Golder Associates Inc.

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October 6, 2005

Florida Department of Environmental Protection Division of Air Resources Management 2600 Blair Stone Road, MS 5500 Tallahassee, FL 32399-2400

OCT 10 2005
BUREAU OF AIR REGULATION

Attention: Mr. Syed Arif, P. E.

RE: MOSAIC FERTILIZER, LLC, GREEN BAY FACILITY

DEP FILE NO. 1050053-041-AC/PSD-FL-359

MODIFICATION OF SOUTH AP AND NORTH MAP/DAP PLANTS

Dear Mr. Arif:

Mosaic Fertilizer, LLC (Mosaic) has received the Department's letter dated September 23, 2005, concerning the application to modify the Green Bay facility. Cargill is providing the following additional information regarding this permit application in response to the Department's request.

1. Please provide in detail the different scrubbing solutions being used in all the scrubbers for the two MAP/DAP plants. Additionally, indicate the set-up of the scrubbing system for the South AP Plant. It is not clear from the application whether the R/G system has one primary scrubber or whether it has secondary scrubbing as well.

Response: The scrubbing solutions in the two plants are as follows:

South DAP fertilizer Plant (EU 007)

Pollution Control Equipment	Scrubber Media
Reactor Granulator Scrubber	Recovery Solution
Dryer Primary Venturi Acid Scrubber	Recovery Solution
Screens and Mills Primary Venturi Acid Scrubber	Recovery Solution
Rotary Cooler Venturi Acid Scrubber	Recovery Solution
Cross Flow Scrubber	Once-Through Process Water

Recovery solution flow = phosphoric acid mixed with process water

North Map/Dap Granulation Plant (EU 029)

Pollution Control Equipment	Scrubbing Media
Primary Reactor Granulator (RG)	Recovery Solution - High
Scrubber	Mole solution
Secondary RG Scrubber	Recovery Solution - Low
	Mole solution
Ammonia Vaporizer Scrubber	Ammoniated Scrubbing
	Liquid
Dryer Scrubber	Recovery Solution
Screen & Mill Scrubber	Recovery Solution
Cooler Venturi Acid Scrubber	Recovery Solution
Cross Flow Scrubber	Once-Through Process
	Water

Recovery solution flow = phosphoric acid mixed with process water

The R/G scrubber on the South AP plant is one vessel with three stages. The first stage is a venturi section, which uses recovery solution (phosphoric acid as the scrubbing medium. The second stage is a cyclonic section, which uses phosphoric acid as the scrubbing media, and also is designed to remove liquid droplets from the gas stream. The last section is a spray tower, which uses process water as the scrubbing medium.

2. Figure 2-4 of the application indicates a primary wet scrubber for the North MAP/DAP Plant R/G system. Please indicate if this is a separate scrubber followed by a venturi/cyclonic and a tail-gas scrubber. When was the primary wet scrubber installed at this plant?

Response: The primary wet scrubber on the North MAP/DAP Plant is a separate scrubber. It is followed by a venturi/cyclonic scrubber as the secondary scrubber and then by a third scrubber, which is an ammonia vaporizer scrubber. The primary wet scrubber was installed in 1992.

3. Please indicate if any of the cross-flow scrubbers installed as a tail-gas scrubber for the Dryer and Screen Mills system for the two plants contains any packing for additional fluoride scrubbing. Calculate the scrubbing efficiency of the cross-flow scrubbers with and without the packing.

Response: The cross-flow scrubbers for the North MAP/DAP plant and South AP plant installed as part of the dryer and screen mills system do not contain packing. The dryer and screen mills scrubbing system for both plants is independent of the reactor/granulator scrubbing systems. The purpose of the dryer and screen mills scrubbing systems is to remove particulate matter emissions, not fluoride emissions. The entering stream is subjected to a process water spray, which then enters the cyclonic for removal. The stream exiting the cyclonic is again subjected to a once-through process water spray at the cross-flow scrubber for particulate matter removal.

Packing material in a cross-flow scrubber designed for removal of vapors is very effective, since "exchange" surface area is increased. However, in the case of the dryer and screen mills scrubbing systems for both plants, the primary pollutant for removal is particulates, and the scrubbers are not designed for packing. Installation of packing material into these cross-flow

scrubbers would cause rapid "blinding" of this packing material, increasing the possibility of channeling, and reducing scrubber particulate removal efficiency while increasing down-time for removal and cleaning.

In addition, Mosaic's experience with packing material used in combined reactor/granulator and dryer/screen mills scrubbing systems that use a single cross-flow scrubber, and only a wet scrubbing system was utilized (i.e., no ammonia vaporizer), has shown that fluoride removal efficiency actually increased significantly when the packing media was removed.

Thus, calculations for scrubbing efficiency of the cross-flow scrubbers with and without packing would not be appropriate for this application, since it would not be appropriate to install packing in the cross-flow scrubbers.

4. Tables 5-4 and 5-5 of the application indicates average process rate in tons per hour as P₂O₅. Please indicate if this process rate is the feed process rate or is it in terms of P₂O₅ produced. If it is feed process rate, submit plant production documentations that reflect that.

Response: The process rates shown represent P₂O₅ input to the process. Plant production documentations were previously submitted through our annual air compliance stack emission reports. A copy of the test result summary data sheets is attached.

5. Table 3-3 of the application indicates potential emissions increase for the Phosphoric acid plants due to being an affected source from this modification. Provide future actual emissions for those plants.

Response: Future actual emissions can be estimated by using the actual average emission factor used in the AORs for 2003-2004, and applying these factors to the potential increase in production due to the proposed project. The potential increase in production for the Phosphoric Acid plants is proportional to the increase in production for the two MAP/DAP plants.

For the South AP Plant, the difference between the average 2003-2004 production (244,121 TPY) and the future permitted production (402,960 TPY) is 158,839 TPY P_2O_5 . The potential increase in production for the North MAP/DAP Plant is the difference between the average 2003-2004 production (382,000 TPY) and the future permitted production (929,436 TPY), or 547,436 P_2O_5 . Therefore, the project could result in a potential increase in P_2O_5 of 706,275 TPY, or a 212% increase.

Applying this percent increase to the past actual emissions from the Phosphoric Acid Plant of 1.31 TPY (from all Phosphoric Acid Plant sources, presented in Table 3-3 of the application), results in future actual fluoride emissions from the Phosphoric Acid Plant of 2.8 TPY. Note that the recovery efficiency of the process (input P_2O_5 versus output P_2O_5) is approximately 99%, and has been ignored in these calculations since it is insignificant.

6. Please submit test reports for all the additional tests that were conducted in developing Tables 5-4 and 5-5 that does not correspond with an annual compliance test.

Response: All of the tests were either annual compliance tests or tests conducted to establish baseline scrubber operating parameters under the MACT regulations, and were submitted to the Department's Southwest District office. For your convenience, the test results data sheets are attached for all the tests included in the tables.

7. Please provide economic analysis for adding an ammonia vaporizer for controlling fluoride emissions at the South AP Plant.

Response: In reviewing the fluoride scrubbing system design for the South AP Plant, it is clear each individual component functions as part of a total scrubbing system, by design. Thus, one individual component of the system could not be removed in lieu of some other type of equipment, as the entire system was not designed with the alternate equipment and fluoride removal efficiencies could be compromised. Likewise, it would be inappropriate to "add-on" another component at the end of the scrubbing system without having the entire scrubbing system designed and replaced to accommodate this equipment.

An economic analysis to modify the South AP Plant reactor/granulator scrubbing system to incorporate an ammonia vaporizer scrubber on the R/G stack (Stack A) was presented in Table 5-8 of the application. However, this cost analysis also included the cost to replace the cross-flow scrubber with a packed bed scrubber on Stack B. Therefore, a cost estimate has been prepared to only add the ammonia vaporizer for Stack A (Table 2 attached). Since about one-half of the total fluoride emission come from the R/G stack, the baseline fluoride emissions were set at one-half of the allowable for the plant. The total capital cost is \$776,000 and the annual cost is \$73,300 per year. The resulting cost effectiveness is over \$60,000 per ton of fluoride removed.

8. Please provide economic analysis for modifying the existing cross-flow scrubber by adding Kimre packing for the South AP Plant. Also, provide the same analysis for the North MAP/DAP plant.

Response: In the response to Question #3 above, Mosaic indicated that it is not technically feasible to modify the existing scrubbers to add packing. Also, replacement of Kimre packing would not improve and may decrease fluoride removal efficiency in our scrubbing systems when using process water in the scrubber. Through discussions with other facilities, fresh water had to be used in place of process water to achieve the fluoride removal requirements. Thus, costs to complete this modification for both the North and South plants would need to include water treatment costs, i.e., the additional fresh water will need to be treated prior to discharge to the ponds.

Therefore, the only feasible option would be to replace the scrubber with a packed bed scrubber. This option was in fact already evaluated for the North MAP/DAP Plant in the application (refer to Table 5-8 of the application). The cost effectiveness of this option was \$38,000 per ton of fluoride removed. Use of fresh water in the scrubber would further add to the costs. The added cost for water treatment is \$32/1,000 gallons and a usage rate at 90 gpm (approximately \$1.2 million per year).

In addition to the costs described in Table 5-8 of the application, electrical costs would increase by 25% (to approximately \$57,300) to account for the larger fan requirements needed to increase air flow across the system.

- 9. Please respond to the attached incompleteness issues raised by the Southwest District, which was e-mailed to the consultant.
 - 1. E. U. 007 Refer to Page 15, Emission Unit Control Equipment, and Figure 2-3, Process Flow Diagram: Equipment types and numbers do not tally in these two documents. Also, these information do not tally with the recently submitted Title V Renewal Application (Title V Renewal Final, was issued on 8/26/05). Please ask for information of each actual control equipment in place, its description with the manufacturer information, for proper tracking.

Response: Page 15, Emission Unit Control Equipment, and Figure 2-3, Process Flow Diagram, equipment types and numbers appear to be consistent in this application. As stated in the response to FDEP Question #1 above, the R/G scrubber is venturi/cyclonic scrubber with a spray tower. Therefore, there are four (4) venturi/cyclonic scrubbers, with one (1) wet scrubber (the cross-flow scrubber). A revised flow diagram is attached to be clearer in this regard. A modification for the Title V permit will be submitted to correct this information. The description of scrubbing equipment as provided in the application is correct and due to the age of the equipment, manufacturer information is not available.

2. E. U. 029 - Refer to Page 15, Emission Unit Control Equipment, and Figure 2-4, Process Flow Diagram: Equipment types and numbers do not tally in these two documents. Also, these information do not tally with the recently submitted Title V Renewal Application (Title V Renewal - Final, was issued on 8/26/05). Please ask for information of each actual control equipment in place, its description with the manufacturer information, for proper tracking.

Response: Page 15, Emission Unit Control Equipment, and Figure 2-4, Process Flow Diagram, equipment types and numbers should be revised. Page 15 should indicate one ammonia vaporizer, two venturi/cyclonic scrubbers, and four wet scrubbers. The appropriately revised pages are attached. The primary Reactor/Granulator Scrubber is a wet scrubber, the Secondary RG Scrubber is a venturi/cyclonic scrubber, the Dryer Scrubber is a wet scrubber, the Screen and Mill scrubber is a wet scrubber, the Cooler Venturi Acid Scrubber is a venturi/cyclonic scrubber, and the Cross-Flow Scrubber is a wet scrubber.

A modification for the Title V permit will be submitted to correct this information. The description of scrubbing equipment as provided in the attached pages is correct, however, manufacturer information is not available as the equipment was field engineered and constructed, modified from it's original design, or engineered and manufactured using on-site engineers.

We would also like to take this opportunity to address the potential BACT limits for the two plants. We do not believe that the use of sample means is the correct statistical methodology to predict an upper 95% confidence interval to support a BACT limit. The facility cannot comply based on "means" or averages; it must comply every single compliance test that is conducted. We believe estimating the 95th percentile of the compliance test data is a more appropriate method. The Department has previously been sent via email the results of such an analysis.

For the South Plant, for PM, the analysis yielded a limit of 0.25 lb/ton P₂O₅. This value would have been even higher if one high test value had not been excluded. Statistics aside, the second highest PM compliance test result for the South Plant is 0.19 lb/ton P₂O₅ input. Given this value and BACT being the use of the existing scrubbing system, a BACT limit of 0.20 lb/ton would be too tight of a limit for Mosaic to accept. Mosaic proposes a compromise between the 0.20 lb/ton value and the 95th percentile value of 0.25 lb/ton, i.e., a BACT limit for PM of 0.22 lb/ton P₂O₅.

For the North Plant, for PM, the statistical analysis yielded a limit of 0.28 lb/ton P₂O₅. This value did not exclude any compliance test values. Statistics aside, the second highest PM compliance test result for the North Plant is 0.22 lb/ton P₂O₅ input. Given this value and BACT being the use of the existing scrubbing system, a BACT limit of 0.17 lb/ton would be much too tight of a limit for Mosaic to accept. In fact, the existing plant would have failed such a limit twice out of 14 tests (i.e., 14% of the time). Mosaic proposes a compromise between the 0.17 lb/ton value and the 95th percentile value of 0.28 lb/ton, i.e., a BACT limit for PM of 0.22 lb/ton P₂O₅, equal to the secondhighest compliance test value. Thus both the South and North Plants would have the same BACT limit.

Please call if you have any questions concerning this additional information.

Sincerely,

GOLDER ASSOCIATES INC.

Owil a. Buff

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

Principal Engineer Florida P. E. #19011

DB/db/all

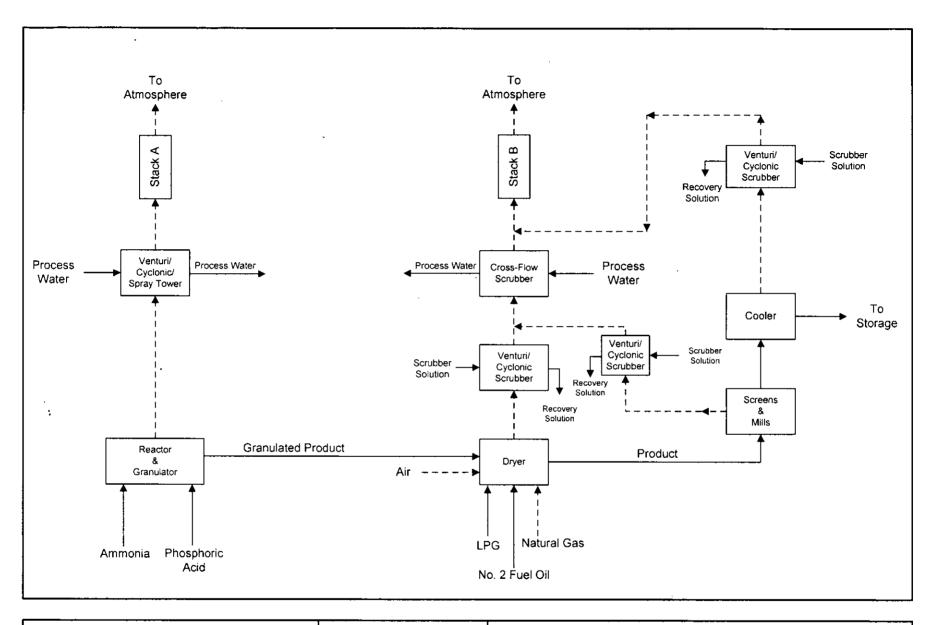
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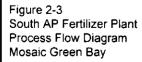
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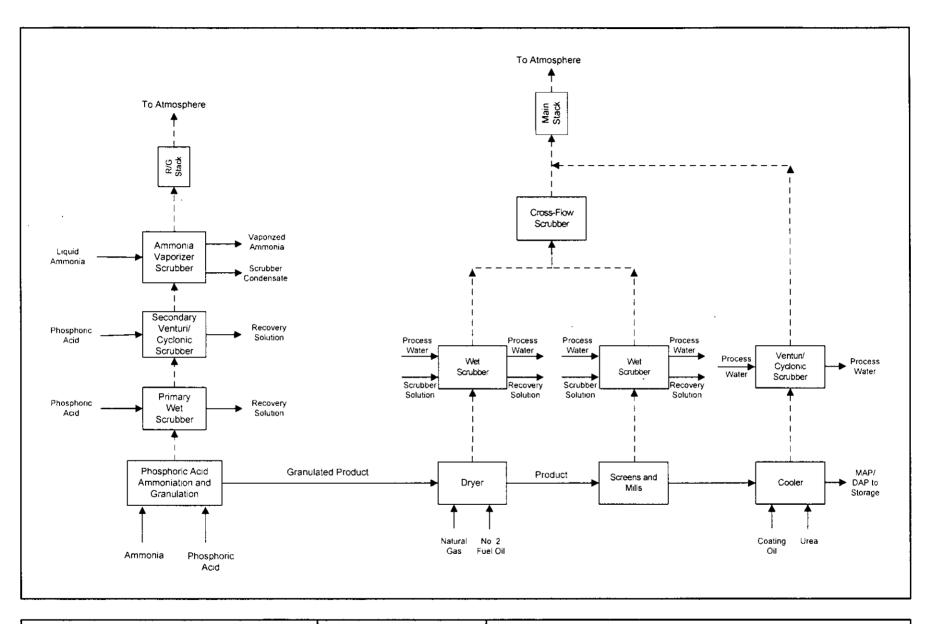


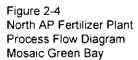
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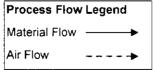
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Date: 10/07/05









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Date: 10/07/05



Table 2. Cost Analysis for Ammonia Vaporizer for Fluoride Removal, South AP Plant, Mosaic Green Bay

	Cost Items	Cost Factors ^a	South Plant Cost (\$)
	APITAL COSTS (DCC): trehased Equipment Cost (PEC)		
	Ammonia Vaporizer Scrubber	Mosaic Green Bay Estimate b	245,700
	Ammonia Vaporizer Scrubber Tank	· .	35,100
	Ammonia Vaporizer Scrubber Pump		32,500
	Piping	Mosaic Green Bay Estimate b	65,000
	Ductwork	Mosaic Green Bay Estimate b	81,900
	Freight	5%	15,665
	Taxes	7%	21,931
To	otal PEC:		497,796
Di	irect Installation Costs		
	Total Installation (Amm. Vaporizer		102,440
	Foundation	Mosaic Green Bay Estimate b	0
	Electrical	Mosaic Green Bay Estimate b	27,767
To	otal Direct Installation Costs		130,207
Total	DCC:		628,003
NDIRECT (CAPITAL COSTS (ICC):		
	Engineering	Mosaic Green Bay Estimate b	39,000
	Contractor Fees	10% of PEC	49,780
	Startup/Performance test	2% of PEC	9,956
Total l	Contingencies ICC:	10% of PEC, OAQPS Retrofit Cost Factor	49,780 148,515
TOTAL CA	PITAL INVESTMENT (TCI):	DCC + ICC	776,518
DIRECT OF	PERATING COSTS (DOC):		
(1)	Operating Labor		
	Operator	16 hours/week, \$16/hr, 52 weeks/yr	13,312
	Supervisor	15% of operator cost	1,997
(2)	Maintenance	Engineering estimate, 1% PEC	4,978
(3)	Electricity - Fan	\$0.06/kWh, 8760 hr/yr	16,363
Total I	DOC:		36,650
NDIRECT (OPERATING COSTS (IOC):		
	Overhead	60% of oper. labor & maintenance	12,172
	Property Taxes	1% of total capital investment	7,765
	Insurance Administration	1% of total capital investment 2% of total capital investment	7,765 15,530
Total I		270 of total capital investment	43,233
CAPITAL R	ECOVERY COSTS (CRC):	CRF of 0.0944 times TC1 (20 yrs @ 7%)	73,303
ANNUALIZ	ED COSTS (AC):	DOC + IOC + CRC	153,186
BASELINE	FL EMISSIONS (TPY) :	Future potential @ 0.06 lb/ton P ₂ O ₅ -Stack A	6.1
MAXIMUM FL EMISSIONS (TPY):		0.035 lb/ton P ₂ O ₅	3.5
REDUCTION IN FL EMISSIONS (TPY):		223	2.5
COST EFFE	CTIVENESS:	\$ per ton of FL Removed	\$60,689

Footnotes

^{*} Unless otherwise specified, factors and cost estimates reflect OAQPS Cost Manual. Section 5. Sixth edition.

^b Mosaic Green Bay 2005 estimates

EMISSIONS UNIT INFORMATION Section [2] North AP Plant

Emissions Unit Control Equipment

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1.	. Control Equipment/Method(s) Description:		
	132 Ammonia Vaporizer (Condenser) 053 Two Venturi/Cyclonic Scrubbers 141 Three Wet Scrubbers		
	•		
2.	2. Control Device or Method Code(s): 053, 132, 141		



Department of Environmental Protection

Jeb Bush Governor

Twin Towers Office Building 2600 Blair Stone Road Tallahassee, Florida 32399-2400

Colleen M. Castille Secretary

September 23, 2005

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Doug Belle, Plant Manager Mosaic Fertilizer, LLC 4390 County Road 640 Bartow, Florida 33830

Re: DEP File No. 1050053-041-AC (PSD-FL-359)

Green Bay Facility - Modification of South AP and North MAP/DAP Plants

Dear Mr. Belle:

The Department has received the application on August 25, 2005 for the Green Bay facility modification in Polk County. Based on our initial review of the proposed project, we have determined that additional information is needed in order to continue processing this application package. Please submit the information requested below to the Department's Bureau of Air Regulation:

- 1. Please provide in detail the different scrubbing solutions being used in all the scrubbers for the two MAP/DAP plants. Additionally, indicate the set-up of the scrubbing system for the South AP Plant. It is not clear from the application whether the R/G system has one primary scrubber or whether it has secondary scrubbing as well.
- 2. Figure 2-4 of the application indicates a primary wet scrubber for the North MAP/DAP Plant R/G system. Please indicate if this is a separate scrubber followed by a venturi/cyclonic and a tail-gas scrubber. When was the primary wet scrubber installed at this plant?
- 3. Please indicate if any of the cross-flow scrubbers installed as a tail-gas scrubber for the Dryer and Screen Mills system for the two plants contains any packing for additional fluoride scrubbing. Calculate the scrubbing efficiency of the cross-flow scrubbers with and without the packing.
- 4. Tables 5-4 and 5-5 of the application indicates average process rate in tons per hour as P₂O₅. Please indicate if this process rate is the feed process rate or is it in terms of P₂O₅ produced. If it is feed process rate, submit plant production documentations that reflect that.
- 5. Table 3-3 of the application indicates potential emissions increase for the Phosphoric acid plants due to being an affected source from this modification. Provide future actual emissions for those plants.
- 6. Please submit test reports for all the additional tests that were conducted in developing Tables 5-4 and 5-5 that does not correspond with an annual compliance test.
- 7. Please provide economic analysis for adding an ammonia vaporizer for controlling fluoride emissions at the South AP Plant.

- 8. Please provide economic analysis for modifying the existing cross-flow scrubber by adding Kimre packing for the South AP Plant. Also, provide the same analysis for the North MAP/DAP plant.
- 9. Please respond to the attached incompleteness issues raised by the Southwest District, which was e-mailed to the consultant.

Modeling information was received on September 9, 2005. The department has until October 9, 2005 to send any further comments based on the modeling review. Any additional comments from EPA and the U.S. Fish and Wildlife Service will be forwarded to you after we receive them.

The Department will resume processing this application after receipt of the requested information. Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. A new certification statement by the authorized representative or responsible official must accompany any material changes to the application. Rule 62-4.055(1), F.A.C. now requires applicants to respond to requests for information within 90 days.

We will be happy to meet and discuss the details with you and your staff. If you have any questions, I can be contacted at 850/921-9528. You may discuss the modeling requirements with Mr. Cleve Holladay at 850/921-8689.

Sincerely,

Syed Arif, P.E.

Bureau of Air Regulation

/sa

cc: Joel Smolen, DEP-SWD
Dave Buff, P.E., Golder Associates, Inc
Gregg Worley, EPA Region 4
John Bunyak, NPS

Arif, Syed

From: A

Arif, Syed

Sent:

Monday, September 19, 2005 1:16 PM

To:

'Buff, Dave'

Subject: Mosaic Green Bay

Dave,

The following incompleteness comments were submitted by the Southwest District. Please respond to Quaid's comments.

Syed,

My comments on the PSD application are as follows:

- 1. E. U. 007 Refer to Page 15, Emission Unit Control Equipment, and Figure 2-3, Process Flow Diagram: Equipment types and numbers do not tally in these two documents. Also, these information do not tally with the recently submitted Title V Renewal Application (Title V Renewal Final, was issued on 8/26/05). Please ask for information of each actual control equipment in place, its description with the manufacturer information, for proper tracking.
- 2. E. U. 029 Refer to Page 15, Emission Unit Control Equipment, and Figure 2-4, Process Flow Diagram: Equipment types and numbers do not tally in these two documents. Also, these information do not tally with the recently submitted Title V Renewal Application (Title V Renewal Final, was issued on 8/26/05). Please ask for information of each actual control equipment in place, its description with the manufacturer information, for proper tracking.

Thanks.

Quaid

Additionally, I looked at all the statistical references that you e-mailed me and every one of those document confirm what I told you about your use of the incorrect equation for 95% confidence level in the application. If you look at page 61 of the Statistical Methods book by Snedecor and Cochran that you e-mailed me, it makes reference to the correct equation. There they use s/sq.rt of n and I was suggesting using sq.rt of n-1 instead of sq.rt of n. In effect, I was giving more of a break than what they suggested in the book. Any time you are estimating population means or 95% upper confidence level by using sample means, that correction has to be made.

Hopefully, you are also working on the other issues that I raised in our last telephone call. We have to resolve all these issues by Thursday, otherwise I'll have to issue an incompleteness letter by Friday which will be Day 29 of the application in order to safeguard my rights.

Syed Arif, P.E Permit Engineer Division of Air Resources Management Department of Environmental Protection (850) 921-9528 or SC 291-9528

COMPLETE THIS SECTION ON DELIVERY SENDER: COMPLETE THIS SECTION Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. ☐ Agent ☐ Addressee Print your name and address on the reverse so that we can return the card to you. Date of Delivery Attach this card to the back of the mailpiece, or on the front if space permits. ☐ Yes D. Is delivery address different from item 1? 1. Article Addressed to: If YES, enter delivery address below: Mr. Doug Belle, Plant Manager Mosaic Fertilizer, LLC 4390 County Road 640 3. Service Type Certified Mail Registered Bartow, Florida 33830 ☐ Express Mail ☐ Return Receipt for Merchandise ☐ Insured Mail □ C.O.D. 4. Restricted Delivery? (Extra Fee)

910 4236	U.S. Postal Service CERTIFIED MAIL (Domestic Mail Only; No Insurance Coverage Provided) For delivery information visit our website at www.usps.com. OFFICIAL USE		
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1,350	Restricted Delivery Fee (Endorsement Required)		
	Mr. Doug B	elle, Plant Manager	r
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