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Golder Associates

September 20, 2006

063-7591

RECEIVED
SEP 21 2006
BUREAU OF AIR REGULATION

Florida Department of Environmental Regulation
Air Permitting South Program
2600 Blair Stone Road, MS 5500
Tallahassee, Florida 32399-2400

Attention: Mr. Jeff Koerner, P.E.

Re: **Project No. 0510003-038-AC (PSD-FL-346)**
Request for Additional Information
U. S. Sugar Corporation – Clewiston Sugar Mill and Refinery
Revision to New White Sugar Dryer No. 2

Dear Mr. Koerner:

United States Sugar Corporation (U.S. Sugar) and Golder Associates Inc. have received the Department's request for information (RAI) dated August 2, 2006, regarding the above referenced air construction permit application for the White Sugar Dryer (WSD) No. 2. We have also received the Department's email requests dated July 12 and July 26, 2006. We have reviewed the RAI and developed responses to each of the Department's comments. The responses are presented below, in the same order as they appear in the RAI letter and the emails.

<u>August 2, 2006 Letter</u>

1. A description of the corrective actions taken and the results.

Response: A detailed description of corrective actions taken through June 2006 was provided in the revised PSD application submitted in June. Since that time, the following additional activities have been conducted:

a. After inspection by David Taub, scrubber consultant, it was determined that the shroud in the Entoleter scrubber was hindering the scrubbing capabilities of the vane cage. Water was building up in the bottom of the vane cage and pouring over the shroud in surges, so instead of a constant 'cloud of mist' around the vane cage the cloud would appear intermittently between surges. Mr. Taub recommended removing the shroud and the bottom section of the vane cage to get the performance expected. Mr. Taub's official report is attached in Appendix A.

b. The modifications to the scrubber were completed in July.

c. The scrubber was operated and visually inspected for proper cloud formation. The visual inspection showed a much improved, more continuous, cloud formation in the scrubber. Therefore, the scrubber modification was considered successful.

d. Additional source testing for PM (PM_{10} was not tested) was conducted on the dryer on August 23, 2006. The results were markedly improved over the previous testing in May 2006. During the May testing, PM emissions averaged 23 pounds per hour (lb/hr). After the scrubber modifications, the August testing averaged 10.6 lb/hr PM. Refer to Question #2 below for a summary of the test results.

2. A summary of all emission tests conducted, including preliminary tests.

Response: A complete summary of all emission tests conducted to date is provided in Appendix B.

3. A description and schematic of the final emissions unit and controls noting changes to the original design and installed equipment.

Response: A schematic of the current emission unit configuration is shown in Figure 1. The only major difference from the original design is the installation of a bypass duct around the cyclone dust collectors, due to higher than anticipated air flow from the dryer. The higher air flow was creating too high a pressure drop across the cyclones. A comparison of the original and current design details is presented below.

Parameter	Original Design	Current Design
Maximum Production Rate (TPH)	85	85
Sugar Temperature- In	120-140°F	120-140°F
Sugar Temperature- Out	92-102°F	92-102°F
Sugar Moisture- In	1.5 percent	1.5 percent
Sugar Moisture- Out	0.03 percent	0.03 percent
Steam Requirement	11,000 lb/hr	11,000 lb/hr
Dust Loading to Control Equipment	14 gr/acf	14 gr/acf
Flue Gas Temperature	113°F	113°F
Flue Gas Volume	104,950 acfm	92,000 acfm, based on August 2006 testing
Flue Gas Volume	91,000 scfm	79,700 scfm, based on August 2006 testing

The original and final (current) control equipment design parameters are shown in Attachment UC-EU1-I3a, b (see revised air permit application pages in Appendix C).

4. A summary of the effectiveness of the particulate matter control system (as corrected) and the emissions.

Response: As described above, the recent changes to the scrubber have resulted in improved PM emissions. PM_{10} emissions have always been well below the permit limit. It is believed that the combination of cyclones and wet scrubber are very effective in removing PM/PM_{10} emissions.

However, the carryover of droplets out of the scrubber, which contain dissolved sugar solids, continues to some degree and is the origin of the higher PM emissions.

July 12 Email

1. A modeling analysis was not provided with the application. Debbie Nelson was the meteorologist on the original project and will be working on this revision as well. She is reviewing the original project to see what was provided and what was "exempted" by rule. She is also reviewing our current rules, which were revised in February of this year. She will review and let you know what modeling analyses must be provided for this project.

An ambient impact analysis for PM_{10} was performed in October 2004 for the original permitting of the new WSD No. 2. Modeling was performed for significant impacts and for AAQS for the 24-hour averaging period. A PM_{10} emission rate of 4.2 lb/hr, which is the current permitted rate for the dryer, was used in the modeling analysis. The analysis showed the maximum 24-hour impact due to all sources as 69 micrograms per cubic meter (ug/m^3), well below the ambient standard of 150 ug/m^3 for the 24-hour averaging period. Since U.S. Sugar is not requesting any increase in the permitted PM_{10} emission rate for the WSD No.2, we believe the previous modeling analysis is sufficient.

2. Page 2-2 of the application indicates that 25 percent of the dryer exhaust bypasses the cyclones directly to the wet scrubber. Please describe how the bypass is introduced into the scrubber and are the flows well mixed? Can another cyclone be added prior to the wet scrubber to avoid the bypass? What would be the additional capital and annualized costs?

The bypass duct joins with the duct to the wet scrubber just prior to the wet scrubber. Mr. Taub's survey did not reveal any issues with the bypass duct and the convergence with the primary exhaust duct from the cyclones.

As shown in the plan view of the scrubbing system submitted with the 2004 application, the cyclones are positioned in a corner of the building. There is no physical room to add another cyclone.

Mr. Taub's report states that bypassing the cyclones with a portion of the flow should have no effect on the overall particulate removal or meeting the PM emission standards, since the wet scrubber has a higher removal efficiency than does the cyclones. It should also be recognized that Entoleter itself proposed this modification.

3. The original application indicated that the scrubber exhaust would be horizontally out of the side of the building. The recent application indicates that the scrubber exhaust is vertical (Page 2-3). Is the scrubber exhaust horizontal or vertical? Was the exhaust stream tested for cyclonic flow?

The exhaust to the atmosphere for the WSD No. 2 is horizontal out the side of the building. A corrected permit application page is attached. However, the point at which the PM stack tests have been conducted is located along a horizontal duct running from the scrubber to the ID fan. This test point meets the minimum criteria of 2 diameters downstream/0.5 diameters upstream, so cyclonic flow should not be an issue at this location.

4. The second paragraph on page 4-6 of the application indicates "... an outlet dust loading of 0.005 gr/dscf (proposed limit for permitting purposes is 0.00729 gr/dscf)." Please explain this statement.

This statement was inadvertently carried over from the previous 2004 application, when U.S. Sugar was proposing an emission limit of 6 lb/hr. Please disregard it.

5. Please describe any other engineering solutions that are being pursued.

U.S. Sugar was considering extending the exhaust duct horizontally outside the building by about 40 feet, and enlarging the duct size to lower the velocity through the duct. The objective would be to allow the water droplets to grow and fallout, as suggested in Mr. Taub's report. However, this would cost in the range of $80,000 to $100,000, due to the structural supports required and the large size of the duct. This is considered to be a very high cost (roughly one-third of the cost of the entire pollution control system for the dryer), and there is no guarantee that this would solve the current problems with the PM emissions. Therefore, U.S. Sugar does not desire to pursue this approach any further.

July 26 Email

Please answer the below questions and add anything else that you plan to do to improve performance. Provide a preliminary schedule for completing each of these items.

1. Remove shrouds; (Where are these located? Describe designed function and current problem. How will removal improve performance?)

There is a blanking plate (or shroud) on the bottom section of the vane cage. There are four vane cage sections total. The blanking plate was installed to increase the velocity through the vane cage. This had to be done because the operating flow rate of 97,000 cfm was less than the design flow rate of 104,000 cfm. After inspection, Mr. Dave Taub determined that this shroud was hindering the scrubbing capabilities of the vane cage. Water was building up in the bottom of the vane cage and pouring over the shroud in surges, so instead of a constant 'cloud of mist' around the vane cage the cloud would appear intermittently between surges. Mr. Taub recommended removing the shroud and the bottom section of the vane cage to get the performance expected. This work was completed. The scrubber was then operated and visually inspected for proper cloud formation.

2. Increase duct dimensions; (specifically, where will duct dimensions be increased?)

The duct dimensions would be increased downstream of the existing duct, which exhausts to the atmosphere, as part of an extension to the existing duct. See also response #5 above.

3. Add ~ 40 ft. horizontal extension and test ports to existing exhaust vent;

As stated above in the response #5 to the July 12 email, this approach has a very high cost with uncertain results, which render this option infeasible.

4. Increase diameter of the new extension to reduce exhaust flow rates; and

As stated above in the response #5 to the July 12 email, this approach has a very high cost with uncertain results, which render this option infeasible.

5. Add drains to new extension and existing silencer.

U.S. Sugar is still considering the drain on the existing silencer, as it could reduce the deposition of sugar water onto the ductwork, outlet duct screen, and refinery building and process area. However, this would not affect the PM test results due to the location of the test ports upstream of the silencer.

U.S. Sugar is proposing a maximum PM emission rate for the new White Sugar Dryer No. 2 of 15 lb/hr, pending additional compliance testing (see revised air permit application pages in Appendix C). The revised emission tables (UC-EU1-F.10a and UC-EU1.F.10d) and revised PSD netting table (Table 3-3) are also included in Appendix C. Although the in-house testing indicated PM emissions of less than 15 lb/hr, additional compliance testing at full load operation is needed.

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

Sincerely,

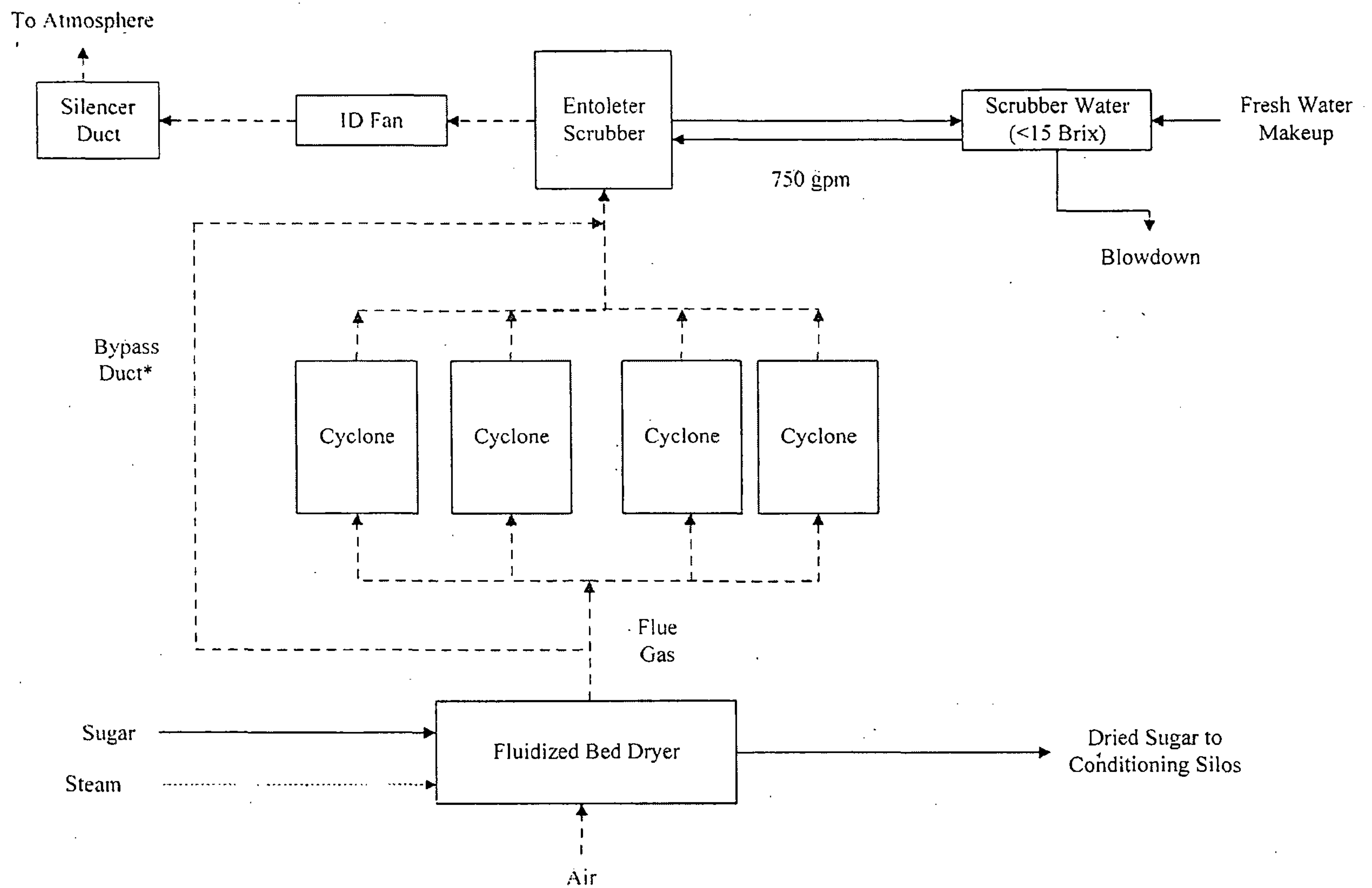
GOLDER ASSOCIATES INC.

David A. Buff, P.E., Q.E.P.
Principal Engineer

DB/dm

Enclosures

cc: Mr. Ron Blackburn, DEP South District Office
Mr. Peter Briggs, USSC
Mr. Don Griffin, USSC
Mr. James Stormer, PBCHD



* 25 percent of the flue gas bypasses the cyclones and enters the scrubber directly.

Figure 1
New White Sugar Dryer No. 2
Process Flow Diagram
U.S. Sugar

Process Flow Legend
Solid/Liquid ——→
Gas - - - →
Steam ·······→

Filename: 0637591/4.1/RA091406/FIGURE 1.VSD
Date: 09/19/06

Golder Associates

APPENDIX A

REPORT BY MR. DAVID TAUB

INNOVATIVE
SCRUBBER SOLUTIONS, INC.
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Phone: 973-584-4439 Fax: 973-584-4081
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August 2, 2006

US Sugar Corporation
1731 South W.C. Owen Ave.
Clewiston, FL 33440-1207

Att: Mr. Don Griffin

Ref: USSC PO No. C224316
Dryer #1 Entoleter Scrubber
ISS 2306 Report

Dear Mr. Griffin:

The purpose of this investigation is to determine if the Entoleter scrubber was correctly sized according to the design parameters, fabricated in accordance with drawings and to determine possible causes for the scrubber's failure to meet particulate emission limits and guarantees. A visual inspection was conducted on July 11 and 12, 2006 to gather the information required to accomplish the objectives of this report. Details of the information I gathered and observations that I made follow.

SCRUBBER OPERATION & DESIGN

Please refer to the attached figure 1 for the terminology used to describe the parts of the CentriField scrubber. The exhaust from the dryer enters the scrubber through the air inlet. It passes around and through the vane cage. The vane cage in this scrubber consisted of four rows with12-1/2" tall vanes in each row. There were about 84 vanes in each row. Each vane is angled toward the next vane in the cage so that each pair of vanes forms a mini venturi throat. As the air passes through the vanes, it picks up and atomizes liquid that has been recycled to the sump in the bottom of the vane cage. The droplets form a cloud of drops that spin inside the vane cage. Larger drops are spun out of the cloud by centrifugal force. The larger drops can exit the cage through slots in the vanes and clean the inside walls of the scrubber. Drops thrown from the cloud also sustain the cloud by two methods. First, the larger drops will collide with other drops and shatter to make smaller drops that are not affected by centrifugal force. They remain in the cloud.

Second, a drop can hit the back side of a vane and be regenerated by venturi action (by the velocity of the gas passing over the face of the vane).

Particles entering with the gas must travel a tortuous path through the cloud of droplets. Almost all of the particles will collide with a drop and be collected. While most of the drops remain in the cloud or exit the cages through the slots in the vanes, some drops exit as the gas is pulled up through the scrubber. The primary mist eliminator removes the particle-laden drops before they can exit the scrubber. The primary imparts a spin to the gas/droplet mixture and forces it to the wall of the separator tank. The drops with the collected particles agglomerate on the wall and fall to the bottom of the tank to be recirculated to the recycle tank through the liquid return. Liquid is bled from the stream to maintain a given percent solids.

The droplet free gas then continues spinning in the separator tank to insure that there is no droplet carry over. In this scrubber the spin pattern takes the form of a helix and will complete at least three spins before exiting the scrubber.

PARTICULATE TESTS

A review of the particulate tests shows that most of the particulate is being captured in the probe wash. This is typically the result of poor scrubber operation, droplet carryover, or poor test methods. Tests have shown that there is very little emission of particles under 10 microns. This indicates that the particles are being collected in the cage. I have to assume that the testers were alerted to the significance of the tests performed and that should rule out poor test methods. Droplet carryover would seem to be the cause of the test failures. We observed the performance of the primary mist eliminator through a sheet of Plexiglas while the unit was in operation. The visual surveillance of the mist eliminator demonstrates that it seems to be operating in accordance with its design. Most of the droplets are removed by the time the liquid reaches a height of about one half of the scrubber diameter (about 7-8 feet) above the mist eliminator. The vessel walls above this point seem to be dry.

Based on the above visual observation of the mist eliminator in operation, it appears that the droplets reaching the test ports are from condensation. At low saturated temperatures, the water in the gas will condense on any solid particles that pass through the scrubber and the drops formed have a high solids content. If a drop is collected during the test, non-compliance is guaranteed. I have observed this phenomenon in other dryer scrubbers with low saturated temperatures. Drops have caused failure of tests if there is not enough time for the drops to grow and fall out of the gas stream prior to the test ports. There is not enough time for the condensed drops to grow and fall from the gas stream in the present layout. It has been suggested that a chevron mist eliminator will solve the problem of droplet carryover. I am not convinced that droplet carryover is the problem

If condensation is causing the drops at the test ports, a chevron will have little effect on the test results.

EXISTING SYSTEM

The Entoleter scrubber appears to be correctly sized based on the original design parameters provided by the dryer manufacturer. Upon start-up and testing of the scrubber, it was determined that the exhaust gas volume was approximately 10,000 actual cubic feet per minute less than given design. Even with the reduced volume the cyclones were found to be undersized. Entoleter proposed that 25% of the gas be bypassed around the cyclones directly to the scrubber inlet. The fact that the gas is bypassed should have no effect on the operation of the scrubber or it's ability to meet emission requirements. The particles that would have been caught in the cyclone will easily be collected in the scrubber because it is more efficient at removing particulate than a cyclone when operated correctly. Entoleter also proposed modifications to the vane cage and primary mist eliminator (ME) to improve the operation of the scrubber. A 10" high steel band was placed around the bottom of the bottom row of vanes. That modification would increase the air velocity through the cage back to its original design. Increasing the air velocity makes smaller droplets in the cloud, which improves the collection efficiency of particles. The modification to the primary ME consisted of adding 5" pieces to the end of the nine blades of the ME. That increases the velocity out of the ME, which increases the droplet removal. The new velocity is about 7700 FPM. That is normal for this type of ME.

Visual observation of the ME verified that it is operating in accordance with good practice. The same cannot be said for the vane cage. Upon close scrutiny, it was noted that the cloud was not forming. The cloud would appear and then vanish. It was visible about one third of the time and when it was there it was watery. There also appeared to be no cloud in the top third of the cage. A gap between the installed band modification and the bottom of the cage allows recycle liquid to spill out of the cage bottom and bypass the cloud. That decreases the amount of water that can enter the cloud and adversely affects the cleaning of the inside of the scrubber, as well as particulate removal efficiency.

I was also informed that the recycle liquid rate had been increased from 500 to 750 GPM. This might or might not help the performance of the scrubber. The increased recycle rate would only help if the vane velocity is high enough to draw the excess liquid into the cloud. Too much water could have and adverse effect. The bottom of the cloud will become watery (larger drops) and larger drops reduce the particulate removal capability. Additional tests and visual observation would be required to determine the benefits of increasing the recycle rate.

DUCTWORK

Two areas of concern are noticeable when looking at the duct for the system. The duct into and out of the cyclones is not designed in accordance with manifolds I have seen for multiple cyclones. The present design allows most of the air to enter one or the other cyclones, creating an imbalance and the high pressure drop noted at start-up.

Properly designed manifolds are sloped to create a higher pressure drop at the back of the manifold. Air is then forced into the front cyclone. It is possible that a correctly designed manifold and larger outlet tubes in the cyclones will alleviate the high pressure drop.

The second area of concern is the duct at the outlet of the scrubber. A mitered elbow should not be installed on the top outlet of a scrubber. The scrubber should have been installed with a side tangential outlet on the separator tank. The velocity of the existing outlet duct is 60 FPS. Normal design for a wet duct is 45 FPS. The high velocity and turbulence caused by the mitered elbow could be the cause of condensation of gaseous liquid to drops. High velocity across cooler metal will cause condensation.

MODIFICATIONS

The inconsistent and watery cloud can be corrected by cutting the recycle feed pipe and removing the bottom of the cage. The bottom row of vanes can then be unbolted and removed and the cage bottom reinstalled. A spool piece should be welded in to reconnect the feed pipe. This modification should make the particulate removal capability of the scrubber more consistent. There will probably be a slight increase in the scrubber pressure drop, an inch or less.

There seemed to be few drops exiting the duct exhaust. Reheat of the exhaust by the fan raises the exhaust gas above the dew point and the silencer is probably acting like a mist eliminator to remove any drops remaining after the fan. The liquid exiting at the bottom of the exhaust duct confirms this. I would like to see a drawing of the silencer to confirm my suspicions. A drain should be installed on the bottom of the duct after the silencer to prevent the condensed liquid from coating the side of the building and ground.

The existing outlet duct should be extended and a new test conducted. There is a reasonable chance that the exhaust after the fan is in compliance with PM-10. All ducts and the silencer should be cleaned prior to testing. If the outlet is still higher than the allowable, more tests and observations should be conducted to determine where the drops are being formed.

It is my opinion that the scrubber is capable of providing outlet emissions of less than 0.05 gr/dscf. There are a number of this type of scrubber installed on similar, not the same type, dryers that have emissions in the 0.003 gr/dscf range. If the above modifications do not yield the required results more drastic changes will be required to bring the system into compliance.

The first change is to insure that the cyclones are correctly sized and make any modifications required to pass all the dryer exhaust gas through them. This would reduce the amount of liquid bleed from the system. I would then change the fan to a dry fan so it is between the cyclones and scrubber. This would allow a properly sized stack to be installed at the scrubber outlet and remove the poorly designed miter elbow. The stack would be sized so that condensed drops would have the opportunity to grow and fall back into the scrubber prior to the test ports.

GENERAL COMMENTS

Typically, scrubbers that require outlet particulate loadings of less than 0.005 gr/dscf are operated with low percent solids in the recycle liquid. There is no way I would ever recommend operating a scrubber at 50% solids. No mist eliminator is 100% efficient. A single, caught drop would fail an emission test. Most of the dryer scrubbers I installed that required 0.005 gr/dscf were operated with less than 3% solids in the recycle. Improving the performance of the cyclones would probably get you close to 3% solids with less bleed from the system.

Please let me know if you have any questions or require further clarification. Thank you for the opportunity to work with you.

Regards,
David B. Taub
President

APPENDIX B

WHITE SUGAR DRYER NO. 2 PM/PM_{10} TESTS

TABLE B-1
WHITE SUGAR DRYER NO. 2 PM EMISSION TESTS

Run Number	Test Date	Start/End Time	% Load	Stack Gas Flow Rate (dscfm)	Stack Gas Flow Rate (acfm)	Allowable PM Emissions (EPA Method 5)		Actual PM Emissions (EPA Method 5)		Avg. Water Flow (gpm)	Avg. Pressure Drop		Particulate Data		
						lb/hr	gr/dscf	lb/hr	gr/dscf		Cyclone (in. H_2O)	Scrubber (in. H_2O)	Filter (mg)	Wash (mg)	% Wash of Total
1	12/07/05	1056-1206	100	82,909	96,941	4.2	0.005	6.82	0.0096	529.4	3.8	9.6	0.3	23.5	98.7
2	12/07/05	1235-1345	100	82,993	97,239	4.2	0.005	3.65	0.0051	527.8	4.0	9.0	0.2	12.4	98.4
3	12/07/05	1453-1605	100	82,541	97,104	4.2	0.005	19.23	0.0272	524.8	4.0	9.0	0.4	65.2	99.4
Average=				**82,814**	**97,095**	**4.2**	**0.005**	**9.9**	**0.0140**	**527**	**3.9**	**9.2**			**98.8**
1	05/24/06	0852-0927	100	83,682	96,546	4.2	0.005	26.10	0.0364	747.7	5.0	9.0	1.0	46.5	97.9
2	05/24/06	1002-1037	100	82,769	95,849	4.2	0.005	18.61	0.0262	747.7	4.3	9.0	0.7	33.8	98.0
3	05/24/06	1100-1134	100	83,743	96,872	4.2	0.005	20.89	0.0291	750.0	4.3	9.0	0.6	36.6	98.4
4	05/24/06	1208-1243	50	85,704	98,102	4.2	0.005	19.65	0.0267	750.0	4.8	9.5	0.5	35.1	98.6
5	05/24/06	1303-1337	50	86,321	98,919	4.2	0.005	32.55	0.0440	747.3	3.7	10.7	0.5	57.1	99.1
6	05/24/06	1350-1425	50	85,981	98,614	4.2	0.005	20.89	0.0283	749.0	4.0	10.0	0.8	36	97.8
7	05/25/06	0802-0836	100	82,866	96,457	4.2	0.005	24.30	0.0342	747.7	4.7	10.0	0.5	42.7	98.8
8	05/25/06	0850-0925	100	82,501	96,272	4.2	0.005	20.21	0.0286	749.7	4.0	10.3	0.7	34.1	98.0
9	05/25/06	0934-1008	100	83,246	97,078	4.2	0.005	20.99	0.0294	745.7	3.0	11.0	0.6	35.4	98.3
Average=				**84,090**	**97,190**	**4.2**	**0.005**	**22.7**	**0.0314**	**748**	**4.2**	**9.8**			**98.3**
1	08/23/06	1320-1353	50	74,966	88,090	4.2	0.005	14.09	0.0219	750	3.0	8.5	0.8	28.9	97.9
2	08/23/06	1415-1449	50	75,900	88,771	4.2	0.005	10.38	0.0160	750	2.3	8.7	0.8	22.5	98.0
3	08/23/06	1502-1535	50	75,677	89,775	4.2	0.005	10.61	0.0164	751	3.0	8.7	0.7	23.3	98.4
4	08/23/06	1543-1600	50	75,650	89,117	4.2	0.005	11.97	0.0185	747	2.5	9.0	0.7	26.2	98.6
5	08/23/06	1635-1708	50	75,618	89,384	4.2	0.005	9.72	0.0150	757	3.0	8.7	0.8	21.1	99.1
6	08/23/06	1720-1753	50	76,365	89,939	4.2	0.005	6.91	0.0106	752	3.3	9.0	1.1	14.2	98.3
Average=				**75,696**	**89,179**	**4.2**	**0.005**	**10.6**	**0.0164**	**751**	**2.9**	**8.8**			**98.4**

Notes:
lb/hr = pounds per hour
gr/dscf = grains per dry standard cubic foot
mg = milligrams

TABLE B-2
WHITE SUGAR DRYER NO. 2 PM_{10} EMISSION TESTS

Run Number	Test Date	Start/End Time	% Load	Stack Gas Flow Rate (dscfm)	Stack Gas Flow Rate (acfm)	Allowable PM_{10} Emissions		Actual PM_{10} Emissions (EPA Method 210A)		Avg. Water Flow (gpm)	Avg. Pressure Drop		Particulate Data		
						lb/hr	gr/dscf	lb/hr	gr/dscf		Cyclone (in. H_2O)	Scrubber (in. H_2O)	Filter (mg)	Wash (mg)	% Wash of Total
1	05/23/06	1015-1040	50	85,299	93,003	4.2	0.005	2.37	0.00324	749.7	4.7	9.7	1.1	1.5	57.7
2	05/23/06	1127-1200	50	85,082	92,570	4.2	0.005	1.59	0.00218	753.0	4.3	9.7	0.7	1	58.8
3	05/23/06	1220-1254	50	85,713	92,883	4.2	0.005	1.13	0.00154	750.0	4.0	9.8	0.7	0.5	41.7
4	05/23/06	1400-1433	100	83,395	91,246	4.2	0.005	1.02	0.00143	750.0	4.0	9.7	0.4	0.8	66.7
5	05/23/06	1450-1554	100	84,141	91,790	4.2	0.005	1.75	0.00242	750.6	4.0	10.0	1	1	50.0
6	05/23/06	1545-1619	100	83,009	90,815	4.2	0.005	1.06	0.00149	750.3	4.0	10.0	0.5	0.7	58.3
7	05/25/06	1024-1058	100	83,263	91,101	4.2	0.005	1.02	0.00143	749.7	4.0	10.3	0.5	0.7	58.3
8	05/25/06	1110-1144	100	83,058	90,876	4.2	0.005	0.94	0.00131	745.7	4.0	10.0	0.4	0.7	63.6
9	05/25/06	1153-1228	100	82,799	90,877	4.2	0.005	1.26	0.00177	751.0	3.7	11.0	0.7	0.8	53.3
Average=				**83,973**	**91,684**	**4.2**	**0.005**	**1.3**	**0.00187**	**750**	**4.1**	**10.0**			**56.5**

Notes:
lb/hr = pounds per hour
gr/dscf = grains per dry standard cubic foot
mg = milligrams

APPENDIX C

REVISED AIR PERMIT APPLICATION PAGES

Professional Engineer Certification

1. Professional Engineer Name: **David A. Buff**
   Registration Number: **19011**

2. Professional Engineer Mailing Address...
   Organization/Firm: **Golder Associates Inc.****
   Street Address: **6241 NW 23rd Street, Suite 500**
   City: **Gainesville** State: **FL** Zip Code: **32653**

3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 336-5600** ext. **545** Fax: **(352) 336-6603**

4. Professional Engineer Email Address: **dbuff@golder.com**

5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

David A. Buff
Signature

9/19/06
Date

(seal)

* Attach any exception to certification statement.
**** Board of Professional Engineers Certificate of Authorization #00001670**

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **Sugar Refinery**	2. Emission Point Type Code: **3**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **See Attachment UC-EU1-A11.**	
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:	

5. Discharge Type Code: **H**	6. Stack Height: **80** feet	7. Exit Diameter: **7.0 × 6.0** feet
8. Exit Temperature: **113**°F	9. Actual Volumetric Flow Rate: **92,000** acfm	10. Water Vapor: **4** %

11. Maximum Dry Standard Flow Rate: **79,700** dscfm	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **Stack parameters represent White Sugar Dryer No. 2 discharge vent. See Attachment UC-EU1-A11 for a list of all stacks and their parameters in this emissions unit.**	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **15** lb/hour **65.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **15 lb/hr** Reference: **Proposed permit limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☒ 10 years
10. Calculation of Emissions: **15 lb/hr x 8,760 hr/yr ÷ 2000 lb/ton = 65.7 TPY**	
11. Pollutant Potential/Estimated Fugitive Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **1.63 lb/hr**	4. Equivalent Allowable Emissions: **1.63** lb/hour **7.12** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to VHP Sugar Dryer (EU 015) (Point ID S-11). As a surrogate parameter for PM, VE Must be less than 5% opacity.**	

Allowable Emissions Allowable Emissions 2 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **1.43 lb/hr**	4. Equivalent Allowable Emissions: **1.43** lb/hour **6.28** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to existing White Sugar Dryer No. 1 (EU 016) (Point ID S-10). As a surrogate parameter for PM, VE must be less than 5% opacity.**	

Allowable Emissions Allowable Emissions 3 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.7 lb/hr**	4. Equivalent Allowable Emissions: **0.7** lb/hour **3.07** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to Granular Carbon Regeneration Furnace (EU 017) (Point ID S-12).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 4 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **15 lb/hr**	4. Equivalent Allowable Emissions: **15** lb/hour **65.7** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Proposed permit limit. Applies to new White Sugar Dryer No. 2 (EU 029) (Point ID S-13).**	

Allowable Emissions Allowable Emissions 5 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.19 lb/hr**	4. Equivalent Allowable Emissions: **0.19** lb/hour **0.84** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to Vacuum Systems (EU 018). As a surrogate parameter for PM, VE must be less that 5% opacity (Point IDs S-1, S-2, S-3).**	

Allowable Emissions Allowable Emissions 6 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.17 lb/hr**	4. Equivalent Allowable Emissions: **0.17** lb/hour **0.74** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to Conditioning Silos (EU 019) (Point IDs S-7, S-8, S-9).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 7 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.25 lb/hr**	4. Equivalent Allowable Emissions: **0.25** lb/hour **1.07** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to Screening and Distribution (EU 020) (Point IDs S-5, S-6). As a surrogate parameter for PM, VE must be less than 5% opacity.**	

Allowable Emissions Allowable Emissions 8 of 8

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.21 lb/hr**	4. Equivalent Allowable Emissions: **0.21** lb/hour **0.90** tons/year
5. Method of Compliance: **EPA Method 5 or DEP Method 9**	
6. Allowable Emissions Comment (Description of Operating Method): **Permit No. 0510003-010-AC; PSD-FL-272A. Applies to Packing Baghouse (EU 022) (Point ID S-4). As a surrogate parameter for PM, VE must be less than 5% opacity.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

ATTACHMENT UC-EU1-A11

SOURCES AND RESPECTIVE STACK PARAMETERS INCLUDED IN THE SUGAR PROCESSING OPERATION

44.6

Source/Vent Name	EU ID	Stack No.	Stack/Vent Release Height (ft)	Stack/Vent Diameter (ft)	Exhaust Flow (acfm)	Exit Velocity[a] (ft/sec)	Gas Exit Temp. (°F)
Existing White Sugar Dryer	015	S-11	75	7.31	113,000	0.29	115
New White Sugar Dryer	029	S-13	80	7 × 6	92,000	36.5	113
VHP Sugar Dryer	016	S-10	10	4.79	127,000	0.29	115
Granular Carbon Furnace	017	S-12	30	2.00	4,300	22.8	160
<u>Vacuum Systems</u>							
Screening & Distribution Vacuum	018	S-1	65	0.50	1,705	0.29	68
100-lb Bagging Vacuum System	018	S-2	65	0.50	1,564	0.29	90
5-lb Bagging Vacuum System	018	S-3	65	0.50	1,585	0.29	90
<u>Conditioning Silos</u>							
Conditioning Silo No. 2	019	S-7	130	1.37	3,000	0.29	110
Conditioning Silo No. 4	019	S-8	130	1.37	3,000	0.29	110
Conditioning Silo No. 6	019	S-9	130	1.37	3,000	0.29	110
<u>Screening, Distributing, Packaging, Powdered Sugar/Starch</u>							
Screening and Distribution #1	020	S-5	72	0.95	3,200	0.29	125
Screening and Distribution #2	020	S-6	72	1.94	10,500	0.29	125
<u>Sugar Packaging Baghouse</u>							
Packaging Baghouse	022	S-4	60	1.94	11,500	0.29	125

[a] All sources but the Granular Carbon Furnace have horizontal discharge.

Attachment UC-EU1-F.10a
Future Potential Emissions of PM/PM_{10} From the Sugar Refinery, U.S. Sugar Corp., Clewiston
(revised 9-20-06)

Source/Vent Name	EU No.	Source ID	Exhaust Grain Loading (gr/dscf)	Exhaust Gas Flow (dscfm)	Hours of Operation	PM10 Emissions (lb/hr)[a]	PM10 Emissions (TPY)	PM Emissions (lb/hr)[a]	PM Emissions (TPY)
V.H.P. Sugar Dryer	015	S-11	0.001723	110,042	8,760	1.63	7.12	1.63	7.12
White Sugar Dryer No. 1	016	S-10	0.00177	94,488	8,760	1.43	6.28	1.43	6.28
White Sugar Dryer No. 2	029	S-13	0.022	79,700	8,760	15.03	65.83	15.0 [b]	65.70
					TOTAL =	18.09	79.22	18.06	79.10
Vacuum Systems									
Screening and Distribution Vacuum	018	S-1	0.00754	990	8,760	0.06	0.28	0.06	0.28
100 lb Bagging Vacuum System	018	S-2	0.00856	872	8,760	0.06	0.28	0.06	0.28
5 lb Bagging Vacuum System	018	S-3	0.00759	984	8,760	0.06	0.28	0.06	0.28
					TOTAL =	0.19	0.84	0.19	0.84
Conditioning Silos									
Conditioning Silo No. 2	019	S-7	0.0025	2,641	8,760	0.06	0.25	0.06	0.25
Conditioning Silo No. 4	019	S-8	0.0025	2,641	8,760	0.06	0.25	0.06	0.25
Conditioning Silo No. 6	019	S-9	0.0025	2,641	8,760	0.06	0.25	0.06	0.25
					TOTAL =	0.17	0.74	0.17	0.74
Screening and Distribution									
Screening and Distribution #1	020	S-5	0.0025	2,668	8,760	0.06	0.25	0.06	0.25
Screening and Distribution #2	020	S-6	0.0025	8,775	8,760	0.19	0.82	0.19	0.82
					TOTAL =	0.25	1.07	0.25	1.07
Sugar Packaging Baghouse									
Packing Dust Collector	022	S-4	0.0025	9,589	8,760	0.21	0.90	0.21	0.90
Granular Carbon Furnace	017	--	--	--	8,760	0.63	2.76	0.70	3.07
			GRAND TOTAL =			**19.53**	**85.54**	**19.57**	**85.72**

[a] Based on permit emission limits, except for PM emissions from White Sugar Dryer No. 2, based on proposed limit.
[b] Based on proposed PM limit.
Note: lb/hr = pounds per hour
TPY = tons per year

Attachment UC-EU1-F.10d

Summary of Potential Future Emissions from Sugar Refinery, U. S. Sugar Corporation, Clewiston (revised 9-20-2006)

Source	EU No.	Source ID	Potential Emissions (TPY) PM	PM_{10}	SO_2	NO_x	CO	VOC	SAM
V.H.P. Sugar Dryer	015	S-11	7.12	7.12	0	0	0	0	0
White Sugar Dryer No. 1	016	S-10	6.28	6.28	0	0	0	0	0
White Sugar Dryer No. 2	029	S-13	65.70	65.83	0	0	0	0	0
Vacuum Systems									
Screening and Distribution Vacuum	018	S-1	0.28	0.28	0	0	0	0	0
100 lb Bagging Vacuum System	019	S-2	0.28	0.28	0	0	0	0	0
5 lb Bagging Vacuum System	020	S-3	0.28	0.28	0	0	0	0	0
Conditioning Silos									
Conditioning Silo No. 2	019	S-7	0.25	0.25	0	0	0	0	0
Conditioning Silo No. 4	020	S-8	0.25	0.25	0	0	0	0	0
Conditioning Silo No. 6	021	S-9	0.25	0.25	0	0	0	0	0
Screening, Distribution, Packaging, Powdered Sugar/Starch									
Screening and Distribution #1	020	S-5	0.25	0.25	0	0	0	0	0
Screening and Distribution #2	021	S-6	0.82	0.82	0	0	0	0	0
Sugar Packaging Baghouse									
Packing Dust Collector	022	S-4	0.90	0.90	0	0	0	0	0
Granular Carbon Furnace	017	S-12	3.07	2.76	2.80	13.14	13.14	4.38	0.172
Alcohol Usage	021		0	0	0	0	0	15.00	0
TOTAL ALL REFINERY SOURCES			85.72	85.54	2.80	13.14	13.14	19.38	0.172

ATTACHMENT UC-EU1-I3a

DETAILED DESCRIPTION OF CONTROL EQUIPMENT

Control Equipment Parameters for

White Sugar Dryer No. 2

Cyclone Collectors

	ORIGINAL DESIGN	CURRENT DESIGN
Manufacturer and Model No.	Entoleter, LLC – Model 6600	Entoleter, LLC – Model 6600
No. of Cyclones	4	4
Inlet Gas Temp (°F)	113	113
Inlet Gas Flow Rate (acfm)	105,000	92,000
(scfm)	96,000	79,700
Pressure Drop Across Cyclones (inches of H_2O)	6	3 to 5
Inlet Dust Loading	11,760 lb/hr; 14 gr/dscf	11,760 lb/hr; 14 gr/dscf
Outlet Dust Loading	118 lb/hr	118 lb/hr
Cyclone System Particulate Removal Efficiency	99%	99%

Note: All values are based on manufacturer's design information and are subject to revision. All values represent typical operating conditions.

ATTACHMENT UC-EU1-I3b

DETAILED DESCRIPTION OF CONTROL EQUIPMENT

Control Equipment Parameters for

White Sugar Dryer No. 2

Wet Scrubber

	ORIGINAL DESIGN	CURRENT DESIGN
Manufacturer and Model No.	Entoleter, LLC – Centrifield Vortex Model 1500	Entoleter, LLC – Centrifield Vortex Model 1500
Inlet Gas Temp (°F)	113	113
Inlet Gas Flow Rate (acfm)	105,000	92,000
(scfm)	96,000	79,700
Pressure Drop Across Scrubber (inches of H_2O)	8-10	8-11
Scrubber Recirculation Flow Rate (gal/min)	500	750
Scrubber Make-up Flow Rate (gal/min)	12	12
Inlet Dust Loading	118 lb/hr	118 lb/hr
Outlet Dust Loading: PM_{10}	4.2 lb/hr	4.2 lb/hr
PM	4.2 lb/hr	15 lb/hr
PM/PM_{10}	0.005 gr/acf	0.02 gr/acf
Wet Scrubbing System Particulate Removal Efficiency (PM_{10})	96%	87%

[a] Efficiency impacted by carryover of water droplets from scrubber which contain dissolved sugar.

Table 3-3

White Sugar Dryer No. 2 PSD Source Applicability Analysis, U.S. Sugar Corporation, Clewiston (revised 9-20-2006)

	Baseline Emissions [a]				Future Potential Emissions				Net Change In Emissions Due to Proposed Project (TPY)	PSD Significant Emission Rate (TPY)	PSD Review Triggered?
Regulated Pollutant	Sugar Refinery Baghouses (TPY)	Granular Carbon Furnace (TPY)	Alcohol Usage (TPY)	Total (TPY)	Sugar Refinery Baghouses (TPY)	Granular Carbon Furnace (TPY)	Alcohol Usage (TPY)	Total (TPY)			
Particulate Matter (Total)	11.45	1.82	0	13.26	82.66	3.07	0	85.72	72.46	25	Yes
Particulate Matter (PM_{10})	11.45	1.63	0	13.08	82.78	2.76	0	85.54	72.46	15	Yes
Sulfur Dioxide	0	1.05	0	1.05	0	2.80	0	2.80	1.75	40	No
Nitrogen Oxides	0	10.13	0	10.13	0	13.14	0	13.14	3.01	40	No
Carbon Monoxide	0	10.13	0	10.13	0	13.14	0	13.14	3.01	100	No
VOC	0	1.24	3.13	4.37	0	4.38	15.0	19.38	15.01	40	No
Sulfuric Acid Mist	0	0.064	0	0.064	0	0.172	0	0.172	0.107	7	No

[a] Actual emissions based on the average emissions for 2002 and 2003.

PM_{10} = Particulate Matter with aerodynamic diameter less than or equal to 10 microns
VOC = Volatile Organic Compounds
TPY= tons per year