July 6, 2000

Kimre, Inc.
PHASE SEPARATION TECHNOLOGY

RECEIVED
JUL 10 2000
BUREAU OF AIR REGULATION

John Reynolds
Florida Dept. of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

SUBJECT: G Map

Dear Mr. Reynolds,

To reiterate and/or supplement the discussions we had by a telephone conference on July 5th beginning at 3:35p.m.

I'm not really familiar with "impact scrubber" although I thought that I was fairly familiar with scrubber technology used in the word. If the basic scrubber has been in use for 30 years on fertilizer and other industry of air exhaust problems, then there will be a very extensive reference list, and I presume that would be available for perusal.

The sketch on page one, identified as page one, (which was page 2 of 13, which you sent me), indicates that there's a "standing ball of fine droplet spray". I don't understand that there can be a standing ball of fine droplets, nor do I understand how you can "place" that in a duct. And if it were generated, the velocity difference could only be the velocity of the air.

Further on there's reference to impacting these two jets of water. That contradicts other claims which indicates there are opposing sets of sprays (not jets of water). In any event, that is not "the normal method of making a fine mist", at least not in my experience: although, on the other hand, I have no idea what is meant by fine mist. The advantage of "immensely more surface area", sounds suspect to me. Perhaps some figures can be presented.

In respect to item 2, it is claimed, "In a Venturi scrubber the velocity is essentially the same", referring to, velocity difference. This is simply not true. Nor is it true that the velocity difference between the air and the water stream is the maximum with impact sprays: nor does it assure maximum of contact. We've never found any technology that matches the Kimre structure for efficiency of collection of particulate matter.

Item 3 is simply not true.

Item 4 contradicts the performance figures given and the cost figures are suspect.

Item 5 may be true under certain circumstances but the circumstances aren't specified.

In respect of Item 6 the performance contradicts other parts of the presentation.

Typically the higher the pressure used, the faster nozzles wear out. Nozzle wear is, in fact, a significant factor for any kind of device in a fertilizer plant that uses nozzles. There is no

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Web: www.Kimre.com • Email: sales@Kimre.com

provision given in the cost for nozzle replacement. By the way, we do not know, nor do I know, anyone that does know how to get complete contact of a gas stream of this magnitude with only 4 nozzles. It would be interesting to see the calculations to show how this is contacting the entire gas stream

When sprays are generated, it's an established fact that due to the lack of re-circulation within the individual droplets, mass transfer slows down very soon after droplet formation. And, of course, the droplets lose the relative velocity compared to the gas pretty quickly as well. These findings are well documented in the literature.

It is usual that heat transfer has a significant effect on the performance of these systems. In our discussions, I gave reference to an existing DAP plant with a classical granulation system where heat transfer was a limiting factor on fluoride removal. The installation used pond water (but not a standard phosphoric acid pond). If they are using re-circulated water and it is re-circulating to an existing pond, then the long term fluoride and ammonium phosphate concentration in that pond and the consequential effects of that need to be considered.

Attachment B shows a fluoride concentration below 500 PPM. This would seem to imply they are using a large amount of fresh water: especially when it is considered a fair amount of the water will evaporate. I have not seen the overall process calculations, but I do wonder where that water is coming from.

Quite candidly, it's my opinion that none of the proposed alternatives looks like the best approach. Alternative 1 apparently uses re-circulated water on impact spray. The water flow is not clearly established but it seems that the Kimre section would also have re-circulated fresh water. One stage of Kimre will provide three transfer units of fluoride removal and three transfer units of enthalpy removal. If there's no material equilibrium constraint this provides 95% fluoride removal not 70% as referenced.

Also, collection of any liquid or solid fluorides would be 99% at 10 microns size and higher than that for any larger particle or liquid diameter. The overall efficiency is much better than shown. IF THE IMPACT SPRAYS WOULD COLLECT ON A COMPARABLE BASIS WE WOULD LIKE TO SEE THE DATA AS WE HAVE YET TO SEE ANY PERFORMANCE FIGURES THAT COMPARE TO THE KIMRE STRUCTURE.

Alternative 5 appears to have combined Alternative 2, which is impact sprays with the addition of a Kimre stage. We suggest that including a conventional duct spray in the duct (co-current hollow cone) or spray stages in the scrubber body would be a more cost-effective way of achieving the objectives.

It is our position that when scrubbing fluorides, (and the same principle applies for particulates to a less extent), the first order of business is to get the gas saturated. It is not typically cost effective to use a high-pressure space for saturation or conditioning gas. This is really what the impact sprays would primarily be doing if they were used ahead of a Kimre™ Technology based scrubber. Kimre always prefers to have the gas saturated conditioned prior to contacting to the first bed. We are confident a more cost controlled design using Kimre would yield a lower cost per ton.

Finally, again a reminder that the Kimre pads can be installed in slide in/slide out modules. This increases the initial cost considerably but it also adds to the number of hours per year that the plant can really operate; for those plants that shut down due to maintenance of scrubbers. For example one of the DAP Plants in Florida never shuts down for maintenance on the scrubbers: although they don't use the slide in/slide out technique.

Now I have a question for you: Suppose a company, like IMC, selects an option to install a higher cost version of a Kimre™ scrubber with the intent of increasing the plant availability and therefore the total production capacity of the plant over a year. Their obvious intent is to provide the lowest cost per ton of product produced and it doesn't take many days of increased production per year to justify a significant increase of capital expenditure. In this case, HOW DOES ONE CALCULATE THE COST PER TON OF FLUORIDE REMOVED? Do you have a standardized protocol for looking at them? It really becomes a complicated issue since not only is the effective capacity increased, the maintenance cost and operating cost are actually decreased. Since the cleaning of the set of dirty media or the repair of a damaged nozzle, can be scheduled as a matter of routine rather than be rushed through when the equipment is down.

In any event, it was a pleasure talking to you and I hope that my input was of some assistance.

Sincerely,

KIMRE, INC.

George C. Pedersen, P.E.
President

GCP/cg

F: USA/IMC 059
USA/ FL, DEP 007

Cc: All Engineering

RECEIVED
JUN 19 2000
BUREAU OF AIR REGULATION

June 15, 2000

To: File

From: J. Kissel

Re: IMC New Wales GMAP application, DEP project 1050059-028-AC

This project is for a GMAP (Granular Monoammonium Phosphate) plant. Rule 296.403(i) requires BACT to control fluoride emissions. The purpose of this memo is to summarize the application submittals to provide a basis for selecting BACT.

Fluoride Removal in General Generally, fluoride removal has involved packed bed and a few venturi-type scrubbers. In recent years, information has been developed from various tests, and some limited speciation work by IMC, which indicates that efficiency of fluoride removal in the different types of scrubbers is dependent on the form of the fluoride, as to whether it is gaseous or non-gaseous. Non-gaseous fluorides could be in liquid or solid particulate form, and are referred to as liquid/solid fluoride or L/S fluoride.

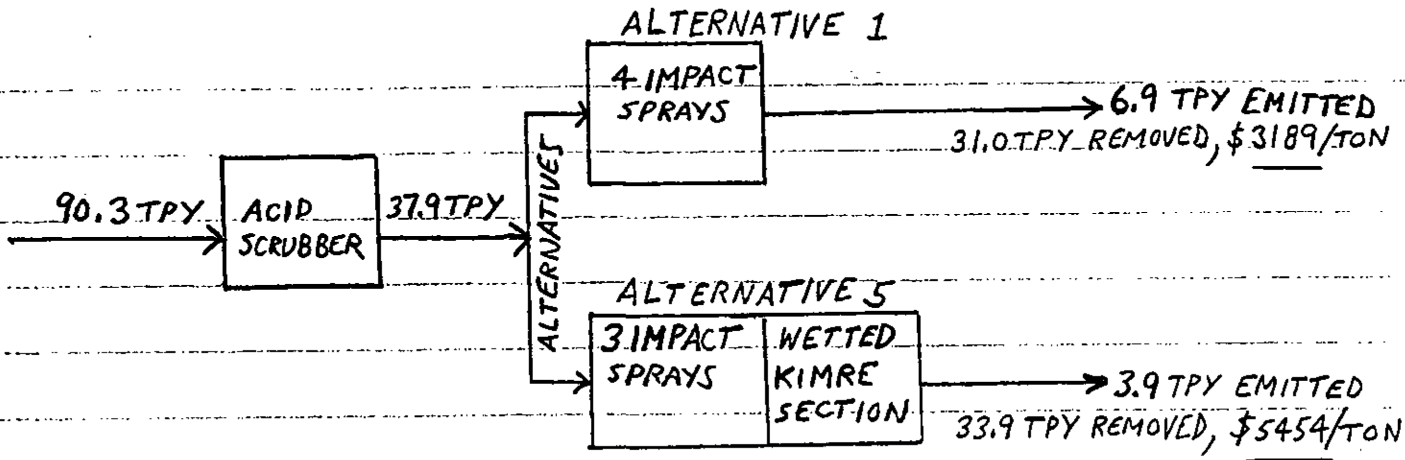
Fluoride from phos acid tanks, for example, would be gaseous fluoride, while fluoride from equipment such as dryers, coolers, and granulators, tends to be L/S fluoride. Fluoride from phos acid plants tends to be somewhere in between. Generally, L/S fluoride is amenable to removal in particulate removal-type devices, such as venturi scrubbers, and gaseous fluoride is not. Thus tests indicate that particulate removal-type devices at Granular DAP/MAP plants are successful because of the high proportion of L/S fluoride.

Further indication of this distinction between gaseous and L/S fluoride is found in the attached Table 1, which shows all the fluoride tests for IMC-Agrico's units. Note the three highlighted lines. The lowest emissions in the table by far are found in the first line, which is the only case where a baghouse is used. This indicates that when the ratio of particulate to gaseous fluoride is high, as would be expected for the cooler in line 1, a particulate removal device is very effective for F removal. Also note the highlighted lines for the No. 1 DAP Plant. That plant had a packed scrubber which was replaced with impact sprays. F emissions dropped by about 2/3 after the installation of the impact sprays (but the impact sprays used fresh water, as opposed to process water in the packed bed scrubber).

Fluoride Removal in GMAP Plants Because of the gaseous vs. L/S fluoride issue, the relevant plants to examine in the evaluation of BACT for this project are other granular DAP and MAP plants. There are 22 such plants in the SWD, summarized in Table 2. These plants utilize a venturi acid scrubber which conceptually should be considered as both part of the process and a pollution control device, followed by either a packed bed scrubber (17 plants) or a venturi-type scrubber (5 plants); "venturi-type scrubber" means a water dispersion type device such as a venturi scrubber itself, or impact sprays, or water sprays of some kind.

<u>BACT for this Project</u> The applicant has presented five alternatives for BACT. The two leading candidates are presented in a diagram below. The packed bed alternatives, which are not among the two leading candidates, generally show higher emissions and higher costs than the two cases presented below, largely because the packed bed scrubbers are not as effective on L/S fluoride.

Alternative 1 is a venturi acid scrubber followed by four recirculating water impact sprays. Alternate 5 is a venturi acid scrubber (the same scrubber as in alternative 1) followed by three recirculating water impact sprays (three of the four sprays in alternative 1). The water from the fourth spray is used to irrigate a Kimre section of packing.



INCREMENTAL COST FOR ALTERNATIVE 5 VS. ALTERNATIVE 1:
$29,157/TON

FOR REMOVAL COSTS ACROSS THE ENTIRE SYSTEM:

ALTERNATIVE 1: 83.4 TPY REMOVED $9,392/TON

ALTERNATIVE 5: 86.4 TPY REMOVED $10,071/TON

INCREMENTAL COST FOR ALTERNATIVE 5 VS. ALT'V 1: $29,256/TON

As a basis for selecting BACT, the following discussion is quoted from DEP's (Tallahassee) BACT Determination in the Sea Ray case, 0090093-003-AC, 5/10/00.

> The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical emission unit or emission unit category. If it is shown that this level of control is technically or economically unfeasible for the emission unit in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

Alternative 1 was calculated in the application material on the basis of .037 lb F/ton P_2O_5(lowest prior BACT), and Alternative 5 was calculated at .028 lb F/ton P2O5. The above discussion from the Sea Ray case points in the direction of selecting Alternative 5, in the context of fluoride removal costs from prior BACT determinations, but there are indications from prior tests that Alternative 1 will do about as well, and that actual emissions in both cases will be somewhat lower. There is enough uncertainty that it may not be reasonable for the Department to choose a lower BACT than .037 at this time.

An approach for this unit, however, could be to establish an initial BACT of .037, with the unit configured for both Alternatives 1 and 5. It will operate initially in Alternative 5 configuration (with the Kimre section). For the purposes of a test, it will operate in Alternative 1 configuration (without the Kimre section), and then return to Alternative 5 configuration until the Department approves the Alternative 1 test. At that point, at the option of the applicant, and with the consent of the Department, it can continue in Alternative 1 configuration, with a BACT of .030. The draft permit and BACT is being written along these lines and the purpose of this memo is to solicit comments from interested parties.

* * * * * * * * * * * *

This staff assessment is preliminary and is designed to assist in the review of the application prior to final agency action. The comments provided herein are not the final position of the Department and may be subject to revision pursuant to additional information and final review.

c: LAI Linero, FDEP — W. Thomas, FDEP
J. Reynolds, FDEP — D. Turley, IMC

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Table 1

Fluoride Emission Concentrations for IMC-Agrico Sources
Ranked From Lowest to Highest Emissions

Plant	Unit Name	F gr/scf (1)	Tests	Start Date	End Date	Source	1st Control Device	2nd Control Device	Scrubbing Liquid
New Wales	2DAP W COOLER *	0.00018	4	05/04/94	04/14/98	cooler	bag collector		none
Nichols	DAP COOLER *	0.00026	10	04/20/93	04/13/99	cooler	venturi		recirculated plant water
New Wales	2DAP E COOLER *	0.00031	12	01/25/91	03/25/99	cooler	venturi		recirculated fresh
New Wales	UR ACID CLEANUP	0.00035	7	03/31/94	03/11/99	tanks	packed scrubber		process (once through)
Nichols	DAP DRYER *	0.00050	10	04/21/93	04/14/99	dryer	venturi		recirculated plant water
New Wales	**1 DAP PLANT**	0.00051	3	11/17/98	11/04/99	r/g/d/c	venturi (acid)	Impact sprays	recirculated fresh
South Pierce	A PHOS ACID	0.00069	15	12/03/93	03/10/99	reactor	kimre scrubber		process (once through)
Nichols	PHOS ACID	0.00101	5	03/24/93	05/19/98	reactor	packed scrubber (removed)		process (once through)
New Wales	MAP PLANT *	0.00108	31	04/27/84	02/10/00	prill tower	venturi		process (recirculated)
South Pierce	B PHOS ACID	0.00136	18	08/26/93	03/16/00	reactor	kimre scrubber		process (once through)
New Wales	**1 DAP PLANT**	0.00166	31	04/26/84	03/23/98	r/g/d/c	venturi (acid)	packed scrubber	process (once through)
South Pierce	GTSP PLANT	0.00176	26	02/25/88	02/01/00	r/g/d/c	venturi (acid)	packed scrubber	process (once through)
New Wales	2DAP EAST *	0.00178	21	03/06/86	02/23/99	r/g/d/c	venturi (acid)	packed scrubber	process (once through)
South Pierce	GTSP BLDG - S	0.00178	25	03/24/88	03/10/00	storage	wet cyclonic		process (once through)
South Pierce	GTSP BLDG - N	0.00225	24	03/22/88	03/07/00	storage	wet cyclonic		process (once through)
New Wales	2DAP WEST *	0.00226	18	08/31/87	02/10/99	r/g/d/c	venturi	packed scrubber	process (once through)
New Wales	W PHOS ACID	0.00252	30	01/13/84	02/11/99	reactor	packed scrubber		process (once through)
New Wales	GTSP PLANT	0.00261	26	02/03/84	12/07/99	r/g/d/c	venturi	packed scrubber	process (once through)
New Wales	3 PHOS ACID *	0.00262	26	08/09/84	07/15/99	reactor	packed scrubber		process (once through)
New Wales	E PHOS ACID	0.00276	32	01/04/84	02/18/99	reactor	packed scrubber		process (once through)
Nichols	DAP R/G *	0.00282	11	04/19/93	04/13/99	r/g	venturi (acid)	fan spray	nuetral water (controlled)
New Wales	MULTIFOS *	0.00488	26	02/16/84	02/02/99	kilns	packed scrubber		process (once through)
New Wales	CLARIFICATION	0.00625	31	10/14/81	02/29/00	tanks	packed scrubber		process (once through)

* Units have undergone PSD BACT review. r/g/d/c = reactor/granulator/dryer/cooler

(1) Average for all tests

IMC-Agrico 5/9/00 Submittal
for 1050059-028-AC

TABLE 2

SWD GRANULAR MAP/DAP PLANTS - ranked approximately by fluoride limit

"403 BACT" means that fluoride limit was established as a result of BACT required by Rule 62-296.403(i)

Description (emission unit)	Fluoride Limit lb F/ton P_2O_5	Comments
IMC New Wales, GMAP (78) 1050059-028-AC	.030*(impact sprays) or .037	This project; 403 BACT
USAgrichem 1050051, MAP/DAP(38)	.037*	403 BACT
IMC 1050059, DAP II E&W (45 & 46)	.0417	PSD BACT
IMC 1050057, DAP/GMAP (2,3,&4)	.0417*	PSD
Farmland 1050053, North DAP (29)	.0417	PSD BACT
North MAP (29)	.06	PSD BACT
Cargill 0570008, No. 5 DAP (55)	.045	403 & PSD BACT
No. 3 & 4 MAP (22 & 23)	.055*	403 BACT
CF, 0570005, X MAP/DAP/GTSP(11)	.04	403 BACT
A,Y, & Z MAP/DAP(10,12,&13)	.06	403 BACT
Cargill (Polk), 1050046, DAP (01 & 21)	.06	403 BACT
IMC New Wales, 1050059, DAP 1 (9)	.06*	403 BACT
IMC1050055 So. P., MAP/DAP (3)	.06	PSD BACT
Piney Pt., 0810002, DAP (6)	.06	403 BACT
US Agrichem,1050050, MAP/DAP(38)	.06	PSD BACT
Cargill (Hills'o), 0570008, DAP (7)	.06	PSD BACT
GTSP (7)	.075	PSD BACT
IMC So. Pierce, 1050055, GTSP (23)	.15	403 BACT
Mulberry Phos,1050048, MAP/DAP (5)	.24	403 BACT
Farmland, 1050053, S.DAP (7)	.26	403 BACT

*indicates that the emission unit does not utilize a packed bed scrubber (5 plants), but rather a venturi-type scrubber for the last scrubber section; the balance have packed scrubbers (17 plants)

imcbact.doc

Department of
Environmental Protection

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Jeb Bush
Governor

David B. Struhs
Secretary

April 14, 2000

Mr. T.W. Fuchs
General Manager, New Wales Plant
IMC-Agrico Co.
P.O. Box 2000
Mulberry, FL 33860

Dear Mr. Fuchs:

Re: Air Construction Permit Application, Dated March 14, 2000
Project: Conversion of GTSP Plant to GMAP
DEP File No. 1050059-030-AC
Site Name: New Wales Facility
Location: 3095 Highway 640, Mulberry, Polk County

On March 17, 2000, the Department received the above referenced application. In order to continue processing the application, the Department will need the following additional information pursuant to Rule 62-4.070(1), F.A.C. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. You were listed as the Responsible Official in the application. Please provide a letter of authorization from the facility owner or an officer of the facility that states that you qualify as a "Responsible Official", which is defined as "...For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C. If not, please have someone qualified to act as a "Responsible Official" sign for the above referenced permit application.

2. In the calculation of the net PM emissions increase due to this project, several emissions units to be idled were used in the analysis. To use the "netting out" method to avoid PSD, the following must be met:

- All contemporaneous emission increases and decreases must be included in the netting analysis. Contemporaneous means within the five year period prior to startup of the new plant.
- All emission increases must be creditable (i.e., actual emissions, quantifiable, not previously relied upon in issuing a prior PSD permit.

Please update the analysis to reflect the above.

3. The proposed Alternative 1 does not provide the Department with reasonable assurance that the requested fluoride limit of 2.75 lb/hr can be met, based on the data submitted. As a result, the conversion to GMAP may be subject to PSD permitting. Note: The use of Kimre pads irrigated with fresh water, as discussed by David Turley and John Reynolds, could provide reasonable assurance that this is a non-PSD project. You have several options in this regard:

A. Provide additional information for Alternative 1 that gives reasonable assurance that this is a non-PSD project. The data should be well supported, documented by physical, chemical, and engineering principles. Some examples of essential additional information are listed below.

- Vendor supplied or other information on design basis and operating principles of impact sprays.
- Detailed drawing(s) and description of the impact spray section.
- Detailed drawing(s) and description of the nozzles
- Submit test reports for the tests used in the BACT analysis.
- Was the Department notified of the tests and given the opportunity to witness them?
- Were the tests conducted concurrently?
- Explain the apparent discrepancies in the exhaust temperatures (e.g., same temperature before and after venturi, low dryer exhaust temperature).
- Basis for the pre-control fluoride emissions (L/S and gr/scf) for the Reactor, Cooler, and Equipment exhausts.
- Show removal efficiency calculations.
- Why was there no fluoride removal listed for the impact sprays following the equipment scrubber?
- Was the cost for the impact sprays following the equipment scrubber included in the cost analysis? If appropriate, please include.
- Are you aware of any studies or a theoretical basis that supports the listed 92% reduction of liquid/solid fluoride using impact sprays? If so, please provide.
- Are you aware of any studies or a theoretical basis that supports the listed 20% reduction of particulate matter using impact sprays downstream of venturi scrubbers? If so, please provide.
- In alternatives 2 and 3, why wasn't recirculated water used for the packed section? Why weren't alternatives 2 and 3 evaluated without the impact sprays?
- Provide a BACT evaluation for the use of a packed scrubber only for fluoride control.
- Provide a BACT evaluation for the use of an irrigated Kimre mist eliminator.
- The derivation of the capital and annual costs for each component of the cost.
- Vendors bids or estimates to support the cost figures cited, if available.
- The majority of other similar sources in the District use packed bed scrubbing for fluoride control. If unusual circumstances greatly effect the cost of control in this specific project, the District may consider other alternatives as BACT. Please document why the $/ton removed is disproportionately high when compared to those of recent BACT determinations.
- Other than DAP #1, are you aware of any other applications of impact sprays used for fluoride removal?

or

B. Apply for a PSD permit.

or

C. Change the proposed control to include the irrigated pads as outlined above. Please update the proposed BACT Determination to reflect this option.

4. What are the costs (capital and indirect) for the new venturi scrubber?

5. The PSD applicability discussion for SO_2 did not account for differences in SO2 removal between the existing GTSP Plant control equipment and the proposed GMAP control equipment. Also, the sulfur content limit of 2.5% was used instead of the actual sulfur content of the fuel. The example below demonstrates the possible effect this has on PSD applicability.

Pre-Control 97/97 avg	Past Actual @ 80% SO_2 reduction[1]	Past Actual @ 90% SO_2 reduction[1]	PSD Minor Increase (+39 tpy)	Pre-Control Future Allowable[2]	Proposed Pre-Control Limit to Avoid PSD	PSD Avoided (Y/N)
SO_2 Emissions, tpy - based on fuel oil with 2.5% S						
113	22.6	-	61.6	154	152	Y
113	-	11.3	50.3	126	152	N
SO_2 Emissions, tpy - based on fuel oil with 2.3% S						
104	20.7	-	59.7	149	152	N
104	-	10.4	49.4	123	152	N

1. The application referred to SO_2 reductions of much higher than 80% for the DAP 2 Plant East and West Trains, which would presumably be similar for the GTSP Plant.
2. SO_2 reduction for Alternate 1 was not provided. This example assumes a 40% SO2 reduction (equal to that listed for fluoride reduction).

Please update the PSD applicability discussion for SO_2. Use the average fuel oil sulfur content (wt. %) for 1997 and 1998, and SO2 removal efficiencies for the GTSP Plant control equipment and the proposed GMAP Plant control equipment. Provide justification for selection of the removal efficiencies.

This staff assessment is preliminary and is designed to assist in the review of the application prior to final agency action. The comments provided herein are not the final position of the Department and may be subject to revision pursuant to additional information and further review.

"NOTICE: Pursuant to the provisions of Section 120.60, F.S. and Chapter 62-12.070(5), F.A.C., if the Department does not receive a response to this request for information within 90 days of the date of this letter, the Department will issue a final order denying your application. You need to respond within 30 days after you receive this letter, responding to as many of the information requests as possible and indicating when a response to any unanswered question will be submitted. If the response will require longer than 90 days to develop, an application for new construction should be withdrawn and resubmitted when completed information is available. Or for operating permits, you should develop a specific timetable for the submission of the requested information for Department review and consideration. Failure to comply with a timetable accepted by the Department will be grounds for the Department to issue a Final Order of Denial for lack of timely response. A denial for lack of information or response will be unbiased as to the merits of the application. The applicant can reapply as soon as the requested information is available."

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.

Due to the nature of the information requested above, your response should be certified by the responsible official. Please complete and submit a new R.O. certification statement page from the application form, DEP Form No. 62-210.900(1), effective February 11, 1999 (enclosed).

Sincerely,

Eric Peterson, P.E.
Air Permitting Engineer

cc:
Mr. Al Linero, P.E., DARM
Mr. John Reynolds, DARM
Mr. Charles David Turley, P.E., IMC-Agrico

IMC AGRICO®

Certified Mail Z 182 383 464
Return Receipt Requested

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MAR 1 6 2000

BUREAU OF AIR REGULATION

March 14, 2000

Mr. Eric Peterson, P. E.
Florida Department of
Environmental Protection
Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619-8218

RE: Project: Conversion of GTSP Plant to GMAP
FDEP File No. 1050059-028-AC
Site Name: New Wales Facility
Location: 3095 Highway 640, Mulberry, Polk County

Dear Mr. Peterson:

Based on further review of this project, a construction permit application has been prepared to replace the application submitted on October 6, 1999. Engineering testing was conducted at the No. 1 DAP Plant while producing GMAP and the data was used in the preparation of this application. The application and three copies are enclosed. The control of the particulate matter emissions has been revised.

The following information is provided to complete the response to your request for additional information dated November 4, 1999. The initial response was made on December 8, 1999, and included answers to questions 2, 4, 5, 6 and 11.

1. **Please submit a fluoride BACT determination for the proposed GMAP Plant to the Division of Air Resources Management - New Source Review Section, 2600 Blair Stone Road, Tallahassee, FL 32399-2400, and a copy to the Southwest District.**

   The fluoride BACT is included as Attachment B in the permit application.

2. **Related Southwest District comment: As reported in Annual Operating Reports, the 1994 and 1996 SO_2 emissions were 50.95 and 22.6 TPY, respectively (average is 36.8 TPY). The average SO_2 emissions listed in the application for 1994 and 1996 was 176 TPY.**

A further discussion of the calculation of the SO2 emissions was included in Attachment A. No SO2 testing was done at DAP1 since it had converted to natural gas before the testing started.

3. **Please provide a GMAP Plant (including the storage building) process flow diagram that shows the cyclones, scrubbers, process equipment (including sizing, handling, and storage), with appropriate labels.**

   The proposed GMAP Plant process flow diagram is attached to the application.

7. **How often is the N/P mole ratio checked? How is it controlled? What is the optimum for fluoride removal? What is its variability?**

   The N/P mole ratio of the scrubber solution is only checked randomly. The pH of the scrubber liquor has a direct relationship with the N/P mole ratio and is checked hourly. The pH is controlled by regulating the acid flow to the acid Venturi scrubber.

   The pH should be above 2.5, which corresponds to a mole ratio of about 0.7. A mole ratio above 0.6 gives maximum fluoride removal. The variability is generally between 2.5 and 3.0 pH (or between 0.7 and 0.85 mole ratio).

8. **What are the proposed normal operating pressure drop and flow rate ranges for the scrubbers?**

   The acid Venturi scrubber and cyclones should operate at 15-20 in w.g. The flow rate for the acid liquor is expected to be 1200-1800 gpm. The impact sprays and the demist section should be operated at about 4-6 in w.g. with a recirculating water flow of 1000-1400 gpm. The equipment Venturi scrubber will operate at 10-25 in. w.g. with an expected flow of 300-600 gpm of recirculated water.

9. **Please provide a completed emissions unit section for the GMAP storage building.**

   This section is included in the attached application.

10. What is the maximum annual GMAP production for this plant?

This information is included in the application and is 657,000 tons per year as P2O5.

Thank you for your attention to this matter. If you have any questions, please contact me at 941-428-7106.

Sincerely,

P. A. Steadham
Manager Environmental Services
Concentrates - Florida

Attachments

Attachment B separate to New Source Review Section

lmr
rsp02.doc

BACT Determination

This analysis of the Fluoride emission control alternatives is based on the installation of the new venturi scrubber for the purposes of particulate matter and ammonia recovery. This unit is necessary from the recovery stand point and also for the compliance with the PM emission limit proposed for this project. This analysis presents three alternative fluoride emission control approaches which will follow the new venturi scrubber. The alternatives are shown in Sketch 5.

In the preparation of this application, certain testing was done on the New Wales DAP 1 Plant while it was producing GMAP as will be done at the converted GTSP plant of this project. The configuration of the scrubbing system is similar to the proposed system. It can be used for determining expected concentrations at certain points in the proposed system. The testing locations in the DAP 1 system and the results are contained in sketch 4. These values were used to estimate equivalent values for the new system. These results were then used to predict expected efficiencies for the components of the new system. The tests were conducted from 12/20/99 through 01/27/00.

During the testing, the samples were handled in order to identify the fluoride components as either solid/liquid (S/L) or as gas. The probe wash and the filter were each analyzed individually and added together as S/L. The impinger catch amounts were considered as gaseous. This separation has been identified and used in the following analysis.

Base Emissions

The Fluoride emissions from the new scrubber system are projected to be approximately 10 lb/hr. This includes the stream from the new venturi scrubber and the stream from the existing scrubber to be used for the plant equipment. The designated flows and conditions from the testing are used for the estimation of the emissions. The test results, as flow weighted averages, were used to establish values for the new system location points shown in Sketch 5. These test averages were used to estimate collection efficiencies for the new system components as listed in the table.

Projected Emissions						Fluoride		
point	acfm	temp	%hoh	scfm	gr/scf	L/S %	lb/hr L/S	lb/hr gas
Streams from process equipment								
5	25000	180	0.47	10973	0.011	0.35	0.36	0.67
6	15000	140	0.22	10335	0.009	0.75	0.60	0.20
7	65000	170	0.22	42652	0.035	0.95	12.2	0.64
9	55000	130	0.12	43478	0.016	0.95	5.66	0.30
Stream entering the new scrubber								
4	160000			107438		0.91	18.8	1.81
New scrubber discharge						eff	0.63	0.06
2		147	0.24	107438	0.009	0.80	6.95	1.70
Stream entering the equipment scrubber								
8	26000	120	0.1	21383	0.016	0.95	2.79	0.15
Equipment scrubber discharge						eff	0.63	0.06
3				21383	0.006	0.88	1.03	0.14
Final stack emissions								
0				128821	0.009	0.81	7.98	1.84
							Total lb/hr F	9.82
							TPY @ 8760 hr/yr	43.0

Alternative 1

This configuration consists of impact sprays installed in the duct following the new venturi scrubber. This configuration is similar to the DAP 1 Plant scrubber revisions made under permit 1050059-013-AC. This permit covered the replacement of a packed process water scubber with impact sprays and a cyclonic demister. This configuration incorporates the impact spray control approach used at DAP 1 and uses the GTSP existing scrubber body with demister pads instead of a cyclonic demister.

The DAP 1 system has a recirculating water system for the impact sprays to replace the use of process water. This configuration uses recirculating water system also.

Projected Emissions						Fluoride		
point	acfm	temp	%hoh	scfm	gr/scf	L/S %	lb/hr L/S	lb/hr gas
New scrubber discharge (entering Impact Sprays)								
2		147	0.24	107438	0.009	0.80	6.95	1.70
Impact Spray discharge						eff	0.92	0.40
1				107438	0.002	0.35	0.56	1.02
Equipment scrubber discharge								
3				21383	0.006	0.88	1.03	0.14
Final stack emissions								
0				128821	0.002	0.58	1.59	1.16
							Total lb/hr F	2.75
							TPY @ 8760 hr/yr	12.0
							TPY Reduction	31.0

Cost analysis	Capital Cost	Indirect Cost, $/yr	Operating Cost, $/yr	Maintenance Cost, $/yr	Total Cost, $/yr
Install 8 impact sprays for fresh water scrubbing (pump 150 hp.)	$ 25,000		35,289		
Utilize existing Kimre mesh for mist elimination in existing TG scrubber	$ 10,250				
Part of new fan for pulling thru Impact sprays and TG section (150 hp.)	$ 42,500		35,289		
Total for Alternate 1	$ 85,525	21,450	70,578	6,842	98,869
Control Cost				$/ton	3,191

Alternative 2

This configuration extends that of Alternative 1. The Impact sprays are installed to follow the new venturi scrubber. In the existing scrubber, a packed section is added. This section uses once through process water as the scrubbing medium. The impact sprays continue to use recirculating water.

In this analysis, the efficiency of the process water section was estimated to be lower than the impact sprays because of the high concentrations of fluoride in the scrubbing medium compared to the dilute concentrations in the gas stream. In practice, process water scrubbers are used in situations where the inlet gas stream fluoride concentration is high. In the DAP 1 impact spray system, the fluoride concentration is below 500 ppm. In process water, the concentration is above 1%.

Projected Emissions						Fluoride		
point	acfm	temp	%hoh	scfm	gr/scf	L/S %	lb/hr L/S	lb/hr gas
New scrubber discharge (entering Impact Sprays)								
2		147	0.24	107438	0.009	0.80	6.95	1.70
Impact Spray discharge (stream entering Packed Section)						eff	0.92	0.40
1				107438	0.002	0.35	0.56	1.02
Packed Section discharge						eff	0.05	0.20
1a				107438	0.001	0.39	0.53	0.82
Equipment scrubber discharge								
3				21383	0.006	0.88	1.03	0.14
Final stack emissions								
0				128821	0.002	0.62	1.56	0.95
							Total lb/hr F	2.51
							TPY @ 8760 hr/yr	11.0
							TPY Reduction	32.0
							TPY diff Alternative 1 and 2	1.0

Cost analysis	Capital Cost	Indirect Cost, $/yr	Operating Cost, $/yr	Maintenance Cost, $/yr	Total Cost, $/yr
Reinstall new packing (Tellerettes) in existing TGS (130,000 scfm)	$ 75,000		39,156		
Portion of new fan for pulling through additional packing (300 hp.)	$ 85,000		70,578		
Total for Alternate 2	$ 176,000	44,141	109,733	14,080	167,954
Total Cost of Alternate 1 + Alternate 2	$ 261,525	65,590	180,311	20,922	266,823
Control Costs				Overall $/ton	8,339
				Incremental $/ton	165,333

Alternative 3

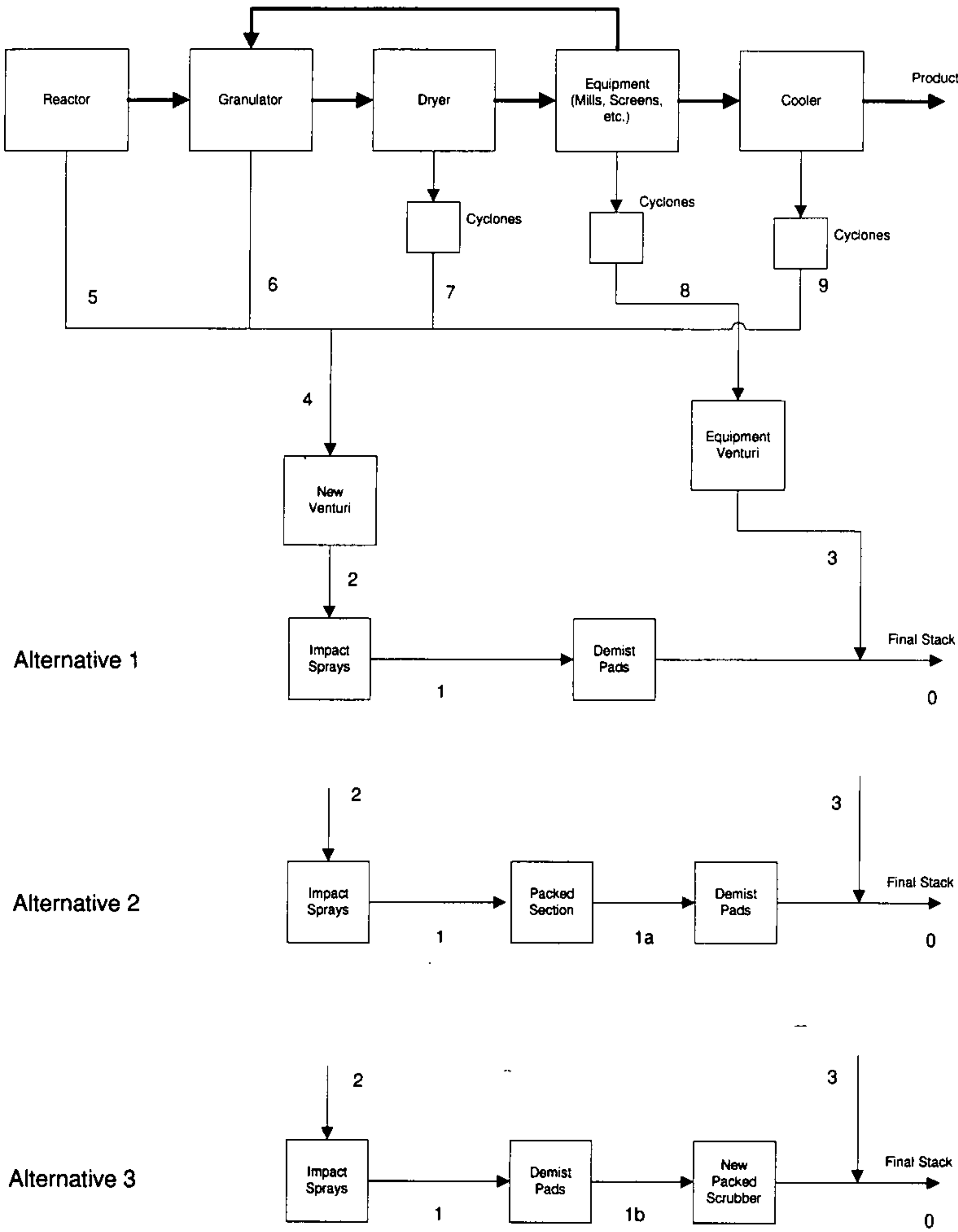
This configuration is similar to Alternative 1. The Impact sprays are installed to follow the new venturi scrubber using a recirulating water system. A second packed scrubber is added to further scrub the gas stream. The scrubber will also have a separate recirculating water system. It requires the addition of another fan (or additional capacity) to handle the increased pressure drop associated with it.

The fluoride reduction in the scrubber is estimated to be higher than that of the impact sprays for the removal of the gaseous portion of the emissions since the fluoride concentration in the scrubbing liquor will be lower than the following system. Any further collection of any solid fluorides will be minimal in this unit.

Projected Emissions						Fluoride		
point	acfm	temp	%hoh	scfm	gr/scf	L/S %	lb/hr L/S	lb/hr gas
New scrubber discharge (entering Impact Sprays)								
2		147	0.24	107438	0.009	0.80	6.95	1.70
Impact Spray discharge (stream entering Second Scrubber)						eff	0.92	0.40
1				107438	0.002	0.35	0.56	1.02
Second Scrubber discharge						eff	0.05	0.60
1b				107438	0.001	0.55	0.50	0.41
Equipment scrubber discharge								
3				21383	0.006	0.88	1.03	0.14
Final stack emissions								
0				128821	0.002	0.74	1.53	0.55
							otal lb/hr F:	2.08
							TPY @ 8760 hr/yr:	9.1
							TPY Reduction from base case:	33.9
							TPY difference Alternative 1 and 2:	2.9

Cost analysis	Capital Cost	Indirect Cost, $/yr	Operating Cost, $/yr	Maintenance Cost, $/yr	Total Cost, $/yr
Install new vertical packed scrubber (130,000 scfm)	$ 400,000		10,000		
Increase size of fan (220 hp) for additional pressure drop (6")	$ 62,429		51,757		
Fresh water recirculation pumps (135 hp)	$ 50,000		31,760		
Total for Alternate 3	$ 563,672	141,369	93,517	45,094	279,980
Total Cost of Alternate 1 + Alternate 3	$ 649,197	162,819	164,094	51,936	378,849
Control Costs				Overall $/ton	11,175
				Incremental $/ton	95,892

IMC AGRICO	Proposed BACT Configurations for GMAP Conversion		
	3/10/00	New Wales	Sketch No. 5



Department of Environmental Protection

Jeb Bush
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

David B. Struhs
Secretary

November 4, 1999

Mr. E.M. Newberg
V.P. of Concentrated Phosphate Operations
IMC-Agrico Co.
P.O. Box 2000
Mulberry, FL 33860

Dear Mr. Newberg:

Re: Air Construction Permit Application, Dated October 6, 1999
Project: Conversion of GTSP Plant to GMAP
DEP File No. 1050059-028-AC
Site Name: New Wales Facility
Location: 3095 Highway 640, Mulberry, Polk County

On October 7, 1999, the Department received the above referenced application. In order to continue processing the application, the Department will need the following additional information pursuant to Rule 62-4.070(1), F.A.C.:

1. Please submit a fluoride BACT determination for the proposed GMAP Plant to the Division of Air Resources Management - New Source Review Section, 2600 Blair Stone Road, Tallahassee, FL, 32399-2400, and a copy to the Southwest District.

2. Please address the comment from John Reynolds (Division of Air Resources Management - New Source Review Section) :

There are several issues that could affect PSD applicability. First, the decision to use 1994 and 1996 may not be justifiable within the rules since the two year period is not consecutive. Unless there are valid reasons for doing otherwise, the two-year period of representative operation must be the most recent, i.e. 1997/98. It appears that IMC's selection was based on the highest production but that isn't necessarily valid if production steadily declined for market reasons (or other reasons affecting the industry). The emission averages should have been determined on a lb/ton basis and then converted back to lb/hr. It appears that this reconstruction project is subject to PSD for fluorides on the basis that the average fluoride test results for 1997/98 = 0.179 lb F/ton P2O5 and that reasonable assurance must be shown that the proposed scrubber configuration could achieve a substantial increase in efficiency (0.179 vs. 0.041). There will be an increase of 75 - approx. 24 = 51 tons P2O5/hr processed (446,760 TPY P2O5) which, by itself, is the equivalent of installing three PSD-significant sources of fluoride emissions (446,760 x 0.041/2000 = 9.15 TPY Flouride). There is no assurance presented that the proposed modifications will be capable of preventing PSD-significant thresholds from being exceeded.

We would need the design parameters of the scrubbers, flow streams, etc., including the extent of water scrubbing contemplated in the modification.

Related Southwest District comment: As reported in Annual Operating Reports, the 1994 and 1996 SO2 emissions were 50.95 and 22.6 TPY, respectively (average is 36.8 TPY). The average SO2 emissions listed in the application for 1994 and 1996 was 176 TPY.

3. Please provide a GMAP Plant (including the storage building) process flow diagram that shows the cyclones, scrubbers, process equipment (including sizing, handling, and storage), with appropriate labels.

4. Will the proposed change debottleneck the facility and increase potential emissions of other emissions units? If so, the increases must be accounted for in the PSD applicability review.

5. List each material sizing, handling, and storage equipment vent and/or material transfer point with its emissions vented to air pollution control equipment.

6. List each material sizing, handling, and storage equipment vent and/or material transfer point that will not be vented to air pollution control equipment and any reasonable precautions to be taken to prevent emissions of unconfined particulate matter. Why aren't they vented to the air pollution control equipment?

7. How often is the N/P mole ratio checked? How is it controlled? What is the optimum for fluoride removal? What is its variability?

8. What are the proposed normal operating pressure drop and flowrate ranges for the scrubbers?

9. Please provide a completed emissions unit section for the GMAP storage building.

10. What is the maximum annual GMAP production for this plant?

11. The Title V Permit for this facility lists the heat input rate for the dryer as 63.7 mmbtu/hr, yet the application lists it as 30 mmbtu/hr. Is this a new dryer? If not, how is this decrease in heat rate input accomplished?

"NOTICE: Pursuant to the provisions of Section 120.60, F.S. and Chapter 62-12.070(5), F.A.C., if the Department does not receive a response to this request for information within 90 days of the date of this letter, the Department will issue a final order denying your application. You need to respond within 30 days after you receive this letter, responding to as many of the information requests as possible and indicating when a response to any unanswered question will be submitted. If the response will require longer than 90 days to develop, an application for new construction should be withdrawn and resubmitted when completed information is available. Or for operating permits, you should develop a specific timetable for the submission of the requested information for Department review and consideration. Failure to comply with a timetable accepted by the Department will be grounds for the Department to issue a Final Order of Denial for lack of timely response. A denial for lack of information or response will be unbiased as to the merits of the application. The applicant can reapply as soon as the requested information is available."

NOTE: 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.

Sincerely,

Eric Peterson, P.E.
Air Permitting Engineer

cc:
Mr. Al Linero, P.E., DARM
Mr. John Reynolds, DARM
Mr. Charles David Turley, P.E., IMC-Agrico