Golder Associates Inc.

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

Golder Associates

December 17, 1999

9937515

Florida Department of Environmental Protection
New Source Review Section
2600 Blair Stone Road
Tallahassee, FL, 32399-2400

Attention: A. A. Linero, P.E.

RE: United States Sugar Corporation – Clewiston Mill
Air Permit No. 0510003-009-AC (PSD-FL-272)

Dear Mr. Linero: 0510003-010-AC

In accordance with Final Permit No. 0510003-009-AC (PSD-FL-272), Emission Unit No. 009, Interim Condition 7(c), United States Sugar Corporation (U.S. Sugar) is submitting an application to the Department to modify the current permit that includes the following information:

1. A final air quality impact analysis based on ISC-PRIME consisting of only one fuel sulfur limit and stack height combination for each boiler at the facility. Following state and federal guidelines, the analysis must demonstrate that the project complies with the requirements for the ambient air quality standards and PSD increments.
2. Based on any assumed restrictions and input parameters used for the air quality impact modeling analysis, the permittee shall submit a final plan specifying any physical modifications or new limits that are necessary to ensure compliance with the ambient air quality standards and PSD increments.
3. A final summary of the maximum fuel consumption, fuel sulfur limits, heat input, steam production, stack height, volumetric flow rate, exhaust gas temperature, and emission rates (pounds per hour and tons per year) for each facility boiler.
4. The application shall include Sections I and II of the DEP Form No. 62-210.900(1) and only those pages in Section III that require revision as a result of the requested modification.
5. If the Department approves the requested modification, the permittee shall publish a Public Notice in a newspaper of general circulation with a 30-day comment period. The Department will provide the notice.

To satisfy Interim condition 7(c)1., U.S. Sugar is submitting Tables 1 through 4 presenting the results of an air quality modeling analysis using the ISC-PRIME dispersion model. The purpose of the air quality modeling analysis was to demonstrate compliance with AAQS

and PSD Class I and II increments for the selected combination of boiler stack heights and fuel sulfur contents. The final selected option, and this modeling analysis, is based on Boiler Nos. 1, 2, and 3 with 182-ft tall stacks (increased from the present 165 feet) and firing 2.5% sulfur No. 6 fuel oil, Boiler No. 4 with a 150-ft tall stack (existing stack height) firing 0.7% sulfur No. 6 fuel oil, and Boiler No. 7 remaining the same as currently permitted. The attached tables are identical to the Scenario 1 (R1) tables submitted in the November 17, 1999, letter response from Golder Associates to the Department, which reflect the selected option.

Both the AAQS and PSD Class II increment modeling analyses were performed in two phases and included off-site sources within the significant impact area of the U.S. Sugar facility. The first phase (screening analysis) used a coarse polar receptor grid to predict general locations of maximum annual and maximum highest, second highest short term impacts. The second phase (refined analysis) used a finer (less than 100-meter spacing) polar receptor grid centered on the location of maximum impacts predicted in the screening analysis.

The results of the AAQS screening analysis for SO_2, PM_{10} and CO are presented in Table 1. The results of the refined AAQS analysis, including an appropriate background concentration, are presented in Table 2. As shown in Table 2, the predicted SO_2, PM_{10} and CO impacts are in compliance with their respective AAQS.

The results of the PSD Class II screening analysis for SO_2 and PM_{10} are presented in Table 3. The results of the refined PSD Class II analysis are presented in Table 4. As shown in Table 4, predicted SO_2, and PM_{10} impacts are in compliance with their respective PSD Class II increments.

The results of the PSD Class I modeling analysis for SO_2 are presented in Table 5. PM_{10} impacts at the Class I area for the proposed project were below EPA's significant impact concentrations, and were therefore not evaluated further. As shown in Table 5, predicted maximum annual and maximum highest, second highest, short-term SO_2 impacts are in compliance with their respective PSD Class I increments.

To satisfy Interim Permit Conditions 7(c)2. and 7(c)3., U.S. Sugar is submitting Tables 6 through 10. Note, there is no change in the current maximum heat input rates or emission rates associated with Boiler Nos. 1, 2, 3, and 7. Summarized in Table 6 are the maximum 3-hour and 24-hour average (fuel oil and bagasse) heat input rates for the boilers for firing fuel oil and bagasse, together and separately, and corresponding maximum SO_2 emissions limits. Summarized in Table 7 are maximum 24-hour average PM_{10} emissions and maximum 1- and 8-hour average CO emissions.

Maximum annual emission rates for Boiler No. 4 are presented in Table 8. Maximum short-term emissions for Boiler No. 4 are presented in Table 9. Summarized in Table 10 are the stack parameters used in the dispersion modeling analysis presented to satisfy Interim Permit Condition 7(c)1.

To satisfy Interim Permit Condition 7(c)4., please find attached Sections I and II of the DEP Form No. 62-210.900(1) and those pages of Section III that require revision as part of the requested modifications.

To satisfy Interim Permit Condition 7(c)5., upon Department approval, U.S. Sugar will publish a Department provided Public Notice in a news paper of general circulation with a 30-day comment period.

At this time, U.S. Sugar would also like to request the following minor revisions to the current construction permit for this project:

1. Page 2, REGULATORY CLASSIFICATION, HAPs - Replace "This facility is not believed to be a major source of hazardous air pollutants", with "Based on recent data this facility is a major source of hazardous air pollutants". This is consistent with recent proposed changes to U.S. Sugar's draft Title V Permit.
2. Page 6, Specific Condition No. 6 – Replace "3-hour block average" and "24-hour block average" with the terms "3-hour block" and "24-hour block" as the applicable fuel-use limits are totals and not averages for their respective periods.
3. Page 11, Specific Condition No. 22 – Replace "daily logs" with "Daily Operational Records" (as in Specific Condition 22 g.).
4. Page 11, Specific Condition No. 22 e. - Replace "3-hour and 24-hour block averages" with "3-hour and 24-hour block totals".
5. Page 12, Specific Condition No. 23 – To calculate the data availability for all monitored parameters is very burdensome and not known to be imposed on similar facilities even as periodic monitoring under Title V. Please remove this requirement or limit calculation of data availability to steam rate and fuel oil usage rate.

If you have any questions concerning the information provided in this application, please call me at (352) 336-5600, Ext. 545.

Sincerely,

GOLDER ASSOCIATES INC.

David A. Buff

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

DB/SM/jkk

Enclosures
cc: Don Griffin
Bill Wehrum

cc: J. Kaerner
C. Holladay
SD

Table 1. Maximum Predicted Pollutant Impacts Due to All Future Sources, AAQS Screening Analyses - Boiler Nos. 1, 2, and 3 @ 182 ft and @ 2.5 % S; Boiler No. 4 @ 0.7 % S

Averaging Time	Concentration[a] (ug/m^3)	Receptor Location[b]		Time Period (YYMMDDHH)
		Direction (degree)	Distance (m)	
SO_2				
Annual				
	29.9	310	1200	87123124
	31.1	270	1200	88123124
	33.9	310	1200	89123124
	35.8	310	1200	90123124
	33.2	300	1200	91123124
H2H 24-Hour				
	231	310	1200	87080724
	240	310	1200	88040324
	217	320	900	89061524
	208	320	900	90031624
	203	320	1200	91041624
H2H 3-Hour				
	552	310	900	87080715
	615	310	900	88090912
	574	310	900	89061212
	561	270	900	90092115
	728	310	900	91070615
PM_{10}				
Annual				
	5.5	310	1200	87123124
	5.7	270	1200	88123124
	6.4	310	1200	89123124
	6.8	310	1200	90123124
	6.3	300	1200	91123124
H2H 24-Hour				
	48.7	270	1200	87123124
	49.0	310	1500	88112024
	45.2	320	900	89060424
	43.9	320	1200	90020324
	44.3	290	1200	91050924
CO				
H2H 8-Hour				
	3781	310	900	87061416
	3824	280	1200	88032408
	3978	320	900	89060516
	3323	320	1200	90031508
	4211	310	900	91043016
H2H 1-Hour				
	7822	340	900	87072410
	7798	320	900	88040612
	7930	320	900	89051714
	8872	330	527	90080511
	9124	40	600	91081212

[a] Based on 5-year meteorological record, West Palm Beach, 1987-91

[b] Relative to Boiler Number 4 Stack Location

Notes

YYMMDDHH = Year, Month, Day, Hour Ending

H2H = Highest, 2nd-Highest Concentration in 5 years.

Table 2. Maximum Predicted Pollutant Impacts Due to All Future Sources For Comparison to AAQS, Refined Analysis - Boiler Nos. 1, 2, and 3 @ 182 ft and @ 2.5 % S; Boiler No. 4 @ 0.7 % S

Averaging Time	Concentration (mg/m^3)			Receptor Location[b]		Time Period (YYMMDDHH)	Florida AAQS (mg/m^3)
	Total	Modeled	ackground	Direction (degree)	Distance (m)		
SO_2							
Annual	39.7	34.7	5	316	1100	89123124	60
	40.9	35.9	5	310	1100	90123124	
	38.2	33.2	5	300	1200	91123124	
H2H 24-Hour	258	245	13	316	1100	87032424	260
	253	240	13	310	1200	88040324	
H2H 3-Hour	775	728	47	310	900	91070615	1300
PM_{10}							
Annual	29.6	6.6	23	316	1100	89123124	50
	29.8	6.8	23	310	1100	90123124	
H2H 24-Hour	90	51	39	272	1100	87123124	150
	88	49	39	310	1500	88112024	
CO							
H2H 8-Hour	7761	4331	3430	318	900	89060416	10000
	7681	4251	3430	310	800	91043016	
H2H 1-Hour	14839	9124	5715	40	600	91081212	40000

[a] Based on 5-year meteorological record, West Palm Beach, 1987-91

[b] Relative to Boiler Number 4 Stack Location

Notes

YYMMDDHH = Year, Month, Day, Hour Ending

H2H = Highest, 2nd-Highest Concentration in 5 years.

Table 3. Maximum Predicted Pollutant PSD Class II Increment, Screening Analysis
- Boiler Nos. 1, 2, and 3 @ 182 ft and @ 2.5 % S; Boiler No. 4 @ 0.7 % S

Averaging Time	Concentration[a] (mg/m^3)	Receptor Location[b]		Time Period (YYMMDDHH)
		Direction (degree)	Distance (m)	
SO_2				
Annual				
	0.1	250	11000	87123124
	0.0	0	0	88123124
	0.0	0	0	89123124
	0.1	210	11000	90123124
	0.0	0	0	91123124
H2H 24-Hour				
	7	30	11000	87030524
	9	350	11000	88060224
	12	80	11000	89040224
	11	100	11000	90042124
	8	50	11000	91040824
H2H 3-Hour				
	29	60	11000	87041324
	46	60	11000	88040521
	48	70	11000	89041303
	33	120	11000	90042203
	36	80	11000	91041121
PM_{10}				
Annual				
	<0	0	0	87123124
	<0	0	0	88123124
	<0	0	0	89123124
	<0	0	0	90123124
	<0	0	0	91123124
H2H 24-Hour				
	4.9	320	900	87100624
	6.4	330	900	88062824
	5.9	350	900	89073024
	5.4	310	900	90082924
	6.0	310	900	91083124

[a] Based on 5-year meteorological record, West Palm Beach, 1987-91

[b] Relative to Boiler Number 4 Stack Location

Notes:

YYMMDDHH = Year, Month, Day, Hour Ending

H2H = Highest, 2nd-Highest Concentration in 5 years.

PSD = Prevention of Significant Deterioration

Table 4. Maximum Predicted Pollutant PSD Increment Consumption For Comparision With PSD Class II Allowable Increments, Refined Analysis - Boiler Nos. 1, 2, and 3 @ 182 ft and @ 2.5 % S; Boiler No. 4 @ 0.7 % S

Averaging Time	Concentration ($\mu g/m^3$)	Receptor Location[b]		Time Period (YYMMDDHH)	Allowable PSD Class II Increment ($\mu g/m^3$)
		Direction (degree)	Distance (m)		
SO_2					
Annual	0.1	250	11000	87123124	20
H2H 24-Hour	12.2	78	11000	89042324	91
H2H 3-Hour	47.7	70	11000	89041303	512
PM_{10}					
Annual	<0	0	0	0	17
H2H 24-Hour	7.6	332	1200	88081424	30

[a] Based on 5-year meteorological record, West Palm Beach, 1987-91

[b] Relative to Boiler Number 4 Stack Location

Notes:

YYMMDDHH = Year, Month, Day, Hour Ending

H2H = Highest, 2nd-Highest Concentration in 5 years.

EPA = Environmental Protection Agency

PSD = Prevention of Significant Deterioration

Table 5. Maximum Predicted SO_2 PSD Increment at the Everglades National Park PSD Class I Area - Boiler Nos. 1, 2, and 3 @ 182 ft and @ 2.5 % S; Boiler No. 4 @ 0.7 % S

Averaging Time	Concentration[a] (ug/m^3)	Receptor Location (UTM) (m)	(m)	Time Period (YYMMDDHH)	Allowable PSD Class I Increment (ug/m^3)
Annual					
	0.16	550300	2848600	87123124	2
	0.14	535000	2848600	88123124	
	0.10	540000	2848600	89123124	
	0.20	545000	2848600	90123124	
	0.09	540000	2848600	91123124	
H2H 24-Hour					
	2.3	550300	2848600	87052924	5
	3.0	545000	2848600	88060224	
	2.8	545000	2848600	89040124	
	3.2	530000	2848600	90041224	
	2.5	550300	2848600	91100924	
H2H 3-Hour					
	17.7	540000	2848600	87041303	25
	24.2	540000	2848600	88042209	
	18.1	550300	2848600	89042924	
	19.1	540000	2848600	90020706	
	14.5	530000	2848600	91100915	

[a] Based on 5-year meteorological record, West Palm Beach, 1987-91

Legend:

PSD = Prevention of Significant Deterioration
YYMMDDHH = Year, Month, Day, Hour Ending
UTM = Universal Transverse Mercator
H2H = Highest, 2nd-Highest

Table 6. U.S. Sugar Clewiston Mill Maximum Fuel Oil Burning And SO_2 Emissions - Future Operation:
(09/20/99)

Boilers 1-3 @ 2.5% sulfur fuel oil; 182 ft stack height
Boiler 4 @ 0.7% sulfur fuel oil; 150 ft stack height

Boiler	Total Maximum Heat Input (MMBtu/hr)	Maximum Heat Input From Fuel Oil (MMBtu/hr)	Rates Used For Modeling Purposes: Fuel Oil gal/hr [a]	Fuel Oil MMBtu/hr	Bagasse MMBtu/hr	Bagasse lb/hr(dry)	Modeled SO_2 Emissions: Fuel Oil (lb/hr)	Bagasse [b] (lb/hr)	Total (lb/hr)	Total (g/s)
					MAXIMUM 3-HOUR CASE					
1	495.6 [c]	225.1	1,500	225.0	270.6	37,583	615.0	18.8	633.8	79.86
2	495.6 [c]	225.1	1,500	225.0	270.6	37,583	615.0	18.8	633.8	79.86
3	342.0 [c]	135.1	900	135.0	207.0	28,750	369.0	14.4	383.4	48.31
4	633.0	225.1	1,500	213.0	420.0	58,333	153.3	42.0 [d]	195.3	24.61
7	812.0	249.0	0	0.0	812.0	112,778	0.0	138.0 [d]	138.0	17.39
Totals	2,778.2		5,400 (16,200 gallons per 3-hour period)	798.0	1,980.2	275,028	1,752.3	232.0	1,984.3	250.0
					MAXIMUM 24-HOUR CASE					
1	495.6	225.1	1,400	210.0	285.6	39,667	574.0	19.8	593.8	74.82
2	495.6	225.1	1,400	210.0	285.6	39,667	574.0	19.8	593.8	74.82
3	342.0	135.1	900	135.0	207.0	28,750	369.0	14.4	383.4	48.31
4	600.0	225.1	0	0.0	600.0	83,333	0.0	60.0 [d]	60.0	7.56
7	738.0	249.0	0	0.0	738.0	102,500	0.0	125.5 [d]	125.5	15.81
Totals	2,671.2		3,700 (88,800 gallons per 24-hour period)	555.0	2,116.2	293,917	1,517.0	239.5	1,756.5	221.3

[a] Total fuel usage for all boilers based on current permit limits. Individual boiler rates selected to maximize SO_2 emissions, i.e., Boiler Nos. 1, 2 and 3 burning 2.5% sulfur oil, and Boiler No.4 burning 0.7% sulfur oil. Boiler Nos. 1, 2 and 3 have 182 ft stacks, and Boiler No. 4 has a 150 ft stack.

[b] Assumes 75% removal of SO_2 due to bagasse firing, based on industry test data.

[c] Permit limit for 24-hour average.

[d] Based on proposed permit limit for Boiler No. 4 of 0.1 lb/MMBtu, and current permit limit of 0.17 lb/MMBtu for Boiler No. 7.

Note: Fuel Oil - 2.5% sulfur
18,300 Btu/lb; 150,000 Btu/gal
8.2 lb/gal

0.7% sulfur
19,450 Btu/lb; 142,000 Btu/gal
7.3 lb/gal

Bagasse - 7,200 Btu/lb (dry); 3,600 Btu/lb (wet)
0.1% sulfur average, dry basis

Table 7. U.S. Sugar Clewiston Boiler Maximum PM10 and CO Emissions - Future Configuration

Source	Maximum Heat Input (MMBtu/hr)	Emission Factor		Emissions (lb/hr)	Emissions (g/s)
		MAXIMUM 24-HOUR CASE - PM10 EMISSIONS			
Boilers		PM Emission Factor	PM10 Emission Factor		
Boiler 1	495.6	0.25 lb/MMBtu	93% of PM	115.2	14.52
Boiler 2	495.6	0.25 lb/MMBtu	93% of PM	115.2	14.52
Boiler 3	342.0	0.30 lb/MMBtu	93% of PM	95.4	12.02
Boiler 4	600.0	0.15 lb/MMBtu	93% of PM	83.7	10.55
Boiler 7	738.0	0.03 lb/MMBtu	100% of PM	22.1	2.79
		MAXIMUM 1-HOUR CASE - CO EMISSIONS			
Boilers					
Boiler 1	495.6	13.0 lb/MMBtu		6,442.80	811.79
Boiler 2	495.6	13.0 lb/MMBtu		6,442.80	811.79
Boiler 3	342.0	10.0 lb/MMBtu		3,420.00	430.92
Boiler 4	633.0	6.5 lb/MMBtu		4,114.50	518.43
Boiler 7	812.0	0.7 lb/MMBtu		568.40	71.62
		MAXIMUM 8-HOUR CASE - CO EMISSIONS			
Boilers					
Boiler 1	495.6	9.2 lb/MMBtu		4,559.52	574.50
Boiler 2	495.6	12.5 lb/MMBtu		6,195.00	780.57
Boiler 3	342.0	9.1 lb/MMBtu		3,112.20	392.14
Boiler 4	633.0	6.5 lb/MMBtu		4,114.50	518.43
Boiler 7	812.0	0.7 lb/MMBtu		568.40	71.62

Note: PM emissions are based on allowable emission rates for bagasse firing.
CO emissions for Boiler Nos. 1, 2 and 3 are based on actual test data.
CO emissions for Boiler Nos. 4 and 7 are based on allowable emission rates for bagasse firing.

Table 8. Future Maximum Annual Emissions, Clewiston Boiler No. 4, U.S. Sugar Corp. (revised 12/17/99)

Pollutant	Bagasse Firing			Fuel Oil Firing			Total Emissions (TPY)
	Emission Factor	Heat Input (a) (MMBtu/yr)	Emissions (TPY)	Emission Factor	Heat Input (a) (MMBtu/yr)	Emissions (TPY)	
Particulate Matter (PM)	0.15 lb/MMBtu	2,880,000	216.0	0.1 lb/MMBtu	0	0.0	216.0
PM10	0.14 lb/MMBtu	2,880,000	201.6	0.1 lb/MMBtu	0	0.0	201.6
Sulfur Dioxide	0.1 lb/MMBtu	2,805,000	140.3	0.72 lb/MMBtu (b)	75,000	27.0	167.3
Nitrogen Oxides	0.2 lb/MMBtu	2,805,000	280.5	0.31 lb/MMBtu	75,000	11.6	292.1
Carbon Monoxide	6.5 lb/MMBtu	2,880,000	9,360.0	0.033 lb/MMBtu	0	0.0	9,360
Volatile Organic Compounds	0.5 lb/MMBtu	2,880,000	720.0	0.0019 lb/MMBtu	0	0.0	720
Sulfuric Acid Mist	0.006 lb/MMBtu	2,880,000	8.8	0.044 lb/MMBtu	0	0.0	8.82
Lead	4.45E-04 lb/MMBtu	2,880,000	0.6	1.01E-05 lb/MMBtu	0	0.0	0.64
Mercury	3.80E-05 lb/MMBtu	2,880,000	0.1	7.53E-07 lb/MMBtu	0	0.0	0.055
Beryllium	--	2,805,000	0.0	1.85E-07 lb/MMBtu	75,000	6.94E-06	6.94E-06

(a) Total heat input based on total steam production of 1.368E+09 lb steam/yr, 1,160 Btu/lb steam and 55% thermal efficiency.
Fuel oil considered where worst case emission factor is due to oil burning. Maximum fuel oil burning is 500,000 gal/yr, equivalent to 75,000 MMBtu/yr.

(b) Represents maximum sulfur content of 0.7% for fuel oil.

Table 9. Short Term Emissions of Regulated Pollutants for Boiler No. 4 (revised 12/17/99)

Regulated Pollutant	Emission Factor (lb/MMBtu)	Reference	Activity Factor 1-Hour Max. (MMBtu/hr)(a)	Activity Factor 24-Hour Avg. (MMBtu/hr)(a)	Maximum Hourly Emissions (lb/hr)	Maximum 24-Hour Emissions (lb/hr)
			Carbonaceuos Fuel			
Particulate Matter (PM)	0.15	1	633	600	95.0	90.0
Particulate Matter (PM10)	0.14	2	633	600	88.3	83.7
Sulfur dioxide	0.1	3	633	600	63.3	60.0
Nitrogen oxides	0.20	4	633	600	126.6	120.0
Carbon monoxide	6.5	1	633	600	4,114.5	3900.0
VOC	0.5	5	633	600	316.5	300.0
Sulfuric Acid Mist	0.006	6	633	600	3.9	3.7
Lead	4.45E-04	7	633	600	0.28	0.27
Mercury	3.8E-05	8	633	600	0.0241	0.0228
Beryllium	--	7	633	600	--	--
			No. 6 Fuel Oil			
Particulate Matter (PM)	0.10	1	225	--	22.5	22.5
Particulate Matter (PM10)	0.10	9	225	--	22.5	22.5
Sulfur dioxide (b)	0.72	10	225	--	162.0	162.0
Nitrogen oxides	0.31	11	225	--	69.8	69.8
Carbon monoxide	0.033	11	225	--	7.5	7.5
VOC	0.0019	11	225	--	0.4	0.4
Sulfuric Acid Mist	0.044	6	225	--	9.9	9.9
Lead	1.01E-05	11	225	--	2.27E-03	2.27E-03
Mercury	7.53E-07	11	225	--	1.70E-04	1.70E-04
Beryllium	1.85E-07	11	225	--	4.17E-05	4.17E-05
			Maximum No. 6 Fuel Oil/ Remainder Bagasse			
Particulate Matter (PM)			530	499	68.3	63.6
Particulate Matter (PM10)			530	499	65.1	60.7
Sulfur dioxide			530	499	192.6	189.4
Nitrogen oxides			530	499	130.9	124.5
Carbon monoxide			530	499	1,993.3	1787.2
VOC			530	499	153.2	137.3
Sulfuric Acid Mist			530	499	11.8	11.6
Lead			530	499	0.14	0.12
Mercury			530	499	0.012	0.011
Beryllium			530	499	4.17E-05	4.17E-05
			Maximum Any Combination			
Particulate Matter (PM)					95.0	90.0
Particulate Matter (PM10)					88.3	83.7
Sulfur dioxide					192.6	189.4
Nitrogen oxides					130.9	124.5
Carbon monoxide					4,114.5	3,900.0
VOC					316.5	300.0
Sulfuric Acid Mist					11.8	11.6
Lead					0.28	0.27
Mercury					0.0241	0.0228
Beryllium					4.17E-05	4.17E-05

3851

MARY S OR DAVID A BUFF
1527 NW 57TH ST PH 332-6308
GAINESVILLE FL 32605

DATE Jan. 3, 2000

63-7841/2631

PAY TO THE ORDER OF Florida Dept. of Environmental Protection $ 250.00

Two Hundred and fifty and 00/100 DOLLARS

Florida Credit Union
Gainesville - Ocala - Lake City - Starke (1)

MEMO U.S. Sugar Clewiston Application David A. Buff

⑆263178410⑆ 000999916387411⑈ 3851

Footnotes

(a) Maximum 1-hour activity factor is based on a steam production of 300,000 lb/hr at 600 psig, 750 F.
Maximum 6-hour average activity factor based on steam production rate of 285,000 lb/hr at 600 psig, 750 F.
Enthalpy of steam = 1,378 Btu/lb. Enthalpy of feedwater = 218 Btu/lb. Net enthalpy = 1,160 Btu/lb.
Boiler efficiency = 80% on fuel oil and 55% on bagasse.
Derivation of heat input for No. 6 Fuel oil/Bagasse combination firing:
Max 1-hr case: Max oil = 225 MMBtu/hr x 80% eff. = 180 MMBtu/hr into steam.
Remainder needed into steam = (300,000 lb/hr steam x 1,160 Btu/lb) - 180 MMBtu/hr = 168 MMBtu/hr
Required heat input to boiler from bagasse = 168 MMBtu/hr / 55% eff. = 305.5 MMBtu/hr
Total heat input required = 225 + 305.5 = 530 MMBtu/hr
Max 24-hr case: Max oil = 225 MMBtu/hr x 80% eff. = 180 MMBtu/hr into steam.
Remainder needed into steam = (285,000 lb/hr steam x 1,160 Btu/lb) - 180 MMBtu/hr = 150.6 MMBtu/hr
Required heat input to boiler from bagasse = 150.6 MMBtu/hr / 55% eff. = 273.8 MMBtu/hr
Total heat input required = 225 + 274 = 499 MMBtu/hr

(b) The SO2 emission factor reflects the maximum sulfur content (0.7%). Boiler Nos. 1, 2 and 3 are permitted to burn up to 2.5% sulfur fuel oil.

References

1. Current BACT permit limit for Clewiston.
2. Based on limited source testing of bagasse boiler which indicated 93% of PM was PM10.
3. Proposed BACT limit, based on actual stack testing on Clewiston boilers. Equivalent to 0.1% sulfur content of bagasse (wet), 3,600 Btu/lb(wet); and 82% removal in wet scrubber.
4. Equivalent to current permit limit for Clewiston Boiler No. 4.
5. Proposed permit limit.
6. Based on assuming 5% of SO2 emissions are equal to SO3, based on AP-42 Section 1.3, Fuel Oil Combustion. Conversion of SO3 to H2SO4 (SO3 x 98/80).
7. Based on AP-42, Section 1.6, Wood Waste Combustion. Represents controlled emissions.
8. Based on stack testing of 5 bagasse boilers in Florida (refer to appendices).
9. Assumed as 100% of PM emissions.
10. Based on 0.7% S fuel oil; 142,000 Btu/gal; 7.3 lb/gal; assumes 100% conversion of sulfur to SO2.
11. Based on AP-42, Section 1.3, Fuel Oil Combustion.
NOx - 47 lb/1000 gal; CO - 5 lb/1000 gal; VOC - 0.28 lb/1000 gal;
Lead - 1.51E-03 lb/1000 gal; Mercury - 1.13E-04 lb/1000 gal; Beryllium - 2.85E-05 lb/1000 gal

Example Calculations

Single Fuel Combustion:
Hourly Emission Rate = Emission Factor X Activity Factor (1-hour maximum)

Multiple Fuel Combustion:
= {(Bagasse Activity Factor - Fuel Oil Activity Factor) x Bagasse Emission Factor}
+ (Fuel Oil Activity Factor x Fuel Oil Emission Factor)

Table 10. Summary of Finalized Source Parameters Used in the Modeling Analysis of U.S. Sugar's Clewiston Mill

Emission Unit	Modeling ID	Stack Height		Stack Diameter		Temperature		Flow Rate		Velocity		Relative Location (a)			
												X		Y	
		(ft)	(m)	(ft)	(m)	(F)	(K)	(dscfm)	(acfm)	(ft/s)	(m/s)	(ft)	(m)	(ft)	(m)
Boiler 1	USSBLR1	182	55.5	8.00	2.44	165	347.0	--	190,000	63.0	19.2	200.1	61.0	9.8	3.0
Boiler 2	USSBLR2	182	55.5	8.00	2.44	150	338.7	--	190,000	63.0	19.2	164.0	50.0	9.8	3.0
Boiler 3	USSBLR3	182	55.5	8.00	2.44	140	333.2	--	108,000	35.8	10.9	111.5	34.0	36.1	11.0
Boiler 4	USSBLR4	150	45.7	8.25	2.51	160	344.3	--	266,800	83.2	25.4	0.0	0.0	0.0	0.0
Boiler 7	USSBLR7	225	68.6	8.50	2.59	270	405.4	--	290,000	85.2	26.0	-131.6	-40.1	21.7	6.6

(a) Relative to Boiler No. 4 stack location.