposed project will not adversely impact the background visibility levels at the Everglades NP PSD Class I area.

Table 2-1. Cogeneration Boiler Emission Rates for Okeelanta Power, L.P.--Total all Three Boilers

Pollutant		Total Heat Input Rate	CURRENT ACTUAL EMISSIONS Short-Term Emissions lb/hr	CURRENT ACTUAL EMISSIONS Short-Term Emissions g/sec	CURRENT ACTUAL EMISSIONS Annual Average Emissions TPY	CURRENT ACTUAL EMISSIONS Annual Average Emissions g/sec	FUTURE POTENTIAL EMISSIONS Short-Term Emissions lb/hr	FUTURE POTENTIAL EMISSIONS Short-Term Emissions g/sec	FUTURE POTENTIAL EMISSIONS Annual Average Emissions TPY	FUTURE POTENTIAL EMISSIONS Annual Average Emissions g/sec
Sulfur Dioxide	--3-Hour	2,145 MMBtu/hr [a]	321.75 [b]	40.54	--	--	429.0 [e]	54.05	--	--
	--24-Hour	2,145 MMBtu/hr [a]	214.50 [c]	27.03	--	--	364.7 [f]	45.95	--	--
	--Annual	11.5 x 10^{12} Btu/yr	--	--	219.0 [d]	6.30	--	--	402.50 [g]	11.58
Sulfuric Acid Mist	--24-Hour	2,145 MMBtu/hr [a]	13.14 [h]	1.66	--	--	22.3 [h]	2.81	--	--

[a] Based on three boilers operating at 715 MMBtu/hr each.

[b] Based on 0.15 lb/MMBtu, maximum 3-hour average SO_2 emissions from actual CEM data (Appendix B of letter to FDEP dated 6/8/01).
[c] Based on current 24-hour limit of 0.1 lb/MMBtu.
[d] Based on 2000 AOR data.
[e] Based on the expected future maximum of 0.2 lb/MMBtu.
[f] Based on the expected future maximum of 0.17 lb/MMBtu.
[g] Based on an annual maximum heat input rate of 11.5 x 10^{12} Btu/yr and 0.07 lb/MMBtu.
[h] Based on SO_2 emissions and then converted to H_2SO_4 mist assuming 5% conversion of SO_2 to SO_3, then using the ratio of the molecular weights of sulfuric acid mist to gaseous sulfate (98/80).

Note:
Btu/yr = British thermal units per year
g/sec = Grams per second
lb/hr = Pounds per hour
MMBtu/hr = Million British thermal units per hour
TPY = Tons per year

Table 2-2. Stack Parameters[a] for Okeelanta Power, L.P. Boilers

ISCST ID	Heat Input Rate (MMBtu/hr)	Stack/Vent Release Height		Stack/Vent Diameter		Gas Flow Rate (acfm)	Gas Exit Temperature		Velocity	
		ft	m	ft	m		^{0}F	K	ft/sec	m/sec
COGENF	715	199	60.66	10	3.05	300,000	352	450.9	63.6	19.39

[a] Representative of all 3 boiler stacks.

Note: acfm = Actual cubic feet per minute
^{0}F = Degrees Fahrenheit
K = Kelvin
m = Meters
m/sec = Meters per second
ft = Feet
ft/sec = Feet per second

Table 2-3. Summary of SO_2 Facilities Considered for Inclusion in the AAQS and PSD Class II Air Modeling Analyses

AIRS Number	Facility	County	UTM Coordinates East (km)	UTM Coordinates North (km)	Relative to Okeelanta [a] X (km)	Relative to Okeelanta [a] Y (km)	Relative to Okeelanta [a] Distance (km)	Relative to Okeelanta [a] Direction (deg)	Maximum SO_2 Emissions (TPY)	Q, Emission Threshold [b] (Dist - SIA) x 20	Include in Modeling Analysis ?
0990086	Glades Correctional Institute	Palm Beach	523.4	2955.2	-1.5	15.1	15.2	354	98	143.5	NO
0990026	Sugar Cane Growers	Palm Beach	534.9	2953.3	10.0	13.2	16.6	37	2,555	171.2	YES
0510001	Everglades Sugar	Hendry	509.6	2954.2	-15.3	14.1	20.8	313	1,216	256.1	YES
0510003	U.S. Sugar Clewiston	Hendry	506.1	2956.9	-18.8	16.8	25.2	312	7,806	344.3	YES
0990016	Atlantic Sugar	Palm Beach	552.9	2945.2	28.0	5.1	28.5	80	954	409.2	YES
0990061	U.S. Sugar -Bryant	Palm Beach	538.8	2968.1	13.9	28.0	31.3	26	2,698	465.2	YES
0990019	Osceola Farms	Palm Beach	544.2	2968.0	19.3	27.9	33.9	35	2,023	518.5	YES
0510015	Southern Gardens Citrus	Hendry	487.6	2957.6	-37.3	17.5	41.2	295	409	664.0	NO
0990021	Pratt & Whitney	Palm Beach	559.2	2978.3	34.3	38.2	51.3	42	504	866.8	NO
0850102	Bechtel Indiantown	Martin	545.6	2991.5	20.7	51.4	55.4	22	2,629	948.2	YES
0850001	FPL -Martin	Martin	543.1	2992.9	18.2	52.8	55.8	19	78,522	957.0	YES
0990234	Palm Beach Resource Recovery[c]	Palm Beach	585.8	2960.2	60.9	20.1	64.1	72	1,533	1122.6	YES
0110120	North Broward Resource Recovery	Broward	583.6	2907.6	58.7	-32.5	67.1	119	896	1181.9	NO
0990568	Lake Worth Utilities[c]	Palm Beach	592.8	2943.7	67.9	3.6	68.0	87	8,996	1199.9	YES
0990042	FPL -Riviera Beach[c]	Palm Beach	594.2	2960.6	69.3	20.5	72.3	74	73,475	1285.4	YES
0112119	South Broward Resource Recovery[c]	Broward	579.6	2883.3	54.7	-56.8	78.9	136	1,318	1417.1	YES
0110037	FPL -Lauderdale[c]	Broward	580.1	2883.3	55.2	-56.8	79.2	136	47,858	1424.1	YES
0110036	FPL -Port Everglades[c]	Broward	587.4	2885.3	62.5	-54.8	83.1	131	170,215	1502.4	YES
0850021	Stuart Contracting	Martin	575.2	3006.8	50.3	66.7	83.5	37	100	1510.8	NO
0250020	Tarmac[c]	Dade	562.9	2861.7	38.0	-78.4	87.1	154	2,792	1582.5	YES
0250348	Dade Co. Resource Recovery	Dade	564.3	2857.4	39.4	-82.7	91.6	155	857	1672.1	NO
0710019	Lee County Resource Recovery	Lee	424.0	2946.0	-100.9	5.9	101.1	273	490	1861.4	NO
0710000	FPL - Fort Myers[c]	Lee	422.1	2952.9	-102.8	12.8	103.6	277	22,702	1911.9	YES
	Fort Pierce Utilities[c]	St. Lucie	566.8	3036.3	41.9	96.2	104.9	24	2,708	1938.6	YES
	Vero Beach Power[c]	St. Lucie	567.1	3056.5	42.2	116.4	123.8	20	11,832	2316.3	YES

[a] Okeelanta Power Coordinates: 524.9 2940.1

[b] Based on North Carolina Screening Technique for annual average basis. "Dist" is the distance the facility is located from the project and SIA is the significant impact area. The proposed project's emissions are predicted to be significant to 8 km.

[c] Large sources (> 1,000 TPY) beyond the screening area (58 km) that were included in the inventory.

Note: deg = Degrees
Km = Kilometers
SIA = Significant impact area
TPY = Tons per year

Table 2-4. Summary of SO_2 Facilities Included in the PSD Class I Air Modeling Analysis

			UTM Coordinates		Relative to Everglades National Park			
AIRS Number	Facility	County	East (km)	North (km)	X (km)	Y (km)	Distance [a] (km)	Direction (deg)
0250348	Dade Co. Resource Recovery	Dade	564.3	2857.4	14.0	8.8	16.5	58
0250020	Tarmac	Dade	562.9	2861.7	12.6	13.1	18.2	44
0112119	South Broward Resource Recovery	Broward	579.6	2883.3	29.3	34.7	45.4	40
0110037	FPL -Lauderdale	Broward	580.1	2883.3	29.8	34.7	45.7	41
0110120	North Broward Resource Recovery	Broward	583.6	2907.6	33.3	59.0	67.7	29
0710019	Lee County Resource Recovery	Lee	424.0	2946.0	-30.0	82.0	87.3[b]	340
0990332	Okeelanta	Palm Beach	525.0	2937.4	-25.3	88.8	92.3	344
0710000	FPL - Fort Myers	Lee	422.1	2952.9	-31.9	88.9	94.5[b]	340
0990016	Atlantic Sugar	Palm Beach	552.9	2945.2	2.6	96.6	96.6	2
0990568	Lake Worth Utilities	Palm Beach	592.8	2943.7	42.5	95.1	104.2	24
0990026	Sugar Cane Growers Coop.	Palm Beach	534.9	2953.3	-15.4	104.7	105.8	352
0510003	U.S. Sugar Clewiston	Hendry	506.1	2956.9	-44.2	108.3	117.0	338
0990234	Palm Beach Resource Recovery	Palm Beach	585.8	2960.2	35.5	111.6	117.1	18
0990019	Osceola Farms	Palm Beach	544.2	2968.0	-6.1	119.4	119.6	357
0990061	U.S. Sugar -Bryant	Palm Beach	538.8	2968.1	-11.5	119.5	120.1	355
0510015	Southern Gardens Citrus	Hendry	487.6	2957.6	-62.7	109.0	125.7	330
0990021	Pratt & Whitney	Palm Beach	559.2	2978.3	8.9	129.7	130.0	4
0850102	Bechtel Indiantown	Martin	545.6	2991.5	-4.7	142.9	143.0	358
0850001	FPL -Martin	Martin	543.1	2992.9	-7.2	144.3	144.5	357

[a] Distance from the northeast corner of the Everglades National Park, unless otherwise noted.

[b] Distance from the northwestern corner of the Everglades National Park: 454 2864.0

Table 2-5. Summary of SO_2 Sources Included in the Air Modeling Analysis

				Stack and Operating Parameters				Emission Rate (g/s)			Modeled in		
AIRS Number	Facility	Units	Modeling ID Name	Height (m)	Diameter (m)	Temper. (K)	Velocity (m/s)	3-Hour	24-Hour	PSD Source? (EXP/CON)	AAQS	Class II	Class I
50PMB500332	Okeelanta [a]												
		Boiler 4 PSD Baseline	OKBLR4B	22.9	2.29	333.0	7.36	-10.95	-10.95	EXP	No	Yes	Yes
		Boiler 5 PSD Baseline	OKBLR5B	22.9	2.29	333.0	12.07	-15.64	-15.64	EXP	No	Yes	Yes
		Boiler 6 PSD Baseline	OKBLR6B	22.9	2.29	334.0	8.74	-15.64	-15.64	EXP	No	Yes	Yes
		Boiler 10 PSD Baseline	OKBLR10B	22.9	2.29	334.0	10.35	-17.15	-17.15	EXP	No	Yes	Yes
		Boiler 11 PSD Baseline	OKBLR11B	22.9	2.29	342.0	9.89	-16.79	-16.79	EXP	No	Yes	Yes
		Boiler 16 PSD Baseline	OKBLR16B	22.9	1.52	483.0	22.86	-1.47	-1.47	EXP	No	Yes	Yes
0990026	Sugar Cane Growers [a]												
		Unit 1&2	SUGCN12	45.7	1.87	339.0	21.75	41.20	41.20	CON	Yes	Yes	Yes
		Unit 3	SUGCN3	27.4	1.52	339.0	22.25	16.20	16.20	CON	Yes	Yes	Yes
		Unit 4 PSD	SUGCN4	54.9	2.44	339.0	21.73	38.20	38.20	CON	Yes	Yes	Yes
		Unit 5	SUGCN5	45.7	2.30	339.0	15.94	27.90	27.90	CON	Yes	Yes	Yes
		Unit 8 PSD	SUGCN8	47.2	2.90	339.0	13.62	23.50	23.50	CON	Yes	Yes	Yes
		Unit 1&2 PSD Baseline	SUGCN12B	24.4	1.40	344.0	11.40	-24.20	-24.20	EXP	No	Yes	Yes
		Unit 3 PSD Baseline	SUGCN3B	24.4	1.60	344.0	15.60	-4.40	-4.40	EXP	No	Yes	Yes
		Unit 4 PSD Baseline	SUGCN4B	25.9	1.63	344.0	11.20	-24.20	-24.20	EXP	No	Yes	Yes
		Unit 5 PSD Baseline	SUGCN5B	24.4	1.40	344.0	15.20	-16.20	-16.20	EXP	No	Yes	Yes
		Unit 6&7 PSD Baseline	SUGCN67B	12.2	1.52	606.0	11.20	-51.00	-51.00	EXP	No	Yes	Yes
0510001	Everglades Sugar [b]	Main Boiler	EVERGLAD	21.9	1.10	477.0	10.10	34.90	34.90	NO	Yes	No	No
0510003	US Sugar - Clewiston [c]												
		PSD Baseline (On-crop season only)											
		Unit 1 PSD Baseline	USSBRL1B	23.1	1.86	344.0	30.20	-79.86	-58.21	EXP	No	Yes	Yes
		Unit 2 PSD Baseline	USSBLR2B	23.1	1.86	343.0	35.70	-79.86	-58.21	EXP	No	Yes	Yes
		Unit 3 PSD Baseline	USSBLR3B	27.4	2.29	342.0	14.70	-48.30	-33.20	EXP	No	Yes	Yes
		East Pellet Plant PSD Baseline	EPELLET	12.2	1.52	347.0	8.54	-10.30	-10.30	EXP	No	Yes	Yes
		West Pellet Plant PSD Baseline	WPELLET	15.7	1.52	347.0	8.54	-10.30	-10.30	EXP	No	Yes	Yes
		On-crop season future											
		Unit 1	USSBRL1N	65.0	2.44	347.0	15.36	78.79	73.73	CON	Yes	Yes	Yes
		Unit 2	USSBLR2N	65.0	2.44	338.0	13.86	78.49	73.44	CON	Yes	Yes	Yes
		Unit 3	USSBLR3N	65.0	2.44	333.2	6.78	47.08	47.08	CON	Yes	Yes	Yes
		Unit 4	USSBLR4N	45.7	2.51	344.3	20.28	21.53	3.68	CON	Yes	Yes	Yes
		Unit 7	USSBLR7N	68.6	2.59	405.4	20.77	13.91	12.65	CON	Yes	Yes	Yes
		Off-crop season future											
		Unit 1	USSBRL1F	65.0	2.44	347.0	14.05	51.64	24.29	CON	Yes	Yes	Yes
		Unit 2	USSBLR2F	65.0	2.44	338.0	12.68	51.27	24.02	CON	Yes	Yes	Yes
		Unit 3	USSBLR3F	65.0	2.44	333.2	6.20	30.74	30.20	CON	Yes	Yes	Yes
		Unit 4	USSBLR4F	45.7	2.51	344.3	0.00	0.00	0.00	CON	Yes	Yes	Yes

Table 2-5. Summary of SO_2 Sources Included in the Air Modeling Analysis

AIRS Number	Facility	Units	Modeling ID Name	Stack and Operating Parameters Height (m)	Diameter (m)	Temper. (K)	Velocity (m/s)	Emission Rate (g/s) 3-Hour	24-Hour	PSD Source? (EXP/CON)	Modeled in AAQS	Class II	Class I
		Unit 7	USSBLR7F	68.6	2.59	405.4	23.60	17.39	15.81	CON	Yes	Yes	Yes
0990016	Atlantic Sugar [a]												
		Unit 1	ATLSUG1	27.4	1.83	346.0	17.97	16.28	16.28	CON	Yes	Yes	Yes
		Unit 2	ATLSUG2	27.4	1.83	350.0	23.36	16.28	16.28	CON	Yes	Yes	Yes
		Unit 3	ATLSUG3	27.4	1.83	350.0	21.56	16.02	16.02	CON	Yes	Yes	Yes
		Unit 4	ATLSUG4	27.4	1.83	344.0	25.16	16.21	16.21	CON	Yes	Yes	Yes
		Unit 5 PSD [b]	ATLSUG5	27.4	1.68	339.0	19.24	8.41	8.04	CON	Yes	Yes	Yes
		Unit 1 PSD Baseline	ATLSUG1B	18.9	1.92	506.0	12.70	-17.24	-17.24	EXP	No	Yes	Yes
		Unit 2 PSD Baseline	ATLSUG2B	18.9	1.92	511.0	10.90	-22.50	-22.50	EXP	No	Yes	Yes
		Unit 3 PSD Baseline	ATLSUG3B	21.9	1.83	522.0	17.50	-16.88	-16.88	EXP	No	Yes	Yes
		Unit 4 PSD Baseline	ATLSUG4B	18.3	1.83	344.0	15.00	-10.76	-10.76	EXP	No	Yes	Yes
0990061	US Sugar-Bryant [a]												
		Unit 5 PSD	USSBRY5	42.7	2.90	345.0	11.49	45.70	45.70	CON	Yes	Yes	Yes
		Unit 1,2&3	USBRY123	19.8	1.64	342.0	36.40	109.50	109.50	CON	Yes	Yes	Yes
		Unit 1 PSD Baseline	USSBRY1B	19.8	1.68	494.0	44.30	-36.50	-36.50	EXP	No	Yes	Yes
		Unit 2&3 PSD Baseline	USBRY23B	19.8	1.68	344.0	37.90	-73.00	-73.00	EXP	No	Yes	Yes
0990019	Osceola Farms [a]												
		Unit 2	OSBLR2	27.4	1.52	339.0	18.63	17.12	17.12	CON	Yes	Yes	Yes
		Unit 3	OSBLR3	27.4	1.92	344.0	14.34	30.74	30.74	CON	Yes	Yes	Yes
		Unit 4	OSBLR4	27.4	1.83	344.0	16.53	17.12	17.12	CON	Yes	Yes	Yes
		Unit 5	OSBLR5	27.4	1.52	344.0	17.85	18.00	18.00	CON	Yes	Yes	Yes
		Unit 6	OSBLR6	27.4	1.92	339.0	18.25	33.39	33.39	CON	Yes	Yes	Yes
		Unit 1 PSD Baseline	OSBLR1B	22.0	1.52	342.0	8.18	-5.07	-5.07	EXP	No	Yes	Yes
		Unit 2 PSD Baseline	OSBLR2B	22.0	1.52	341.0	18.10	-16.32	-16.32	EXP	No	Yes	Yes
		Unit 3 PSD Baseline	OSBLR3B	22.0	1.93	341.0	14.50	-7.26	-7.26	EXP	No	Yes	Yes
		Unit 4 PSD Baseline	OSBLR4B	22.0	1.83	341.0	18.80	-13.61	-13.61	EXP	No	Yes	Yes
50FTM260015	Southern Gardens Citrus - PSD												
		Peel Dryer	SGARDDRY	38.1	1.73	316.0	7.45	5.29	5.29	CON	No [c]	No [c]	Yes
		Boilers 1-3	SGARDBLR	16.8	1.22	478.0	14.22	6.88	6.88	CON	No [c]	No [c]	Yes
990021	Pratt & Whitney												
		Heater	PRATARCH	15.2	0.91	810.9	143.73	13.99	13.99	CON	No [c]	No [c]	Yes
		Boiler BO-12	PRATBO12	4.6	0.76	533.2	6.92	0.51	0.51	CON	No [c]	No [c]	Yes
0850102	Bechtel Indiantown PSD		BECHTIND	150.9	4.88	333.2	30.50	75.64	75.64	CON	Yes	Yes	Yes
0850001	FPL Martin												
		Units 1&2	MART12	152.1	7.99	420.9	21.03	1743.79	1743.79	NO	Yes	No	No
		Aux Blr PSD	MARTAUX	18.3	1.10	535.4	15.24	12.90	12.90	CON	Yes	Yes	Yes
		Diesel Gens PSD	MARTGEN	7.6	0.30	785.9	39.62	0.51	0.51	CON	Yes	Yes	Yes

Table 2-5. Summary of SO_2 Sources Included in the Air Modeling Analysis

AIRS Number	Facility	Units	Modeling ID Name	Stack and Operating Parameters Height (m)	Diameter (m)	Temper. (K)	Velocity (m/s)	Emission Rate (g/s) 3-Hour	24-Hour	PSD Source? (EXP/CON)	Modeled in AAQS	Class II	Class I
		Units 3&4 PSD	MART34	64.9	6.10	410.9	18.90	470.40	470.40	CON	Yes	Yes	Yes
		2 Simple Cycle CT	MARTCTs	18.3	6.17	853.2	37.63	25.98	25.98	CON	Yes	Yes	Yes
0990234	Palm Beach Co. Resource Recovery												
		1&2 PSD	PBCRRF	76.2	2.04	505.2	24.90	85.05	85.05	CON	Yes	Yes	Yes
110120	North Broward RRF PSD		NBCRRF	58.5	3.96	381.0	18.01	35.40	35.40	CON	No[c]	No[c]	Yes
0990568	Lake Worth Utilities												
		Unit 3	LAKWTHU3	38.1	2.13	408.2	7.71	103.95	103.95	NO	Yes	No	No
		Unit 4	LAKWTHU4	35.1	2.29	418.2	17.00	129.85	129.85	NO	Yes	No	No
		Unit 5	LAKWTHU5	22.9	0.94	450.4	18.29	11.59	11.59	NO	Yes	No	No
		HRSG	LAKWTHHR	45.7	5.49	377.6	13.74	12.79	12.79	CON	Yes	Yes	Yes
0990042	FPL Riviera												
		Units 3&4 at 2.5%s fuel oil	RIVU34	90.8	4.88	401.5	18.90	2113.65	2113.65	NO	Yes	No	No
0112119	South Broward RRF PSD		SBCRRF	59.4	3.96	381.0	18.01	37.91	37.91	CON	Yes	Yes	Yes
0110037	FPL - Lauderdale												
		CTs 1-4 PSD	LAUDU45	45.7	5.49	438.7	14.60	271.15	271.15	CON	Yes	Yes	Yes
		GT 1-12 (0.5% fuel oil)	LDGT1_12	13.7	2.37	733.2	114.31	552.80	552.80	NO	Yes	No	No
		GT 13-24 (0.5% fuel oil)	LDGT1324	13.4	4.75	733.2	28.43	552.80	552.80	NO	Yes	No	No
		4&5 PSD Baseline	FTLAU45B	46.0	4.27	422.0	14.63	-457.00	-457.00	EXP	No	Yes	Yes
	FPL Port Everglades												
		Units 1&2 at 2.5%s fuel oil	PTEVU12	104.5	4.27	415.9	26.72	1593.90	1593.90	NO	Yes	No	No
		Units 3&4 at 2.5%s fuel oil	PTEVU34	104.5	5.52	414.8	23.88	2772.00	2772.00	NO	Yes	No	No
		GT 1-12 (0.5% fuel oil)	PTEVGTS	13.4	4.75	733.2	28.43	530.70	530.70	NO	Yes	No	No
0250020	Tarmac												
		Kiln 1	TARMC1	61.0	2.44	465.0	12.80	5.67	5.67	NO	Yes	No	No
		Kiln 2 PSD Baseline	TARMC2B	61.0	2.44	465.0	12.84	-5.71	-5.71	EXP	No	Yes	Yes
		Kiln 3 PSD Baseline	TARMC3B	61.0	4.57	472.0	10.78	-2.76	-2.76	EXP	No	Yes	Yes
		Kiln 2 PSD	TABMC2P	61.0	2.44	422.0	9.10	24.57	24.57	CON	Yes	Yes	Yes
		Kiln 3 PSD	TARMC3P	61.0	4.57	450.0	11.04	51.43	51.43	CON	Yes	Yes	Yes
0250348	Dade County RRF PSD												
		Units 1&2	DCRRF12	76.2	3.66	405.4	15.86	26.41	12.32	CON	No[c]	No[c]	Yes
		Units 3&4	DCRRF34	76.2	3.66	405.4	15.86	26.41	12.32	CON	No[c]	No[c]	Yes
0710019	Lee County RRF PSD		LEECORRF	83.8	1.88	388.5	19.81	14.00	14.00	CON	No[c]	No[c]	Yes
0710000	FPL Fort Myers												

Table 2-5. Summary of SO_2 Sources Included in the Air Modeling Analysis

AIRS			Modeling	Stack and Operating Parameters				Emission Rate (g/s)		PSD Source?	Modeled in		
Number	Facility	Units	ID Name	Height (m)	Diameter (m)	Temper. (K)	Velocity (m/s)	3-Hour	24-Hour	(EXP/CON)	AAQS	Class II	Class I
		Unit 1 PSD	FMU1	91.8	2.90	422.0	29.90	-585.50	-585.50	EXP	No	Yes	Yes
		Unit 2 PSD	FMU2	121.2	5.52	408.0	19.20	-1334	-1334.0	EXP	No	Yes	Yes
		HRSGs 1 - 6	FMYHR1_6	38.1	5.79	377.6	14.2	3.86	3.9	CON	Yes	Yes	Yes
		Gas Turbines 1 -12	FMYGT112	9.75	4.42	797.0	35.7	649.2	649.2	NO	Yes	No	No
	Fort Pierce Utilities												
		Units 6&7	FTPIER67	45.7	2.19	408.2	12.50	77.87	77.87	NO	Yes	No	No
	Vero Beach Power												
		Unit 1	VERBU1	60.96	1.07	437.0	32.42	28.77	28.77	NO	Yes	No	No
		Unit 2	VERBU2	60.96	1.07	434.3	37.57	84.21	84.21	NO	Yes	No	No
		Unit 3	VERBU3	60.96	1.83	440.4	19.93	142.07	142.07	NO	Yes	No	No
		Unit 4	VERBU4	60.96	2.13	425.4	24.36	69.05	69.05	NO	Yes	No	No
		Unit 5 Simple Cycle CT	VERBU5	38.10	3.35	416.5	19.56	15.50	15.50	CON	Yes	Yes	No

[a] Facilities or sources within facilities that operate only during the October 1 through April 31 crop season.

[b] Sugar mill sources that operate all year.

[c] Large source outside the 24-hour significant impact distance, but included in analysis.

[d] Future data represents worst case emissions for May 1 through September 31 off-crop season operation, and October 1-April 30 for on-crop season. Updated from PSD modeling information, Golder Associates (7/18/00). Baseline data represents November 1 though April 30.

[e] Not included in the AAQS or PSD Class II modeling because they screened out.

Note: EXP = PSD expanding source
CON = PSD consuming source
NO = Source does not affect PSD increment

Table 3-1. Okeelanta Power, L.P. Property Boundary Receptors[a] Used In the Modeling Analysis

Coordinates[b]		Coordinates[b]		Coordinates[b]		Coordinates[b]		Coordinates[b]	
X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)
-9699.6	444.2	-9509.5	3738.7	-6259.5	3791.6	-2959.5	3791.6	340.5	3791.6
-9693.9	544.0	-9459.5	3791.6	-6159.5	3791.6	-2859.5	3791.6	440.5	3791.6
-9688.1	643.9	-9359.5	3791.6	-6059.5	3791.6	-2759.5	3791.6	540.5	3791.6
-9682.3	743.7	-9259.5	3791.6	-5959.5	3791.6	-2659.5	3791.6	640.5	3791.6
-9676.6	843.5	-9159.5	3791.6	-5859.5	3791.6	-2559.5	3791.6	740.5	3791.6
-9670.8	943.4	-9059.5	3791.6	-5759.5	3791.6	-2459.5	3791.6	840.5	3791.6
-9665.1	1043.2	-8959.5	3791.6	-5659.5	3791.6	-2359.5	3791.6	940.5	3791.6
-9659.3	1143.0	-8859.5	3791.6	-5559.5	3791.6	-2259.5	3791.6	1040.5	3791.6
-9653.5	1242.9	-8759.5	3791.6	-5459.5	3791.6	-2159.5	3791.6	1140.5	3791.6
-9647.8	1342.7	-8659.5	3791.6	-5359.5	3791.6	-2059.5	3791.6	1240.5	3791.6
-9642.0	1442.5	-8559.5	3791.6	-5259.5	3791.6	-1959.5	3791.6	1340.5	3791.6
-9636.3	1542.4	-8459.5	3791.6	-5159.5	3791.6	-1859.5	3791.6	1440.5	3791.6
-9630.5	1642.2	-8359.5	3791.6	-5059.5	3791.6	-1759.5	3791.6	1540.5	3791.6
-9624.7	1742.0	-8259.5	3791.6	-4959.5	3791.6	-1659.5	3791.6	1640.5	3791.6
-9619.0	1841.9	-8159.5	3791.6	-4859.5	3791.6	-1559.5	3791.6	1740.5	3791.6
-9613.2	1941.7	-8059.5	3791.6	-4759.5	3791.6	-1459.5	3791.6	1840.5	3791.6
-9607.5	2041.5	-7959.5	3791.6	-4659.5	3791.6	-1359.5	3791.6	1940.5	3791.6
-9601.7	2141.4	-7859.5	3791.6	-4559.5	3791.6	-1259.5	3791.6	2040.5	3791.6
-9595.9	2241.2	-7759.5	3791.6	-4459.5	3791.6	-1159.5	3791.6	2140.5	3791.6
-9590.2	2341.0	-7659.5	3791.6	-4359.5	3791.6	-1059.5	3791.6	2240.5	3791.6
-9584.4	2440.9	-7559.5	3791.6	-4259.5	3791.6	-959.5	3791.6	2306.1	3757.2
-9578.7	2540.7	-7459.5	3791.6	-4159.5	3791.6	-859.5	3791.6	2306.1	3657.2
-9572.9	2640.5	-7359.5	3791.6	-4059.5	3791.6	-759.5	3791.6	2306.1	3557.2
-9567.1	2740.4	-7259.5	3791.6	-3959.5	3791.6	-659.5	3791.6	2306.1	3457.2
-9561.4	2840.2	-7159.5	3791.6	-3859.5	3791.6	-559.5	3791.6	2306.1	3357.2
-9555.6	2940.0	-7059.5	3791.6	-3759.5	3791.6	-459.5	3791.6	2306.1	3257.2
-9549.9	3039.9	-6959.5	3791.6	-3659.5	3791.6	-359.5	3791.6	2306.1	3157.2
-9544.1	3139.7	-6859.5	3791.6	-3559.5	3791.6	-259.5	3791.6	2306.1	3057.2
-9538.3	3239.5	-6759.5	3791.6	-3459.5	3791.6	-159.5	3791.6	2306.1	2957.2
-9532.6	3339.4	-6659.5	3791.6	-3359.5	3791.6	-59.5	3791.6	2306.1	2857.2
-9526.8	3439.2	-6559.5	3791.6	-3259.5	3791.6	40.5	3791.6	2306.1	2757.2
-9521.1	3539.0	-6459.5	3791.6	-3159.5	3791.6	140.5	3791.6	2306.1	2657.2
-9515.3	3638.9	-6359.5	3791.6	-3059.5	3791.6	240.5	3791.6	2306.1	2557.2

Table 3-1. Okeelanta Power, L.P. Property Boundary Receptors[a] Used In the Modeling Analysis (continued)

Coordinates[b]		Coordinates[b]		Coordinates[b]		Coordinates[b]		Coordinates[b]	
X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)	X (m)	Y (m)
2306.1	2457.2	3448.7	299.8	3696.1	-2838.9	396.1	-2838.9	-2903.9	-2838.9
2306.1	2357.2	3448.7	199.8	3596.1	-2838.9	296.1	-2838.9	-3003.9	-2838.9
2306.1	2257.2	3448.7	99.8	3496.1	-2838.9	196.1	-2838.9	-3103.9	-2838.9
2306.1	2157.2	3448.7	-0.2	3396.1	-2838.9	96.1	-2838.9	-3203.9	-2838.9
2366.8	2117.9	3448.7	-100.2	3296.1	-2838.9	-3.9	-2838.9	-3303.9	-2838.9
2466.8	2117.9	3448.7	-200.2	3196.1	-2838.9	-103.9	-2838.9	-3403.9	-2838.9
2566.8	2117.9	3448.7	-300.2	3096.1	-2838.9	-203.9	-2838.9	-3503.9	-2838.9
2666.8	2117.9	3448.7	-400.2	2996.1	-2838.9	-303.9	-2838.9	-3603.9	-2838.9
2766.8	2117.9	3448.7	-500.2	2896.1	-2838.9	-403.9	-2838.9	-3703.9	-2838.9
2866.8	2117.9	3448.7	-600.2	2796.1	-2838.9	-503.9	-2838.9	-3803.9	-2838.9
2966.8	2117.9	3448.7	-700.2	2696.1	-2838.9	-603.9	-2838.9	-3903.9	-2838.9
3066.8	2117.9	3448.7	-800.2	2596.1	-2838.9	-703.9	-2838.9	-4003.9	-2838.9
3166.8	2117.9	3448.7	-900.2	2496.1	-2838.9	-803.9	-2838.9	-4103.9	-2838.9
3266.8	2117.9	3448.7	-1000.2	2396.1	-2838.9	-903.9	-2838.9	-4203.9	-2838.9
3366.8	2117.9	3448.7	-1100.2	2296.1	-2838.9	-1003.9	-2838.9	-4303.9	-2838.9
3448.7	2099.8	3448.7	-1200.2	2196.1	-2838.9	-1103.9	-2838.9	-4403.9	-2838.9
3448.7	1999.8	3448.7	-1300.2	2096.1	-2838.9	-1203.9	-2838.9	-4503.9	-2838.9
3448.7	1899.8	3448.7	-1400.2	1996.1	-2838.9	-1303.9	-2838.9	-4603.9	-2838.9
3448.7	1799.8	3448.7	-1500.2	1896.1	-2838.9	-1403.9	-2838.9	-4703.9	-2838.9
3448.7	1699.8	3448.7	-1600.2	1796.1	-2838.9	-1503.9	-2838.9	-4803.9	-2838.9
3448.7	1599.8	3448.7	-1700.2	1696.1	-2838.9	-1603.9	-2838.9	-4903.9	-2838.9
3448.7	1499.8	3448.7	-1800.2	1596.1	-2838.9	-1703.9	-2838.9	-5003.9	-2838.9
3448.7	1399.8	3448.7	-1900.2	1496.1	-2838.9	-1803.9	-2838.9	-5103.9	-2838.9
3448.7	1299.8	3448.7	-2000.2	1396.1	-2838.9	-1903.9	-2838.9	-5203.9	-2838.9
3448.7	1199.8	3448.7	-2100.2	1296.1	-2838.9	-2003.9	-2838.9	-5303.9	-2838.9
3448.7	1099.8	3483.0	-2191.1	1196.1	-2838.9	-2103.9	-2838.9	-5403.9	-2838.9
3448.7	999.8	3532.4	-2278.0	1096.1	-2838.9	-2203.9	-2838.9	-5503.9	-2838.9
3448.7	899.8	3581.8	-2365.0	996.1	-2838.9	-2303.9	-2838.9	-5603.9	-2838.9
3448.7	799.8	3631.2	-2451.9	896.1	-2838.9	-2403.9	-2838.9	-5703.9	-2838.9
3448.7	699.8	3680.6	-2538.9	796.1	-2838.9	-2503.9	-2838.9	-5803.9	-2838.9
3448.7	599.8	3730.0	-2625.8	696.1	-2838.9	-2603.9	-2838.9	-5903.9	-2838.9
3448.7	499.8	3779.4	-2712.8	596.1	-2838.9	-2703.9	-2838.9	-6003.9	-2838.9
3448.7	399.8	3828.8	-2799.7	496.1	-2838.9	-2803.9	-2838.9	-6103.9	-2838.9

Table 3-1. Okeelanta Power, L.P. Property Boundary Receptors[a] Used In the Modeling Analysis (continued)

Coordinates[b]		Coordinates[b]	
X (m)	Y (m)	X (m)	Y (m)
-6203.9	-2838.9	-9120.5	-2368.5
-6303.9	-2838.9	-9140.7	-2270.6
-6403.9	-2838.9	-9160.9	-2172.6
-6503.9	-2838.9	-9181.0	-2074.7
-6603.9	-2838.9	-9201.2	-1976.7
-6703.9	-2838.9	-9221.4	-1878.8
-6803.9	-2838.9	-9241.5	-1780.9
-6903.9	-2838.9	-9261.7	-1682.9
-7003.9	-2838.9	-9281.9	-1585.0
-7103.9	-2838.9	-9302.0	-1487.0
-7203.9	-2838.9	-9322.2	-1389.1
-7303.9	-2838.9	-9342.3	-1291.1
-7403.9	-2838.9	-9362.5	-1193.2
-7503.9	-2838.9	-9382.7	-1095.2
-7603.9	-2838.9	-9402.8	-997.3
-7703.9	-2838.9	-9423.0	-899.3
-7803.9	-2838.9	-9443.2	-801.4
-7903.9	-2838.9	-9463.3	-703.5
-8003.9	-2838.9	-9483.5	-605.5
-8103.9	-2838.9	-9503.7	-507.6
-8203.9	-2838.9	-9523.8	-409.6
-8303.9	-2838.9	-9544.0	-311.7
-8403.9	-2838.9	-9564.2	-213.7
-8503.9	-2838.9	-9584.3	-115.8
-8603.9	-2838.9	-9604.5	-17.8
-8703.9	-2838.9	-9624.7	80.1
-8803.9	-2838.9	-9644.8	178.1
-8903.9	-2838.9	-9665.0	276.0
-9003.9	-2838.9	-9685.2	373.9
-9039.9	-2760.3		
-9060.0	-2662.4		
-9080.2	-2564.4		
-9100.4	-2466.5		

[a] Receptors were selected at 100-meter spacing along property boundary.

[b] Distances are relative to the OkPLP Boiler B stack.

Note: m = meter

Table 3-2. Everglades National Park Receptors Used in the PSD Class I Modeling Analysis

UTM Coordinates (m)		UTM Coordinates (m)		UTM Coordinates (m)		UTM Coordinates (m)	
East	North	East	North	East	North	East	North
557000	2789000	538000	2848600	514500	2837000	470000	2860000
556600	2792000	537000	2848600	514500	2836000	469000	2860000
556000	2796000	536000	2848600	514500	2835000	468000	2860000
553000	2796500	535000	2848600	514500	2834000	467000	2860000
548000	2796500	534000	2848600	514500	2833000	466000	2860000
542700	2796500	533000	2848600	514500	2832500	465000	2860000
542700	2800000	532000	2848600	510000	2832500	464000	2860000
542700	2805000	531000	2848600	509000	2832500	463000	2860000
542700	2810000	530000	2848600	508000	2832500	462000	2860000
542000	2811000	529000	2848600	507000	2832500	461000	2860000
541300	2814000	528000	2848600	506000	2832500	460000	2860000
542700	2816000	527000	2848600	505000	2832500	459500	2863200
544100	2820000	526000	2848600	504000	2832500	459000	2863200
543500	2824600	525000	2848600	503000	2832500	458000	2863200
545000	2829000	524000	2848600	502000	2832500	457000	2863200
545700	2832200	523000	2848600	501000	2832500	456000	2863200
546200	2835700	522000	2848600	500000	2832500	455000	2863200
548600	2837500	521000	2848600	499000	2832500	454000	2863200
550300	2839000	520000	2848600	498000	2832500		
545000	2839000	519000	2848600	497000	2832500		
540000	2839000	518000	2848600	496000	2832500		
550500	2844000	517000	2848600	495000	2832500		
545000	2844000	516000	2848600	495000	2833000		
540000	2844000	515000	2848600	495000	2834000		
550300	2848600	514500	2848600	495000	2835000		
549000	2848600	514500	2848000	495000	2836000		
548000	2848600	514500	2847600	494500	2837000		
547000	2848600	514500	2846600	491500	2841000		
546000	2848600	514500	2845000	488500	2845500		
545000	2848600	514500	2844000	483000	2848500		
544000	2848600	514500	2843000	480000	2852500		
543000	2848600	514500	2842000	475000	2854000		
542000	2848600	514500	2841000	473500	2857000		
541000	2848600	514500	2840000	473000	2860000		
540000	2848600	514500	2839000	472000	2860000		
539000	2848600	514500	2838000	471000	2860000		

Note: m = meter
Okeelanta Power L.P.'s coordinates are 524900 m E, 2940100 m N.

Table 4-1. OkPLP Building Dimensions Used in the Modeling Analysis

Structure	Height		Length		Width	
	ft	m	ft	m	ft	m
Boiler Building	139	42.44	207	63.12	114	34.84
Electrostatic Precipitator Building No. 1	107	32.54	50	15.24	71	21.76
Electrostatic Precipitator Building No. 2	107	32.54	50	15.24	71	21.76
Electrostatic Precipitator Building No. 3	107	32.54	50	15.24	71	21.76

Table 5-1. Summary of Continuous Sulfur Dioxide Ambient Monitoring Data Collected Near South Bay

County	Station ID	Monitor Location	Year	Number of Observations	Concentration µg/m³ Maximum 3-hour	2nd High 3-hour	Maximum 24-hour	2nd High 24-hour	Annual Average
Palm Beach	4150-001-J02	South Bay-300 North US 27	1997	8,486	55	47	19	13	5
Palm Beach	3840-004-G02	Riviera Beach-1050 15th Street	1997	8,274	165	154	50	37	4
Palm Beach	12-099-3004	Riveria Beach-1050 15th Street	1998	8,299	177 (0.068 ppm)	31 (0.012 ppm)	24 (0.009 ppm)	10 (0.004 ppm)	3 (0.001 ppm)
			1999	8,221	45 (0.017 ppm)	37 (0.014 ppm)	34 (0.013 ppm)	34 (0.013 ppm)	5 (0.002 ppm)
			2000	8,404	34 (0.013 ppm)	31 (0.012 ppm)	26 (0.010 ppm)	21 (0.008 ppm)	5 (0.002 ppm)

Note: µg/m³ = micrograms per cubic meter
ppm = parts per million

Table 6-1. Maximum Predicted SO_2 Impacts Due to the Proposed Project Only
Okeelanta Power, L.P.

Pollutant/ Averaging Time	Concentration[a] (µg/m³)	Receptor Location[b] Direction (degrees)	Receptor Location[b] Distance (m)	Time Period (YYMMDDHH)	EPA Significant Impact Level (µg/m³)
Annual	0.1	311.7	5,703	87123124	
	0.1	155.5	3,121	88123124	
	0.2	316.8	5,201	89123124	1
	0.1	314.5	5,410	90123124	
	0.1	309.7	5,930	91123124	
Highest 24-Hour	6.1	229.3	4,356	87110724	
	6.0	337.6	4,100	88012024	
	5.8	316.8	5,201	89031524	5
	5.8	324.0	4,690	90101024	
	5.7	341.6	3,995	91030224	
Highest 3-Hour	11.5	216.5	3,534	87053018	
	11.4	158.9	3,043	88102603	
	11.2	157.2	3,081	89120312	25
	11.4	170.1	2,882	90011315	
	10.2	168.1	2,901	91110424	

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.

[b] Relative to OkPLP Boiler B stack.

Note: YYMMDDHH = Year, Month, Day, Hour Ending

Table 6-2. Summary of Maximum Pollutant Concentrations Predicted for the Project Only Compared to the EPA Class I Significant Impact Levels and PSD Class I Increments

Pollutant	Averaging Time	Maximum Concentration[a] (μg/m³)	EPA Class I Significant Impact Levels (μg/m³)	PSD Class I Increments (μg/m³)
SO_2	Annual	0.002	0.1	2
	24-Hour	0.29	0.2	5
	3-Hour	0.38	1.0	25

[a] Highest concentration predicted with CALPUFF model and CALMET South Florida Domain, 1990.

Table 6-3. Maximum Predicted SO_2 Impacts For All Sources, AAQS Screening Analysis, Okeelanta Power, L.P.

Pollutant/ Averaging Time	Concentration [a] ($\mu g/m^3$)	Receptor Location [b] Direction (degrees)	Distance (m)	Time Period (YYMMDDHH)
Annual	10.1	302.0	7,148	87123124
	10.3	294.1	9,270	88123124
	10.7	297.9	8,102	89123124
	10.4	300.0	7,577	90123124
	10.4	293.9	9,362	91123124
HSH 24-Hour	51.7	312.4	5,628	87041424
	61.2	160.0	8,000	88112024
	50.8	100.0	8,000	89060424
	43.9	311.7	5,703	90031624
	52.2	180.0	8,000	91051724
HSH 3-Hour	185.7	150.0	8,000	87110921
	174.6	312.4	5,628	88071621
	177.0	120.0	6,000	89020624
	186.3	180.0	8,000	90090721
	200.7	130.0	7,000	91032124

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.

[b] Relative to OkPLP Boiler B stack.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

Table 6-4. Maximum Predicted SO_2 Concentrations for All Sources Compared to the AAQS - Refined Analysis

Pollutant/ Averaging Time	Concentration (µg/m³) [a] Total	Modeled Sources	Background	Receptor Location [b] Direction (degree)	Distance (m)	Time Period (YYMMDDHH)	Florida AAQS (µg/m³)
Annual	15.1	10.1	5	302	7,148	87123124	
	15.3	10.3	5	294	9,270	88123124	
	15.7	10.7	5	298	8,102	89123124	60
	15.4	10.4	5	300	7,577	90123124	
	15.4	10.4	5	294	9,362	91123124	
HSH 24-Hour	74.2	61.2	13	160	8,000	88112024	260
HSH 3-Hour	232.7	185.7	47	151	8,000	87110921	
	233.4	186.4	47	178	8,000	90090721	1,300
	248.6	201.6	47	128	7,000	91032124	

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.

[b] Relative to OkPLP Boiler B stack.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

Table 6-5. Maximum Predicted SO_2 Impacts For All Sources,
PSD Class II Screening Analysis, Okeelanta Power L.P.

Pollutant/ Averaging Time	Concentration[a] ($\mu g/m^3$)	Receptor Location[b] Direction (degree)	Distance (m)	Time Period (YYMMDDHH)
Annual	<0.0	All	All[c]	87123124
	<0.0	All	All[c]	88123124
	<0.0	All	All[c]	89123124
	<0.0	All	All[c]	90123124
	<0.0	All	All[c]	91123124
HSH 24-Hour	10.6	219	3,656	87052824
	10.4	237	5,156	88061224
	10.1	317	5,201	89060424
	9.8	225	3,990	90061324
	10.7	235	4,908	91060924
HSH 3-Hour	39.9	208	3,213	87053003
	46.0	292	10,098	88071409
	39.5	329	4,414	89060521
	43.9	285	9,930	90080409
	41.1	310	8,000	91090209

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.

[b] Relative to OkPLP Boiler B stack.

[c] Maximum concentrations were predicted to be less than zero at all receptors.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

Table 6-6. Maximum Predicted SO_2 Concentrations for All Sources Compared to the PSD Class II Increment Refined Analysis, Okeelanta Power L.P.

Pollutant/ Averaging Time	Concentration [a] (µg/m³)	Receptor Location [b] Direction (degree)	Distance (m)	Time Period (YYMMDDHH)	PSD Increment (µg/m³)
Annual	<0.0	All	All [c]	All years	20
HSH 24-Hour	10.6	219	3,656	87052824	
	10.4	237	5,156	88061224	
	10.1	317	5,201	89060424	91
	9.8	225	3,990	90061324	
	10.7	235	4,908	91060924	
HSH 3-Hour	46.0	292	10,098	88071409	512
	43.9	285	9,930	90080409	

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.

[b] Relative to OkPLP Boiler B stack.

[c] Maximum concentrations were predicted to be less than zero for all receptors.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

Table 6-7. Summary of Maximum 24-Hour Average SO_2 Concentrations Predicted for PSD Sources at the Everglades National Park Compared to the Allowable PSD Class I Increments

Averaging Time	Maximum Concentration[a] ($\mu g/m^3$)	Receptor Location (m)		Period Ending (Julian day/ hour/year)	Allowable PSD Class I Increments ($\mu g/m^3$)
		UTM East	UTM North		
24-Hour	3.47	54500	2848600	307/23/90	5

[a] Concentrations are second-highest predicted with CALPUFF model and CALMET South Florida Domain, 1990.

Note: m = meter
UTM = Universal Transverse Mercator
$\mu g/m^3$ = micrograms per cubic meter

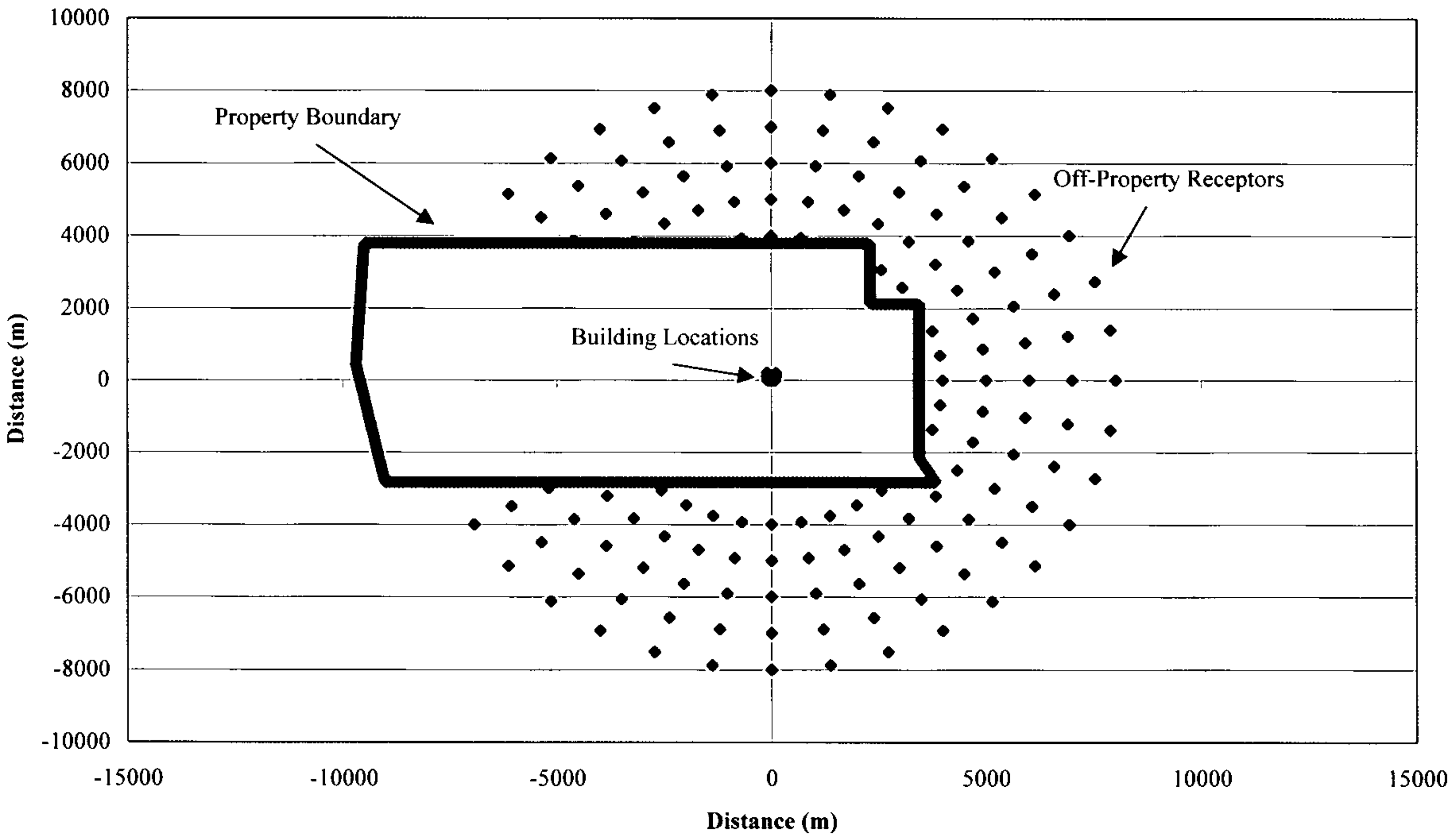

Figure 3-1. Okeelanta Power, L.P.
Building, Property Boundary, and Receptor Locations

Source: Golder, 2001.

Golder Associates

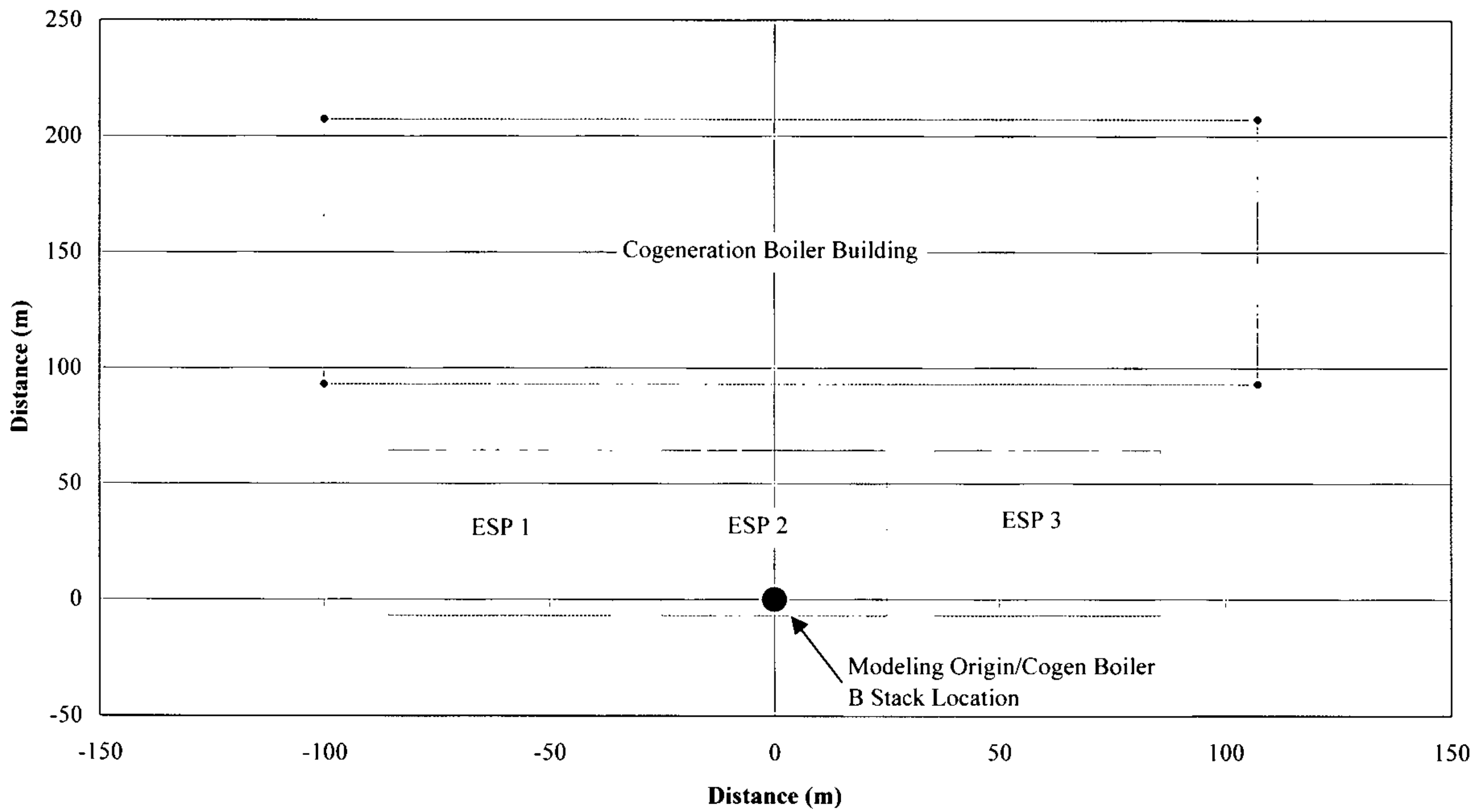

Figure 4-1. Building and Modeling Origin Locations Used in the Modeling Analysis
Okeelanta Power L.P.

Source: Golder, 2001.

Golder Associates

APPENDIX A

CALPUFF MODEL DESCRIPTION AND METHODOLOGY

A.0 CALPUFF MODEL DESCRIPTION AND METHODOLOGY

A.1 INTRODUCTION

As part of the new source review requirements under Prevention of Significant Deterioration (PSD) regulations, new sources are required to address air quality impacts at PSD Class I areas. As part of the PSD analysis report submitted to the Florida Department of Environmental Protection (DEP), the air quality impacts due to the potential emissions of the proposed Cargill Riverview modification are required to be addressed at the PSD Class I area of the Everglades National Park (ENP). The ENP is located approximately 92.3 km south of the facility site and is the nearest Class I area to the facility.

The evaluation of air quality impacts are not only concerned with determining compliance with PSD Class I increments but also assessing a source's impact on Air Quality Related Values (AQRVs), such as regional haze. Further, compliance with PSD Class I increments can be evaluated by determining if the source's impacts are less than the proposed U.S. Environmental Protection Agency (EPA) Class I significant impact levels. The significant impact levels are threshold levels that are used to determine the type of air impact analyses needed for the facility. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance with Class I increments.

Currently there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and Federal Land Managers (FLM) of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report.
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report,* USFS, NPS, USFWS (12/00), referred to as the FLAG document.

For the Proposed Project, air quality analyses were performed that assess the facility's impacts in the PSD Class I area of the ENP using the refined modeling approach from the IWAQM Phase 2 report for:

- Significant impact analysis,

- SO_2 PSD Class I increment analysis, and
- Regional haze analysis.

The refined analysis approach was used instead of the screening analysis approach since the air quality impacts are based on generally more realistic assumptions, include more detailed meteorological data, and are estimated at locations at the Class I area.

A.2 GENERAL AIR MODELING APPROACH

The general modeling approach was based on using the long-range transport model, California Puff model (CALPUFF, Version 5.4). At distances beyond 50 km, the ISCST3 model is considered to over-predict air quality impacts, because it is a steady-state model. At those distances, the CALPUFF model is recommended for use. Recently, the FLM have requested that air quality impacts, such as for regional haze, for a source located more than 50 km from a Class I area be predicted using the CALPUFF model. The Florida DEP has also recommended that the CALPUFF model be used to assess if the source has a significant impact at a Class I area located beyond 50 km from the source. As a result, a significant impact and regional haze analyses were performed using the CALPUFF model to assess the facility's impacts at the ENP.

The methods and assumptions used in the CALPUFF model were based on the latest recommendations for a refined analysis as presented in the IWAQM Phase 2 Summary Report and the FLAG documents.

A regional haze analysis was performed to determine the affect that the facility's emissions will have on background regional haze levels at the ENP. In the regional haze analysis, the change in visual range, as calculated by a deciview change, was estimated for the facility in accordance with the IWAQM recommendations. Based on those recommendations, the CALPUFF model is used to predict the maximum 24-hour average sulfate (SO_4), nitrate (NO_3), and fine particulate (PM_{10}) concentrations as well as ammonium sulfate [$(NH_4)_2SO_4$] and ammonium nitrate (NH_4NO_3) concentrations. The change in visibility due to a source, estimated as a percentage, is then calculated based on the change from background data.

The following sections present the methods and assumptions used to assess the refined significant impact and regional haze analyses performed for the proposed project. The results of these analyses are presented in Section 1.0.

A.3 MODEL SELECTION AND SETTINGS

The California Puff (CALPUFF, version 5.4) air modeling system was used to model to assess the Proposed Project's impacts at the PSD Class I area for comparison to the PSD Class I significant impact levels and to the regional haze visibility criteria. CALPUFF is a non-steady state Lagrangian Gaussian puff long-range transport model that includes algorithms for building downwash effects as well as chemical transformations (important for visibility controlling pollutants), and wet/dry deposition. The CALPUFF meteorological and geophysical data preprocessor (CALMET, Version 5.2), a preprocessor to CALPUFF, is a diagnostic meteorological model that produces a three-dimensional field of wind and temperature and a two-dimensional field of other meteorological parameters. CALMET was designed to process raw meteorological, terrain and land-use databases to be used in the air modeling analysis. The CALPUFF modeling system uses a number of FORTRAN preprocessor programs that extract data from large databases and converts the data into formats suitable for input to CALMET. The processed data produced from CALMET was input to CALPUFF to assess the pollutant specific impact. Both CALMET and CALPUFF were used in a manner that is recommended by the IWAQM Phase 2 and FLAG reports.

A.3.1 CALPUFF MODEL APPROACHES AND SETTINGS

The IWAQM has recommended approaches for performing a Phase 2 refined modeling analyses that are presented in Table A-1. These approaches involve use of meteorological data, selection of receptors and dispersion conditions, and processing of model output.

The specific settings used in the CALPUFF model are presented in Table A-2.

A.3.2 EMISSION INVENTORY AND BUILDING WAKE EFFECTS

The CALPUFF model included the facility's emission, stack, and operating data as well as building dimensions to account for the effects of building-induced downwash on the emission sources. Dimensions for all significant building structures were processed with the Building Profile Input Program (BPIP), Version 95086, and were included in the CALPUFF model input. Section 2.0 presents a listing of the facility's emissions and structures included in the analysis.

A.4 RECEPTOR LOCATIONS

For the refined analyses, pollutant concentrations were predicted in an array of 126 discrete receptors located at the ENP area. These receptors are the same as those used in the PSD Class I analysis performed. These receptors were presented in Section 3.0, Table 3-2.

A.5 METEOROLOGICAL DATA

A.5.1 REFINED ANALYSIS

CALMET was used to develop the gridded parameter fields required for the refined modeling analyses. The follow sections discuss the specific data used and processed in the CALMET model.

A.5.2 CALMET SETTINGS

The CALMET settings contained in Table A-3 were used for the refined modeling analysis. With the exception of hourly precipitation data files, all input data files needed for CALMET were developed by the FDEP staff.

A.5.3 MODELING DOMAIN

A rectangular modeling domain extending 450 km in the east-west (x) direction and 470 km in the north-south (y) direction was used for the refined modeling analysis. The southwest corner of the domain is the origin and is located at 23.8 degrees north latitude and 83.5 degrees west longitude. This location is in the Gulf of Mexico approximately 110 km west of Venice, Florida. For the processing of meteorological and geophysical data, the domain contains 90 grid cells in the x-direction and 94 grid cells in the y-direction. The domain grid resolution is 5 km. The air modeling analysis was performed in the UTM coordinate system.

A.5.4 MESOSCALE MODEL – GENERATION 4 (MM4) DATA

Pennsylvania State University in conjunction with the NCAR Assessment Laboratory developed the MM4 data set, a prognostic wind field or "guess" field, for the United States. The hourly meteorological variables used to create this data set (wind, temperature, dew point depression, and geopotential height for eight standard levels and up to 15 significant levels) are extensive and only allow for one data base set for the year 1990. The analysis used the MM4 data to initialize the CALMET wind field. The MM4 data have a horizontal spacing of 80 km and are used to simulate atmospheric variables within the modeling domain.

The MM4 subset domain was provided by FDEP and consisted of a 7 x 7- cell rectangle, with 80 km grid resolution, extending from the MM4 grid points (50,6) to (57,13). These data were processed to create a MM4.DAT file, for input to the CALMET model.

The MM4 data set used in the CALMET, although advanced, lacks the fine detail of specific temporal and spatial meteorological variables and geophysical data. These variables were processed into the appropriate format and introduced into the CALMET model through the additional data files obtained from the following sources.

A.5.5 SURFACE DATA STATIONS AND PROCESSING

The surface station data processed for the CALPUFF analyses consisted of data from eight NWS stations or Federal Aviation Administration (FAA) Flight Service stations for Orlando, Fort Myers, Daytona Beach, Vero Beach, Key West, Miami, Tampa, and West Palm Beach. A summary of the surface station information and locations are presented in Table A-4. The surface station parameters include wind speed, wind direction, cloud ceiling height, opaque cloud cover, dry bulb temperature, relative humidity, station pressure, and a precipitation code that is based on current weather conditions. The surface station data were processed by FDEP into a SURF.DAT file format for CALMET input.

Because the modeling domain extends largely over water, C-Man station data from Venice, Sombrero Key, and Lake Worth was obtained. These data were processed by Florida DEP into an over-water surface station format (i.e., SEA*.DAT) for input to CALMET. The over-water station data include wind direction, wind speed and air temperature.

A.5.6 UPPER AIR DATA STATIONS AND PROCESSING

The analysis included three upper air NWS stations located in Ruskin, Key West, and West Palm Beach. Data for each station were obtained from the Florida DEP in a format for CALMET input.

The data and locations for the upper air stations are presented in Table A-4.

A.5.7 PRECIPITATION DATA STATIONS AND PROCESSING

Precipitation data were processed from a network of hourly precipitation data files collected from primary and secondary NWS precipitation-recording stations located within the latitude and longitudinal limits of the modeling domain. Data for 23 stations were obtained in NCDC TD-3240 variable format and converted into a fixed-length format. The utility programs PXTRACT and PMERGE were then used to process the data into the format for the PRECIP.DAT file that is used by CALMET. A listing of the precipitation stations used for the modeling analysis is presented in Table A-5.

A.5.8 GEOPHYSICAL DATA PROCESSING

The land-use and terrain information data were developed by the FDEP for the modeling domain and were provided in a GEO.DAT file format for input to CALMET. Terrain elevations for each grid cell of the modeling domain were obtained from Digital Elevation Model (DEM) files obtained from US Geographical Survey (USGS). The DEM data was extracted for the modeling domain grid using the utility extraction program LCELEV. Land-use data were obtained from the USGS GIS.DAT which is based on the ARM3 data. The resolution of the GIS.DAT file is one-eighth of a degree in the east-west direction and one-twelfth of a degree in the north-south direction. Land-use values for the domain grid were obtained with the utility program CAL-LAND. Other parameters processed for the modeling domain by CAL-LAND include surface roughness, surface Albedo, Bowen ratio, soil heat flux, and leaf index field. The land-use parameter values were based on annual averaged values.

Table A-1. Refined Modeling Analyses Recommendations[a]

Model Input/Output	Description
Meteorology	Use CALMET (minimum 6 to 10 layers in the vertical; top layer must extend above the maximum mixing depth expected); horizontal domain extends 50 to 80 km beyond outer receptors and sources being modeled; terrain elevation and land-use data is resolved for the situation.
Receptors	Within Class I area(s) of concern; obtain regulatory concurrence on coverage.
Dispersion	1. CALPUFF with default dispersion settings. 2. Use MESOPUFF II chemistry with wet and dry deposition. 3. Define background values for ozone and ammonia for area.
Processing	1. For PSD increments: use highest, second highest 3-hour and 24-hour average SO_2 concentrations; highest, second highest 24-hour average PM_{10} concentrations; and highest annual average SO_2, PM_{10} and NO_x concentrations. 2. For haze: process, on a 24-hour basis, compute the source extinction from the maximum increase in emissions of SO_2, NO_x and PM_{10}; compute the daily relative humidity factor [f(RH)], provided from an external disk file; and compute the maximum percent change in extinction using the FLM supplied background extinction data in the FLAG document. 3. For significant impact analysis: use highest annual and highest short-term averaging time concentrations for SO_2, PM_{10}, and NO_x.

Note:

[a] IWAQM Phase II report (12/98) and FLAG document (12/00)

Table A-2. CALPUFF Model Settings

Parameter	Setting
Pollutant Species	SO_2, SO_4, NO_x, HNO_3, and NO_3, PM_{10}, and FL
Chemical Transformation	MESOPUFF II scheme, hourly ozone data
Deposition	Include both dry and wet deposition, plume depletion
Meteorological/Land Use Input	CALMET
Plume Rise	Transitional, Stack-tip downwash, Partial plume penetration
Dispersion	Puff plume element, PG/MP coefficients, rural mode, ISC building downwash scheme
Terrain Effects	Partial plume path adjustment
Output	Create binary concentration file including output species for SO_4, NO_3, PM_{10}, SO_2, NO_x, FL, CO, and Be
Model Processing	For haze: highest predicted 24-hour extinction change (%) for the year For significant impact analysis: highest predicted annual and highest short-term averaging time concentrations for SO_2, NO_x, and PM_{10}
Background Values [a]	Ozone: 80 ppb; Ammonia: 10 ppb

Note:

[a] Recommended values by the Florida DEP.

Table A-3. CALMET Settings

Parameter	Setting
Horizontal Grid Dimensions	450 by 470 km, 5 km grid resolution
Vertical Grid	9 layers
Weather Station Data Inputs	8 surface, 3 upper air, 23 precipitation stations
Wind model options	Diagnostic wind model, no kinematic effects
Prognostic wind field model	MM4 data, 80 km resolution, 7 x 7 grid, used for wind field initialization
Output	Binary hourly gridded meteorological data file for CALPUFF input

Table A-4. Surface and Upper Air Stations Used in the CALPUFF Analysis

Station Name	Station Symbol	WBAN Number	UTM Coordinates Easting (km)	Northing (km)	Zone	Anemometer Height (m)
Surface Stations						
Tampa	TPA	12842	349.20	3094.25	17	6.7
Daytona Beach	DAB	12834	495.14	3228.05	17	9.1
Orlando	ORL	12815	468.96	3146.88	17	10.1
Vero Beach	VER	12843	557.52	3058.36	17	6.7
Fort Myers	FMY	12835	413.65	2940.38	17	6.1
Miami	MIA	12839	566.82	2857.20	17	7.0
Key West	EYW	12836	424.03	2715.14	17	18.3
West Palm Beach	PBI	12844	587.87	2951.43	17	10.1
Upper Air Stations						
Ruskin	TBW	12842	349.20	3094.28	17	NA
West Palm Beach	PBI	12844	587.87	2951.42	17	NA
Key West	EYW	12836	424.03	2715.14	17	NA

Table A-5. Hourly Precipitation Stations Used in the CALPUFF Analysis

Station Name	Station Number	UTM Coordinate Easting (km)	UTM Coordinate Northing (km)	Zone
Belle Glade HRCN GT 4	80616	528.19	2953.03	17
Boca Raton	80845	588.75	2916.52	17
Canal Point Gate 5	81271	536.43	2971.51	17
Clewiston US Engineers	81654	546.19	2912.73	17
Fort Myers FAA/AP	83186	413.99	2940.71	17
Homestead Exp Stn	84091	550.26	2820.21	17
Key West Intl AP	84570	423.67	2715.51	17
Miami WSCMO Airport	85663	570.20	2856.17	17
Moore Haven Lock 1	85895	491.61	2967.80	17
North New River Canal #	86323	546.58	2912.48	17
Ortona Lock 2	86657	470.17	2962.27	17
Parrish	86880	366.99	3054.39	17
Pennsuco 5 WNW	86988	554.70	2867.81	17
Port Mayaca S 1 Canal	87293	538.04	2984.44	17
St Lucie New Lock 1	87859	571.04	2999.35	17
St Petersburg	87886	339.61	3071.99	17
Tamiami Trail 40 Mi BEN	88780	517.64	2849.04	17
Tampa WSCMO AP	88788	348.48	3093.67	17
Trail Glade Ranges	89010	551.57	2849.99	17
Venice	89176	357.59	2998.18	17
Venus	89184	467.27	3001.22	17
Vero Beach 4 W	89219	554.27	3056.50	17
West Palm Beach Int AP	89525	589.61	2951.63	17

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Golder Associates

November 2, 2001

0037584

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

RECEIVED

NOV 05 2001

BUREAU OF AIR REGULATION

Attention: Mr. Jeff Koerner, P.E.

RE: OKEELANTA POWER COGENERATION FACILITY
ARMS FACILITY ID NO. 0990332
PROJECT NO. 0990332-014-AC/PSD-FL-196M
APPLICATION TO MODIFY CO AND SO_2 EMISSIONS STANDARDS
ADDITIONAL INFORMATION NO. 2

Dear Mr. Koerner:

Okeelanta Power Limited Partnership (OkPLP) has received the Department's request to provide a best available control technology (BACT) analysis for CO, SO_2, and fluoride emissions for the three cogeneration boilers. Note that in the original application submitted by OkPLP for this change in December 2000, the applicant concluded that PSD review applied for CO, SO_2, fluorides and sulfuric acid mist. As such, a brief BACT analysis was provided in Section 3.0 of said report. During the course of the Department's review of the application, several information requests were received that related to control technology and modeling of emissions. Therefore, it was presumed that the Department had received adequate information on which to base a BACT determination.

Nevertheless, OkPLP is providing an additional analysis of BACT for CO, SO_2 and fluoride emissions. This analysis is attached. As part of this analysis, OkPLP is proposing a lower 12-month rolling average SO_2 limit of 0.07 lb/MMBtu, or 402.5 TPY for all three boilers combined. This is lower than the previously requested annual limit of 0.10 lb/MMBtu and 575 TPY. Also attached are revised application form pages addressing this change.

Thank you for your consideration of this information. Please call if there are any questions.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

David A. Buff, P.E., Q.E.P.
Principal Engineer
Florida P.E. #19011
SEAL

Enclosures

cc: Gus Cepero
James Meriwether
David Dee
Bill Tarr
J. Koerner
C. Halladay
D. Grasiani
D. Knowles
G. Worley, EPA
G. Bunyak, NPS

\\GATORBAIT\DP\Projects\2000\0037\0037584Y Okeelanta Power LP\F1\WP\L110101.doc

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **214.5** lb/hour **219.2** tons/year	4. Synthetically Limited? [X]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: **0.30 lb/MMBtu** Reference: **CEM Data**	7. Emissions Method Code: **0**
8. Calculation of Emissions (limit to 600 characters): **Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr** **Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb = 219.2 TPY**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **402.5 TPY total for all three boilers. Based on biomass firing.**	

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.10 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters): **Continuous SO_2 monitor**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.10 lb/MMBtu 30-day rolling average for biomass firing.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

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3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing and BACT.**	

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(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

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1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **214.5** lb/hour **219.2** tons/year	4. Synthetically Limited? [**X**]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
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8. Calculation of Emissions (limit to 600 characters): **Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr** **Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb = 219.2 TPY**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **402.5 TPY total for all three boilers. Based on biomass firing.**	

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
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5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

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Potential/Fugitive Emissions

1. Pollutant Emitted: SO_2	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing and BACT.**	

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(Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

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5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ____ to ____ tons/year	
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8. Calculation of Emissions (limit to 600 characters): Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb =219.2 TPY	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): 402.5 TPY total for all three boilers. Based on biomass firing.	

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: OTHER	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: 0.10 lb/MMBtu	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters): Continuous SO_2 monitor	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): Requested Allowable Emissions: 0.10 lb/MMBtu 30-day rolling average for biomass firing.	

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Potential/Fugitive Emissions

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3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 Monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units -
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Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing. and BACT.**	

BACT ANALYSIS
FOR
CO AND SO_2 EMISSIONS

OKEELANTA POWER L.P.
SOUTH BAY, FLORIDA

Prepared For:

Okeelanta Power L.P.
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Prepared By:

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November 2001
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TABLE OF CONTENTS

1.0 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

1.1 REQUIREMENTS

The 1977 Clean Air Act Amendments established requirements for the approval of pre-construction permit applications under the Prevention of Significant Deterioration (PSD) program. One of these requirements is that Best Available Control Technology (BACT) be installed for applicable pollutants. BACT determinations must be made on a case-by-case basis considering technical, economic, energy, and environmental impacts for various BACT alternatives. To bring consistency to the BACT process, the U.S. Environmental Protection Agency (EPA) developed the so called "top-down" approach to BACT determinations. As mentioned previously, this approach has been challenged in court and a settlement agreement reached, which requires EPA to initiate formal rulemaking concerning the "top-down" approach. However, no rule has yet been proposed or promulgated. Nonetheless, in the absence of formal rules related to this approach, the "top-down" approach is followed in the Okeelanta Power L.P. (OkPLP) BACT analysis.

The first step in a top-down BACT analysis is to determine, for each applicable pollutant, the most stringent control alternative available for a similar source or source category. If it can be shown that this level of control is not feasible on the basis of technical, economic, energy, or environmental impacts for the source in question, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy, or environmental consideration.

In the case of the proposed revision to the permitted emission rates for OkPLP, carbon monoxide (CO), sulfur dioxide (SO_2), and fluorides (F) require a BACT analysis. The BACT analysis is presented in the following sections.

1.2 SULFUR DIOXIDE

1.2.1 EXISTING CONTROL TECHNOLOGY

SO_2 emissions are currently controlled by burning low sulfur content biomass fuel and fuel oil, and by limiting the maximum fuel oil burning to no more than 24.9 percent of the total heat input on a calendar quarter basis. The OkPLP boilers are also permitted to burn natural gas, although this capability has not yet been incorporated into the boilers. Biomass fuel and natural gas are inherently low in sulfur, and therefore produce low SO_2 emissions. SO_2 removal is inherent to the process of combusting biomass. The fly ash produced during biomass firing is alkaline in nature and acts as a dry scrubbant, adsorbing SO_2 from the exhaust gas stream.

The current emission limit for SO_2 is 0.10 pound per million British thermal units (lb/MMBtu) on a 24-hour average for biomass firing and 0.02 and 0.05 lb/MMBtu on an annual average for bagasse and wood firing, respectively. OkPLP has requested that these limits be increased to 0.20 lb/MMBtu on a 24-hour average and 0.10 lb/MMBtu on an annual average basis [equivalent to 575 tons per year (TPY)] for biomass firing. However, based on discussions with Florida Department of Environmental Protection (FDEP), OkPLP is now proposing a 30-day rolling average SO_2 limit of 0.10 lb/MMBtu, along with a 12-month rolling average of 0.07 lb/MMBtu (equivalent to 402.5 TPY).

OkPLP believes that a lower annual limit compared to the previously requested 0.10 lb/MMBtu (575 TPY) is achievable, based on the highest period of SO_2 emissions experienced to date at OkPLP. Review of SO_2 emissions data from the CEMs shows that the highest 12-month period of SO_2 emissions occurred during the period of June 2000 through May 2001. During this period, SO_2 emissions averaged approximately 0.040 lb/MMBtu for all three cogeneration boilers. In August of this year, the OkPLP boilers were burning 100 percent wood materials. The monthly average SO_2 emissions for the boilers were approximately 0.046 lb/MMBtu. Since the historic SO_2 data has shown a recent increase in SO_2 emissions, future SO_2 emissions due to biomass firing could increase above these historic levels. Considering the potential variability of biomass fuels from south Florida, the potential future fuel mix of wood and bagasse, and possibly higher sulfur content in the fuels, a 12-month rolling average limit of 0.07 lb/MMBtu is proposed for SO_2.

1.2.2 BACT ANALYSIS

A review of previous SO_2 BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's web page was performed. A summary of BACT determinations for biomass-fired boilers from this review is presented in Table 1-1. FDEP also provided a listing of BACT determinations for wood-fired boilers. This listing is provided in Table 1-2. All of the boilers listed by FDEP in Table 1-2 are also listed in Table 1-1.

From the review of these previous BACT determinations, it is evident that SO_2 BACT determinations for industrial boilers have typically been fuel specifications (i.e., use of low sulfur-containing fuels).

Proper design, combustion control, wet scrubbers and lime flue gas desulfurization (FGD) have also cited as BACT for biomass-fired boilers. However, it is believed that add-on SO_2 control has not been required on solely a biomass-fired boiler, due to the inherent low SO_2 emissions from biomass firing. Previous BACT determinations have ranged from 0.0083 to 0.46 lb/MMBtu of SO_2 emissions. The highest limit of 0.46 lb/MMBtu was for a boiler burning a combination of bark and sludge. Paper mill sludge can have a higher sulfur content than bark alone due to sulfur concentrating in the sludge.

It is noted that the OkPLP facility is believed to be significantly different than these other wood/bark burning facilities shown in Tables 1-1 and 1-2. OkPLP obtains its wood materials from a number of suppliers and sources throughout south Florida. None of these other sources are located in south Florida, and all are believed to have a dedicated fuel supply source, which means that the fuel is much more homogenous compared to OkPLP.

Technically feasible SO_2 control alternatives for the OkPLP boilers consist of add-on SO_2 control systems. These include wet scrubbers using water, caustic, and other similar scrubbing media. Wet scrubbing using a lime or limestone slurry can also be used, but must be followed by treatment to remove the solids, which then creates a waste disposal problem. Dry FGD systems include lime spray drying, dry lime furnace injection, and dry lime duct injection. These systems must be followed by a highly efficient PM control device, which is typically a fabric filter, although an electrostatic precipitator could also be used. SO_2 control efficiencies for these systems range from 50 to 95 percent, depending on type of device and design.

Each of these alternative SO_2 control systems would result in significant capital and operating costs for OkPLP. In OkPLP's case, three boilers would need to be retrofitted with these systems, substantially increasing the cost over a single boiler. At the proposed SO_2 emission rate of 402.5 TPY for all three boilers combined, each boiler on average would be limited to approximately 134 TPY. The cost effectiveness of add-on equipment would therefore be very high.

The uncontrolled SO_2 emissions from biomass, No. 2 fuel oil and natural gas are very low, which renders any add-on control equipment as too costly. Further, there is inherent SO_2 removal in the boiler/PM control system, based on OkPLP's operating and emissions data. The ash generated from biomass burning is alkaline in nature, and adsorbs SO_2 in the boiler and through contact between the ash particles and the flue gas stream downstream of the boiler. This phenomenon is also documented in the published literature for wood-fired boilers in the pulp and paper industry. The ash particles are effectively removed in the downstream mechanical dust collectors and electrostatic precipitator.

In summary, the proposed BACT for the OkPLP boilers is the continued use of very low sulfur fuels, i.e., biomass, No. 2 fuel oil, and natural gas. The requested BACT emission limits are 0.10 lb/MMBtu on a 30-day rolling average and 0.07 lb/MMBtu on a 12-month rolling average. This is equivalent to 402.5 TPY on a 12-month rolling average for all three boilers combined.

1.3 CARBON MONOXIDE

1.3.1 EXISTING CONTROL TECHNOLOGY

CO emissions from the OkPLP boilers are currently controlled through proper furnace design and good combustion practices, including control of combustion air and temperature, improved fuel feeders, distribution of fuel on the combustion grate, and better controls over the furnace loads and transient conditions. Both oxygen and CO continuous monitors are installed on each boiler, providing the boiler operators with valuable information on the combustion conditions. Since there is a cost for the biomass fuel burned in the boilers, the boiler operators are trained to operate the boilers in the most efficient manner possible, which minimizes CO emissions and conserves biomass fuel usage.

OkPLP is proposing a BACT emission limit for CO emissions from the cogeneration boilers as follows: 0.50 lb/MMBtu on a 30-day rolling average, and 0.35 lb/MMBtu as a 12-month rolling average. The equivalent annual emissions are 2,012.5 TPY. This annual emissions limit is the same as the limit in the existing OkPLP PSD permit.

1.3.2 BACT ANALYSIS

A review of previous CO BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's web page was performed. A summary of BACT determinations for biomass-fired industrial boilers based on this review is presented in Table 1-3. The FDEP also provided a listing of BACT determinations for wood-fired boilers. This listing is provided in Table 1-2.

The CO emission limits for biomass-fired boilers range from 0.03 to 6.5 lb/MMBtu. This rather large range of emissions is due to differences in boiler design and operation, and fuel characteristics. From the review of previous determinations, it is evident that CO BACT determinations for biomass-fired industrial boilers have been limited to good combustion practices and boiler design.

The OkPLP proposed emission limits are well within the range of previous BACT determinations. OkPLP proposes to use good combustion practices to control CO emissions from the cogeneration boilers. This level of control is consistent with previous determinations. These good combustion practices techniques include maintaining boiler flue gas oxygen levels within the range of 2 to 10 percent (1-hour block average), to the extent possible. If the 1-hour block average oxygen level for a boiler falls outside this range, OkPLP will take corrective actions to bring the oxygen level within the acceptable range as expeditiously as possible. Other good combustion practices, as described above, will continue to be employed at the facility.

In summary, OkPLP proposes to continue the implementation of good combustion practices as BACT for CO emissions. The proposed BACT emission limit for CO emissions from the cogeneration boilers is 0.50 lb/MMBtu on a 30-day rolling average, and 0.35 lb/MMBtu as a 12-month rolling average. The equivalent annual emissions are 2,012.5 TPY.

1.4 FLUORIDES

1.4.1 EXISTING CONTROL TECHNOLOGY

The fuels burned in the cogeneration boilers can contain trace levels of F. Stack testing of both wood and bagasse have indicated very low, although detectable, levels of F in the stack gases of the boilers. Fuel oil can also contain trace levels of F. F contained in the fuels is converted to hydrogen fluoride (HF) in the furnace. HF is an acid gas, and will behave similar to SO_2 in the furnace and downstream control equipment. Thus, as discussed for SO_2, HF will be adsorbed onto the alkaline ash particles existing in the flue gas. The ash is then removed in the downstream mechanical collectors and electrostatic precipitator, resulting in inherent F control.

1.4.2 BACT ANALYSIS

As part of the BACT analysis, a review of previous F BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's webpage was performed. A summary of BACT determinations for biomass-fired industrial boilers, from this review, is presented in Table 1-

4. The sole F emission limit for a biomass-fired boiler is 1.7E-03 lb/MMBtu. By comparison, OkPLP's measured F emissions have been less than 7.0E-04 lb/MMBtu for both wood and bagasse. These represent extremely low levels of F emissions. The same control techniques identified to control SO_2 emissions also control F emissions.

As discussed above for SO_2, any of the add-on SO_2 control systems would result in significant capital and operating costs for OkPLP. In OkPLP's case, three boilers would need to be retrofitted with these systems, substantially increasing the cost over a single boiler. At the very small F emission levels projected for the OkPLP facility (4.0 TPY potential and 1.1 TPY actual), the cost effectiveness of add-on equipment would be extremely high.

F emissions are currently limited to 6.27E-06 lb/MMBtu for No. 2 fuel oil combustion. There is currently no F emission limit for biomass combustion. Estimated maximum F emissions for the cogeneration boilers are 7.00E-04 lb/MMBtu for biomass and 6.27E-06 lb/MMBtu for No. 2 fuel oil. Maximum actual F emissions for all three cogeneration boilers are estimated at 1.1 TPY.

Table 1-1. BACT Determinations for SO_2 and SO_x for Biomass-Fired Industrial Boilers

Company	State	RBLC ID	Permit Date	Throughput MMBtu/hr	Emission Limits: As Provided in LAER/BACT Clearinghouse	Emission Limits: Converted to lb/MMBtu[a]	Control Equipment Description	% Efficiency
Gulf States Paper Corporation	AL	AL-0116	12/10/97	775	355.7 lb/hr	0.46	Proper design and operation. Wood ash alkalinity as scrubbing media. Fuel is bark and clarified sludge.	--
Champion International	AL	AL-0112	12/9/97	710	0.03 lb/MMBtu	0.03	Wet scrubber with soda ash	95
Mead Containerboard	AL	AL-0099	1/15/97	620	0.02 lb/MMBtu	0.02	Combustion control	--
Willamette Industries - Marlboro Mill	SC	SC-0045	4/17/96	470	0.1 lb/MMBtu	0.1	No controls feasible	--
Scott Paper Company	WA	WA-0276	3/9/95	718	70 lb/hr 12 mo. avg.	0.10	Fuel spec: backup fuel limited to 0.05% sulfur distillate	--
SAI Energy, Inc.	CA	CA-0633	12/23/94	245	0.023 lb/MMBtu	0.023	SNCR ammonia injection; natural gas fuel supplement	70
KES Chateaugay Project	NY	NY-0055	12/19/94	275	0.03 lb/MMBtu	0.03	Fuel spec: oil less than 0.08% by wgt. sulfur content	--
Okeelanta Power Limited Partnership	FL	FL-0069	9/27/93	715	0.02 lb/MMBtu 30-day avg.	0.02	Fuel Spec: low sulfur supplemental fuel APCE includes ESP, SNCR, and Carbon injection.	-- --
Osceola Power Limited Partnership	FL	FL-0070	9/27/93	665	0.02 lb/MMBtu 30-day avg.	0.02	Fuel Spec: low sulfur supplemental fuel	--
Multitrade Limited Partnership	VA	VA-0183	2/21/92	374	0.016 lb/MMBtu	0.016	No controls feasible	--
Beaver-Livermore Falls	ME	ME-0013	9/5/91	534	0.023 lb/MMBtu	0.023		--
Thermo Electron's Delano Energy	CA	CA-0424	7/10/91	315	13.07 PPM @ 12% CO_2		Limestone injection	80
Willamette Industries Inc.	LA	LA-0074	2/4/91	940	7.8 lb/hr	0.0083	Fuel speciation	--
Alabama River Pulp Co.	AL	AL-0047	1/22/90	266	0.3 lb/MMBtu	0.3		--
Cogeneration Michigan, Inc.	MI	MI-0147	1/16/90	293	0.017 lb/MMBtu	0.017		--
Hillman Limited Partners	MI	MI-0139	12/5/89	300	0.018 lb/MMBtu	0.018		--
Bio-Gen Torrington Partnership	CT	CT-0007		209	0.1 lb/MMBtu	0.1	Fuel spec: fuel analysis	--

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001.

[a] To convert from lb/hr, the emission limit was divided by the throughput rate. To convert from lb/day, assumed 24 hr/day operation.
[b] Assumed 8,760 hr/yr.

Table 1-2. BACT for Similar Sources from the EPA RACT/BACT/LAER Clearinghouse (as provided by FDEP)

RBLC ID	Date	Facility Name	Boiler Type/Fuel	MMBtu/hour	CO, lb/MMBTU	SO_2, lb/MMBtu	Add-On Controls Equipment
AL-0047	1990	Alabama River Pulp, Co.	wood	266	0.3	0.3	None
AL-0099	1997	Mead Container Board	wood, sludge	622	0.4	0.02	None
CT-0007	>1991	Bio-Gen Tarrington Partnership	wood	208.5	0.29	0.10	None
LA-0074	1991	Willamette Industries, Inc.	wood	940	0.30	0.008	None
ME-0013	1991	Beaver-Livermore Falls	wood, stoker	533.6	0.30	0.023	None
MI-0139	1989	Hillman Limited Partners	wood	300	0.35	0.018	None
MI-0147	1991	Cogeneration Michigan, Inc.	wood	293	0.35	0.017	SNCR
MI-0151	1990	Grayling Generating Station L.P.	wood	450/523	0.40	ND	SNCR
MI-0180	1992	Cogeneration Michigan, Ass.	wood	523	0.40	ND	SNCR
MT-0005	1995	Plum Creek Mfg. – Columbia Falls	wood	292.4	1.6	ND	None
MT-0007	1997	Plum Creek Mfg. - Evergreen	hogged wood	225	2.25	ND	None
NH-0003	1990	Pinetree Power, Inc. - Bethlehem	wood	289	0.50	ND	None
NH-0004	1990	Pinetree Power, Inc. Tamworth	wood	404	0.50	ND	None
NY-0055	1994	KES Chateauguay Project	wood	275	0.35	0.03	Low sulfur fuels
VA-0183	1992	Mulitrade Limited Partnership	wood	373.7	0.35	0.016	SNCR
VT-0004	1990	Ryegate Wood Energy Co.	wood	300	0.30	ND	SNCR
WA-0276	1993	Scott Paper Company	wood	718	0.50	0.097, 365-day rolling avg.	SNCR

Summary of CO Standards		Summary of SO_2 Standards	
0.290	= minimum standard	0.008	= minimum standard
2.250	= maximum standard	0.300	= maximum standard
0.555	= average of standards	0.060	= average of standards
1.730	= 95th percentile	0.210	= 95th percentile
0.35	= median of standards	0.022	= median of standards

Table 1-3. BACT Determinations for CO for Biomass-Fired Industrial Boilers

Company	State	RBLC ID	Permit Date	Throughput (MMBtu/hr)	Emission Limits: As Provided in LAER/BACT Clearinghouse	Emission Limits: Converted to lb/MMBtu[a]	Control Equipment Description
Atlantic Sugar Association	FL		6/7/01	255.3	6.5 lb/MMBtu	6.5	Good Combustion Practices
United States Sugar Corporation	FL		3/8/01	633	6.5 lb/MMBtu	6.5	Good Combustion Practices
Gulf States paper Corp.	AL	AL-0122	10/14/98	98	0.5 lb/MMBtu	0.5	
Wellborn Cabinet Inc.	AL	AL-0107	2/3/98	29.5	23.6 lb/hr	0.8	Boiler design & combustion control: oxygen trim, staged combustion, steam injection, & overfire air.
Champion International	AL	AL-0112	12/9/97	710	0.03 lb/MMBtu	0.03	Proper design and good combustion practices
Plum Creek Mfg. - Evergreen Facility	MT	MT-0007	2/15/97	225	506 lb/hr	2.25	Good combustion
Mead Containerboard	AL	AL-0099	1/15/97	620	0.4 lb/MMBtu	0.4	Combustion controls
Vaughan Furniture Company	VA	VA-0237	8/28/96	28	104.2 TPY[b]	0.85	No controls feasible
Willamette Industries - Marlboro Mill	SC	SC-0045	4/17/96	470	0.3 lb/MMBtu	0.3	Good combustion control
Plum Creek Mfg. LP-Columbia Falls Op'n	MT	MT-0005	7/26/95	292.4	468 lb/hr	1.60	Good Combustion Practices
Weyerhaeuser Company	MS	MS-0026	5/9/95	90	0.4 lb/MMBtu	0.4	Combustion controls
KES Chateaugay Project	NY	NY-0055	12/19/94	275	0.35 lb/MMBtu	0.35	No controls
Weyerhaeuser Company	AL	AL-0079	10/28/94	91	1.4 lb/MMBtu	1.4	
Scott Paper Company	WA	WA-0276	7/1/93	718	511 ppm @ 7% O_2	--	Combustion control, boiler design
Newman Paper Co.	PA	PA-0093	4/24/92	129	0.3 lb/MMBtu	0.3	Good Combustion Practices
Multitrade Limited Partnership	VA	VA-0183	2/21/92	373.7	0.35 lb/MMBtu	0.4	Boiler design
Beaver-Livermore Falls	ME	ME-0013	9/5/91	533.64	0.3 lb/MMBtu	0.3	Good combustion control
Willamette Industries Inc.	LA	LA-0074	2/4/91	940	286.1 lb/hr	0.30	Design & operation
Pinetree Power - Tamworth Inc.	NH	NH-0004	11/15/90	404	0.5 lb/MMBtu	0.5	
Pinetree Power Inc.	NH	NH-0003	3/27/90	289	0.5 lb/MMBtu	0.5	
Grayling Generating Station	MI	MI-0151	3/20/90	450	0.4 lb/MMBtu	0.4	Design & operating practices
Alabama River Pulp Co.	AL	AL-0047	1/22/90	266	0.3 lb/MMBtu	0.3	
Cogeneration Michigan, Inc.	MI	MI-0147	1/16/90	293	0.35 lb/MMBtu	0.35	Good Combustion Practices
Hillman Limited Partners	MI	MI-0139	12/5/89	300	0.35 lb/MMBtu	0.35	Boiler design & good combustion practices
Wood Preservers, Inc.	VA	VA-0166	10/12/89	48.6	21.6 lb/hr	0.44	
Bio-Gen Torrington Partnership	CT	CT-0007		208.5	0.29 lb/MMBtu	0.29	Staged combustion
Cogeneration Michigan Associates	MI	MI-0180		523	0.4 lb/MMBtu	0.4	Combustion controls

[a] To convert from lb/hr, the emission limit was divided by the throughput rate.
[b] Assuming 8,760 hr/yr.

Source: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001.

Table 1-4. Summary of BACT Determinations for Fluorides Emissions from Biomass-Fired Industrial Boilers

Company Name	State	RBLC ID	Permit Issue Date	Throughput Per Unit	Emission Limits: As provided in BACT/LAER Clearinghouse	Emission Limits: Converted to lb/MMBtu	Control Technology/Comment
Multitrade Limited Partnership	VA	VA-0183	2/21/92	373.7 MMBtu/hr	0.64 lb/hr	1.7E-03	No controls feasible

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001

[a] Assumed 8,760 hr/yr.

Golder Associates Inc.

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BUREAU OF AIR REGULATION

Golder Associates

November 1, 2001

0037584

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attention: Mr. Jeff Koerner, P.E.

RE: OKEELANTA POWER COGENERATION FACILITY
ARMS FACILITY ID NO. 0990332
PROJECT NO. 0990332-014-AC/PSD-FL-196M
APPLICATION TO MODIFY CO AND SO_2 EMISSIONS STANDARDS
ADDITIONAL INFORMATION NO. 2

Dear Mr. Koerner:

Okeelanta Power Limited Partnership (OkPLP) has received the Department's request to provide a best available control technology (BACT) analysis for CO, SO_2, and fluoride emissions for the three cogeneration boilers. Note that in the original application submitted by OkPLP for this change in December 2000, the applicant concluded that PSD review applied for CO, SO_2, fluorides and sulfuric acid mist. As such, a brief BACT analysis was provided in Section 3.0 of said report. During the course of the Department's review of the application, several information requests were received that related to control technology and modeling of emissions. Therefore, it was presumed that the Department had received adequate information on which to base a BACT determination.

Nevertheless, OkPLP is providing an additional analysis of BACT for CO, SO_2 and fluoride emissions. This analysis is attached. As part of this analysis, OkPLP is proposing a lower 12-month rolling average SO_2 limit of 0.07 lb/MMBtu, or 402.5 TPY for all three boilers combined. This is lower than the previously requested annual limit of 0.10 lb/MMBtu and 575 TPY. Also attached are revised application form pages addressing this change.

Thank you for your consideration of this information. Please call if there are any questions.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

David A. Buff, P.E., Q.E.P.
Principal Engineer
Florida P.E. #19011
SEAL

Enclosures

cc: Gus Cepero
James Meriwether
David Dee
Bill Tarr
C. Holladay
\\GATORBAIT\DP\Projects\2000\0037\0037584Y Okeelanta Power LP\F1\WP\L110101.doc
D. Graziani, PBC B. Worley, EPA
G. Bunyak, NPS

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **214.5** lb/hour **219.2** tons/year	4. Synthetically Limited? [X]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: **0.30 lb/MMBtu** Reference: **CEM Data**	7. Emissions Method Code: **0**
8. Calculation of Emissions (limit to 600 characters): **Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr** **Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb = 219.2 TPY**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **402.5 TPY total for all three boilers. Based on biomass firing.**	

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.10 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters): **Continuous SO_2 monitor**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.10 lb/MMBtu 30-day rolling average for biomass firing.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: SO_2	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing and BACT.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **214.5** lb/hour **219.2** tons/year	4. Synthetically Limited? [**X**]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: **0.30 lb/MMBtu** Reference: **CEM Data**	7. Emissions Method Code: **0**

8. Calculation of Emissions (limit to 600 characters):

Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr
Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb = 219.2 TPY

9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):

402.5 TPY total for all three boilers. Based on biomass firing.

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.10 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour tons/year

5. Method of Compliance (limit to 60 characters):

Continuous SO_2 monitor

6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):

Requested Allowable Emissions: 0.10 lb/MMBtu 30-day rolling average for biomass firing.

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing and BACT.**	

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

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **214.5** lb/hour **219.2** tons/year	4. Synthetically Limited? **[X]**
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: **0.30 lb/MMBtu** Reference: **CEM Data**	7. Emissions Method Code: **0**
8. Calculation of Emissions (limit to 600 characters): **Hourly: 0.30 lb/MMBtu x 715 MMBtu/hr = 214.5 lb/hr** **Annual: 0.07 lb/MMBtu x 715 MMBtu/hr x 8,760 hr/yr x ton/2000 lb =219.2 TPY**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **402.5 TPY total for all three boilers. Based on biomass firing.**	

Allowable Emissions Allowable Emissions 1 of 3

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.10 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters): **Continuous SO_2 monitor**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.10 lb/MMBtu 30-day rolling average for biomass firing.**	

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

<u>Potential/Fugitive Emissions</u>

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 _____ to _____ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

<u>Allowable Emissions</u> Allowable Emissions 2 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.07 lb/MMBtu**	4. Equivalent Allowable Emissions: lb/hour **219.2** tons/year
5. Method of Compliance (limit to 60 characters): **Continous SO_2 Monitor.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Requested Allowable Emissions: 0.07 lb/MMBtu 12-month rolling average for biomass firing.**	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION

(Regulated Emissions Units -
Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? [ ]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8. Calculation of Emissions (limit to 600 characters):	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters):	

Allowable Emissions Allowable Emissions 3 of 3

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **0.05 lb/MMBtu**	4. Equivalent Allowable Emissions: **24.5** lb/hour **36.7** tons/year
5. Method of Compliance (limit to 60 characters): **Limit fuel oil burning to 24.9% for any single boiler.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **Based on No. 2 fuel oil firing. and BACT.**	

BACT ANALYSIS
FOR
CO AND SO_2 EMISSIONS

OKEELANTA POWER L.P.
SOUTH BAY, FLORIDA

Prepared For:

Okeelanta Power L.P.
8001 U.S. Highway 27 South
South Bay, Florida 33493

Prepared By:

Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

November 2001
0137520

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1.0 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

1.1 REQUIREMENTS

The 1977 Clean Air Act Amendments established requirements for the approval of pre-construction permit applications under the Prevention of Significant Deterioration (PSD) program. One of these requirements is that Best Available Control Technology (BACT) be installed for applicable pollutants. BACT determinations must be made on a case-by-case basis considering technical, economic, energy, and environmental impacts for various BACT alternatives. To bring consistency to the BACT process, the U.S. Environmental Protection Agency (EPA) developed the so called "top-down" approach to BACT determinations. As mentioned previously, this approach has been challenged in court and a settlement agreement reached, which requires EPA to initiate formal rulemaking concerning the "top-down" approach. However, no rule has yet been proposed or promulgated. Nonetheless, in the absence of formal rules related to this approach, the "top-down" approach is followed in the Okeelanta Power L.P. (OkPLP) BACT analysis.

The first step in a top-down BACT analysis is to determine, for each applicable pollutant, the most stringent control alternative available for a similar source or source category. If it can be shown that this level of control is not feasible on the basis of technical, economic, energy, or environmental impacts for the source in question, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy, or environmental consideration.

In the case of the proposed revision to the permitted emission rates for OkPLP, carbon monoxide (CO), sulfur dioxide (SO_2), and fluorides (F) require a BACT analysis. The BACT analysis is presented in the following sections.

1.2 SULFUR DIOXIDE

1.2.1 EXISTING CONTROL TECHNOLOGY

SO_2 emissions are currently controlled by burning low sulfur content biomass fuel and fuel oil, and by limiting the maximum fuel oil burning to no more than 24.9 percent of the total heat input on a calendar quarter basis. The OkPLP boilers are also permitted to burn natural gas, although this capability has not yet been incorporated into the boilers. Biomass fuel and natural gas are inherently low in sulfur, and therefore produce low SO_2 emissions. SO_2 removal is inherent to the process of combusting biomass. The fly ash produced during biomass firing is alkaline in nature and acts as a dry scrubbant, adsorbing SO_2 from the exhaust gas stream.

The current emission limit for SO_2 is 0.10 pound per million British thermal units (lb/MMBtu) on a 24-hour average for biomass firing and 0.02 and 0.05 lb/MMBtu on an annual average for bagasse and wood firing, respectively. OkPLP has requested that these limits be increased to 0.20 lb/MMBtu on a 24-hour average and 0.10 lb/MMBtu on an annual average for biomass firing. However, based on discussions with Florida Department of Environmental Protection (FDEP), OkPLP is now proposing a 30-day rolling average SO_2 limit of 0.10 lb/MMBtu, along with a 12-month rolling average of 0.06 lb/MMBtu [equivalent to 345 tons per year (TPY)].

OkPLP believes that a lower annual limit compared to the previously requested 0.10 lb/MMBtu (575 TPY) is achievable, based on the highest period of SO_2 emissions experienced to date at OkPLP. Review of SO_2 emissions data shows that the highest 12-month period of SO_2 emissions occurred during the period of June 2000 through May 2001. During this period, SO_2 emissions averaged approximately 0.040 lb/MMBtu for all three cogeneration boilers. Considering the potential variability of biomass fuels from south Florida, the potential future fuel mix of wood and bagasse, a permitted level of 0.06 lb/MMBtu is acceptable.

1.2.2 BACT ANALYSIS

A review of previous SO_2 BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's web page was performed. A summary of BACT determinations for biomass-fired boilers from this review is presented in Table 1-1. FDEP also provided a listing of BACT determinations for wood-fired boilers. This listing is provided in Table 1-2. All of the boilers listed by FDEP in Table 1-2 are also listed in Table 1-1.

From the review of these previous BACT determinations, it is evident that SO_2 BACT determinations for industrial boilers have typically been fuel specifications (i.e., use of low sulfur-containing fuels). Proper design, combustion control, wet scrubbers and lime flue gas desulfurization (FGD) have also cited as BACT for biomass-fired boilers. However, it is believed that add-on SO_2 control has not been required on solely a biomass-fired boiler, due to the inherent low SO_2 emissions from biomass firing. Previous BACT determinations have ranged from 0.0083 to 0.46 lb/MMBtu of SO_2 emissions. The highest limit of 0.46 lb/MMBtu was for a boiler burning a combination of bark and sludge.

Paper mill sludge can have a higher sulfur content than bark alone due to sulfur concentrating in the sludge.

It is noted that the OkPLP facility is believed to be significantly different than these other wood/bark burning facilities shown in Tables 1-1 and 1-2. OkPLP obtains its wood materials from a number of suppliers and sources throughout south Florida. None of these other sources are located in south Florida, and all are believed to have a dedicated fuel supply source, which means that the fuel is much more homogenous compared to OkPLP.

Technically feasible SO_2 control alternatives for the OkPLP boilers consist of add-on SO_2 control systems. These include wet scrubbers using water, caustic, and other similar scrubbing media. Wet scrubbing using a lime or limestone slurry can also be used, but must be followed treatment to remove the solids, which then creates a waste disposal problem. Dry FGD systems include lime spray drying, dry lime furnace injection, and dry lime duct injection. These systems must be followed by a highly efficient PM control device, which is typically a fabric filter, although an electrostatic precipitator could also be used. SO_2 control efficiencies for these systems range from 50 to 95 percent, depending on type of device and design.

Each of these alternative SO_2 control systems would result in significant capital and operating costs for OkPLP. In OkPLP's case, three boilers would need to be retrofitted with these systems, substantially increasing the cost over a single boiler. At the proposed SO_2 emission rate of 345 TPY for all three boilers, each boiler on average would be limited to approximately 115 TPY. The cost effectiveness of add-on equipment would be very high.

The uncontrolled SO_2 emissions from biomass, No. 2 fuel oil and natural gas are very low, which renders any add-on control equipment as too costly. Further, there is inherent SO_2 removal in the boiler/PM control system, based on OkPLP's operating and emissions data. The ash generated from biomass burning is alkaline in nature, and adsorbs SO_2 in the boiler and through contact between the ash particles and the flue gas stream downstream of the boiler. This phenomena is also documented in the published literature for wood-fired boilers in the pulp and paper industry. The ash particles are effectively removed in the downstream mechanical dust collectors and electrostatic precipitator.

In summary, the proposed BACT for the OkPLP boilers is the continued use of very low sulfur fuels, i.e., biomass, No. 2 fuel oil, and natural gas. The requested BACT emission limits are 0.10 lb/MMBtu on a 30-day rolling average and 0.060 lb/MMBtu on a 12-month rolling average. This is equivalent to 345 TPY on a 12-month rolling average.

1.3 CARBON MONOXIDE

1.3.1 EXISTING CONTROL TECHNOLOGY

CO emissions from the OkPLP boilers are currently controlled through proper furnace design and good combustion practices, including control of combustion air and temperature, improved fuel feeders, distribution of fuel on the combustion grate, and better controls over the furnace loads and transient conditions. Both oxygen and CO continuous monitors are installed on each boiler, providing the boiler operators with valuable information on the combustion conditions. Since there is a cost for the biomass fuel burned in the boilers, the boiler operators are trained to operate the boilers in the most efficient manner possible, which minimizes CO emissions and conserves biomass fuel usage.

OkPLP is proposing a BACT emission limit for CO emissions from the cogeneration boilers as follows: 0.50 lb/MMBtu on a 30-day rolling average, and 0.35 lb/MMBtu as a 12-month rolling average. The equivalent annual emissions are 2,012.5 TPY. This annual emissions limit is the same as the limit in the existing OkPLP PSD permit.

1.3.2 BACT ANALYSIS

A review of previous CO BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's web page was performed. A summary of BACT determinations for biomass-fired industrial boilers from this review are presented in Table 1-3. The FDEP also provided a listing of BACT determinations for wood-fired boilers. This listing is provided in Table 1-2.

The CO emission limits for biomass-fired boilers range from 0.03 to 6.5 lb/MMBtu. This rather large range of emissions is due to differences in boiler design and operation, and fuel characteristics. From the review of previous determinations, it is evident that CO BACT determinations for biomass-fired industrial boilers have been limited to good combustion practices and boiler design.

The OkPLP proposed emission limits are well within the range of previous BACT determinations. OkPLP proposes to use good combustion practices to control CO emissions from the cogeneration boilers. This level of control is consistent with previous determinations. OkPLP has agreed to maintain the boiler flue gas oxygen level in the boilers within the range of 2 to 10 percent (1-hour block average), to the extent possible, as a good combustion practices technique. If the 1-hour average oxygen levels falls outside this range, OkPLP will take corrective actions to bring the oxygen level within the acceptable range as expeditiously as possible. Other good combustion practices, as described above, will continue to be employed at the facility.

In summary, OkPLP proposes to continue the implementation of good combustion practices as BACT for CO emissions. The proposed BACT emission limit for CO emissions from the cogeneration boilers is 0.50 lb/MMBtu on a 30-day rolling average, and 0.35 lb/MMBtu as a 12-month rolling average. The equivalent annual emissions are 2,012.5 TPY.

1.4 FLUORIDES

1.4.1 EXISTING CONTROL TECHNOLOGY

The fuels burned in the cogeneration boilers can contain trace levels of F. Stack testing of both wood and bagasse have indicated very low, although detectable, levels of F in the stack gases of the boilers. Fuel oil can also contain trace levels of F. F contained in the fuels is converted to hydrogen fluoride (HF) in the furnace. HF is an acid gas, and will behave similar to SO_2 in the furnace and downstream control equipment. Thus, as discussed for SO_2, HF will be adsorbed onto the alkaline ash particles existing in the flue gas. The ash is then removed in the downstream mechanical collectors and electrostatic precipitator, resulting in inherent F control.

1.4.2 BACT ANALYSIS

As part of the BACT analysis, a review of previous F BACT determinations for industrial boilers listed in the RACT/BACT/LAER Clearinghouse on EPA's webpage was performed. A summary of the BACT determination for biomass-fired industrial boilers from this review are presented in Table 1-4. The sole F emission limit for a biomass-fired boiler is 1.7E-03 lb/MMBtu. By comparison, OkPLP's measured F emissions have been less than 7.0E-04 lb/MMBtu for both wood and bagasse. These represent extremely low levels of F emissions. The same control techniques identified to control SO_2 emissions also control F emissions.

As discussed above for SO_2, any of the add-on SO_2 control systems would result in significant capital and operating costs for OkPLP. In OkPLP's case, three boilers would need to be retrofitted with these systems, substantially increasing the cost over a single boiler. At the very small F emission levels projected for the OkPLP facility (4.0 TPY potential and 1.1 TPY actual), the cost effectiveness of add-on equipment would be extremely high.

F emissions are currently limited to 6.27E-06 lb/MMBtu for No. 2 fuel oil combustion. There is currently no F emission limit for biomass combustion. Estimated maximum F emissions for the cogeneration boilers are 7.00E-04 lb/MMBtu for biomass and 6.27E-06 lb/MMBtu for No. 2 fuel oil. Maximum actual F emissions for all three cogeneration boilers are estimated at 1.1 TPY.

Table 1-1. BACT Determinations for SO_2 and SO_x for Biomass-Fired Industrial Boilers

Company	State	RBLC ID	Permit Date	Throughput MMBtu/hr	Emission Limits: As Provided in LAER/BACT Clearinghouse	Emission Limits: Converted to lb/MMBtu[a]	Control Equipment Description	% Efficiency
Gulf States Paper Corporation	AL	AL-0116	12/10/97	775	355.7 lb/hr	0.46	Proper design and operation. Wood ash alkalinity as scrubbing media. Fuel is bark and clarified sludge.	--
Champion International	AL	AL-0112	12/9/97	710	0.03 lb/MMBtu	0.03	Wet scrubber with soda ash	95
Mead Containerboard	AL	AL-0099	1/15/97	620	0.02 lb/MMBtu	0.02	Combustion control	--
Willamette Industries - Marlboro Mill	SC	SC-0045	4/17/96	470	0.1 lb/MMBtu	0.1	No controls feasible	--
Scott Paper Company	WA	WA-0276	3/9/95	718	70 lb/hr 12 mo. avg.	0.10	Fuel spec: backup fuel limited to 0.05% sulfur distillate	--
SAI Energy, Inc.	CA	CA-0633	12/23/94	245	0.023 lb/MMBtu	0.023	SNCR ammonia injection; natural gas fuel supplement	70
KES Chateaugay Project	NY	NY-0055	12/19/94	275	0.03 lb/MMBtu	0.03	Fuel spec: oil less than 0.08% by wgt. sulfur content	--
Okeelanta Power Limited Partnership	FL	FL-0069	9/27/93	715	0.02 lb/MMBtu 30-day avg.	0.02	Fuel Spec: low sulfur supplemental fuel APCE includes ESP, SNCR, and Carbon injection.	-- --
Osceola Power Limited Partnership	FL	FL-0070	9/27/93	665	0.02 lb/MMBtu 30-day avg.	0.02	Fuel Spec: low sulfur supplemental fuel	--
Multitrade Limited Partnership	VA	VA-0183	2/21/92	374	0.016 lb/MMBtu	0.016	No controls feasible	--
Beaver-Livermore Falls	ME	ME-0013	9/5/91	534	0.023 lb/MMBtu	0.023		--
Thermo Electron's Delano Energy	CA	CA-0424	7/10/91	315	13.07 PPM @ 12% CO_2		Limestone injection	80
Willamette Industries Inc.	LA	LA-0074	2/4/91	940	7.8 lb/hr	0.0083	Fuel speciation	--
Alabama River Pulp Co.	AL	AL-0047	1/22/90	266	0.3 lb/MMBtu	0.3		--
Cogeneration Michigan, Inc.	MI	MI-0147	1/16/90	293	0.017 lb/MMBtu	0.017		--
Hillman Limited Partners	MI	MI-0139	12/5/89	300	0.018 lb/MMBtu	0.018		--
Bio-Gen Torrington Partnership	CT	CT-0007		209	0.1 lb/MMBtu	0.1	Fuel spec: fuel analysis	--

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001.

[a] To convert from lb/hr, the emission limit was divided by the throughput rate. To convert from lb/day, assumed 24 hr/day operation.

[b] Assumed 8,760 hr/yr.

Table 1-2. BACT for Similar Sources from the EPA RACT/BACT/LAER Clearinghouse (as provided by FDEP)

RBLC ID	Date	Facility Name	Boiler Type/Fuel	MMBtu/hour	CO, lb/MMBTU	SO_2, lb/MMBtu	Add-On Controls Equipment
AL-0047	1990	Alabama River Pulp, Co.	wood	266	0.3	0.3	None
AL-0099	1997	Mead Container Board	wood, sludge	622	0.4	0.02	None
CT-0007	>1991	Bio-Gen Tarrington Partnership	wood	208.5	0.29	0.10	None
LA-0074	1991	Willamette Industries, Inc.	wood	940	0.30	0.008	None
ME-0013	1991	Beaver-Livermore Falls	wood, stoker	533.6	0.30	0.023	None
MI-0139	1989	Hillman Limited Partners	wood	300	0.35	0.018	None
MI-0147	1991	Cogeneration Michigan, Inc.	wood	293	0.35	0.017	SNCR
MI-0151	1990	Grayling Generating Station L.P.	wood	450/523	0.40	ND	SNCR
MI-0180	1992	Cogeneration Michigan, Ass.	wood	523	0.40	ND	SNCR
MT-0005	1995	Plum Creek Mfg. – Columbia Falls	wood	292.4	1.6	ND	None
MT-0007	1997	Plum Creek Mfg. - Evergreen	hogged wood	225	2.25	ND	None
NH-0003	1990	Pinetree Power, Inc. - Bethlehem	wood	289	0.50	ND	None
NH-0004	1990	Pinetree Power, Inc. Tamworth	wood	404	0.50	ND	None
NY-0055	1994	KES Chateauguay Project	wood	275	0.35	0.03	Low sulfur fuels
VA-0183	1992	Mulitrade Limited Partnership	wood	373.7	0.35	0.016	SNCR
VT-0004	1990	Ryegate Wood Energy Co.	wood	300	0.30	ND	SNCR
WA-0276	1993	Scott Paper Company	wood	718	0.50	0.097, 365-day rolling avg.	SNCR

Summary of CO Standards		**Summary of SO_2 Standards**	
0.290	= minimum standard	0.008	= minimum standard
2.250	= maximum standard	0.300	= maximum standard
0.555	= average of standards	0.060	= average of standards
1.730	= 95th percentile	0.210	= 95th percentile
0.35	= median of standards	0.022	= median of standards

Table 1-3. BACT Determinations for CO for Biomass-Fired Industrial Boilers

Company	State	RBLC ID	Permit Date	Throughput (MMBtu/hr)	Emission Limits: As Provided in LAER/BACT Clearinghouse	Emission Limits: Converted to lb/MMBtu[a]	Control Equipment Description
Atlantic Sugar Association	FL		6/7/01	255.3	6.5 lb/MMBtu	6.5	Good Combustion Practices
United States Sugar Corporation	FL		3/8/01	633	6.5 lb/MMBtu	6.5	Good Combustion Practices
Gulf States paper Corp.	AL	AL-0122	10/14/98	98	0.5 lb/MMBtu	0.5	
Wellborn Cabinet Inc.	AL	AL-0107	2/3/98	29.5	23.6 lb/hr	0.8	Boiler design & combustion control: oxygen trim, staged combustion, steam injection, & overfire air.
Champion International	AL	AL-0112	12/9/97	710	0.03 lb/MMBtu	0.03	Proper design and good combustion practices
Plum Creek Mfg. - Evergreen Facility	MT	MT-0007	2/15/97	225	506 lb/hr	2.25	Good combustion
Mead Containerboard	AL	AL-0099	1/15/97	620	0.4 lb/MMBtu	0.4	Combustion controls
Vaughan Furniture Company	VA	VA-0237	8/28/96	28	104.2 TPY[b]	0.85	No controls feasible
Willamette Industries - Marlboro Mill	SC	SC-0045	4/17/96	470	0.3 lb/MMBtu	0.3	Good combustion control
Plum Creek Mfg. LP-Columbia Falls Op'n	MT	MT-0005	7/26/95	292.4	468 lb/hr	1.60	Good Combustion Practices
Weyerhaeuser Company	MS	MS-0026	5/9/95	90	0.4 lb/MMBtu	0.4	Combustion controls
KES Chateaugay Project	NY	NY-0055	12/19/94	275	0.35 lb/MMBtu	0.35	No controls
Weyerhaeuser Company	AL	AL-0079	10/28/94	91	1.4 lb/MMBtu	1.4	
Scott Paper Company	WA	WA-0276	7/1/93	718	511 ppm @ 7% O_2	--	Combustion control, boiler design
Newman Paper Co.	PA	PA-0093	4/24/92	129	0.3 lb/MMBtu	0.3	Good Combustion Practices
Multitrade Limited Partnership	VA	VA-0183	2/21/92	373.7	0.35 lb/MMBtu	0.4	Boiler design
Beaver-Livermore Falls	ME	ME-0013	9/5/91	533.64	0.3 lb/MMBtu	0.3	Good combustion control
Willamette Industries Inc.	LA	LA-0074	2/4/91	940	286.1 lb/hr	0.30	Design & operation
Pinetree Power - Tamworth Inc.	NH	NH-0004	11/15/90	404	0.5 lb/MMBtu	0.5	
Pinetree Power Inc.	NH	NH-0003	3/27/90	289	0.5 lb/MMBtu	0.5	
Grayling Generating Station	MI	MI-0151	3/20/90	450	0.4 lb/MMBtu	0.4	Design & operating practices
Alabama River Pulp Co.	AL	AL-0047	1/22/90	266	0.3 lb/MMBtu	0.3	
Cogeneration Michigan, Inc.	MI	MI-0147	1/16/90	293	0.35 lb/MMBtu	0.35	Good Combustion Practices
Hillman Limited Partners	MI	MI-0139	12/5/89	300	0.35 lb/MMBtu	0.35	Boiler design & good combustion practices
Wood Preservers, Inc.	VA	VA-0166	10/12/89	48.6	21.6 lb/hr	0.44	
Bio-Gen Torrington Partnership	CT	CT-0007		208.5	0.29 lb/MMBtu	0.29	Staged combustion
Cogeneration Michigan Associates	MI	MI-0180		523	0.4 lb/MMBtu	0.4	Combustion controls

[a] To convert from lb/hr, the emission limit was divided by the throughput rate.
[b] Assuming 8,760 hr/yr.

Source: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001.

Table 1-4. Summary of BACT Determinations for Fluorides Emissions from Biomass-Fired Industrial Boilers

					Emission Limits		
Company Name	State	RBLC ID	Permit Issue Date	Throughput Per Unit	As provided in BACT/LAER Clearinghouse	Converted to lb/MMBtu	Control Technology/Comment
Multitrade Limited Partnership	VA	VA-0183	2/21/92	373.7 MMBtu/hr	0.64 lb/hr	1.7E-03	No controls feasible

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2001

[a] Assumed 8,760 hr/yr.

Golder Associates Fax

To: Jeffery Koerner, P. E.
Fax Number: 850-922-6979

Company: FDEP, Tallahassee
Date: October 23, 2001

From: David Buff
e-mail: @golder.com

Our ref:
Voice Mail:

RE: Okeelanta Power Limited Partnership

Total pages (including cover: 2
Hard copy to follow ☐

MESSAGE

Golder Associates

6241 NW 23rd St., Suite 500
Gainesville, FL 32653
U.S.A.
Telephone: (352) 336-5600
Fax: (352) 336-6603

WAIVER OF PERMIT APPLICATION PROCESSING TIME PERIODS UNDER SECTIONS 120.60(1), 403.0872 AND 403.0876 FLORIDA STATUTES

Permit Application/Project: **0990332-014-AC**
Cogeneration Boilers Permit Modification
Facility ID No.: **0990332**
Applicant's Name: **Okeelanta Power Limited Partnership**

The undersigned has read sections 120.60(1), 403.0872 and 403.0876, Florida Statues, and fully understands the applicant's rights under those sections. With regard to the above referenced permit application, the applicant hereby with full knowledge and understanding of its rights under Sections 120.60(1), 403.0872, and 403.0876, Florida Statutes, waives the right under Sections 120.60(1), 403.0872, and 403.0876, Florida Statues, to have the application approved or denied by the State of Florida Department of Environmental Protection within the 90-day time period prescribed in Sections 120.60(1), and 403.0876, Florida Statutes.

In specific, this letter waives the 30-day and 60-day completeness reviews of the information provided to the Department on January 2, 2001 and subsequent correspondence. This waiver shall in no way limit the Department's ability to request information prior to the expiration of this waiver. This waiver shall expire on 011/30/01, at which time all processing time clocks will resume.

Said waiver is made freely and voluntarily by the applicant, is in its self interest and without any pressure or coercion by anyone employed by the State of Florida Department of Environmental Protection.

This waiver shall expire on the 30th day of November, 2001.

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

Signature David A. Buff   Date 10/23/01

By: David A. Buff, P.E.

State of Florida
County of Alachua

Sworn to (or affirmed) and subscribed before me this 26th day of June 2001, by David Buff. Who is personally know or has produced ________________ identification.

Sealed by Notary Public

Trudy L. Aust

Trudy L. Aust
Commission # CC 968118
Expires Nov. 1, 2004
Bonded Thru
Atlantic Bonding Co., Inc.

Golder Associates Inc.

6241 NW 23rd Street, Suite 500
Gainesville, FL 32653-1500
Telephone (352) 336-5600
Fax (352) 336-6603

Golder Associates

RECEIVED
AUG 15 2001
BUREAU OF AIR REGULATION

0037584

August 14, 2001

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attention: Mr. Jeff Koerner, P.E.

RE: OKEELANTA POWER COGENERATION FACILITY
ARMS FACILITY ID NO. 0990332
PROJECT NO. 0990332-014-AC/PSD-FL-196M
APPLICATION TO MODIFY CO AND SO_2 EMISSIONS STANDARDS
REQUEST FOR ADDITIONAL INFORMATION NO. 2

Dear Mr. Koerner:

Okeelanta Power Limited Partnership (OkPLP) has received the Department's letter dated July 11, 2001, requesting additional information in regards to revising the CO and SO_2 emissions standards for the three cogeneration boilers. A response to each of the Department's questions is provided below, in the same order as they appear in the Department's letter.

1. <u>CO, NO_x, and SO_2 Data</u>

A brief summary of the methodology for determining lb/MMBtu by the CEMS data acquisition system (DAS) is provided below.

The DAS calculates a combined a carbon-based F-factor (Fc factor) by determining the fraction of heat input due to each type fuel and using the F_c factor for each type fuel. F_c for biomass is 1,850 scf/MMBtu.

Heat input due to each type fuel is determined by fuel flow rates. Biomass fuel flow to the boilers is controlled by the biomass feeder speeds. The feeder speeds correlate to the volume of biomass entering the boilers. Feeder speed is read directly into the DAS, which is programmed to convert the speed to volume of material. A constant is set in the DAS related to the percentage of wood versus bagasse being fed to the boilers. This constant is changed depending on the time of year, i.e., crop season, off-season, etc. With this constant, the DAS calculates the lb/hr of wood and bagasse entering the boilers. Fuel oil input to each boiler is also measured by fuel oil flow meters.

Constants are also in the DAS related to heating value of wood, bagasse and fuel oil. The DAS uses these constants to calculate the heat input due to each fuel type, and then the combined F_c factor.

Next, the DAS uses the combined fuel factor (F_c) to convert ppm measured in the flue gas stream to lb/MMBtu, based on the following equation:

$$E\ (lb/MMBtu) = (ppm * Fc * 100 * K) / Wet\ CO_2\%$$

where, ppm is wet pollutant concentration from CEMS
F_c is combined carbon fuel factor
K is conversion factor depending on pollutant of interest
Wet $CO_2\%$ = percentage of CO_2 in the gas stream, wet basis.

Combustion Systems, Inc., conducted a boiler efficiency study at Okeelanta Power in July 1997. The results of this study are as follows:

- Boiler A had a boiler efficiency of 59.81% to 65.47% when co-firing bagasse and wood with the wood percentages ranging from 14.4% to 48.2%.
- Boiler B had a boiler efficiency of 64.24% to 70.92% when co-firing bagasse and wood with the wood percentages ranging from 23.4% to 68.8%.
- Boiler C had a boiler efficiency of 72.45% to 72.93% when firing 100% wood.

The study states that, "Bagasse and wood co-firing resulted in significantly lower boiler efficiencies in Boilers A and Boiler B at Okeelanta, due to the high moisture content of the bagasse".

2. Elevated CO Emissions

The CO excursions of the 30-day rolling average are listed in the tables in Appendix A of our response dated June 8, 2001. The dates of the excursions are stated at the top of each table, as follows:

- Boiler A excursions: 11/10/99 through 11/30/99. Each day was an excursion of the 30-day rolling average, for a total of 19 excursions.
- Boiler C excursions: 10/30/99 through 11/26/99. Each day was an excursion of the 30-day rolling average, for a total of 28 excursions.

The 30-day rolling average standard was approved on June 22, 1999. Therefore, the units have operated under this standard for 24 months. This indicates that Boiler A was out of compliance with the CO standard for 2.8% of this time, and Boiler C was out of compliance with the CO standard for 3.8% of this time.

OkPLP always employs "good combustion practices" in operating the boilers. To do otherwise would be costly in terms of not only wasted fuel, but also higher maintenance costs associated with boiler operation. The boiler operators are trained in proper boiler operation and good combustion practices.

Bagasse fuel has higher moisture content (50-55%) compared to wood (35-50%). However, bagasse is of smaller particle size with more surface area, therefore the moisture in bagasse can be driven off faster as compared to larger pieces of wood. Also, greater relative amounts of wood are burned during the summer months, when rainfall is the greatest.

Review of the periods of CO excursions indicates that the excursions for both Boilers A and C began shortly after the start of the crop season. Wood was primarily burned prior to these periods, with bagasse being primarily burned during the period of actual excursions. This indicates that average CO emissions were already rising prior to the crop season starting. This is also demonstrated from Figure 2-1 of the original application, which shows high average CO levels occurring for Boiler A in September 1999, prior to the start of the crop season and prior to the excursions. A similar trend is shown for Boiler C (Figure 2-3 of application) for October 1999, just prior to the excursions. These data indicate that burning bagasse, with its high moisture content, would not be a solution to CO excursions.

OkPLP is a unique operation in that it handles very large volumes of biomass. Approximately 1.4 million tons of biomass is burned annually. Large storage areas for both wood and bagasse are maintained to insure an adequate fuel supply. Providing a 3-day storage area for dry biomass would be highly impractical. OkPLP does not store biomass fuel for very long, and operates on a "first in, first out" basis, since the Btu content of biomass fuel degrades over time. This also minimizes exposure of the fuel to rainfall. The facility has two biomass fuel reclaim areas: one south of the plant to reclaim bagasse, and one east of the plant to reclaim wood. Mobile equipment is always active in the reclaim areas. Constructing a building or covered structure of any sort would interfere with the movement of the mobile equipment and the ability to store and handle biomass fuel. Any covered or confined storage area, in addition to being impractical, would be highly costly.

Natural gas was permitted primarily to replace fuel oil as a startup and supplemental fuel. At times, fuel oil is burned to enhance the combustion process. However, fuel oil or natural gas is very expensive compared to biomass fuel, and the facility could not economically operate for very long if required to burn fossil fuels on an ongoing basis.

OkPLP will continue to implement combustion controls and good combustion practices to reduce CO emissions. However, this does not guarantee in itself that no further excursions of the CO standard will occur. OkPLP desires to be in compliance with its emission limiting standards at all times. OkPLP has made best efforts to combust the fuel as efficiently as possible. However, when extreme events arise, CO emissions can be variable. Due to the variability of CO emissions from biomass burning, and the documented effect of fuel moisture, OkPLP is requesting the 12-month rolling average for CO.

OkPLP did not notify the Department of the replacement of the wood feeders. The old wood feeders were of inefficient design, plugged frequently, and allowed cold air into the boilers. The hourly fuel feed rate or maximum heat input rate did not change as a result of the new rotary feeders.

3. Elevated SO_2 Emissions

The SO_2 excursions of the 30-day rolling average are listed in the tables in Appendix A of our response dated June 8, 2001. The dates of the excursions are stated at the top of each table, as follows:

- Boiler A excursions: 9/11/00, 10/03/00 and 10/04/00. Each day was an excursion of the 30-day rolling average, for a total of 3 excursions.
- Boiler B excursions: 6/23/00 through 7/17/00. Each day was an excursion of the 30-day rolling average, for a total of 23 excursions.
- Boiler C excursions: 6/14/00 through 7/12/00. Each day was an excursion of the 30-day rolling average, for a total of 27 excursions.

There have not been any further excursions since these dates. The current 30-day rolling average standards of 0.05 lb/MMBtu for wood and 0.02 lb/MMBtu for bagasse were approved on 10/24/97. Therefore, the units have operated under this standard for 45 months.

Okeelanta began to collect and analyze additional fuel samples for sulfur when the SO_2 standard was first exceeded. It was determined that the sulfur content of the fuel was higher than the original 1992 application had predicted. Therefore, OkPLP applied for a permit revision as allowed by the air permit, i.e., "Subject to revision after testing". The facility has no SO_2 control equipment so there was little the plant could do to prevent an exceedance other than adhere to "Good Operating Practices."

OkPLP investigated these excursions in order to attempt to identify the cause. These data were presented in the original application for the CO/SO_2 revision request, which analyzed the possibility that fuel sulfur content had increased or that the mechanical collector additions had some effect on SO_2 emissions. The data were found to be inconclusive regarding the mechanical collectors, but indicated that fuel sulfur content may have increased. OkPLP is continuing with more frequent fuel sulfur analysis in an attempt to identify the cause. No further excursions have taken place since July 2000.

A time plot and listing of historic fuel sulfur analysis data are presented in Appendix A. Although not enough historic bagasse data are available to reach any conclusions regarding sulfur content, the data for wood show higher sulfur contents (in terms of potential lb/MMBtu SO_2 emissions) occurring in early 2001. The data indicate an average increase in fuel sulfur content of wood.

Since the fuel sulfur content is beyond the control of OkPLP, and the sulfur content of wood can vary considerably depending on the source, and the exact cause of the excursions is not known, it is possible that further excursions may occur. Therefore, OkPLP is requesting the higher SO_2 limits for biomass. It is stressed once again that Condition 20 of the current air permit states that the SO_2 emissions limits are subject to revision pursuant to facility testing.

The carbon injection system consists of three carbon hoppers with of total volume of 334 cu. ft. each. The blowers, hoppers, piping and injection points were designed to feed and inject carbon. Chemco, the manufacturer, states that lime is more difficult to inject with this system due to the physical consistency. The system would have to be re-engineered, i.e, investigate blower sizing, injection points, plant chemistry, piping arrangements and storage requirements (hopper size) in order to inject lime. This re-engineering would be expensive.

It is noted that, even at the requested SO_2 emission rate of 0.10 lb/MMBtu as a 30-day rolling average, SO_2 emissions from the OkPLP facility are much less than a comparable coal-fired or low sulfur fuel-fired power plant.

4. <u>CO Modeling Analysis</u>

The Pratt & Whitney new rocket testing facility was not permitted at the time the CO modeling was performed. In fact, the final permit has still not been issued, so the final approved allowable emissions are not known. The draft permit stated 1,000 TPY maximum CO emissions. Based on the modeling inventory submitted previously, this facility would not screen out by the North Carolina technique. Therefore, the CO modeling has been revised to include this source.

Okeelanta Boiler 16 was also added to the revised modeling inventory and included in the revised modeling analysis. The final permit for Boiler 16 has not been issued. The potential emission rates and stack and operating parameters are based on the pending permit. Please find revised modeling tables attached in Appendix B.

The modeling files were posted on Golder's FTP site in early June, as stated on page 4 of Appendix C of the June 8, 2001 submittal. The revised model runs will also be posted there.

5. SO$_2$ Modeling Analysis

The requested change was revised in the June 8, 2001 submittal to remove coal as an authorized fuel. On pages 3 and 6 of the June 8 letter and in Table 2-5 attached, the maximum annual SO_2 emissions were stated to be 575 TPY based upon biomass firing and the requested annual limit of 0.10 lb/MMBtu. The permit application forms reflecting the removal of coal were also attached to the letter.

Current actual emissions and the revised future potential SO_2 emissions were presented in Table 3-1 of the June 8 submittal. This showed that the increase in SO_2 emissions was 441.8 TPY.

The Department's January 25, 2001 comment letter clearly stated in comment #5 to compare the SO_2 emission rates used in the original PSD air quality analysis versus the expected maximum future SO_2 emission rates. The modeling was to be revised only if the future maximum emission rates were higher than what was used in the original analysis. This comparison showed much lower SO_2 emissions in the future compared to those originally modeled, both on a short-term and an annual basis.

6. Coal Firing

No response needed.

7. Other Requests

a. Stack testing for CO, NO$_x$, SO$_2$, visible emissions, fluorides, beryllium, arsenic, chromium and copper

Maximum future fluoride emissions:
With coal firing: 12.94 TPY
Without coal firing: 4.03 TPY

Maximum future beryllium emissions:
With coal firing: 0.0032 TPY
Without coal firing: 0.0016 TPY

A revised PSD applicability for these two pollutants is attached (Appendix C). PSD review is not triggered for beryllium. Note that although the revised PSD applicability analysis for fluorides shows the emission increase to be just barely over the significant emission rate of 3.0 TPY, the future potential emissions are based on the highest single stack test result for fluorides for bagasse or wood. This is due to the need to use a highly conservative future emission factor (in the event that the factor becomes a limit). Therefore, potential fluoride emissions are likely greatly overestimated.

Also note that an emission factor for beryllium due to wood firing has been assigned in the tables. All stack tests performed to date on bagasse have shown nondetectable levels of beryllium. Of all the stack tests performed on wood, only one test on each of Units B and C have shown any detectable levels. Therefore, the potential future emissions (without coal firing) are likely greatly overestimated.

To provide a more realistic estimate of the increase in emissions for fluorides and beryllium, the maximum future emissions were estimated using the same emission factors as for the baseline emissions. These future actual emissions and the PSD applicability based on this methodology are shown in Appendix C, Tables C-1 and C-2. As shown, PSD review is not triggered based on expected future emissions.

A summary of the stack test results for arsenic, chromium and copper are also included in Appendix C, Tables C-3 and C-4.

b. *Emission limits for lead, mercury, fluorides and beryllium*
The revised PSD applicability for lead and mercury were included in Tables 3-1 and 3-2 of the June 8 submittal. They are provided again as revised Tables 3-1 and 3-2. The analysis shows that PSD review is triggered for lead but not for mercury.

As for fluorides and beryllium, potential future emissions are overestimated due to the need to use a highly conservative future emission factor (in the event that the factor becomes a limit). To provide a more realistic estimate of the increase in emissions for lead and mercury, the maximum future emissions were also estimated using the same emission factors as for the baseline emissions. These future actual emissions and the PSD applicability based on this methodology are shown in Appendix C, Tables C-1 and C-2. As shown, PSD review is not triggered based on expected future emissions.

c. *Eliminate the requirement for a carbon injection system*
No response necessary.

d. *Bubbling of lead and mercury limits*
The request is simply to be allowed to average the test results from all three boilers to demonstrate compliance with the lb/MMBtu limits for lead and mercury. This is a compliance demonstration issue. An individual limit would be retained for each boiler.

Thank you for your consideration of this information and requests. Please call if there are any questions.

Sincerely,

GOLDER ASSOCIATES INC.

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APPENDIX A

BIOMASS FUEL SULFUR ANALYSIS DATA

Figure A-1. Potential SO_2 Emissions From Wood Fuel (Revised 8/6/01)
1/5/99 - 7/16/01

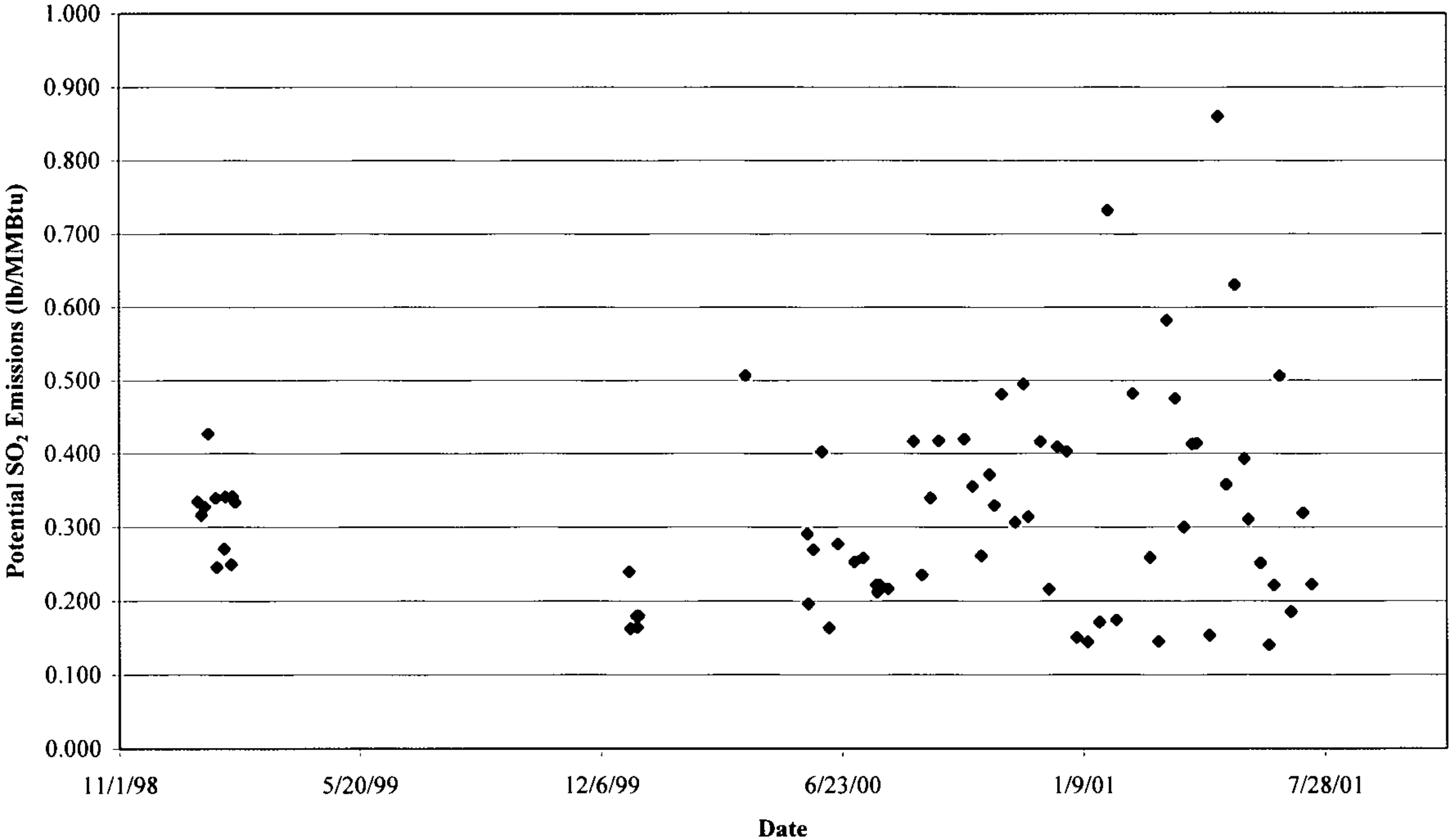

Figure A-2. Potential SO_2 Emissions From Bagasse Fuel (Revised 8/6/01)
12/28/98-7/16/01

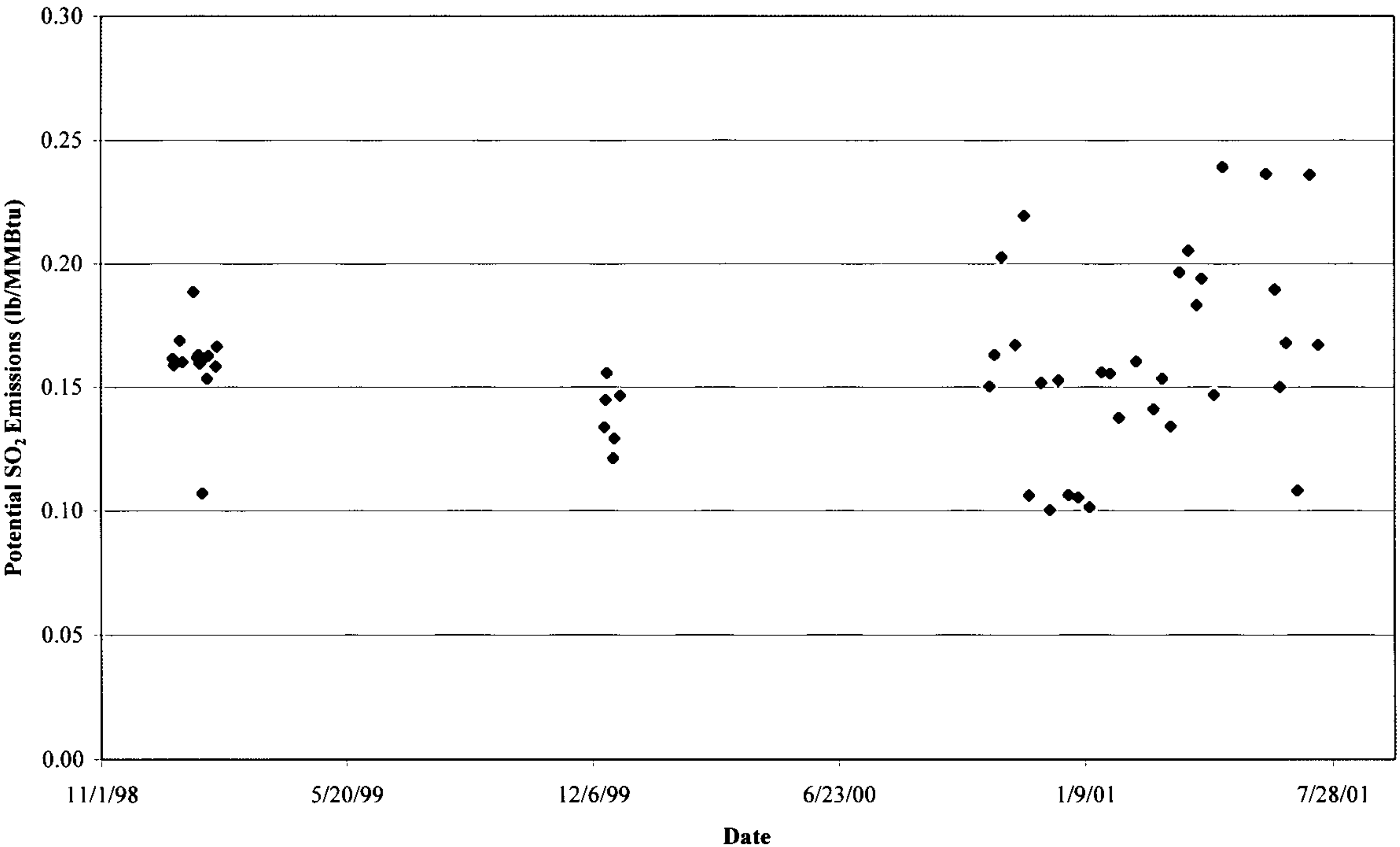

Table A-1. Summary of Wood Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
1/5/99	0.09	4,972	0.36	
1/5/99	0.08	4,769	0.34	
1/5/99	0.07	4,583	0.31	0.33
1/8/99	0.07	5,359	0.26	
1/8/99	0.10	4,804	0.42	
1/8/99	0.07	5,172	0.27	0.32
1/11/99	0.05	5,429	0.18	
1/11/99	0.09	4,019	0.45	
1/11/99	0.07	3,997	0.35	0.33
1/14/99	0.10	5,172	0.39	
1/14/99	0.11	5,255	0.42	
1/14/99	0.11	4,634	0.47	0.43
1/20/99	0.10	4,907	0.41	
1/20/99	0.08	5,260	0.30	
1/20/99	0.08	5,220	0.31	0.34
1/21/99	0.07	5,229	0.27	
1/21/99	0.07	5,298	0.26	
1/21/99	0.05	4,894	0.20	0.25
1/27/99	0.08	5,920	0.27	0.27
1/28/99	0.06	3,516	0.34	0.34
2/2/99	0.06	4,394	0.27	
2/2/99	0.06	5,197	0.23	
2/2/99	0.06	4,927	0.24	0.25
2/3/99	0.08	4,686	0.34	0.34
2/5/99	0.07	4,509	0.31	
2/5/99	0.08	4,582	0.35	0.33
12/29/99	0.05	4,850	0.21	
12/29/99	0.04	4,949	0.16	0.24
12/30/99	0.04	5,073	0.16	
12/30/99	0.04	4,759	0.17	0.16
1/4/00	0.04	4,845	0.17	
1/4/00	0.05	4,835	0.21	
1/4/00	0.04	4,833	0.17	0.18
1/5/00	0.04	5,030	0.16	
1/5/00	0.04	4,739	0.17	0.16
1/6/00	0.05	5,031	0.20	
1/6/00	0.04	4,919	0.16	
1/6/00	0.04	5,029	0.16	
1/6/00	0.05	5,029	0.20	0.18

Table A-1. Summary of Wood Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
4/4/00	0.03	4,417	0.14	
4/4/00	0.16	5,298	0.60	
4/4/00	0.04	4,235	0.19	
4/4/00	0.14	5,866	0.48	
4/4/00	0.04	4,606	0.17	
4/4/00	0.22	5,216	0.84	
4/4/00	0.07	4,190	0.33	
4/4/00	0.15	5,744	0.52	
4/4/00	0.27	4,571	1.18	
4/4/00	0.23	4,835	0.95	
4/4/00	0.15	5,182	0.58	
4/4/00	0.02	4,929	0.08	0.51
5/25/00	0.08	5,508	0.29	0.29
5/26/00	0.04	4,089	0.20	0.20
5/30/00	0.08	4,346	0.37	
5/30/00	0.04	4,707	0.17	0.27
6/6/00	0.05	4,831	0.21	
6/6/00	0.15	5,024	0.60	0.40
6/12/00	0.04	4,882	0.16	
6/12/00	0.03	3,869	0.16	
6/12/00	0.04	4,707	0.17	0.16
6/19/00	0.09	5,091	0.35	
6/19/00	0.04	4,000	0.20	0.28
7/3/00	0.08	4,638	0.34	
7/3/00	0.03	3,755	0.16	0.25
7/10/00	0.05	4,060	0.25	
7/10/00	0.07	4,900	0.29	
7/10/00	0.04	3,592	0.22	
7/10/00	0.09	5,511	0.33	
7/10/00	0.06	5,720	0.21	0.26
7/21/00	0.05	4,899	0.20	
7/21/00	0.03	4,024	0.15	
7/21/00	0.05	4,810	0.21	
7/21/00	0.08	4,911	0.33	
7/21/00	0.06	5,447	0.22	0.22
7/22/00	0.05	4,497	0.22	
7/22/00	0.04	5,008	0.16	
7/22/00	0.06	5,002	0.24	
7/22/00	0.06	5,364	0.22	0.21

Table A-1. Summary of Wood Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
7/24/00	0.04	4,585	0.17	
7/24/00	0.04	4,426	0.18	
7/24/00	0.03	3,366	0.18	
7/24/00	0.09	4,320	0.42	
7/24/00	0.07	4,841	0.29	
7/24/00	0.03	3,455	0.17	
7/24/00	0.02	2,917	0.14	0.22
7/31/00	0.07	4,717	0.30	
7/31/00	0.02	2,957	0.14	0.22
8/21/00	0.14	5,135	0.55	
8/21/00	0.06	4,177	0.29	0.42
8/28/00	0.07	4,796	0.29	
8/28/00	0.03	3,370	0.18	0.23
9/4/00	0.12	4,371	0.55	
9/4/00	0.02	3,094	0.13	0.34
9/11/00	0.13	4,027	0.65	
9/11/00	0.03	3,183	0.19	0.42
10/2/00	0.07	5,583	0.25	
10/2/00	0.12	4,081	0.59	0.42
10/9/00	0.08	4,657	0.34	
10/9/00	0.06	3,279	0.37	0.35
10/16/00	0.09	4,854	0.37	
10/16/00	0.03	3,991	0.15	0.26
10/23/00	0.09	4,854	0.37	0.37
10/27/00	0.08	4,863	0.33	0.33
11/2/00	0.13	5,412	0.48	0.48
11/13/00	0.08	5,223	0.31	0.31
11/20/00	0.13	5,255	0.49	0.49
11/24/00	0.08	5,102	0.31	0.31
12/4/00	0.11	5,286	0.42	0.42
12/11/00	0.06	5,567	0.22	0.22
12/18/00	0.10	4,890	0.41	0.41
12/26/00	0.10	4,965	0.40	0.40
1/3/01	0.04	5,333	0.15	0.15
1/12/01	0.04	5,563	0.14	
1/12/01	0.04	5,544	0.14	0.14
1/22/01	0.05	5,846	0.17	0.17
1/29/01	0.20	5,465	0.73	0.73
2/5/01	0.06	6,900	0.17	0.17

Table A-1. Summary of Wood Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
2/19/01	0.13	5,385	0.48	
2/19/01	0.15	6,248	0.48	0.48
3/5/01	0.10	5,445	0.37	
3/5/01	0.04	5,349	0.15	0.26
3/12/01	0.04	5,519	0.14	0.14
3/19/01	0.15	5,158	0.58	0.58
3/26/01	0.12	5,054	0.47	0.47
4/2/01	0.09	6,011	0.30	0.30
4/9/01	0.11	5,329	0.41	0.41
4/13/01	0.11	5,316	0.41	0.41
4/23/01	0.05	6,536	0.15	0.15
4/30/01	0.25	5,814	0.86	0.86
5/7/01	0.10	5,593	0.36	0.36
5/14/01	0.16	5,076	0.63	0.63
5/22/01	0.10	5,093	0.39	0.39
5/25/01	0.09	5,800	0.31	0.31
6/4/01	0.06	4,781	0.25	0.25
6/11/01	0.03	4,285	0.14	0.14
6/15/01	0.06	5,431	0.22	0.22
6/20/01	0.12	4,744	0.51	0.51
6/29/01	0.05	5,409	0.18	0.18
7/9/01	0.08	5,016	0.32	0.32
7/16/01	0.06	5,403	0.22	0.22

Table A-2. Summary of Bagasse Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
12/29/98	0.03	3,714	0.16	
12/29/98	0.03	3,715	0.16	0.16
12/30/98	0.03	3,780	0.16	0.16
1/4/99	0.03	3,607	0.17	
1/4/99	0.03	3,619	0.17	
1/4/99	0.03	3,441	0.17	0.17
1/6/99	0.03	3,741	0.16	
1/6/99	0.03	3,716	0.16	
1/6/99	0.03	3,790	0.16	0.16
1/15/99	0.04	3,737	0.21	0.19
1/15/99	0.03	3,680	0.16	
1/18/99	0.03	3,779	0.16	
1/18/99	0.03	3,621	0.17	
1/18/99	0.03	3,725	0.16	0.16
1/19/99	0.03	3,682	0.16	
1/19/99	0.03	3,677	0.16	0.16
1/20/99	0.03	3,762	0.16	0.16
1/22/99	0.03	3,734	0.16	0.16
1/22/99	0.02	3,712	0.11	
1/22/99	0.02	3,769	0.11	0.11
1/26/99	0.02	2,953	0.14	
1/26/99	0.03	3,740	0.16	
1/26/99	0.03	3,656	0.16	0.15
1/27/99	0.03	3,689	0.16	0.16
2/2/99	0.03	3,790	0.16	0.16
2/3/99	0.03	3,605	0.17	0.17
12/15/99	0.03	3,542	0.17	
12/15/99	0.02	3,234	0.12	
12/15/99	0.02	3,704	0.11	0.13
12/16/99	0.03	3,451	0.17	
12/16/99	0.03	3,490	0.17	
12/16/99	0.02	3,634	0.11	
12/16/99	0.02	3,254	0.12	0.14
12/17/99	0.03	3,298	0.18	
12/17/99	0.03	3,579	0.17	
12/17/99	0.02	3,401	0.12	0.16
12/22/99	0.02	3,495	0.11	
12/22/99	0.03	3,889	0.15	
12/22/99	0.02	4,229	0.09	0.12
12/23/99	0.02	3,772	0.11	
12/23/99	0.02	3,892	0.10	
12/23/99	0.03	3,359	0.18	0.13
12/28/99	0.03	3,626	0.17	
12/28/99	0.03	3,594	0.17	
12/28/99	0.02	3,731	0.11	0.15

Table A-2. Summary of Bagasse Fuel Analyses, Okeelanta Power L.P. (Revised 8/6/01)

Sample Date	Sulfur (%)	Heat Content (Btu/lb)	Potential SO_2 Emissions (lb/MMBtu)	Daily Average SO_2 (lb/MMBtu)
10/23/00	0.03	3,991	0.15	0.15
10/27/00	0.03	3,680	0.16	0.16
11/2/00	0.05	4,934	0.20	0.20
11/13/00	0.03	3,592	0.17	0.17
11/20/00	0.04	3,647	0.22	0.22
11/24/00	0.02	3,769	0.11	0.11
12/4/00	0.03	3,954	0.15	0.15
12/11/00	0.02	3,993	0.10	0.10
12/18/00	0.03	3,928	0.15	0.15
12/26/00	0.02	3,765	0.11	0.11
1/3/01	0.02	3,802	0.11	0.11
1/12/01	0.02	4,062	0.10	
1/12/01	0.02	3,837	0.10	0.10
1/22/01	0.03	3,846	0.16	0.16
1/29/01	0.03	3,858	0.16	0.16
2/5/01	0.03	4,364	0.14	0.14
2/19/01	0.03	3,793	0.16	
2/19/01	0.03	3,693	0.16	0.16
3/5/01	0.03	4,283	0.14	
3/5/01	0.03	4,226	0.14	0.14
3/12/01	0.03	3,912	0.15	0.15
3/19/01	0.03	4,476	0.13	0.13
3/26/01	0.04	4,070	0.20	0.20
4/2/01	0.04	3,897	0.21	0.21
4/9/01	0.04	4,366	0.18	0.18
4/13/01	0.04	4,124	0.19	0.19
4/23/01	0.03	4,090	0.15	0.15
4/30/01	0.05	4,183	0.24	0.24
6/4/01	0.05	4,231	0.24	0.24
6/11/01	0.03	3,166	0.19	0.19
6/15/01	0.02	2,666	0.15	0.15
6/20/01	0.03	3,575	0.17	0.17
6/29/01	0.02	3,703	0.11	0.11
7/9/01	0.04	3,390	0.24	0.24
7/16/01	0.03	3,591	0.17	0.17

APPENDIX B

REVISIONS TO
AIR QUALITY IMPACT ANALYSIS
FOR
CARBON MONOXIDE

Table B-1. Summary of CO Facilities Considered for Inclusion in the AAQS and PSD Class II Air Modeling Analyses (Revised 8/6/01)

AIRS Number	Facility	County	UTM Coordinates East (km)	UTM Coordinates North (km)	Relative to Okeelanta Power [a] X (km)	Relative to Okeelanta Power [a] Y (km)	Relative to Okeelanta Power [a] Distance (km)	Relative to Okeelanta Power [a] Direction (deg)	Maximum CO Emissions (TPY)	Q, (TPY) Emission Threshold [b] (Dist - 6) x 20	Include in Modeling Analysis ?
0990086	Glades Correctional Institute	Palm Beach	523.4	2955.2	-1.5	15.1	15.2	354	10	183.5	NO
0990026	Sugar Cane Growers	Palm Beach	534.9	2953.3	10.0	13.2	16.6	37	33,771	211.2	YES
0510001	Everglades Sugar	Hendry	509.6	2954.2	-15.3	14.1	20.8	313	15	296.1	NO
0510003	U.S. Sugar Clewiston	Hendry	506.1	2956.9	-18.8	16.8	25.2	312	64,644	384.3	YES
0990016	Atlantic Sugar Association	Palm Beach	552.9	2945.2	28.0	5.1	28.5	80	25,065	449.2	YES
0990061	U.S. Sugar -Bryant	Palm Beach	538.8	2968.1	13.9	28.0	31.3	26	19,958	505.2	YES
0990019	Osceola Farms	Palm Beach	544.2	2968.0	19.3	27.9	33.9	35	25,175	558.5	YES
0510015	Southern Gardens Citrus	Hendry	487.6	2957.6	-37.3	17.5	41.2	295	1,888	704.0	YES
0990021	Pratt & Whitney	Palm Beach	559.2	2978.3	34.3	38.2	51.3	42	1,000	906.8	YES
0850102	Bechtel Indiantown	Martin	545.6	2991.5	20.7	51.4	55.4	22	1,651	988.2	YES
0850001	FPL -Martin	Martin	543.1	2992.9	18.2	52.8	55.8	19	2,285	997.0	YES
0500045	Lake Worth Utilities	Palm Beach	592.8	2943.7	67.9	3.6	68.0	87	204	1239.9	NO
0360119	Lee County Resource Recovery	Lee	424.0	2946.0	-100.9	5.9	101.1	273	238	1901.4	NO
0710002	FPL - Fort Myers [c]	Lee	422.1	2952.9	-102.8	12.8	103.6	277	4,478	1951.9	YES

[a] Okeelanta Power Coordinates: 524.9 2940.1

[b] Proposed project's emissions are significant to 6 kilometers.
Emission inventory is limited to facilities within 56 km of Okeelanta facility but includes major plants outside the proposed project's significant impact distance.

[c] Large source beyond screening area included in modeling analysis.

Table B-2. Summary of CO Sources Included in the Air Modeling Analysis (Revised 8/13/01)

AIRS Number	Facility	Units	ISCST3 ID Name	Stack and Operating Parameters Height (m)	Diameter (m)	Temperature (K)	Velocity (m/s)	Emission Rate (g/s)
50PMB500332	Okeelanta Sugar Mill	Boiler 16	OKBLR16	22.9	1.52	483.2	22.86	4.07
0990026	Sugar Cane Growers [a]	Unit 1&2	SUGCN12	45.7	1.87	339.0	21.75	547.09
		Unit 3	SUGCN3	27.4	1.52	339.0	22.25	187.61
		Unit 4 PSD	SUGCN4	54.9	2.44	339.0	21.73	467.71
		Unit 5	SUGCN5	45.7	2.30	339.0	15.94	359.60
		Unit 8 PSD	SUGCN8	47.2	2.90	339.0	13.62	381.02
0510003	U.S. Sugar Clewiston							
		Unit 1	BRL1	65.0	2.44	347.0	19.20	811.79
		Unit 2	BLR2	65.0	2.44	338.0	17.32	732.19
		Unit 3	BLR3	65.0	2.44	333.2	8.47	334.28
		Unit 4	BLR4	45.7	2.51	344.3	25.35	518.43
		Unit 7	BLR7	68.6	2.59	405.4	25.96	71.62
0990016	Atlantic Sugar Association [a]	Unit 1	ATLSUG1	27.4	1.83	346.0	17.97	299.90
		Unit 2	ATLSUG2	27.4	1.83	350.0	23.36	585.60
		Unit 3	ATLSUG3	27.4	1.83	350.0	21.56	180.20
		Unit 4	ATLSUG4	27.4	1.83	344.0	25.16	180.20
		Unit 5 [b]	ATLSUG5	27.4	1.68	339.0	19.24	209.10
0990061	U.S. Sugar -Bryant [a]	Unit 5 PSD	USSBRY5	42.7	2.90	345.0	11.49	760.91
		Unit 1,2&3	USBRY123	19.8	1.64	342.0	36.40	1309.77
0990019	Osceola Farms [a]	Unit 2	OSBLR2	27.4	1.52	339.0	18.63	317.52
		Unit 3	OSBLR3	27.4	1.92	344.0	14.34	128.77
		Unit 4	OSBLR4	27.4	1.83	344.0	16.53	317.52
		Unit 5	OSBLR5	27.4	1.52	344.0	17.85	374.22
		Unit 6	OSBLR6	27.4	1.92	339.0	18.25	310.40
0510015	Southern Gardens Citrus - PSD	Peel Dryer	SGARDDRY	38.1	1.16	353.0	7.45	116.68
		Boilers 1-3	SGARDBLR	16.8	1.22	478.0	14.23	0.50
0990021	Pratt & Whitney	Jet Engine	PWJETEG	21.3	18.30	383.2	12.20	21000
		Unit 1	PRWIT1	15.2	0.91	810.9	143.70	1.63
		Unit 16	PRWIT16	4.6	0.76	533.2	6.90	0.43
		Unit 22	PRWIT22	20.1	2.32	672.0	10.20	1.11
		Unit 40	PRWIT40	14.9	1.22	298.2	0.04	0.12
		Unit 45	PRWIT45	3.7	0.15	298.2	2.60	2.01
		Unit 59	PRWIT59	6.1	0.46	533.2	4.90	0.64
		Unit 68	PRWIT68	3.7	0.24	922.0	151.40	0.23
		Unit 69	PRWIT69	5.5	3.66	422.0	0.08	5.98
0850102	Bechtel Indiantown		BECHTIND	150.9	4.88	333.2	30.50	47.38
0850001	FPL -Martin	Units 1&2	MART12	152.1	7.99	420.9	21.03	38.92
		Aux Blr PSD	MARTAUX	18.3	1.10	535.4	15.24	-
		Diesel Gens PSD	MARTGEN	7.6	0.30	785.9	39.62	-
		Units 3&4 PSD	MART34	64.9	6.10	410.9	18.90	26.66
0710002	FPL Fort Myers	Gas Turbines 1 - 12	FMGT112	9.8	3.47	797.0	57.73	61.69
		HRSGs 1-6	FMCT1_6	38.1	5.79	377.6	21.43	32.51
		CT 1 - 2	FMCT1_2	24.4	6.25	852.00	39.1	34.32

[a] Facilities or sources with facilities that operate only during the October 1 through April 30 crop season.

[b] Sugar mill sources that operate all year.

Table B-3. Maximum Predicted CO Impacts for the Proposed Project
AAQS Screening Analysis, Okeelanta Power, L.P. (Revised 8/13/01)

Pollutant/ Averaging Time	Concentration (ug/m^3)[a]	Receptor Location[b] Direction (degree)	Distance (m)	Time Period (YYMMDDHH)
HSH 8-Hour	871	217	3,534	87103024
	690	227	4,133	88101516
	618	221	3,785	89110624
	714	224	3,921	90041324
	785	20	6,000	91110524
HSH 1-Hour	2,776	20	6,000	87011923
	2,802	221	3,785	88122618
	3,146	20	5,000	89040619
	2,959	20	5,000	90031904
	2,975	20	6,000	91102101

[a] Based on 5-year meteorological record, West Palm Beach, 1987 to 1991.
[b] Relative to the Cogeneration Boiler B stack.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

Table B-4. Maximum Predicted CO Concentrations for All Sources Compared to AAQS, Refined Analysis, Okeelanta Power, L.P. (Revised 8/13/01)

Pollutant/ Averaging Time	Concentration (ug/m³) Total	Modeled Sources	Background	Receptor Location[a] Direction (degree)	Distance (m)	Time Period (YYMMDDHH)	Florida AAQS (ug/m³)
HSH 8-hour	3,861	871	2,990	217	3,534	87103024	10,000
	3,816	826	2,990	17	6,000	91110524	
HSH 1-hour	7,654	3,284	4,370	24	6,000	89040619	
	7,520	3,150	4,370	25	6,000	90102418	40,000
	7,448	3,078	4,370	25	6,000	91033102	

[a] Relative to the Cogeneration Boiler B stack.

Note: YYMMDDHH = Year, Month, Day, Hour Ending
HSH = Highest, Second-Highest

APPENDIX C

REVISED EMISSION TABLES
AND
PSD APPLICABILITY

Table 2-4. Maximum Annual Emissions for Single Boiler at Okeelanta Power L.P. (Revised 8/6/01)

Regulated Pollutant	Biomass Emission Factor (lb/MMBtu)	Biomass Activity Factor (10^{12} Btu/yr)	Biomass Annual Emissions (TPY)	Alternate Fuel Emission Factor (lb/MMBtu)	Alternate Fuel Activity Factor (10^{12} Btu/yr)	Alternate Fuel Annual missions (TPY)	Total Annual Emissions (TPY)
			100% Biomass				
Particulate (TSP)	0.03	6.263	93.95	--	--	--	93.95 [a]
Particulate (PM_{10})	0.03	6.263	93.95	--	--	--	93.95 [a]
Sulfur dioxide	0.10	6.263	313.15	--	--	--	313.15 [a]
Nitrogen oxides	0.15	6.263	469.73	--	--	--	469.73 [a]
Carbon monoxide	0.35	6.263	1,096.03	--	--	--	1,096.03 [a]
VOC	0.06	6.263	187.89	--	--	--	187.89 [a]
Lead	1.6E-04	6.263	0.501	--	--	--	0.501 [a]
Mercury	5.43E-06	6.263	0.0170	--	--	--	0.0170 [a]
Beryllium[b]	6.00E-07	2.881 [c]	0.0009	--	--	--	0.00086
Fluorides	7.00E-04	6.263	2.19	--	--	--	2.19 [a]
Sulfuric acid mist	0.0061	6.263	19.10	--	--	--	19.10 [a]
			75.1% Biomass / 24.9% Fuel Oil				
Particulate (TSP)	0.03	4.428	66.42	0.03	1.468	22.02	88.44
Particulate (PM_{10})	0.03	4.428	66.42	0.03	1.468	22.02	88.44
Sulfur dioxide	0.10	4.428	221.40	0.05	1.468	36.70	258.10
Nitrogen oxides	0.15	4.428	332.10	0.15	1.468	110.10	442.20
Carbon monoxide	0.35	4.428	774.90	0.35	1.468	256.90	1,031.80
VOC	0.06	4.428	132.84	0.03	1.468	22.02	154.86
Lead	1.6E-04	4.428	0.354	8.9E-07	1.468	0.0007	0.355
Mercury	5.43E-06	4.428	0.0120	2.4E-06	1.468	0.0018	0.0138
Beryllium[b]	6.00E-07	2.037 [c]	0.0006	3.5E-07	1.468	0.00026	0.00087 [a]
Fluorides	7.00E-04	4.428	1.55	6.27E-06	1.468	0.0046	1.5544
Sulfuric acid mist	0.0061	4.428	13.51	0.0015	1.468	1.10	14.61
			75.1% Biomass / 24.9% Natural Gas				
Particulate (TSP)	0.03	4.428	66.42	0.0073	1.468	5.36	71.78
Particulate (PM_{10})	0.03	4.428	66.42	0.0073	1.468	5.36	71.78
Sulfur dioxide	0.10	4.428	221.40	0.00058	1.468	0.43	221.83
Nitrogen oxides	0.15	4.428	332.10	0.15	1.468	110.10	442.20
Carbon monoxide	0.35	4.428	774.90	0.08	1.468	58.72	833.62
VOC	0.06	4.428	132.84	0.0053	1.468	3.89	136.73
Lead	1.6E-04	4.428	0.354	4.8E-07	1.468	0.0004	0.355
Mercury	5.43E-06	4.428	0.0120	2.5E-07	1.468	0.0002	0.0122
Beryllium[b]	6.00E-07	2.037 [c]	0.0006	1.2E-08	1.468	0.00001	0.00062
Fluorides	7.00E-04	4.428	1.55	--	--	--	1.5498
Sulfuric acid mist	0.0061	4.428	13.51	3.55E-05	1.468	0.03	13.53

[a] Denotes maximum annual emissions for any fuel scenario.

[b] Stack tests indicate that Beryllium emissions are below detectable limits for bagasse-firing, therefore, the emission factor and potential emissions are based on wood-firing.

[c] Wood-firing heat input represents 46% of total heat input, therefore, activity factor reflects 46% of total biomass activity factor.

Note: No emissions of total reduced sulfur, asbestos, or vinyl chloride are expected.

Table 2-5. Maximum Annual Emissions for Okeelanta Power L.P. (total all boilers, Revised 8/6/01)

Regulated Pollutant	Biomass Emission Factor (lb/MMBtu)	Biomass Activity Factor (10^{12} Btu/yr)	Biomass Annual Emissions (TPY)	Alternate Fuel Emission Factor (lb/MMBtu)	Alternate Fuel Activity Factor (10^{12} Btu/yr)	Alternate Fuel Annual Emissions (TPY)	Total Annual Emissions (TPY)
			100% Biomass				
Particulate (TSP)	0.03	11.500	172.50	--	--	--	172.50 [a]
Particulate (PM_{10})	0.03	11.500	172.50	--	--	--	172.50 [a]
Sulfur dioxide	0.10	11.500	575.00	--	--	--	575.00 [a]
Nitrogen oxides	0.15	11.500	862.50	--	--	--	862.50 [a]
Carbon monoxide	0.35	11.500	2,012.50	--	--	--	2,012.50 [a]
VOC	0.06	11.500	345.00	--	--	--	345.00 [a]
Lead	1.6E-04	11.500	0.920	--	--	--	0.920 [a]
Mercury	5.43E-06	11.500	0.0312	--	--	--	0.031 [a]
Beryllium[b]	6.00E-07	5.290 [c]	0.0016	--	--	--	0.00159
Fluorides	7.00E-04	11.500	4.03	--	--	--	4.03 [a]
Sulfuric acid mist	0.0061	11.500	35.08	--	--	--	35.08 [a]
			75.1% Biomass / 24.9% Fuel Oil				
Particulate (TSP)	0.03	8.130	121.95	0.03	2.696	40.44	162.39
Particulate (PM_{10})	0.03	8.130	121.95	0.03	2.696	40.44	162.39
Sulfur dioxide	0.10	8.130	406.50	0.05	2.696	67.40	473.90
Nitrogen oxides	0.15	8.130	609.75	0.15	2.696	202.20	811.95
Carbon monoxide	0.35	8.130	1,422.75	0.35	2.696	471.80	1,894.55
VOC	0.06	8.130	243.90	0.03	2.696	40.44	284.34
Lead	1.6E-04	8.130	0.650	8.9E-07	2.696	0.0012	0.652
Mercury	5.43E-06	8.130	0.0221	2.4E-06	2.696	0.0032	0.025
Beryllium[b]	6.00E-07	3.740 [c]	0.0011	3.5E-07	2.696	0.00047	0.00159 [a]
Fluorides	7.00E-04	8.130	2.85	6.27E-06	2.696	0.0085	2.854
Sulfuric acid mist	0.0061	8.130	24.80	0.0015	2.696	2.02	26.82
			75.1% Biomass / 24.9% Natural Gas				
Particulate (TSP)	0.03	8.130	121.95	0.0073	2.696	9.84	131.79
Particulate (PM_{10})	0.03	8.130	121.95	0.0073	2.696	9.84	131.79
Sulfur dioxide	0.10	8.130	406.50	0.00058	2.696	0.78	407.28
Nitrogen oxides	0.15	8.130	609.75	0.15	2.696	202.20	811.95
Carbon monoxide	0.35	8.130	1,422.75	0.08	2.696	107.84	1,530.59
VOC	0.06	8.130	243.90	0.0053	2.696	7.14	251.04
Lead	1.6E-04	8.130	0.650	4.8E-07	2.696	0.0006	0.651
Mercury	5.43E-06	8.130	0.0221	2.5E-07	2.696	0.0003	0.022
Beryllium[b]	6.00E-07	3.740 [c]	0.0011	1.2E-08	2.696	0.00002	0.00114
Fluorides	7.00E-04	8.130	2.85	--	--	--	2.846
Sulfuric acid mist	0.0061	8.130	24.80	3.55E-05	2.696	0.05	24.84

[a] Denotes maximum annual emissions for any fuel scenario.

[b] Stack tests indicate that Beryllium emissions are below detectable limits for bagasse-firing, therefore, the emission factor and potential emissions are based on wood-firing.

[c] Wood-firing heat input represents 46% of total heat input, therefore, activity factor reflects 46% of total biomass activity factor.

Note: No emissions of total reduced sulfur, asbestos, or vinyl chloride are expected.

Table 3-1. Current Actual and Future Potential Emissions, Okeelanta Power L.P. (Revised 8/6/01)

Boiler	Operating Hours[a]	Heat Input[a] (MMBtu/yr)	Annual Emissions (TPY)					
			CO	SO_2	Lead	Mercury	Beryllium	Fluoride
Boiler A	7,265	3,824,398	478.34	47.11	0.036	0.0016	1.99E-04	0.358
Boiler B	5,927	3,206,304	485.29	38.32	0.032	0.0014	1.90E-04	0.292
Boiler C	6,978	3,694,714	562.44	47.80	0.034	0.0015	1.89E-04	0.346
Total	20,170	10,725,416	1,526.07	133.23	0.102	0.0045	5.78E-04	0.996
Future Potential Emissions		11,500,000	2,012.5	575.0	0.920	0.031	0.0016	4.03
Net Increase			486.4	441.8	0.818	0.027	0.0010	3.03
PSD Significant Emission Rate			100	40	0.6	0.1	0.0004	3

[a] Based on the period April 1999 through March 2000.

Table 3-2. Current Actual Lead, Mercury, Beryllium, and Fluoride Emissions for Okeelanta Power L.P. Boilers (Revised 8/6/01)

	Boiler A					Boiler B					Boiler C				
Parameter		Lead	Mercury	Beryllium	Fluoride		Lead	Mercury	Beryllium	Fluoride		Lead	Mercury	Beryllium	Fluoride
Emission Factor (lb/MMBtu)															
Wood waste [a]		3.03E-05	1.33E-06	2.23E-07 [d]	1.46E-04		3.03E-05	1.33E-06	2.23E-07 [d]	1.46E-04		3.03E-05	1.33E-06	2.23E-07 [d]	1.46E-04
Bagasse [a]		8.91E-06	3.66E-07	ND	2.24E-04		8.91E-06	3.66E-07	ND	2.24E-04		8.91E-06	3.66E-07	ND	2.24E-04
No. 2 Fuel [b]		8.90E-07	2.40E-06	3.50E-07	6.30E-06		8.90E-07	2.40E-06	3.50E-07	6.30E-06		8.90E-07	2.40E-06	3.50E-07	6.30E-06
Heat Input (MMBtu/yr) [c]															
Wood	45.68%	1,746,985	1,746,985	1,746,985	1,746,985	52.05%	1,668,881	1,668,881	1,668,881	1,668,881	44.68%	1,650,798	1,650,798	1,650,798	1,650,798
Bagasse	53.69%	2,053,319	2,053,319	2,053,319	2,053,319	47.34%	1,517,864	1,517,864	1,517,864	1,517,864	54.48%	2,012,880	2,012,880	2,012,880	2,012,880
No. 2	0.63%	24,094	24,094	24,094	24,094	0.61%	19,558	19,558	19,558	19,558	0.84%	31,036	31,036	31,036	31,036
Total		3,824,398	3,824,398	3,824,398	3,824,398		3,206,304	3,206,304	3,206,304	3,206,304		3,694,714	3,694,714	3,694,714	3,694,714
Emissions (TPY)															
April 1999 - March 2000 Emissions		0.036	0.0016	1.99E-04	0.358		0.032	0.0014	1.90E-04	0.292		0.03	0.0015	1.89E-04	0.346

[a] Based on average actual stack test data for 1999 and 2000.

[b] Based upon permit limit.

[c] Based upon actual boiler heat input for period April 1999 - March 2000.

[d] Emissions based on average of one detectable test from 1999 and one half of the detectable limits for remaining 1999 and 2000 stack test data since they were below the detectable limits.

Notes: ND = Nondetectable; indicates pollutant emissions are below the detectable limit.

Table C-1. Estimated Future Actual Emissions of Selected Pollutants for Okeelanta Power L.P. (total all boilers)

	Biomass			Alternate Fuel			Total
Regulated Pollutant	Emission Factor (lb/MMBtu)	Activity Factor[c] (10^{12} Btu/yr)	Annual Emissions (TPY)	Emission Factor (lb/MMBtu)	Activity Factor (10^{12} Btu/yr)	Annual Emissions (TPY)	Actual Emissions (TPY)
			100% Biomass				
Lead--*Wood*	3.03E-05	5.290	0.080	--	--	--	0.108 [a]
--*Bagasse*	8.91E-06	6.210	0.028	--	--	--	--
Mercury--*Wood*	1.33E-06	5.290	0.0035	--	--	--	0.0047
--*Bagasse*	3.66E-07	6.210	0.0011	--	--	--	--
Beryllium--*Wood* [b]	2.23E-07	5.290	0.00059	--	--	--	0.00059
Fluorides--*Wood*	1.46E-04	5.290	0.386	--	--	--	1.082 [a]
--*Bagasse*	2.24E-04	6.210	0.696	--	--	--	--
			75.1% Biomass / 24.9% Fuel Oil				
Lead--*Wood*	3.03E-05	3.740	0.057	8.9E-07	2.696	0.0012	0.077
--*Bagasse*	8.91E-06	4.390	0.020	--	--	--	--
Mercury--*Wood*	1.33E-06	3.740	0.0025	2.4E-06	2.696	0.0032	0.0065 [a]
--*Bagasse*	3.66E-07	4.390	0.00080	--	--	--	--
Beryllium--*Wood* [b]	2.23E-07	3.740	0.00042	3.5E-07	2.696	0.00047	0.00089 [a]
Fluorides--*Wood*	1.46E-04	3.740	0.273	6.27E-06	2.696	0.0085	0.773
--*Bagasse*	2.24E-04	4.390	0.492	--	--	--	--
			75.1% Biomass / 24.9% Natural Gas				
Lead--*Wood*	3.03E-05	3.740	0.057	4.8E-07	2.696	0.0006	0.077
--*Bagasse*	8.91E-06	4.390	0.020	--	--	--	--
Mercury--*Wood*	1.33E-06	3.740	0.0025	2.5E-07	2.696	0.0003	0.0036
--*Bagasse*	3.66E-07	4.390	0.00080	--	--	--	--
Beryllium--*Wood* [b]	2.23E-07	3.740	0.00042	1.2E-08	2.696	0.00002	0.00043
Fluorides--*Wood*	1.46E-04	3.740	0.273	--	--	--	0.765
--*Bagasse*	2.24E-04	4.390	0.492	--	--	--	--

[a] Denotes maximum annual emissions for any fuel scenario.

[b] Stack tests indicate that Beryllium emissions are below detectable limits for bagasse-firing, therefore, the emission factor and potential emissions are based on wood-firing only.

[c] Wood-firing heat input represents 46% of total heat input, therefore, the wood-firing activity factor reflects 46% of total biomass activity factor, while bagasse represents 54% of the total.

Note: No emissions of total reduced sulfur, asbestos, or vinyl chloride are expected.

Table C-2. Current and Future Actual Emissions, Okeelanta Power L.P.

Boiler	Operating Hours[a]	Heat Input[a] (MMBtu/yr)	Annual Emissions (TPY)			
			Lead	Mercury	Beryllium	Fluoride
Boilers A, B, C Total	20,170	10,725,416	0.102	0.0045	5.78E-04	0.996
Estimated Future Actual Emissions		11,500,000	0.108	0.007	0.0009	1.08
Net Increase			0.006	0.002	0.0003	0.09
PSD Significant Emission Rate			0.6	0.1	0.0004	3

[a] Based on the period April 1999 through March 2000.

Table C-3. Summary of Okeelanta Power Stack Tests - Wood Firing

Pollutant	Stack Testing: 05/96 Unit A Wood (lb/MMBtu)	Unit B Wood (lb/MMBtu)	Unit C Wood (lb/MMBtu)	Stack Testing: 01/99-02/99 Unit A Wood (lb/MMBtu)	Unit B Wood (lb/MMBtu)	Unit C Wood (lb/MMBtu)	Stack Testing: 12/99-01/00 Unit A Wood (lb/MMBtu)	Unit B Wood (lb/MMBtu)	Unit C Wood (lb/MMBtu)	Stack Testing: 01/3/01-01/23/01 Unit A Wood (lb/MMBtu)	Unit B Wood (lb/MMBtu)	Unit C Wood (lb/MMBtu)
Particulate (TSP)	0.0084	0.0039	0.0073	0.14	0.08	0.43	0.138	0.053	0.078	0.022	0.013	0.022
Particulate (PM_{10})	0.0058	0.003	0.0047	0.02	0.02	0.05	0.0266	0.0148	0.0158	0.025	0.0135	0.023
Sulfur Dioxide	0.063	0.080	0.039	0.03	0	0	0.031	0.0217	0.0357	0.032	0.019	0.03
Nitrogen Oxides	0.138	0.14	0.16	0.13	0.117	0.14	0.152	0.15	0.161	0.18	0.15	0.15
Carbon Monoxide	0.191	0.181	0.203	0.14	0.34	0.35	0.130	0.290	0.267	0.16	0.31	0.22
VOCs	0	0.00021	0.0012	0.004	0.005	0.006	0.012	0.006	0.006	0.002	0.014	0.003
Arsenic				4.80E-05	9.92E-05	4.88E-04[a]	1.53E-05	9.05E-06	1.60E-05	1.13E-04	2.50E-05	3.78E-05
Beryllium	<3.62E-9	<3.28E-9	<4.25e-9	<4.28E-07	5.09E-07	6.09E-07[a]	<2.56E-07	<2.61E-07	<2.68E-07	<1.16E-07	<1.10E-07	<1.05E-07
Chromium				2.36E-05	4.35E-05	3.11E-04[a]	8.72E-06	2.12E-05	1.11E-05	4.12E-05	2.04E-05	2.71E-05
Copper				4.78E-05	7.31E-05	2.89E-04[a]	2.60E-05	1.61E-05	3.08E-05	3.76E-05	1.42E-05	2.13E-05
Lead	2.43E-05	1.23E-05	2.77E-05	3.00E-05	8.40E-05	4.00E-04[a]	1.19E-05	7.97E-06	1.75E-05	7.49E-05	1.97E-05	3.91E-05
Mercury	9.75E-07	9.60E-07	1.70E-06	1.20E-06	1.50E-06	3.60E-06	6.25E-07	4.28E-07	6.52E-07	8.07E-07	8.09E-07	7.41E-07
Fluorides	<2.97E-02	<1.74E-2	2.00E-02	9.38E-05	5.07E-05	1.13E-04	1.50E-04	1.60E-04	3.10E-04	7.00E-04	6.00E-04	6.00E-04
Sulfuric Acid Mist	1.10E-03	1.40E-03	1.40E-03									

Sources: Air Consulting Engineering, Inc., 2001; Golder, 2001

[a] Results may not be representative due to high PM emissions.

Table C-4. Summary of Okeelanta Power Stack Tests - Bagasse Firing

Pollutant	Stack Testing: 1/22/99-2/5/99 Unit A (lb/MMBtu)	Unit B (lb/MMBtu)	Unit C (lb/MMBtu)	Stack Testing: 12/99 - 01/00 Unit A (lb/MMBtu)	Unit B (lb/MMBtu)	Unit C (lb/MMBtu)	Stack Testing: 01/3/01-01/23/01 Unit A (lb/MMBtu)	Unit B (lb/MMBtu)	Unit C (lb/MMBtu)
Particulate (TSP)	0.27	0.12	0.20	0.221	0.039	0.230	0.016	0.021	0.01
Particulate (PM_{10})	0.02	0.01	0.02	0.0282	0.0092	0.0308	0.0153	0.0232	0.0131
Sulfur Dioxide	0.02	0	0	0.0011	0.0080	0.0143	0.022	0.019	0.014
Nitrogen Oxides	0.13	0.12	0.13	0.138	0.142	0.179	0.19	0.17	0.17
Carbon Monoxide	0.16	0.26	0.28	0.377	0.354	0.299	0.24	0.21	0.24
Volatile Organic Compounds	0.01	0.02	0.007	0.010	0.007	0.012	0.007	0.008	0.01
Arsenic	3.18E-05	6.50E-06	4.92E-06	1.40E-06	5.42E-06	8.46E-06	6.34E-05	4.17E-05	4.40E-05
Beryllium	<3.77E-07	<3.94E-07	<1.25E-07	<2.22E-07	<2.34E-07	<2.52E-07	<1.10E-07	<1.07E-07	1.76E-07
Chromium	9.33E-06	5.85E-06	5.40E-06	2.15E-06	4.54E-06	6.57E-06	5.22E-05	2.91E-05	2.41E-05
Copper	2.55E-05	1.03E-05	1.33E-05	8.67E-06	1.43E-05	2.67E-05	2.38E-05	2.23E-05	1.18E-05
Lead	2.00E-05	7.30E-06	6.30E-06	3.41E-06	6.68E-06	9.77E-06	3.81E-05	4.76E-05	1.63E-05
Mercury	4.41E-07	3.83E-07	5.41E-07	1.26E-07	1.68E-07	5.34E-07	1.29E-06	1.41E-06	8.38E-07
Fluorides	7.06E-05	4.07E-05	3.04E-05	3.70E-04	4.40E-04	3.90E-04	6.00E-04	4.00E-04	3.00E-04

Sources: Air Consulting Engineering, Inc., 2001; Golder, 2001