August 9 TCEPC need.

AMAX Chemical Corporation
A SUBSIDIARY OF AMAX INC.
P. O. BOX 790 • PLANT CITY, FLORIDA 34289 • (813) 752-1161

July 31, 1984

Mr. Dan Williams
Air Permitting Section
Department of Environmental Regulation
Southwest District
7601 Highway 301 North
Tampa, Florida 33610

Dear Mr. Williams:

Please find attached four (4) copies of a construction permit application to install a wet scrubber at the Plant City facility.

Potential to emit 50 TPY

Also attached is a check in the amount of $500.00 to cover the application fee. A copy of the application and the appropriate fee have been transmitted to the Hillsborough County Environmental Protection Commission.

Should you have any question concerning this application, please let me know.

Sincerely,

George Townsend

George Townsend
Environmental Supervisor

GT:cr

Attachments

cc: J. J. Lewis
F. G. Mullins

AMAX Chemical Corporation
A SUBSIDIARY OF AMAX INC.
P. O. BOX 790 ♦ PLANT CITY, FLORIDA 34289 ♦ (813) 752-1161

July 31, 1984

Mr. Jerry Campbell
Air Permitting Engineer
Hillsborough County
Environmental Protection Commission
1900 Ninth Avenue
Tampa, Florida 33605

Dear Mr. Campbell:

Please find attached a construction permit application to install a wet scrubber at the Amax Plant City facility. Also attached is a check in the amount of $170.00 to cover the application fee.

The four (4) copies of the application required by the Florida Department of Environmental Regulation have been transmitted to that agency, along with the appropriate application fee.

Should you have any question concerning this application, please let me know.

Sincerely,

George Townsend

George Townsend
Environmental Supervisor

GT:cr

Attachment

cc: J. J. Lewis
F. G. Mullins

AC 29-091316

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

New source? Is all new plants? are modifs. exist plt.?

SOURCE TYPE: Point Source Air Pollution [XX] New[1] [ ] Existing[1]

APPLICATION TYPE: [XX] Construction [ ] Operation [ ] Modification

COMPANY NAME: Amax Phosphate, Inc. COUNTY: Hillsborough

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Phosphoric Acid Defluorinating Plant with Upflow Counter Current Scrubber

SOURCE LOCATION: Street Coronet Road City Plant City

UTM: East 17-393.8 North 3096.3

Latitude ____ ° ____ ' ____ "N Longitude ____ ° ____ ' ____ "W

APPLICANT NAME AND TITLE: J. J. Lewis, Plant Manager

APPLICANT ADDRESS: P.O. Box 790, Plant City, Florida 33566

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Amax Phosphate, Inc.

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: J. J. Lewis

J. J. Lewis, Plant Manager
Name and Title (Please Type)

Date: 5/4/84 Telephone No. (813) 752-1161

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

(Affix Seal)

Signed: Anthony R. Lenkei

Anthony R. Lenkei
Name (Please Type)

Amax Phosphate, Inc.
Company Name (Please Type)

P.O. Box 790, Plant City, FL 33566
Mailing Address (Please Type)

Florida Registration No. 8716 Date: _____ Telephone No. (813) 752-1161

[1] See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

This project will control emissions from the reaction tanks during the defluorination of phosphoric acid. The emission control system will consist of up-flow counter current wet scrubber, fan, and necessary duct work to vent the reaction tanks.

↑ Describe process

B. Schedule of project covered in this application (Construction Permit Application Only) 1½ yrs to const.

Start of Construction September 1, 1984 Completion of Construction February 28, 1985

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Equipment and Materials - $43,700 inexpensive scrubber.

Labor - $15,300

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

Not Applicable

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes XX No

F. Normal equipment operating time: hrs/day 8 ; days/wk 5 ; wks/yr 52 ; if power plant, hrs/yr N/A ;

if seasonal, describe: 2080 hr/yr operation

↑ is this max hr plt operate

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes ✓
   a. If yes, has "offset" been applied? N/A
   b. If yes, has "Lowest Achievable Emission Rate" been applied? N/A
   c. If yes, list non-attainment pollutants.
      Ozone, VOC ✓
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. No
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. No
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

FR-2,608 which rule apply? Need BACT recommendation

Other poll emissions from other equip

If not new plt, Describe what equip affected

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Phosphoric Acid	Fluoride	0.85%	50,792 431.7 lb/hr	See Attachment D-1&D-2
Diatomaceous Earth	Particulate	100	231	See Attachment D-1&D-2
Caustic	N/A	N/A	626	See Attachment D-1&D-2
Heating for dilution Water			51,649	

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 51,649

2. Product Weight (lbs/hr): 51,872 prod wght greater input, is so, why? 51,782 in attach A — Which correct

P_2O_5 acid % F in product?

C. Airborne Contaminants Emitted:

What is potential basis

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Particulate	0.50	0.52	17-2.610 (2) (a)	0.50	25.0	26.0	See Attach. D-3
Fluoride	0.98	1.02	~~17-2.600~~ (3) (a)	0.18	49.23	51.20	See Attach. D-3
			Reject Quartz				
				Basis of allowable emission			
				(You may not have current copy of rules, contact public info)			

All max emission greater than allowable.

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5])
Upflow Counter Current	Particulate	98+%*	N/A	N/A
Wet Scrubber	Fluoride	98+%*	N/A	N/A
designed by A. R. Lenkei				
	EPA says CROSS FLOW SCRUBBER WITH 99% eff IS DRCT			

Check T.S.

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard

*Base on theoretical wet scrubber performance.

[4] Emission, if source operated without control (See Section V, Item 3)

[5] If Applicable

E. Fuels

Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating. Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

The liquid and solid waste generated by this process is either, used in the manufacturing process at the feed preparation plant or returned to the closed circuit recycled process water system.

Emission from pond covered after

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 32 ft. Stack Diameter: 24 ft.

Gas Flow Rate: 1,900 ACFM Gas Exit Temperature: 80 °F.

Water Vapor Content: 3.0 % Velocity: (10.08) FPS

How measure velocity during test

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ days/week _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) _____

Brief description of operating characteristics of control devices: Not Applicable

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight – show derivation. See Attachment A
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. See Attachment B-1 and B-2
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). See Attachment B-1 and B-2
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.). See Attachment C - ΔP, press, GPM
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency). See Attachment B-1 and B-2
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. See Attachment D-1, D-2 and D-3
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map). See Attachment E
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. See Attachment E

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

Recommend if no specific regulation

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [ ] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power – KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data Not Applicable

1. _____ no sites _____ TSP _____( )SO^{2*} _____ Wind spd/dir

Period of monitoring ____/____/____ to ____/____/____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? _____ Yes _____ No

b) Was instrumentation calibrated in accordance with Department procedures? _____ Yes _____ No _____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO^2	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT A

Total Process Input Rate

50,792 Lbs./Hr. Phosphoric Acid @ 52% P_2O_2 + 231 Lbs./Hr. Diatomaceous Earth + 626 Lbs./Hr. Sodium Hydroxide @ 50% NaOH = 51,649 Lbs./Hr. Total Process Input Rate.

Product Rate

51,649 Lbs./Hr. Total Process Input Rate + 1490 Lbs./Hr. H_2O as steam - (1357 Lbs./Hr. Sludge) composed of (1.0% Phosphoric Acid Input + 99.0% Diatomaceous Earth Input + 99.0% Sodium Hydroxide Input) = 51,782 Lbs./Hr. Product.

ATTACHMENT B-1

Particulate Emissions (Actual)

Estimated Scrubber System Loading: 25 Lbs./Hour ← Basis of est.

100% - 98% (Scrubber Efficiency) = 2%

25 Lbs./Hour Loading to Scrubber System X 2% Discharge = 0.50 Lbs./Hour Emissions

0.50 Lbs./Hour Emissions X 2080 Hours Annual Operating Time = 1040 Lbs./Year Emissions ÷ 2,000 Lbs./Ton = 0.52 Tons/Year Emissions

Potential Emissions

25 Lbs./Hour Scrubber System Loading

25 Lbs./Hour X 2080 Hours Annual Operating Time = 52,000 Lbs./Year ÷ 2,000 Lbs./Ton = 26 Tons/Year Potential Emissions

Particulate compliance will be demonstrated using Method 5. ← 10 FPS How measure velocity How test procedure modified

ATTACHMENT B-2

Fluoride Emissions (Actual)

Estimated Scrubber Loading: 49.23 Lbs./Hour

100% - 98% (Scrubber System Efficiency) = 2.0%

49.23 Lbs./Hour Loading to Scrubber System X 2.0% Discharge = 0.98 Lbs./Hour Emissions

0.98 Lbs./Hour Emissions X 2080 Hours Annual Operating Time = 2038.4 Lbs./Year Emissions ÷ 2,000 Lbs./Ton = 1.02 Tons/Year Emissions

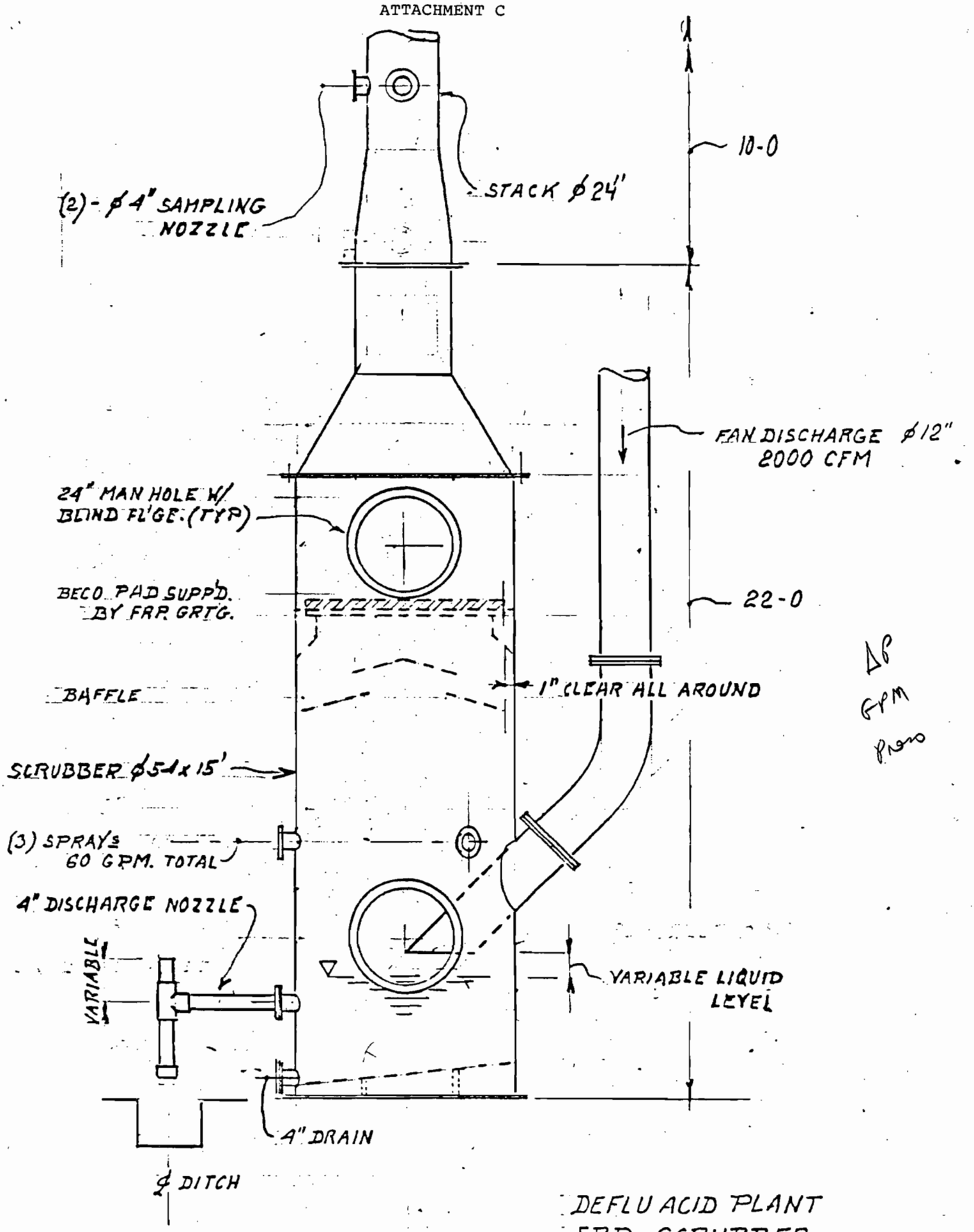
Potential Emissions

49.23 /Hour Scrubber System Loading

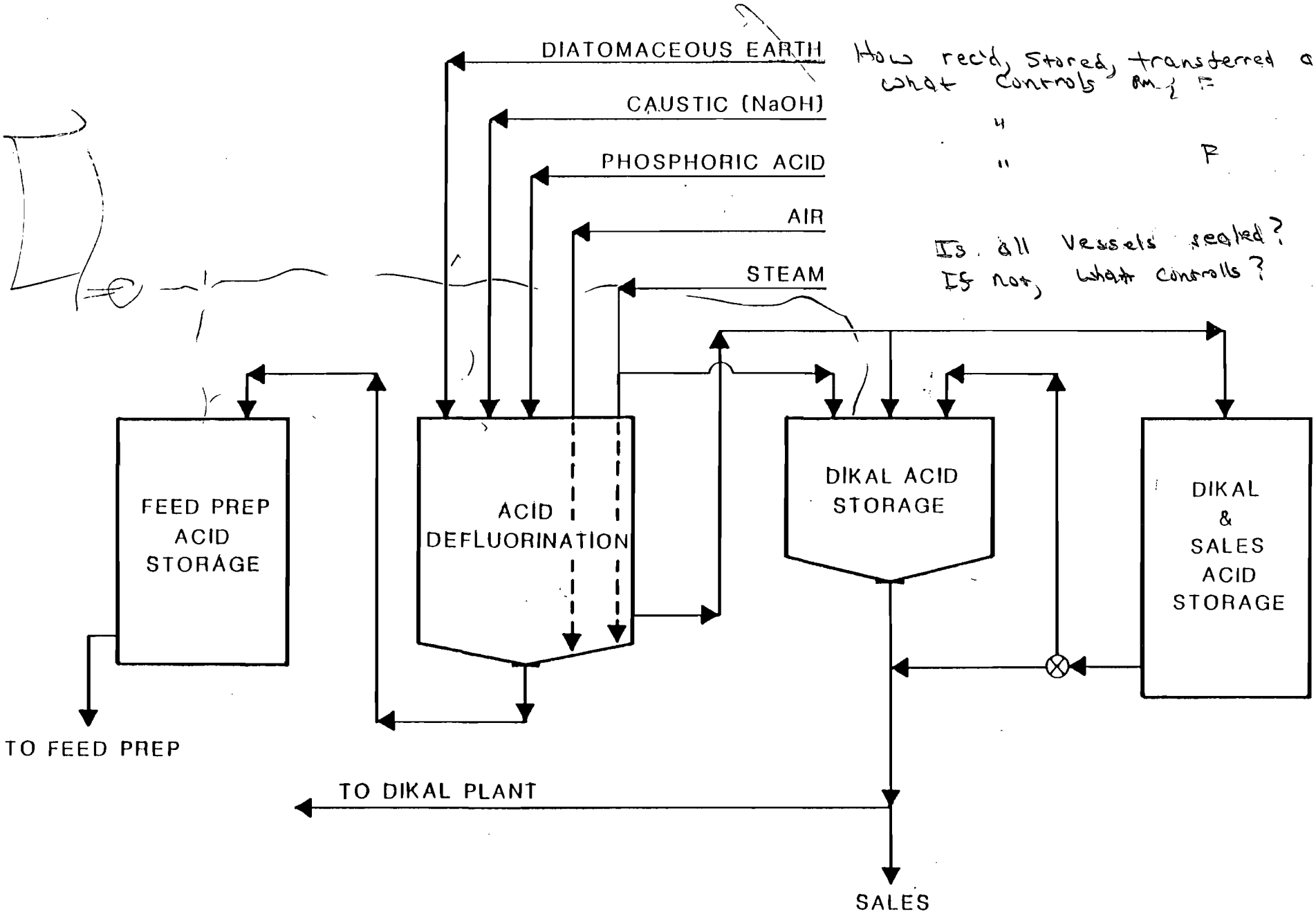
49.23 Lbs./Hour X 2080 Hours Annual Operating Time = 102,398 Lbs./Year ÷ 2,000 Lbs./Ton = 51.20 Tons/Year Emissions

Fluoride compliance will be demonstrated using Method 13B.

ATTACHMENT C

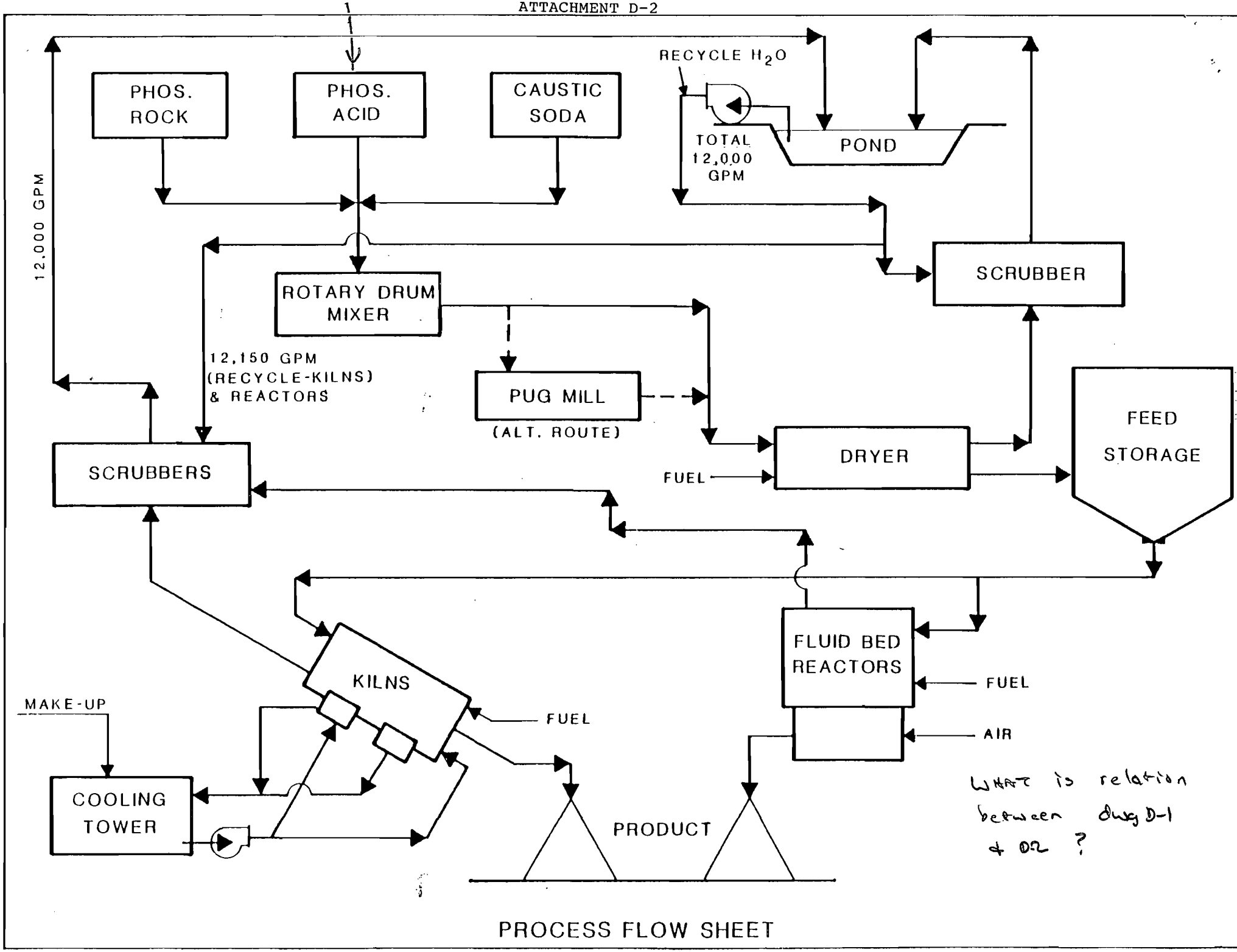


DEFLU ACID PLANT
FRP. SCRUBBER



DEFLUORINATED PHOSPHORIC ACID FLOW SHEET

ATTACHMENT D-2

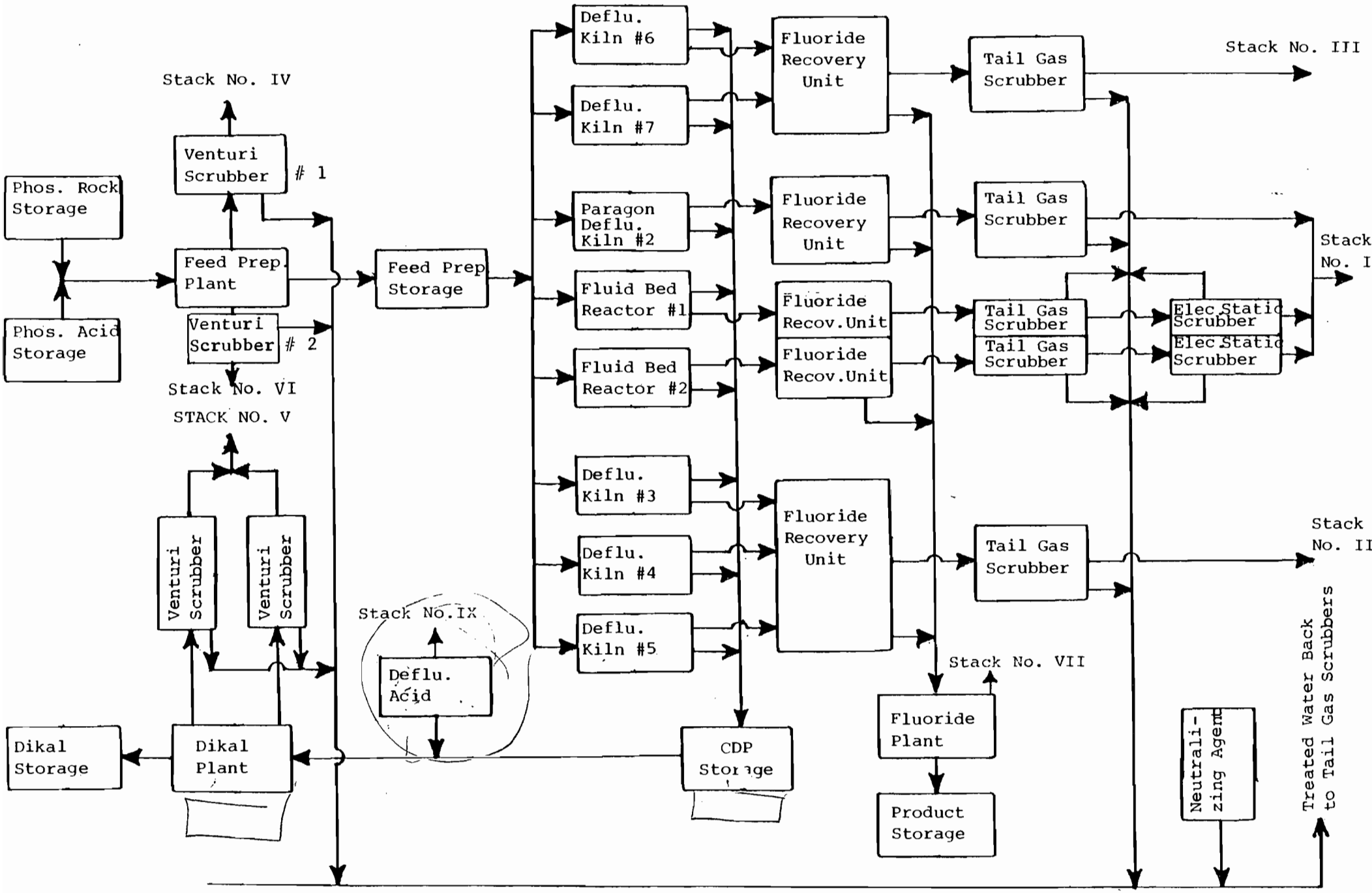


PROCESS FLOW SHEET

AMAX PLANT CITY OPERATION

FLOW DIAGRAM

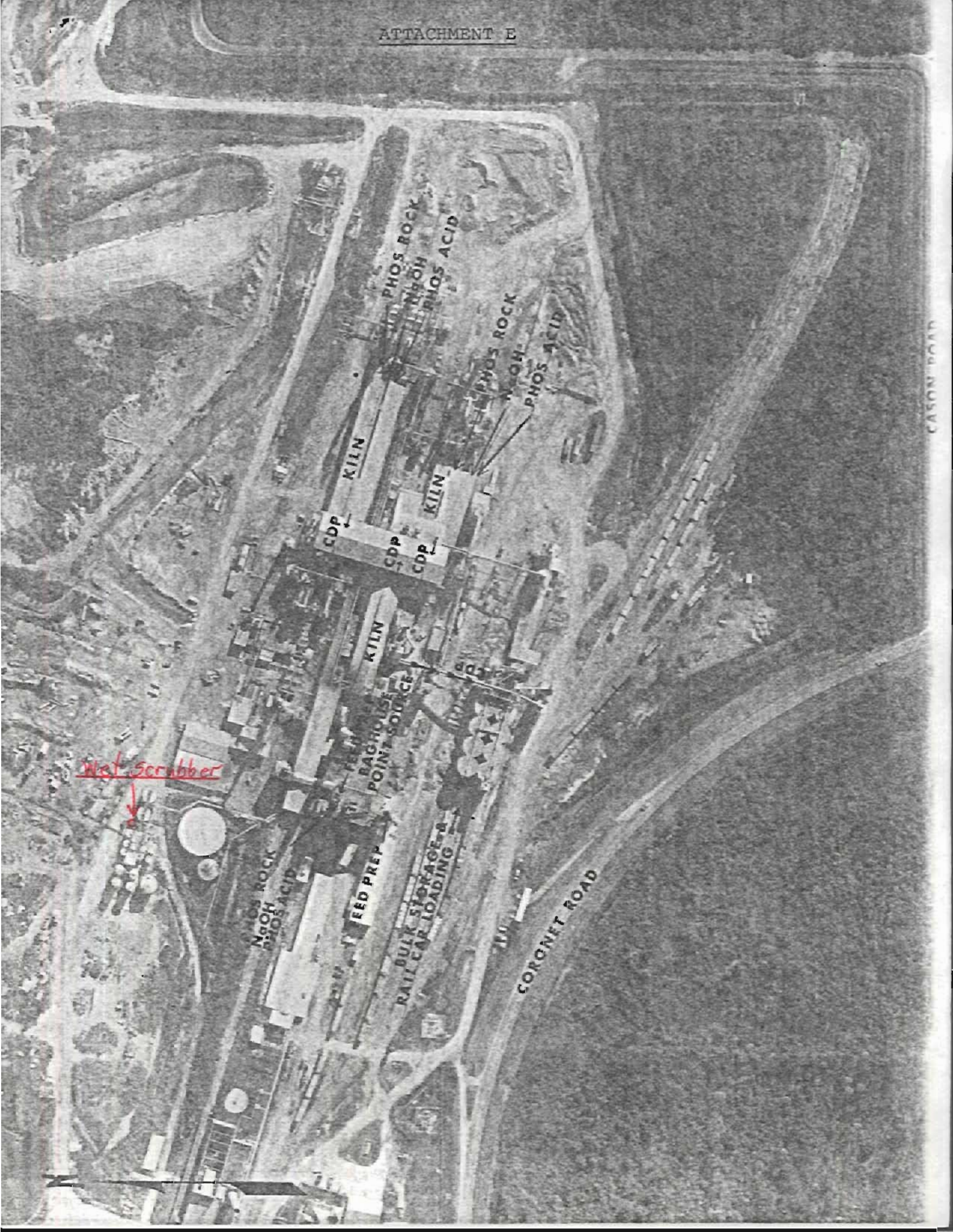
ATTACHMENT D-3



Applies for phos acid defluor plt /D-1 Shows also process equip

INDICATE WHAT IS PROPOSED EQUIP

ATTACHMENT E



STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

September 7, 1984

Mr. George Townsend
Environmental Supervisor
AMAX Chemical Corporation
Post Office Box 790
Plant City, Florida 33566

Dear Mr. Townsend:

Hillsborough County Environmental Protection Commission (HCEPC) and the department have made an initial review of AMAX Chemical Corporation's applications for permits to construct a phosphoric acid defluorinating plant and install a dust collector on a conveyor belt transfer point. Before the applications can be considered complete, we will need the following information.

Phosphoric Acid Defluorination Plant (file No. AC 29-091316)

1. On the drawings D-1 and D-2 or a separate drawing, show the proposed process equipment and air pollution control equipment (ducts and scrubber) that this application is to cover. Also show the operating permit numbers of the adjacent processes.

2. Please provide a process description of the proposed project, with reference to the process flow sheet, and include the chemical reactions that occur in the process.

3. How are raw materials transported to the plant, unloaded, stored, conveyed to process, and air pollutant emissions controlled during each of these operations?

4. Please provide a Best Available Control Technology (BACT) determination for fluorides (Rule 17-2.630, FAC) as required by Rule 17-2.600(3)(a)9., FAC. Consider a spray-cross flow packed bed scrubber in the determination.

5. For the scrubber you recommend as BACT, what is the design scrubber water pressure (in. water), scrubber water flow (GPM), and gas pressure drop (in. water)?

6. Please revise Section III: A and B to include other materials (water?) to account for the product weight of 51,872 lb/hr which is greater than the 51,649 lb/hr of raw material. What is the P_2O_5 content of the phosphoric acid used in the process?

7. In Section III: C, what is the basis of the allowable fluoride emissions of 0.18 lb/hr?

8. What is the estimated increase in fluoride emissions from the process water pond as a result of this project?

9. What is the basis of the 25 lb particulate matter/hr and 49.23 lb fluorides/hr inlet loading to the scrubber? What is the basis for the 0.85 percent fluoride content of the phosphoric acid into the plant?

10. Please provide a copy of the calculations that concluded the proposed scrubber will be 98 percent efficient on particulate matter and fluoride emissions. Include the particulate matter particle size distribution of the inlet loading to the scrubber.

11. How will the stack velocity (10 FPS) be measured during the compliance test? Is the correct stack diameter 25 inches?

Conveyor Belt Transfer Point Dust Collector
(file No. AC 29-091317)

1. On the drawings D-1 and D-2 or a separate drawing, show what conveyor belt the proposed dust collector will control and the operation permit numbers for it (if any) and adjacent process and material handling equipment.

2. Please provide a description of the conveyor belt to be controlled, stating what process equipment discharges on to it and where it discharges to.

3. How will fugitive emissions from the belt and its discharge point be controlled?

4. Are there any other uncontrolled emission points in the CDP material handling system? If so, what plans does the company have to control them?

5. Did HCEPC agree in writing to accept 0.02 grains/DSCF as the emission standard?

6. What guarantee or specifications did the dust collector manufacturer provide for the emission from his equipment? What is the particle size distribution of the particulate matter to the dust collector?

7. What is the percent moisture in the gas handled by the proposed dust collector?

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/WH/agh

cc: Bill Thomas
Steve Gyorog

AMAX Chemic[illegible]orporation
A SUBSIDIARY OF AMAX INC.
P. O. BOX 790 ♦ PLANT CITY, FLORIDA 34289 ♦ (813) 752-1161

December 18, 1984

DER
BAQM

Mr. C. H. Fancy, P.E.
Bureau of Air Quality Management
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Fancy:

In response to a letter of incompleteness concerning File No. AC29-091316, the Phosphoric Acid Defluorination Facility Scrubber, and File No. AC29-091317, the Conveyor Belt Transfer Point Dust Collector, we are submitting a revised permit application for the phosphoric acid defluorination facility modification and the following responses as the questions were presented.

RE: File No. AC29-091316

1. An addition has been made to drawing D-1 to indicate the proposed air pollution control equipment as it relates to the process, and a new drawing (D-2) has been added (see the revised permit application.

2. See Section II: A of the revised permit application.

3. All raw material for the phosphoric acid defluorination facility are manufactured off-site. The phosphoric acid is received in railcars and is pumped, closed pipe, to storage or defluorinating tanks as needed. Caustic solution used in the process is brought in by tank truck and pump, closed pipe, to the storage tank. Diatomaceous earth (D.E.) is received in 50 pound bags and is initially put into the process by hand. The D.E. is then pumped as a slurry to the acid defluorinating tank as needed.

4. See the BACT determination attached to the revised permit for a similar process at the Occidental Chemical Company. However, the Occidental process is designed to strip the fluoride from the acid in the form of SiF_6; whereas the AMAX process is designed to precipitate the majority of the fluoride in the form of Na_2SiF_6.

5. The operating conditions for the proposed scrubber are as follows:

   Scrubber Water Pressure, 45-75 psig
   Scrubber Water Flow, 30-40 gpm
   Gas Pressure Drop, 5.0-6.0" H_2O

6. Please see Section III: A and B of the revised permit application. Typical laboratory analyses of the phosphoric acid used in the process is 50-54% with an overall average of 52%.

7. In the revised permit application the allowable fluoride emission is shown as 0.86 lbs/hr. This figure was calculated using the 0.04 lbs/ton of P_2O_5 input reflected in the attached BACT determination for a like process.

8. There should be no significant increase in fluoride emission from the process water ponds. The process water from the proposed scrubber, as with all process water, will be treated to precipitate fluorides from the process water. Furthermore, the approximately 32 tons maximum per year pond input from this scrubber would have a minor impact on the total pond volumes.

9. The inlet loadings shown in the revised permit application are 3.6 lbs/hr for particulate matter and 31.28 lbs/hr for fluorides. These were determined from test data collected at the process. When the phosphoric acid is purchased laboratory analysis is routinely performed. The fluoride content for acid used in the process is typically 0.60-1.1% with an overall average of 0.85%.

10. Please see Attachment A for the calculations used to determine the fluoride removal efficiency of 99+% for the proposed scrubber. At this time there is no actual data available to establish a particulate removal efficiency for the proposed scrubber. However, AMAX is reasonably assured the proposed scrubber will be more than adequate for this application. Furthermore, AMAX will guarantee the scrubber will meet the 0.015 grain/ACF established as BACT for a similar process (see Attachment G of the revised permit application). The particle size distribution and the mean diameter of the diatomaceous earth are shown in Attachment A of this letter.

11. In the revised permit application the linear velocity of the stack is approximately 63.66 FPS and the stack diameter is 1.0 feet.

The revised permit application for the phosphoric acid defluorination facility is to replace, in its entirety, the previous application--File No. AC29-091316. This is necessary due to the changes in and correction to the previous application.

RE: File No. AC29-091317

1. See Attachment B.

2. The conveyor belt begins at the CDP product storage bins. As product is removed from the bins it enters an enclosed screw conveyor where a dedusting agent is added. The product exits the screw conveyor via a chute and onto a covered belt conveyor. This belt, after a 90° transfer point, continues on to the bulk storage bins to be loaded onto railcar as customer requirements dictate.

3. The belt discharges into an enclosure/chute. At this point, with possible exception of some belt carry-over, the dedusting agent has agglomerated the fine particles to virtually eliminate any further dusting at the discharge point.

4. See 1, 2, and 3.

5. HCEPC did not agree in writing to accept 0.02 grains/DSCF as the emission standard.

6. See Attachment C.

7. Moisture content of the gas is approximately 3-4 percent.

We are also requesting the start of construction and the completion of construction dates of the transfer point dust collector project be changed. The start of construction should be changed from September 1, 1984 to March 1, 1984; and the construction completion date should be changed from December 1, 1984 to August 1, 1984.

Should additional information be required, please let me know.

Sincerely,

George Townsend

George Townsend
Environmental Supervisor

GT/cw

attachments

cc: Bill Thomas (DER)
Steve Gerrog (HCEPC)
J. J. Lewis
F. G. Mullins

ATTACHMENT A

Mr. J. Floyd
Plant Engineer
Amax Chemical
P.O. Box 790
Plant City, Florida 33566

November 7, 1984

Subject: A scrubber for a point source

Amax plans to use one of four Rigidome 4837 scrubbers, used originally for the C-78 project in 1973. The scrubber is 16' high by 4' in diameter. A 1½" thick Beco pad demister is located at the 14' level. A domed 2' high cover serves to remove the demisted gas for transport to the blower. (See Plan: East & south elevation.) Eight spray headers are mounted in pairs at right angle to each other. Each pair is separated vertically by a distance of 2'. Each pair is offset a few inches horizontally to assure full spray coverage. The sprays produce a 90° cone with 50 psig water delivering 1.1 gpm. The headers are sealed by means of rubber stoppers to fill the entrance hole. The far side of the header rests on a 2" saddle mounted on the inside wall. A Hartzell fa operating at 3000 scfm will be used for scrubber air transport.

The following phases will be discussed for fluoride and dust removal: a) Pollution collection from the source. b) Scrubber action. c) Air pollution impact.

a) Pollution collection: There will be three sources; Two 12' diameter acid reaction tanks and one Kennite slurry mixer. They will be connected to the scrubber sump by means of 8" ducts tied to a single inlet duct at the scrubber. Consequently each source will be swept by approximately 1000 scfm air.

Fluoride: Calculations are based on the worst conditions, viz: Heated acid producing 1.825 gr/ft^3 of tank acid surface for approximatel 2 hours. Under these conditions as air sweeps the surface, 1.825 gr/ft^3 of fluorine will emerge from the surface as vapor. The covered tanks will have an open space of about 1' above the acid. Then F produced each minute is:

1) F gr/ft^3 two tanks = 1.825 x 2 = 3.650

Kennite dust: The dust loading found at the slurry tank:

2) gr/ft^3 = 0.42

Then with an air sweep of 1000 scfm, the grains per minute is:

3) gr/min = 0.42 x 1000 = 420

4) $\text{lbs/min} = \frac{420}{7000} = 0.060$*

* An isokinetic deviation occurs, that is, gas or dust entering a duct from a large open area at 1000 scfm, acts like a funnel drawing in more pollutant than found in the air above the slurry or acid. Consequently the loading the scrubber receives may be a little higher.

b) Scrubber action:
Gas absorption in water is dependent upon the effective surface area covered by spray action in a given time and then equating that to the scrubber cross sectional area that the air must traverse. Plant City pond water is maintained at a pH of about 3.0. At this pH there are many ions which will combine with fluoride, both positive and negative, which will aid in the reduction of volatile escape. However, it is understood that Amax plans to use well water.

Scrubber dimensions: The inside dimensions are 4' diameter by 14' to the demister. A sump overflow at 2' leaves an active height of 12'. Sprays: The scrubber manifolds are fitted with Spraying Systems hollow cone sprays with an orifice of 0.140" and operating at 50 psig, a cone of 90° is produced at a usa le vertical coverage of 2'. See page 1 for other dimensions.) Average spray drop size is 100 μ* in diameter using 1.1 gpm water.

5) Drop volume: cc = $4/3\pi r^3$. Drop radius: cm = $\frac{100}{2} \times 10^{-4} = 5.0 \times 10^{-3}$

6) Vol. cc/drop = $4/3\pi(5.0 \times 10^{-3})^3 = 5.24 \times 10^{-7}$

Gas velocity: (counter flow.) r=2'

7) ft/sec = $\frac{3000}{\pi r^2 \times 60} = 4.0$ ft/sec

8) Drops/spray sec = $\frac{1.1 \times 3785.4^{**}}{60 \times 5.24 \times 10^{-7}} = 13.244 \times 10^7$

Area drops/sec:
Since the area of a sphere is $4\pi r^2$, only one half of the area is contacted by the rising gas. Neglecting the other half, which is also contacted, (but to a lesser degree) because of the random action of a gas, the area calculated will be $2\pi r^2$.

9) Area ft^2/ spray sec = $\frac{13.244 \times 10^7 \times 2\pi(5.0 \times 10^{-3})^2}{929.03^{***}} = 22.4$ ft^2/spr sec

Each manifold spray pair has 8 sprays and each pair is separated vertically by a distance of 2', then the area covered by each pair becomes: Area ft^2/sec= 8 x 22.4 = 179.2.
The gas rises at a rate of 4'/sec, therefore it traverses two manifold pairs each second. The area of the rising gas is πr^2, and r=2, then the area becomes A = $\pi 4$ = 12.6 ft^2. Since it moves vertically 2' each second, then the number of gas areas contacting the water spray curtain becomes:

10) No = $\frac{2 \times 179.2}{12.6} = 28.4$ and since it takes 2 seconds for the gas to traverse the entire scrubber the number becomes: No = 2 x 28.4 = 56.8

* is 10^{-6} meters
** cc/gal
*** cm^2/ ft^2

Dust removal:

Screen sizes:

μ	%
-20	98.0
-10	94.5
-6	73.0
-2	27.0
-1	17.0
-0.5	10.0
-0.25	5.0

Average particle size = $\frac{[\quad \times (100 - \%)]^{1,+2,}}{n}$

= 0.74 μ

The dust size is still many times larger than fluoride vapor, however the large area covered by the spray film may assure adequate dust removal. Tests should be conducted to confirm this statement.

c) Air pollution impact:

It is understood that fresh water will be used.

Fluoride: Entering the scrubber:

11) lbs F/hr = $\frac{3.650 \times 60 \times 1000}{7000}$ = 31.284

12) Water lbs/hr = 32 x 8.345 x 60 x 1.1 = 17,625

13) %HF = $\frac{31.284 \times 20/19 \times 100}{17,625}$ = 0.1868

Using the table from patent No 39,423 -- 1947* and a straight line function, and extrapolating to %HF= 0.1868 at 8 F then:

%HF/lbs dry air = 6.576×10^{-6}

14) Lbs dry air/hr = $\frac{3000 \times 60 \times \left[\frac{29.92 - 1.032^{**}}{29.92}\right] \times 2 \quad) \times 528}{359 \times 540}$ = 13,72

15) lbs HF/hr = $\frac{13,727 \times 6.576 \times 10^{-6}}{10^{2}}$ = 9.027×10^{-4}

Dust:

Amax now employs a small water scrubber to remove Ker te dust which is doing a satisfactory job. It is anticipated that C-78 scrubber should perform satisfactorially, however tests should e conducted.

Comments:

Based on the above analysis, the Rigidome scrubber us in the 1973 C-78 tests, should remove fluoride vapors adequately.

Louis John Lamb
Consultant

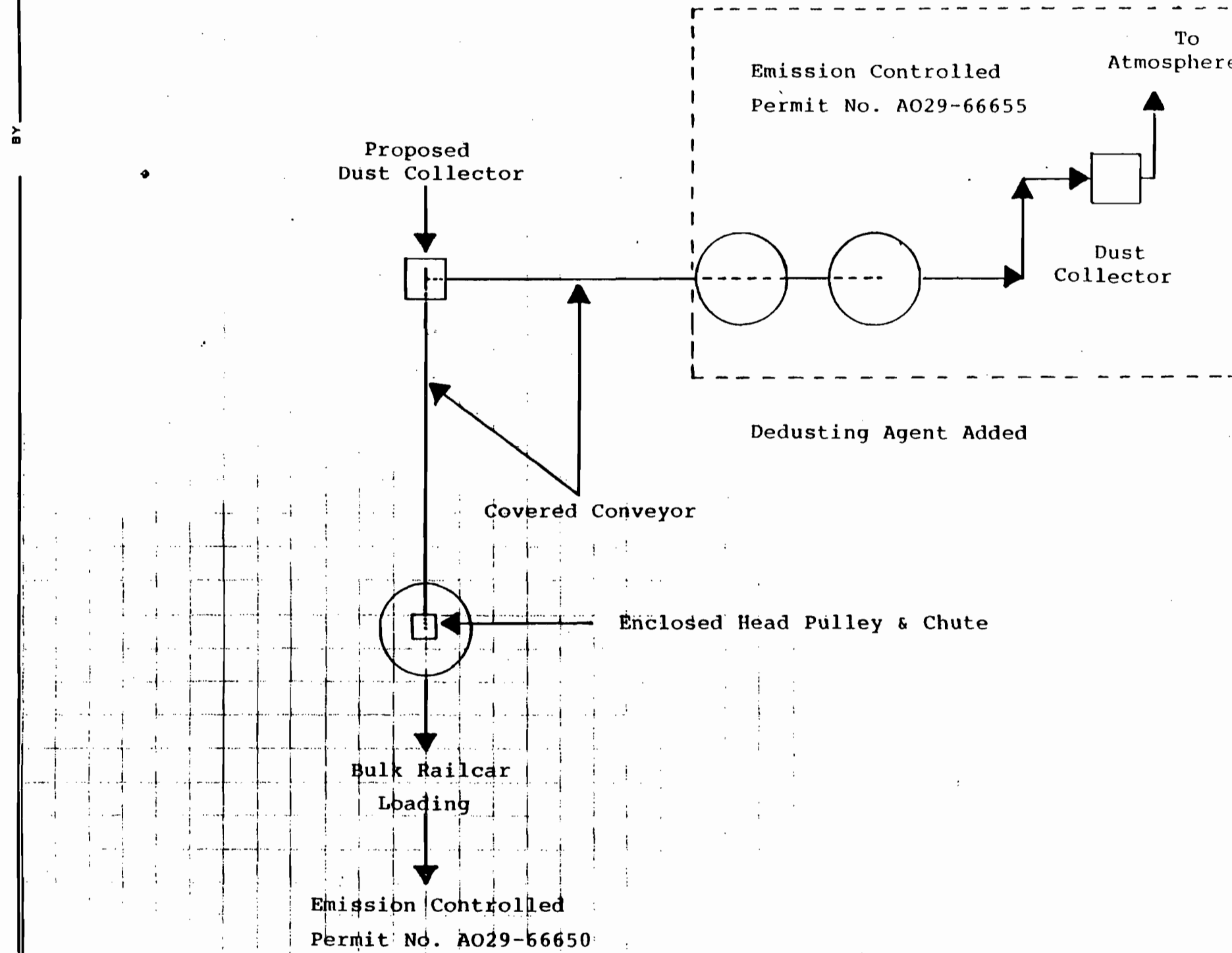
* See attached patent computer printout.
** Water vapor pressure, "Hg at 80° F.

TABLE OF HF VAPOR COMPOSITION
DERIVED FROM TVA DATA
BROSHEER ET AL, I&EC 39, 423, 1947

%HF IN LIQUOR	LBS HF PER LB DRY AIR			
	80 DEG F	100 DEG F	120 DEG F	140 DEG F
.1	3.92672E-6	7.86430E-6	1.54041E-5	3.01663E-5
.2	6.97886E-6	1.39763E-5	2.73761E-5	5.36096E-5
.3	9.75996E-6	1.95463E-5	3.82839E-5	7.49660E-5
.4	1.23345E-5	2.48021E-5	4.85766E-5	9.51156E-5
.5	1.49040E-5	2.98474E-5	5.84564E-5	1.14454E-4
.6	1.73478E-5	3.47407E-5	6.80379E-5	1.33207E-4
.7	1.97343E-5	3.95193E-5	7.73942E-5	1.51516E-4
.8	2.20766E-5	4.42091E-5	8.65759E-5	1.69481E-4
.9	2.43840E-5	4.88289E-5	9.56199E-5	1.87174E-4
1.	2.66637E-5	5.33930E-5	1.04554E-4	2.04650E-4
1	2.66637E-5	5.33930E-5	1.04554E-4	2.04650E-4
1.5	3.78097E-5	7.57053E-5	1.48220E-4	2.90027E-4
2	4.87914E-5	9.76839E-5	1.91216E-4	3.74028E-4
2.5	5.98116E-5	1.19734E-4	2.34334E-4	4.58200E-4
3	7.09882E-5	1.42092E-4	2.78033E-4	5.43435E-4
3.5	8.24012E-5	1.64917E-4	3.22625E-4	6.30336E-4
4	9.41100E-5	1.88328E-4	3.68336E-4	7.19343E-4
4.5	1.06163E-4	2.12419E-4	4.15359E-4	8.10810E-4
5	1.18600E-4	2.37272E-4	4.63842E-4	9.05033E-4
5.5	1.31458E-4	2.62959E-4	5.13925E-4	1.00227E-3
6	1.44770E-4	2.89546E-4	5.65735E-4	1.10277E-3
6.5	1.58568E-4	3.17094E-4	6.19390E-4	1.20674E-3
7	1.72880E-4	3.45662E-4	6.75003E-4	1.31439E-3
7.5	1.87738E-4	3.75309E-4	7.32685E-4	1.42594E-3
8	2.03170E-4	4.06093E-4	7.92543E-4	1.54158E-3
8.5	2.19205E-4	4.38069E-4	8.54688E-4	1.66151E-3
9	2.35872E-4	4.71296E-4	9.19227E-4	1.78593E-3
9.5	2.53200E-4	5.05831E-4	9.86269E-4	1.91505E-3
10	2.71220E-4	5.41733E-4	1.05593E-3	2.04906E-3
10.5	2.89963E-4	5.79062E-4	1.12831E-3	2.18817E-3
11	3.09458E-4	6.17880E-4	1.20354E-3	2.33260E-3
11.5	3.29739E-4	6.58248E-4	1.28173E-3	2.48256E-3
12	3.50837E-4	7.00232E-4	.001363	2.63828E-3
12.5	3.72787E-4	7.43896E-4	1.44748E-3	2.79997E-3
13	3.95624E-4	7.89310E-4	1.53530E-3	2.96788E-3
13.5	4.19383E-4	8.36543E-4	1.62658E-3	3.14224E-3
14	4.44101E-4	8.85668E-4	1.72147E-3	3.32336E-3
14.5	4.69815E-4	9.36759E-4	1.82010E-3	3.51132E-3
15	4.96566E-4	9.89893E-4	1.92262E-3	3.70656E-3
15.5	5.24394E-4	1.04515E-3	2.02913E-3	3.90930E-3
16	5.53341E-4	1.10061E-3	2.13993E-3	4.11982E-3
16.5	5.83459E-4	1.16236E-3	2.25504E-3	4.33841E-3
17	6.14766E-4	1.22449E-3	2.37467E-3	4.56533E-3
17.5	6.47338E-4	1.28960E-3	2.49898E-3	4.80103E-3
18	6.81204E-4	1.35824E-3	2.62817E-3	5.04579E-3
18.5	7.16403E-4	1.43066E-3	2.76248E-3	5.30071E-3
19	7.53002E-4	1.50704E-3	2.90213E-3	5.56343E-3
19.5	7.91101E-4	1.57769E-3	3.04735E-3	5.83781E-3
20	8.30781E-4	1.65951E-3	3.19836E-3	6.12142E-3

ATTACHMENT B

BY



THE DALAMATIC

DALAMATIC reverse jet fabric filters are designed for continuous operation on applications where product or nuisance dusts are involved and where high collection efficiencies are required. The Dalamatic is capable of filtering heavy dust burdens at a high filtration velocity and a constant level of resistance. Collection efficiency often exceeds 99·99%.

The Dalamatics have proven themselves through years of successful performance and have gained wide acceptance in the world's most demanding markets. The improvements in the current design have resulted from the experience gained through thousands of installations cleaning millions of CFM. These modifications have improved filter performance, capacity, and convenience of maintenance, without increasing costs. Today's Dalamatics meet today's rigid requirements.

Some Dalamatic advantages:

- **Downward Flow**
The top inlet of this filter insures a downward flow and more effective operation. Other types with bottom inlet and upward air flow have a higher pressure loss for a given filtration velocity.

- **Cleanside Access**
Full width access from the clean air side makes inspections and changing of filter envelopes easier and safer. Access from the dust side — as on some competitive models — is always unpleasant and may even be dangerous when toxic contaminants are involved.

- **Convenient Envelope Size**
Filter elements are designed so that one man can change a filter envelope without help. In some designs this is impossible.

- **No Moving Parts**
Filter envelopes are cleaned in turn by a brief burst of compressed air in the reverse direction of the main air flow. This is electronically controlled, automatic and continuous. With no moving parts, filter reliability is greater than with mechanical cleaning systems.

- **Advanced Production Methods**
Our designs utilize sophisticated manufacturing techniques which produce a sturdy filter casing at a relatively low cost.

- **Tight Envelope Seals**
The Dalamatic method of sealing each filter envelope by compressing an integral sealing ring between the insert header and the seal frame insures a tight seal — without screws and toggle bolts.

- **Easy Access to Controls**
The controller and filter cleaning assembly are located below the clean air chamber for easy access and adjustment. Top-mounted equipment can be difficult to reach.

- **Very Compact**
The flat envelope configuration of filter elements makes the Dalamatic extremely compact and insures maximum filtration area in a given space.

- **Double Banking**
To save additional space two multi-bank assemblies can be jointed on either the dirty or the clean air sides. This means a considerable saving in the need for access platforms and inspection doors while keeping the advantage of easy access for envelope changing.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Point Source Air Pollution [ ] New[1] [X] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [X] Modification

COMPANY NAME: AMAX Chemical Corporation COUNTY: Hillsborough

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Phosphoric Acid Defluorinating Plant w/ Upflow Counter Current Scrubber

SOURCE LOCATION: Street Coronet Road City Plant City

UTM: East 17-393.8 North 3096.3

Latitude ____ ° ____ ' ____ "N Longitude ____ ° ____ ' ____ "W

APPLICANT NAME AND TITLE: J. J. Lewis, Plant Manager

APPLICANT ADDRESS: P. O. Box 790, Plant City, FL 33566

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of AMAX Chemical Corporation

I certify that the statements made in this application for a Construction Modification permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: J. J. Lewis

J. J. Lewis, Plant Manager
Name and Title (Please Type)

Date: 12/27/84 Telephone No. (813) 752-1161

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed: Anthony R. Lenkei

Anthony R. Lenkei
Name (Please Type)

(Affix Seal)

AMAX Chemical Corporation
Company Name (Please Type)

P. O. Box 790, Plant City, FL 33566
Mailing Address (Please Type)

Florida Registration No. 8716 Date: 1, 4, 85 Telephone No. (813) 752-1161

[1] See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See attached Section II: A

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction February 1, 1981 Completion of Construction August 1, 1984

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

$22,000 - Equipment and material (capital for scrubber already expended)

$ 8,000 - Labor

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

Not applicable

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes XX No

F. Normal equipment operating time: hrs/day 8 ; days/wk 5 ; wks/yr 52 ; if power plant, hrs/yr N/A ; if seasonal, describe: This is a batch process which defluorinates acid as the production and sale of defluorinated acid demands.

G. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes
   a. If yes, has "offset" been applied? N/A
   b. If yes, has "Lowest Achievable Emission Rate" been applied? N/A
   c. If yes, list non-attainment pollutants.

      Ozone and VOC

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. No
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Not applicable			

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating. Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

Scrubber water from this unit will be piped to the recycle holding ponds. The solids will be used in another process or piped to the recycle holding ponds.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 28 ft. Stack Diameter: 1.33 ft.

Gas Flow Rate: 3,000 ACFM Gas Exit Temperature: 80 °F.

Water Vapor Content: 3.0 % Velocity: 35.81 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq & Gas By-prod.)	Type VI (Solid By-prod.)
Lbs/hr Incinerated							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ days/week _____

Manufacturer _____

Date Constructed _____ Model No. _____

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Phosphoric Acid	Fluoride	0.85	82,536*	See Attachment D-1 and D-2
Diatomaceous Earth	Particulate	100	375*	See Attachment D-1 and D-2
Caustic	N/A	N/A	1,017*	See Attachment D-1 and D-2
Water	N/A	N/A	373*	See Attachment D-1 and D-2

*Utilization rate based on a four hour per batch time factor.

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 84,301 (see * above)

2. Product Weight (lbs/hr): 84,301 (see * above)

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Fluoride	0.86	≥0.3253	See Attachment G	0.86**	31.28	32.53	See Att. B-
Particulate	0.39	≥0.406	See Attachment G	0.39**	3.60	3.744	See Att. B-

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5])
Rigidome, Model 4837	Fluoride	99+%	N/A	See Att. F
	Particulate	Not Available	0.25 to 20.0	See Att. F

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard

[4] Emission, if source operated without control (See Section V, Item 3)

[5] If Applicable

**Calculated from the allowables in the attached BACT determination for like process.

	Volume (ft^3)	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight – show derivation. See Attachment A
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.,) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. See Attachments B-1 and B-2
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). See Attachments B-1 and B-2
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.). See Attachment C
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency). See Attachments B-1 and B-2
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. See Attachments D-1 and D-2
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map). See Attachment E
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. See Attachment E

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [ ] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency: *
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power – KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data

1. _____ no sites _____ TSP _____ ( ) SO^2* _____ Wind spd/dir

Period of monitoring _____/_____/_____ to _____/_____/_____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

1. ____ Year(s) of data from _____/_____/_____ to _____/_____/_____
month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO^2	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description on point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

*Specify bubbler (B) or continuous (C).

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

SECTION II: A

This project involves the installation of an upflow counter current spray scrubber to control fluoride and diatomaceous emissions during phosphoric acid defluorination. The scrubber is a Rigidome 4837 which is a 16'x4' round scrubber of fibercast construction. Gases enter the scrubber near the bottom and flow upward. As the gases flow upward, absorption is accomplished by exposure to water droplets with a mean diameter of 100 microns. The sprays are of hollow cone design with a 0.140" orifice. There are eight spray headers mounted in pairs 90° apart with four sprays per header. At approximately 50 psig each spray delivers approximately 1.1 gpm in a 90° cone spray pattern. There is a 1.5 inch Beco demisting/mass transfer pad near the top of the scrubber at the 14' level. Water utilized by the scrubber will be once through fresh water at a rate of approximately 30-40 gpm. Air flow through the scrubber at approximately 3,000 acfm will be provided by a 10 HP Hartzell fan, or equivalent. This scrubber system will have three pick-up points, two covered phosphoric acid defluorinating tanks and the diatomaceous slurry tank. Emissions from these three points will be conveyed through 8" ducts which converge into a single duct at the scrubber. The phosphoric acid defluorination operation is a batch type operation with the total of the two defluorinating tanks constituting a batch. Maximum emissions occur during the slurrying of the diatomaceous earth (D.E.), which takes approximately one hour, and during an approximately two-hour period when the acid is heated and sparged with air and steam. The two-hour period associated with the acid operlaps the D.E. slurrying period. Therefore, there is essentially only a two-hour period in which the fluoride emissions reach an abrupt peak and taper off drastically, and the dust from the D.E. slurrying reaches an abrupt peak and ends. Therefore, the emission control equipment proposed for the phosphoric acid defluorination process should result in compliance for this source.

In the phosphoric acid defluorinating process a diatomaceous earth slurry and caustic are mixed with heated, 110°-140°F, phosphoric acid. The mixture is sparged with compressed air and steam, causing the fluorides to be removed primarily by precipitation and secondarily by stripping. While there will be many other species of the H_3PO_4, NaOH, and SiO_2 involved, the reactions for fluoride removal are as follows:

1. $4HF + SiO_2 \rightarrow 2H_2O + SiF_4$

2. $3SiF_4 + 2H_2O \rightarrow 2H_2SiF_6 + SiO_2$

3. $H_2SiF_6 + 2NaOH \rightarrow Na_2SiF_6 + 2H_2O$

where:

SiF_4 - Silicon Tetrafluoride
H_2SiF_6 - Fluosilicic Acid
Na_2SiF_6 - Sodium Fluosilicate

Additional Notes

Acid Lbs/Hr (two tanks, 12,000 gals/tank)
24,000 gals. acid @ 1.650 typical sp.g. and 52% P_2O_5

$$\frac{(24{,}000 \text{ gals.} \times 8.337 \text{ lbs/gal}) \ 1.650}{4 \text{ hours}} = 82{,}536 \text{ lbs/hr} = 21.5 \text{ tons } P_2O_5\text{/hr}$$

330145 × .52 = 171675 # P_2O_5 = 85.8 Tons

Caustic Lbs/Hr (two tanks, 160 gals/tank)
320 gals. caustic @ 1.525 typical sp.g.

$$\frac{(320 \text{ gals.} \times 8.337 \text{ lbs/gal}) \ 1.525}{4 \text{ hours}} = 1{,}017 \text{ lbs/hr}$$

D.E. Lbs/Hr (two tanks, 750 lbs/tank)

$$\frac{1{,}500 \text{ lbs.}}{4 \text{ hours}} = 375 \text{ lbs/hr}$$

31.24

Water Lbs/Hr (two tanks, 745 lbs/tank)

$$\frac{1{,}490 \text{ lbs. (as steam)}}{4 \text{ hours}} = 373 \text{ lbs/hr}$$

Fluoride Allowable = 0.04 lbs/ton of P_2O_5
Emissions based on the Occidental BACT determination for a similar process.

Emissions Allowable:
0.04 lbs. x 21.5 tons P_2O_5/hr = 0.86 lbs/hr

Particulate Allowable = 0.015 grains/ACF
Emissions based on the Occidental BACT determination for a similar process.

Emissions Allowable:

$$\frac{0.015 \text{ gr/ACF} \ (3{,}000 \text{ ACFM} \times 60 \text{ min/hr})}{7{,}000 \text{ gr/lb}} = 0.39 \text{ lbs/hr}$$

ATTACHMENT A

Total Process Input Rate

82,536 lbs/hr Phosphoric Acid @ 52% P_2O_5 + 375 lbs/hr Diatomaceous Earth + 1,017 lbs/hr Sodium Hydroxide @ 50% NaOH + 373 lbs/hr water = 84,301 lbs/hr Total Process Input Rate.

Product Rate

82,536 lbs/hr Phosphoric Acid @ 52% P_2O_5 + 375 lbs/hr Diatomaceous Earth + 1,017 lbs/hr Sodium Hydroxide @ 50% NaOH + 373 lbs/hr water = 84,301 lbs/hr Total Product Rate.

ATTACHMENT B-1

Fluoride Emissions (Actual)

Estimated Scrubber Loading: 31.28 lbs/hr
100% - 99% (Scrubber Removal Efficiency) = 1.0%
31.28 lbs/hr Loading to Scrubber x 1.0% = 0.3128 lbs/hr Emissions

0.3128 lbs/hr Emissions x 2,080 hours Annual Operating Time = 650.52 lbs/year Emissions ÷ 2,000 lbs/ton = 0.3253 tons/year Emissions

Potential Emissions

31.28 lbs/hr Load to Scrubber
31.28 lbs/hr x 2,080 hours Annual Operating Time = 65,062 lbs/year Emissions ÷ 2,000 lbs/ton = 32.53 tons/year Potential Emissions

Fluoride emission compliance will be demonstrated using Method 13B.

ATTACHMENT B-2

Particulate Emissions (Actual)

Estimated Scrubber Loading: 3.60 lbs/hr
An actual efficiency of particulate removal is not available. However, AMAX will meet or exceed the 0.015 grain/ACF set forth in the Occidental BACT determination for particulate emissions for a like process. The above can be demonstrated by the following:

3.60 lbs/hr x 7,000 gr/lb = 25,200 gr/hr
25,200 gr/hr ÷ (3,000 ACFM x 60 min/hr) = 0.140 gr/ACF

$$\frac{0.140 \text{ gr/ACF} - 0.015 \text{ gr/ACF}}{0.140 \text{ gr/ACF}} \times 100 = 89.29\% \text{ Removal}$$

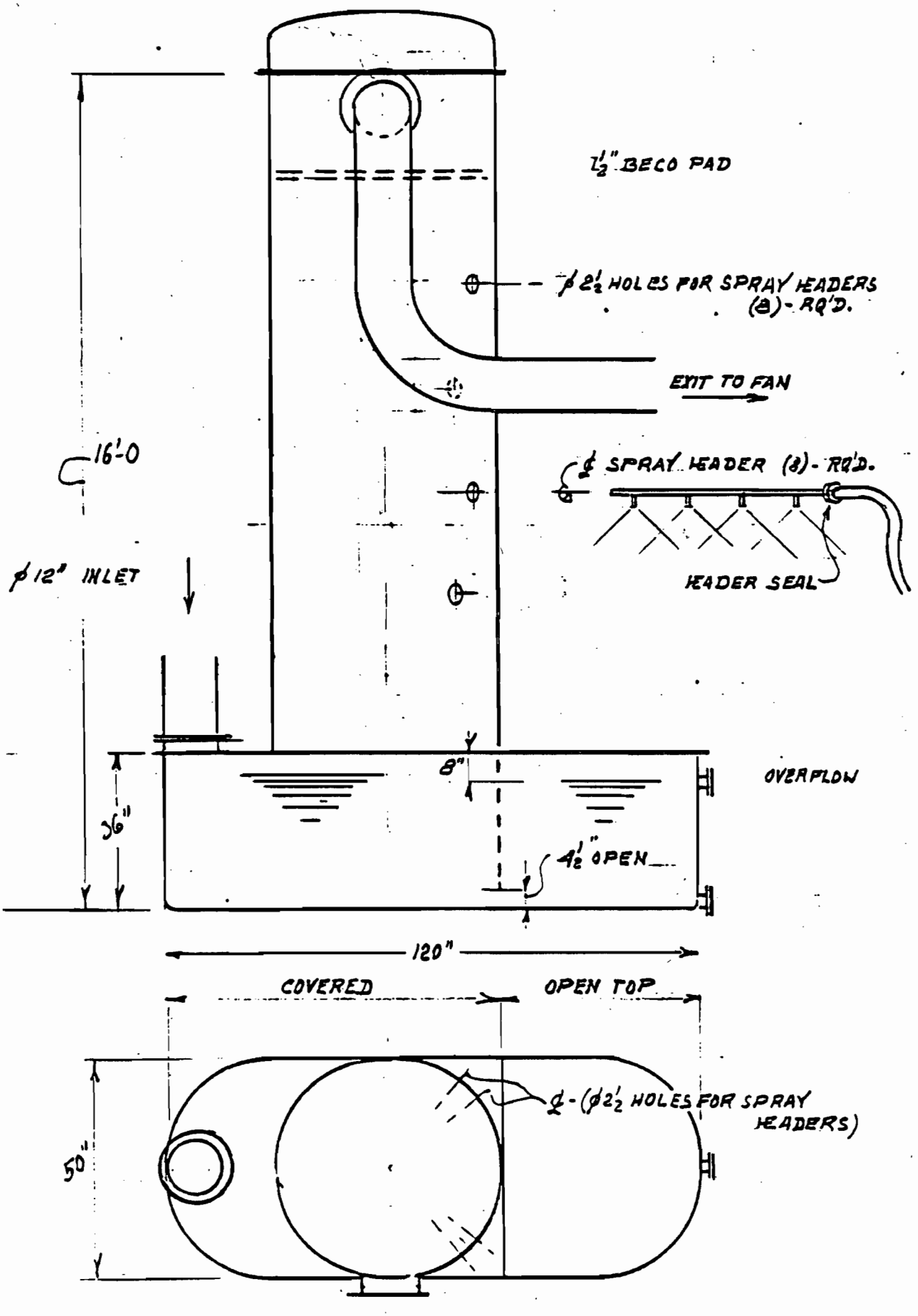
Potential Emissions*

3.60 lbs/hr Loading to Scrubber
3.60 lbs/hr x 2,080 hours Annual Operating Time =
7,488 lbs/year Emissions ÷ 2,000 lbs/ton =
3.744 tons/year Potential Emissions

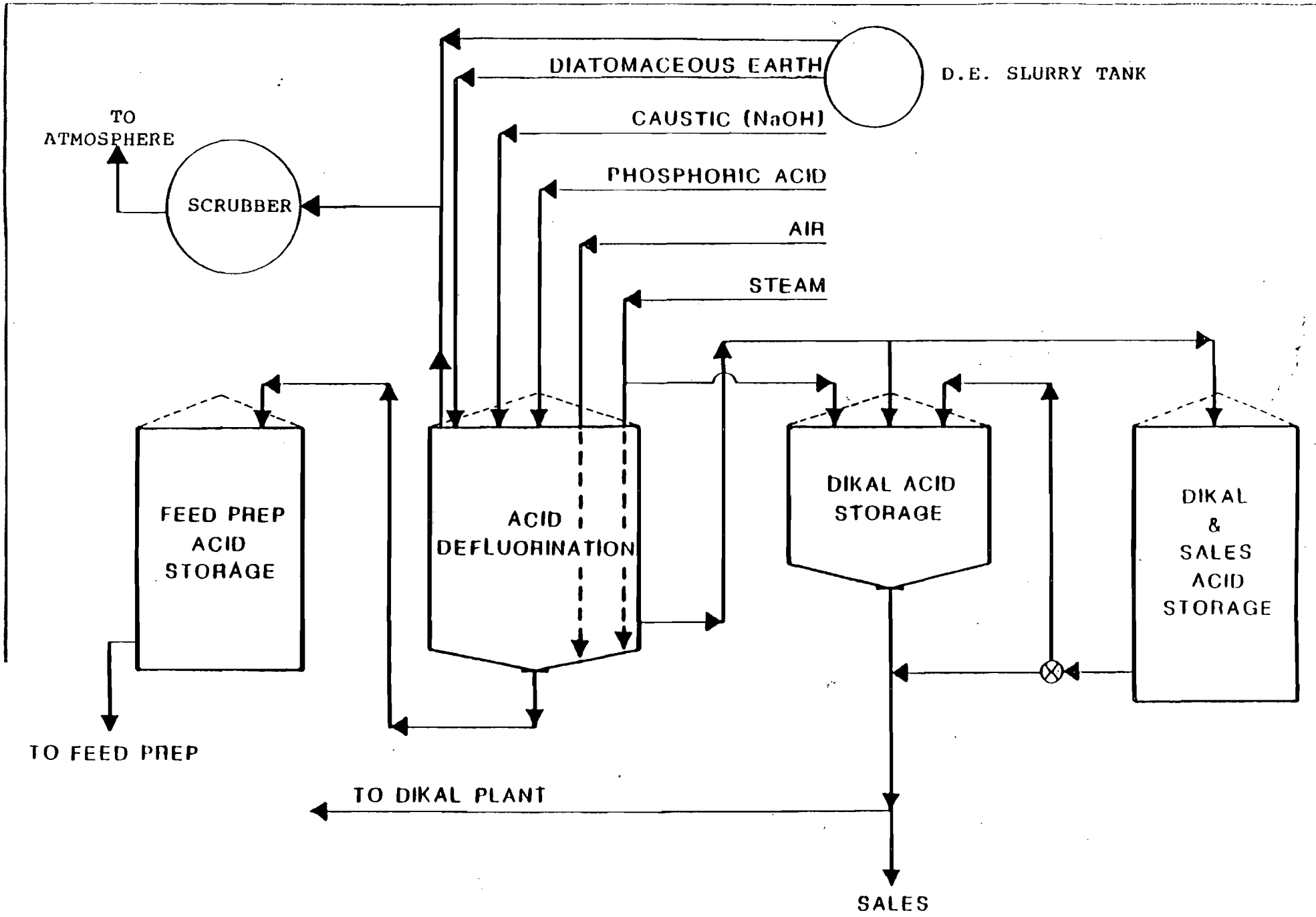
*Potential emissions are based on the data collected during the peak D.E. emission period; to reflect the maximum potential emissions. The peak D.E. emission period would not be applicable to the entire 2,080 annual operating hours. However, we are showing the maximum possible particulate emissions from this unit.

Particulate emission compliance will be demonstrated using Method 5.

ATTACHMENT C

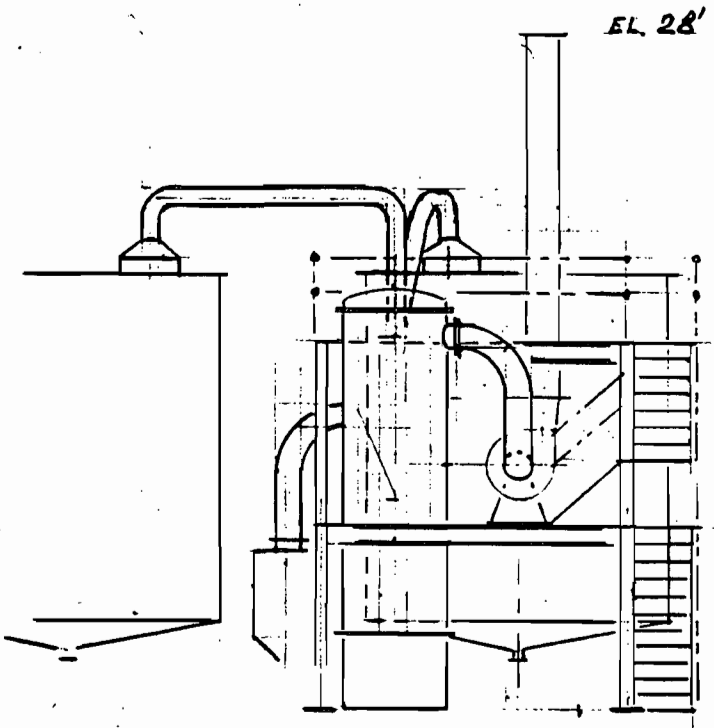


DEFLU PLANT
SCRUBBER C-78

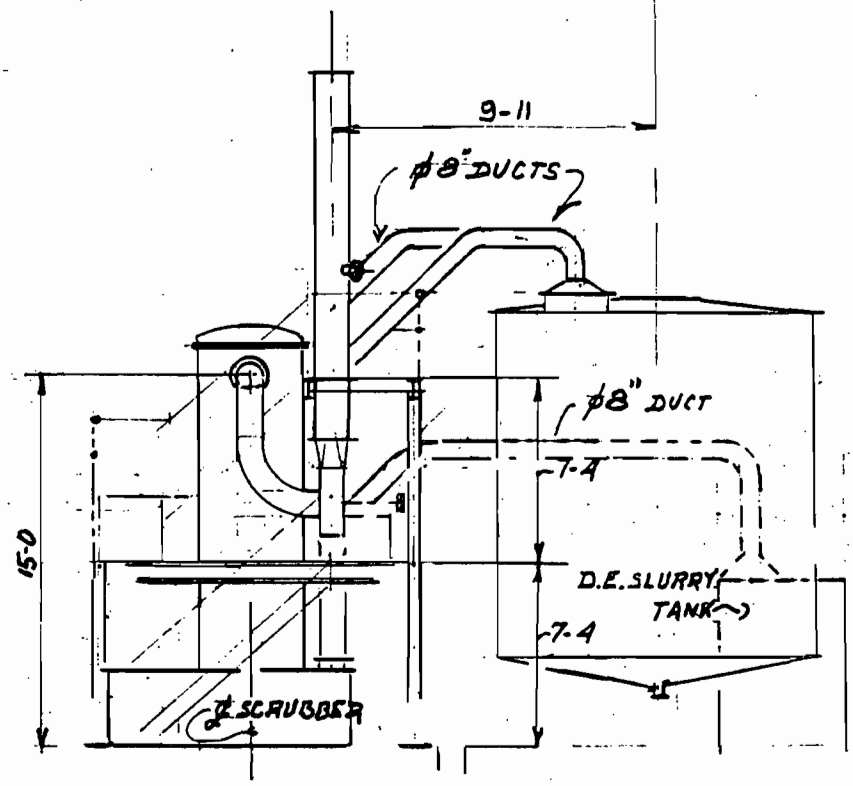


DEFLUORINATED PHOSPHORIC ACID FLOW SHEET

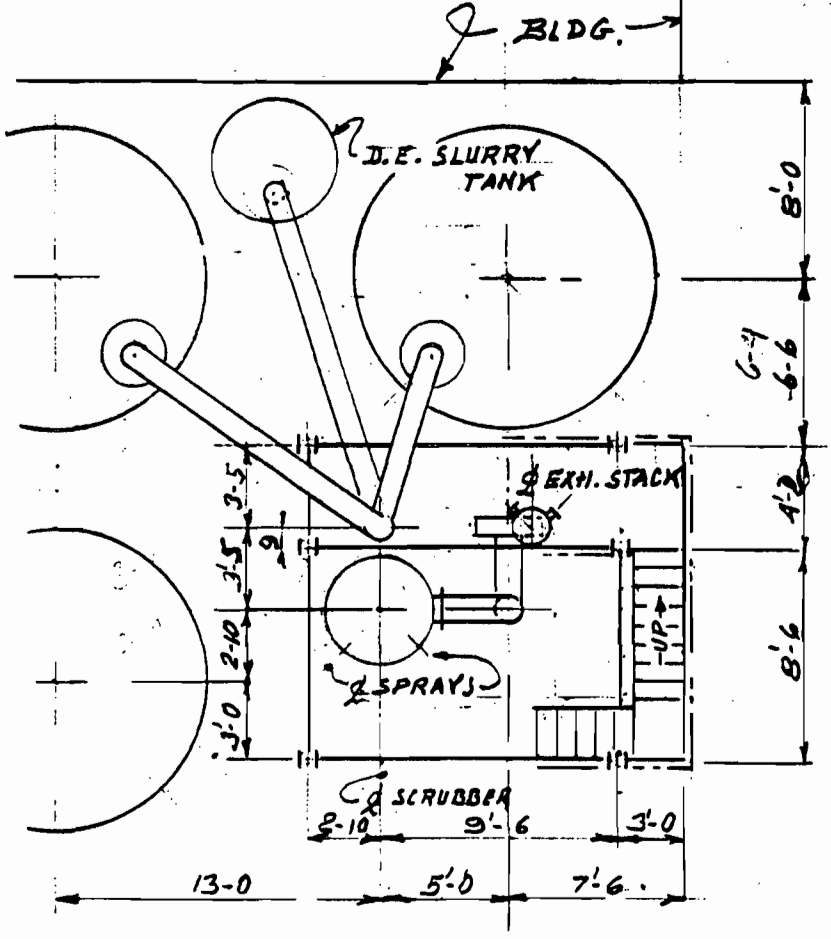
ATTACHMENT "D-2"



SOUTH ELEVATION



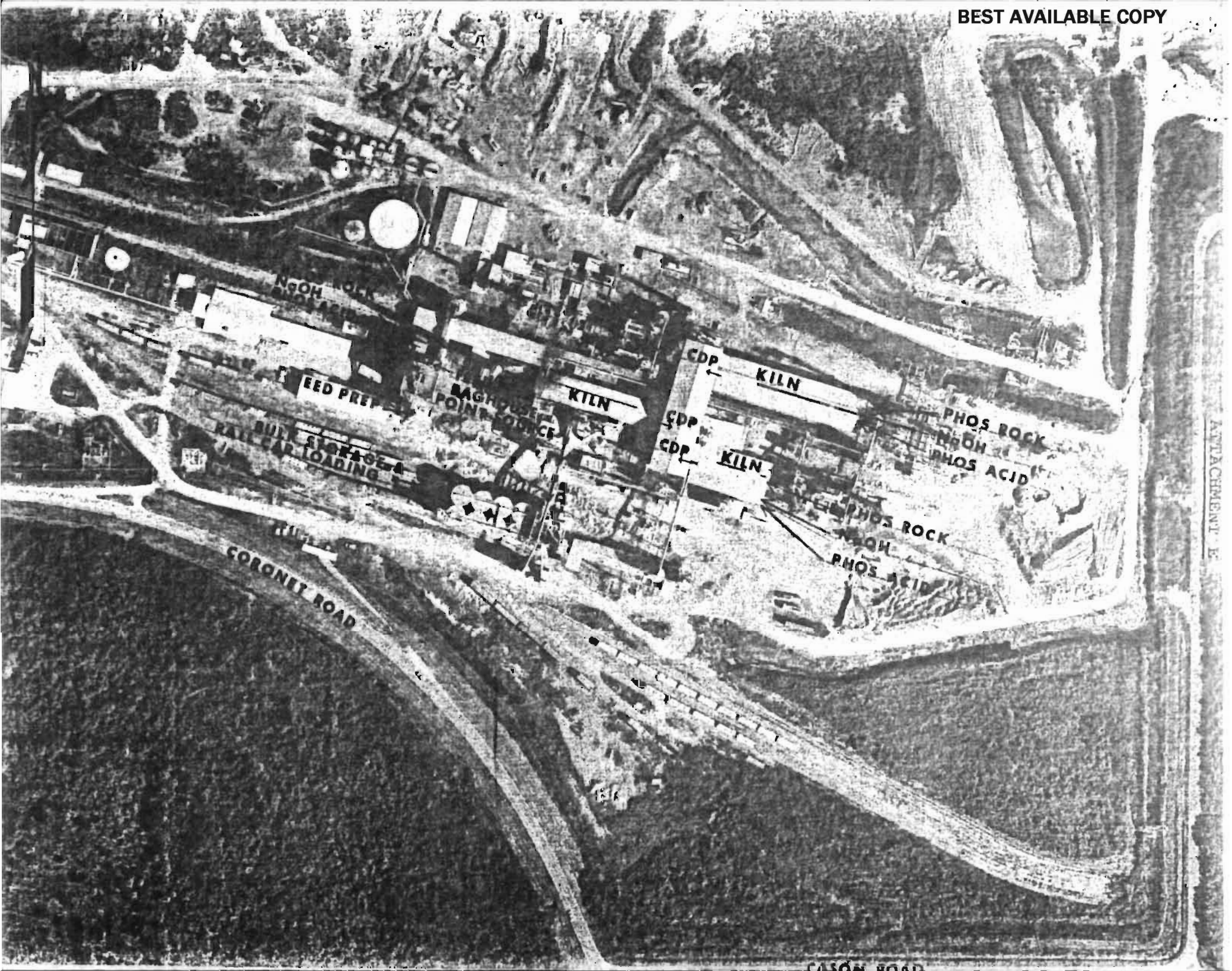
EAST ELEVATION



PLAN

PRESSURE DROP : 5.3" 2961 cfm

HARTZEL 19 FAN 2192 RPM 10 HP



ATTACHMENT E

Mr. J. Floyd
Plant Engineer
Amax Chemical
P.O. Box 790
Plant City, Florida 33566

November 7, 1984

Subject: A scrubber for a point source

Amax plans to use one of four Rigidome 4837 scrubbers, used originally for the C-78 project in 1973. The scrubber is 16' high by 4' in diameter. A 1½" thick Beco pad demister is located at the 14' level. A domed 2' high cover serves to remove the demisted gas for transport to the blower. (See Plan: East & south elevation.) Eight spray headers are mounted in pairs at right angle to each other. Each pair is separated vertically by a distance of 2'. Each pair is offset a few inches horizontally to assure full spray coverage. The sprays produce a 90° cone with 50 psig water delivering 1.1 gpm. The headers are sealed by means of rubber stoppers to fill the entrance hole. The far side of the header rests on a 2" saddle mounted on the inside wall. A Hartzell fan operating at 3000 scfm will be used for scrubber air transport.

The following phases will be discussed for fluoride and dust removal: a) Pollution collection from the source. b) Scrubber action. c) Air pollution impact.

a) Pollution collection: There will be three sources; Two 12' diameter acid reaction tanks and one Kennite slurry mixer. They will be connected to the scrubber sump by means of 8" ducts tied to a single inlet duct at the scrubber. Consequently each source will be swept by approximately 1000 scfm air.
Fluoride: Calculations are based on the worst conditions, viz: Heated acid producing 1.825 gr/ft^3 of tank acid surface for approximately 2 hours. Under these conditions as air sweeps the surface, 1.825 gr/ft^3 of fluorine will emerge from the surface as vapor. The covered tanks will have an open space of about 1' above the acid. Then F produced each minute is:

1) F gr/ft^3 two tanks = 1.825 x 2 = 3.650

Kennite dust: The dust loading found at the slurry tank:

2) gr/ft^3 = 0.42

Then with an air sweep of 1000 scfm, the grains per minute is:

3) gr/min = 0.42 x 1000 = 420

4) lbs/min $= \frac{420}{7000} = 0.060$*

* An isokinetic deviation occurs, that is, gas or dust entering a duct from a large open area at 1000 scfm, acts like a funnel drawing in more pollutant than found in the air above the slurry or acid. Consequently the loading the scrubber receives may be a little higher.

Kennite: Supplier's name brand of diatomaceous earth.

b) Scrubber action:
Gas absorption in water is dependent upon the effective surface area covered by spray action in a given time and then equating that to the scrubber cross sectional area that the air must traverse. Plant City pond water is maintained at a pH of about 3.0. At this pH there are many ions which will combine with fluoride, both positive and negative, which will aid in the reduction of volatile escape. However, it is understood that Amax plans to use well water.

Scrubber dimensions: The inside dimensions are 4' diameter by 14' to the demister. A sump overflow at 2' leaves an active height of 12'.
Sprays: The scrubber manifolds are fitted with Spraying Systems hollow cone sprays with an orifice of 0.140" and operating at 50 psig, a cone of 90° is produced at a usa le vertical coverage of 2'. See page 1 for other dimensions.) Average spray drop size is 100 μ* in diameter using 1.1 gpm water.

5) Drop volume: cc = $4/3\pi r^3$. Drop radius: cm = $\frac{100}{2} \times 10^{-4} = 5.0 \times 10^{-3}$

6) Vol. cc/drop = $4/3\pi(5.0 \times 10^{-3})^3 = 5.24 \times 10^{-7}$

Gas velocity: (counter flow.) r=2'

7) ft/sec = $\frac{3000}{\pi r^2 \times 60} = 4.0$ ft/sec

8) Drops/spray sec = $\frac{1.1 \times 3785.4^{**}}{60 \times 5.24 \times 10^{-7}} = 13.244 \times 10^7$

Area drops/sec:
Since the area of a sphere is $4\pi r^2$, only one half of the area is contacted by the rising gas. Neglecting the other half, which is also contacted, (but to a lesser degree) because of the random action of a gas, the area calculated will be $2\pi r^2$.

9) Area ft^2/ spray sec = $\frac{13.244 \times 10^7 \times 2\pi(5.0 \times 10^{-3})^2}{929.03^{***}} = 22.4$ ft^2/spr sec

Each manifold spray pair has 8 sprays and each pair is separated vertically by a distance of 2', then the area covered by each pair becomes: Area ft^2/sec= 8 x 22.4 = 179.2.
The gas rises at a rate of 4'/sec, therefore it traverses two manifold pairs each second. The area of the rising gas is πr^2, and r=2, then the area becomes A = $\pi 4$ = 12.6 ft^2. Since it moves vertically 2' each second, then the number of gas areas contacting the water spray curtain becomes:

10) No = $\frac{2 \times 179.2}{12.6} = 28.4$ and since it takes 2 seconds for the gas to traverse the entire scrubber the number becomes: No = 2 x 28.4 = 56.8

* is 10^{-6} meters
** cc/gal

Dust removal:

Screen sizes:

μ	%
-20	98.0
-10	94.5
-6	73.0
-2	27.0
-1	17.0
-0.5	10.0
-0.25	5.0

$$\text{Average particle size} = \frac{[\Sigma\ \mu \times (100 - \%)]^{1,+2,}}{n}$$

$$= 0.74\ \mu$$

The dust size is still many times larger than fluoride vapor, however the large area covered by the spray film may assure adequate dust removal. Tests should be conducted to confirm this statement.

c) Air pollution impact:

It is understood that fresh water will be used.
Fluoride: Entering the scrubber:

11) $\text{lbs F/hr} = \frac{3.650 \times 60 \times 1000}{7000} = 31.284$

12) $\text{Water lbs/hr} = 32 \times 8.345 \times 60 \times 1.1 = 17,625$

13) $\%HF = \frac{31.284 \times 20/19 \times 100}{17,625} = 0.1868$

Using the table from patent No 39,423 -- 1947* and assume a straight line function, and extrapolating to %HF= 0.1868 at 80° F then:

$\%HF/\text{lbs dry air} = 6.576 \times 10^{-6}$

14) $\text{Lbs dry air/hr} = \frac{3000 \times 60 \times \left[\frac{29.92 - 1.032^{**}}{29.92}\right] \times 29.00 \times 528}{359 \times 540} = 13,7$

15) $\text{lbs HF/hr} = \frac{13,727 \times 6.576 \times 10^{-6}}{10^{2}} = 9.027 \times 10^{-4}$

Dust:

Amax now employs a small water scrubber to remove Kennite dust which is doing a satisfactory job. It is anticipated that the C-78 scrubber should perform satisfactorially, however tests should be conducted.

Comments:

Based on the above analysis, the Rigidome scrubber used in the 1973 C-78 tests, should remove fluoride vapors adequately.

Louis John Lamb
Consultant

* See attached patent computer printout.
** Water vapor pressure, "Hg at 80° F.

TABLE OF HF VAPOR COMPOSITION
DERIVED FROM TVA DATA
BROSHEER ET AL, I&EC 39, 423, 1947

%HF IN LIQUOR	LBS HF PER LB DRY AIR			
	80 DEG F	100 DEG F	120 DEG F	140 DEG F
.1	3.92672E-6	7.86430E-6	1.54041E-5	3.01668E-5
.2	6.97836E-6	1.39763E-5	2.73761E-5	5.36096E-5
.3	9.75996E-6	1.95463E-5	3.82839E-5	7.49660E-5
.4	1.23345E-5	2.48021E-5	4.85766E-5	9.51156E-5
.5	1.49040E-5	2.98474E-5	5.84564E-5	1.14454E-4
.6	1.73478E-5	3.47407E-5	6.80379E-5	1.33207E-4
.7	1.97343E-5	3.95193E-5	7.73942E-5	1.51516E-4
.8	2.20766E-5	4.42091E-5	8.65759E-5	1.69481E-4
.9	2.43840E-5	4.88289E-5	9.56199E-5	1.87174E-4
1.	2.66637E-5	5.33930E-5	1.04554E-4	2.04650E-4
1	2.66637E-5	5.33930E-5	1.04554E-4	2.04650E-4
1.5	3.78097E-5	7.57053E-5	1.48220E-4	2.90027E-4
2	4.87914E-5	9.76839E-5	1.91216E-4	3.74028E-4
2.5	5.98116E-5	1.19734E-4	2.34334E-4	4.58200E-4
3	7.09882E-5	1.42092E-4	2.78033E-4	5.43435E-4
3.5	8.24012E-5	1.64917E-4	3.22625E-4	6.30336E-4
4	9.41100E-5	1.88328E-4	3.68338E-4	7.19343E-4
4.5	1.06163E-4	2.12419E-4	4.15359E-4	8.10810E-4
5	1.18600E-4	2.37272E-4	4.63842E-4	9.05033E-4
5.5	1.31458E-4	2.62959E-4	5.13925E-4	1.00227E-3
6	1.44770E-4	2.89546E-4	5.65735E-4	1.10277E-3
6.5	1.58568E-4	3.17094E-4	6.19390E-4	1.20674E-3
7	1.72880E-4	3.45662E-4	6.75003E-4	1.31439E-3
7.5	1.87738E-4	3.75309E-4	7.32685E-4	1.42594E-3
8	2.03170E-4	4.06093E-4	7.92543E-4	1.54158E-3
8.5	2.19205E-4	4.38069E-4	8.54688E-4	1.66151E-3
9	2.35872E-4	4.71296E-4	9.19227E-4	1.78593E-3
9.5	2.53200E-4	5.05831E-4	9.86269E-4	1.91505E-3
10	2.71220E-4	5.41733E-4	1.05593E-3	2.04906E-3
10.5	2.89963E-4	5.79062E-4	1.12831E-3	2.18817E-3
11	3.09453E-4	6.17880E-4	1.20354E-3	2.33260E-3
11.5	3.29739E-4	6.58248E-4	1.28173E-3	2.48256E-3
12	3.50837E-4	7.00232E-4	.001363	2.63828E-3
12.5	3.72787E-4	7.43896E-4	1.44748E-3	2.79997E-3
13	3.95624E-4	7.89310E-4	1.53530E-3	2.96788E-3
13.5	4.19383E-4	8.36543E-4	1.62653E-3	3.14224E-3
14	4.44101E-4	8.85668E-4	1.72147E-3	3.32330E-3
14.5	4.69819E-4	9.36759E-4	1.82040E-3	3.51132E-3
15	4.96566E-4	9.89893E-4	1.92362E-3	3.70656E-3
15.5	5.24394E-4	1.04515E-3	2.03143E-3	3.90930E-3
16	5.53341E-4	1.10061E-3	2.13993E-3	4.11982E-3
16.5	5.83450E-4	1.16026E-3	2.25504E-3	4.33841E-3
17	6.14766E-4	1.22429E-3	2.37667E-3	4.56533E-3
17.5	6.47333E-4	1.29291E-3	2.50496E-3	4.80103E-3
18	6.81195E-4	1.36645E-3	2.64017E-3	5.04570E-3
18.5	7.16403E-4	1.44513E-3	2.78264E-3	5.29971E-3
19	7.53026E-4	1.52934E-3	2.93275E-3	5.56340E-3
19.5	7.91113E-4	1.61941E-3	3.09086E-3	5.83701E-3
20	8.30731E-4	1.71575E-3	3.25736E-3	6.12148E-3

State of Florida

DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

ATTACHMENT G

And/Or To Other Than The Addressee

To: _____ Locln.: _____

To: _____ Locln.: _____

To: _____ Locln.: _____

From: _____ Date: _____

77

TO: Jacob D. Varn

FROM: Steve Smallwood

DATE: October 24, 1980

SUBJ: BACT - Occidental Chemical Company
Phosphoric Acid Feed Preparation

Facility: A 422 TPD P_2O_5 acid defluorination plant where diatomaceous earth is mixed with 54 percent phosphoric acid, heated and then air is blown through the mixture to remove fluorides from the acid. The fluoride is removed from this air with a cross-flow packed scrubber before the air is discharged to the atmosphere. Dust from the diatomaceous earth handling equipment is controlled with a baghouse.

BACT Determination Requested by the Applicant:

Fluoride: 0.05 lb F/ton P_2O_5 feed

Particulate: 1.26 lb/hr.

Date of Receipt of a BACT Application:

October 1 , 1980

Date of Publication in the Florida Administrative Weekly:

October 10,1980

Study Group Members:

Johnny Cole, St. Johns River Subdistrict
Teresa Heron, Bureau of Air Quality Management
Bob King, Bureau of Air Quality Management

Study Group Recommendation:

	Fluoride (lb F/TP_2O_5 in.)	Particulate
Johnny Cole	0.05	20% opacity
Teresa Heron	0.04	1.05 lb/hr (scrub
Bob King	0.02	0.21 lb/hr (bagho

BACT Determination by the DER:

Maximum Allowable Emission Rate are as follows:

Fluoride - 0.04 $\frac{\text{lb. total F}}{TP_2O_5 \text{ input}}$ and 0.65 lb F/hr.

Particulate - 0.015 grains/ACF or 5% opacity

Compliance to be determined by reference methods 1, 2, 3, 4, 5, 9, 13A or 13B as published in 40 CFR 60, Appendix A or by other DER approved procedures. Minimum sample volume per run is 30 DSCF collected during an integral number of cycles over a period of 60 minutes are longer. Fluoride emission compliance test are to be conducted near permitted capcity during the time the process pond water is expected to be near its maximum annual temperature.

Justification of DER Determination:

The cross-flow packed scrubber and baghouses are the most satisfactory types of control devices for this service. The BACT standard can be met with properly designed, maintained and operated control devices. Lower fluoride emission from this plant is possible if the scrubber water is treated to remove fluoride. The expense of treating the water to obtain lower emission is not justified at this time.

Details of the Determination:

Details of the determination may be obtained by contacting:

Willard Hanks
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommendation from the Bureau of Air Quality Management:

By: D.K. Thomas for
Steve Smallwood

Date: 10/28/80

Department of Environmental Regulation approval:

By: Jacob D. Varn
Jacob D. Varn

Date: 29 OCT 1980

Attachment: Application
Recommendation (3)

COUNTY OF HILLSBOROUGH

MEMORANDUM

Date January 17, 1985

To Willard Hanks

From Steve Gyorog through Jerry Campbell SG

Subject: AMAX Plant City's Conveyor Belt Transfer Point Dust Collector

We have received the December 18, 1984 letter of incompletion response from AMAX concerning the above source. The particular collection efficiency for the dust collector listed in the application remains to be specified.

If you have any questions, please call me or Jerry Campbell.

SG/ch

COUNTY OF HILLSBOROUGH

MEMORANDUM

DER
JAN 21 1985
BAQM

January 17, 1985

To Willard Hanks, CAPS

From Steve Gyorog through Jerry Campbell SG

Subject: AMAX Chemical Corporation, Plant City, Phosphoric Acid Defluorination Facility Scrubber, AC29-091316, Letter of Incompletion Items

We have received the revised permit application for the above mentioned project. There are a number of problems with the application. The following Item #'s and remarks refer to the December 18, 1984 letter from AMAX:

Item #4: The BACT determination for Occidental Chemical Company was for a packed tower (scrubber). AMAX is proposing the use of a spray tower. The use of packing would lead to greater collection efficiency, and therefore, the BACT quoted is inapplicable.

Item #7: Fluoride emissions of 0.86 lb/hr are based on a production rate of 21.5 tons/hour and 0.04 lb Fl/ton P_2O_5. The BACT is inapplicable. The emissions will probably exceed 0.04 lb Fl/ton P_2O_5.

Item #8: At a scrubber flow rate to the nozzles of 40 gal/min, and yearly hours of operation of 2080 (two, four-hour batches per day), the scrubber effluent sent to the process water ponds will be 20,804 tons per year. The total steam input to the process of 388 tons per year will also add to this figure (some will condense). The 32 tons/year figure listed should be justified.

Item #10: Fluoride emission collection efficiency is based on heated acid producing 1.825 gr Fl^-/ft^3. What is the reference for this concentration?

Item #11: The revised application lists stack and fan characteristics of 1.33 ft. dia., 3000 ACFM, velocity 35.81 fps. Item #11 lists 63.66 fps and a diameter of 1.0 ft. Which is correct?

Finally, although the phosphoric acid is not produced at this facility, it seems reasonable to use 40 CFR 60 Subpart T and ask the applicant to accept 0.02 lb Fl^-/ton P_2O_5 as an allowable emission rate. If the phosphoric acid were defluorinated at the Manatee facility, certainly NSPS would apply. Perhaps a BACT determination for a counter current spray tower is required.

If you have any questions, please call me or Jerry Campbell.

SG/ch

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

January 23, 1985

Mrs. Liz Cloud
Florida Administrative Weekly
Department of State
The Capitol
Tallahassee, Florida 32304

Dear Mrs. Cloud:

Re: Receipt of an Application for BACT Determination

Please publish the attached notice in the February 1, 1985 issue of the Florida Administrative Weekly.

Should you have any questions, please call me at 488-1344.

Sincerely,

Edward Palagyi

Edward Palagyi, BACT Coordinator
Bureau of Air Quality
Management

EP/s

attachment

cc: Geneva Hartsfield
2600 Blair Stone Road
Tallahassee, Florida 32301

THE DEPARTMENT OF ENVIRONMENTAL REGULATION announces receipt on January 11, 1985 of an application for determination of Best Available Control Technology (BACT) to minimize air pollutant emissions from a phosphoric acid defluorinating plant, Amax Phosphate, Inc., Plant City, Florida. Information regarding this application may be obtained by writing to: Edward Palagyi, BACT Coordinator, Florida Department of Environmental Regulation, Bureau of Air Quality Management, 2600 Blair Stone Road, Tallahassee, Florida 32301, Telephone (904)488-1344.

AMAX Chemical Corporation
A SUBSIDIARY OF AMAX INC.
P. O. BOX 790 ◇ PLANT CITY, FLORIDA 34289 ◇ (813) 752-1161

March 7, 1985

Mr. C. H. Fancy, P.E.
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Fancy:

In response to the letter of incompleteness, dated January 28, 1985, concerning file no. A029-091316, we are submitting the following. The responses are in the order the questions were presented.

1. For a clarification of drawing D-1, please see Attachment A of this letter. The process vessels in the phosphoric acid defluorinating area are also shown in Attachment A.

2. There is only one diatomaceous earth (D.E.) slurry tank.

3. We feel that a 180 day period from the date of issuance would be sufficient time to complete the project.

4. To clarify the statement referred to in section II: A, it should have read: Maximum particulate emissions occur during the slurrying of the D.E. This slurrying takes place only in the D.E. slurry tank, not in the acid tanks. The D.E. slurry is prepared using fresh water. The slurrying of D.E. would take place for approximately ½ hour twice a day.

5. The D.E. slurry tank discharges into one of the first 12,000 gallon acid tanks, and while the first defluorination tank is being sparged the D.E. slurry tank is refilled and then dumps into the second 12,000 gallon acid tank.

6. See Attachment B (section VI of the permit application).

7. The basis of Mr. Lamb's calculations of 1.825 gr/ft^3 of fluoride was the amount of total fluoride removed during an actual defluorinating cycle. Although Mr. Lamb's final fluoride determination is labeled lbs. HF/hr., it is in fact total fluoride which includes HF and SiF_4. The reactions between the phosphoric acid, caustic solution, diatomaceous earth (86% SiO_2-0.6% CaO), and the fluoride contaminants are as follows:

   1. $H3PO_4 + NaOH \rightarrow 2H_2O + SiF_4$

   2. $4HF + SiO_2 \rightarrow 2H_2O + SiF_4$

   3. $3SiF_4 + 2H_2O \rightarrow 2H_2SiF_6 + SiO_2$

   4. $H_2SiF_6 + 2NaOH \rightarrow Na_2SiF_6 + 2H_2O$

8. The feed prep acid storage, dikal acid storage, and dikal and sales acid storage tanks and all tanks shown in Attachment A are existing tanks.

9. Precipitated fluoride compounds are removed from the acid by gravity settling. Nearly all of the precipitated sludge is pumped to the feed prep plant and used in the manufacturing process. However, a small percentage may be sluiced to the holding ponds.

10. The proposed scrubber will not recirculate water. The holding pond system is more than adequate, some 350 acres, to contain the potential 20,000 tons of water. If during the rainy season pond volumes require it, we are permitted under EPA-NPDES and DER-Industrial Wastewater permits to discharge treated process water.

11. Fluoride emissions are based on actual test data of the total amount of fluoride removed during the defluorination of one tank of phosphoric acid. The total amount of fluoride removed was then equated to the airflow of 1,000 SCFM.

12. The correct stack diameter is 1.33' and the correct velocity is 35.81 FPS.

Should you have any questions concerning the information provided, please call me at (813) 752-1161.

Sincerely,

George Townsend

George Townsend
Environmental Supervisor

GT:cr

cc: Bill Thomas, DER
Steve Gyorog, HCEPC
J. J. Lewis
F. G. Mullins

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Departmen of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was con structed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[x] Yes [ ] No

Contaminant	Rate or Concentration
Fluoride	3.650 Grains/ft.^{3}
Particulate	0.42 Grains/ft.^{3}

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [ ] No

Contaminant	Rate or Concentration
The state of Florida has declared BACT for a similar source.	

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
Fluoride	0.86 lbs./hr.
Particulate	0.39 Lbs./Hr.

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a.	Height:	ft.	b.	Diameter:	ft.
c.	Flow Rate:	ACFM	d.	Temperature:	°F
e.	Velocity:	FPS			

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. **Control Device:** Packed Bed Scrubber

b. **Operating Principles:** Mass Transfer/Particle Collection

c. **Efficiency*:** 98+

d. **Capital Cost:** $24,000

e. **Useful Life:** 20 Years

f. **Operating Cost:** $8,186

g. **Energy*:** 10 KWH

h. **Maintenance Cost:** $3,030/year

i. **Availability of construction materials and process chemicals:**
Package scrubbers are available through various manufacturers.

j. **Applicability to manufacturing processes:** Compatible with process

k. **Ability to construct with control device, install in available space, and operate within proposed levels:**
The available space is limited; for horizontal configuration.

2.

a. **Control Device:** Venturi

b. **Operating Principles:** Mass Transfer/Particle Collection

c. **Efficiency*:** 98+

d. **Capital Cost:** $46,000

e. **Useful Life:** 20 Years

f. **Operating Cost:** $8,423/year

g. **Energy**:** 12 KWH

h. **Maintenance Costs:** $1,600/year

i. **Availability of construction materials and process chemicals:**
Package scrubbers are available through various manufacturers.

j. **Applicability to manufacturing processes:** Compatible with process

k. **Ability to construct with control device, install in available space, and operate within proposed levels:**
Moderate space available

*Explain method of determining efficiency. Manufacturer's design guarantee

**Energy to be reported in units of electrical power – KWH design rate.

3.

a. **Control Device:**

b. **Operating Principles:**

c. **Efficiency*:**

d. **Capital Cost:**

e. **Life:**

f. **Operating Cost:**

g. **Energy:**

h. **Maintenance Cost:**

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device: Spray Chamber(this scrubber is already owned)
2. Efficiency*: 99+
3. Capital Cost: $5,000 (to recoat inside)
4. Life: 20 Years
5. Operating Cost: $8,186
6. Energy: 10 KWH
7. Maintenance Cost: $1,000
8. Manufacturer: Rigidome
9. Other locations where employed on similar processes: None known

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above. Fluoride emissions calculated rom test data

(7) Emissions*:

Contaminant	Rate or Concentration
Fluoride	0.86 Lbs./Hr.
Particulate	0.39 Lbs./Hr.

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

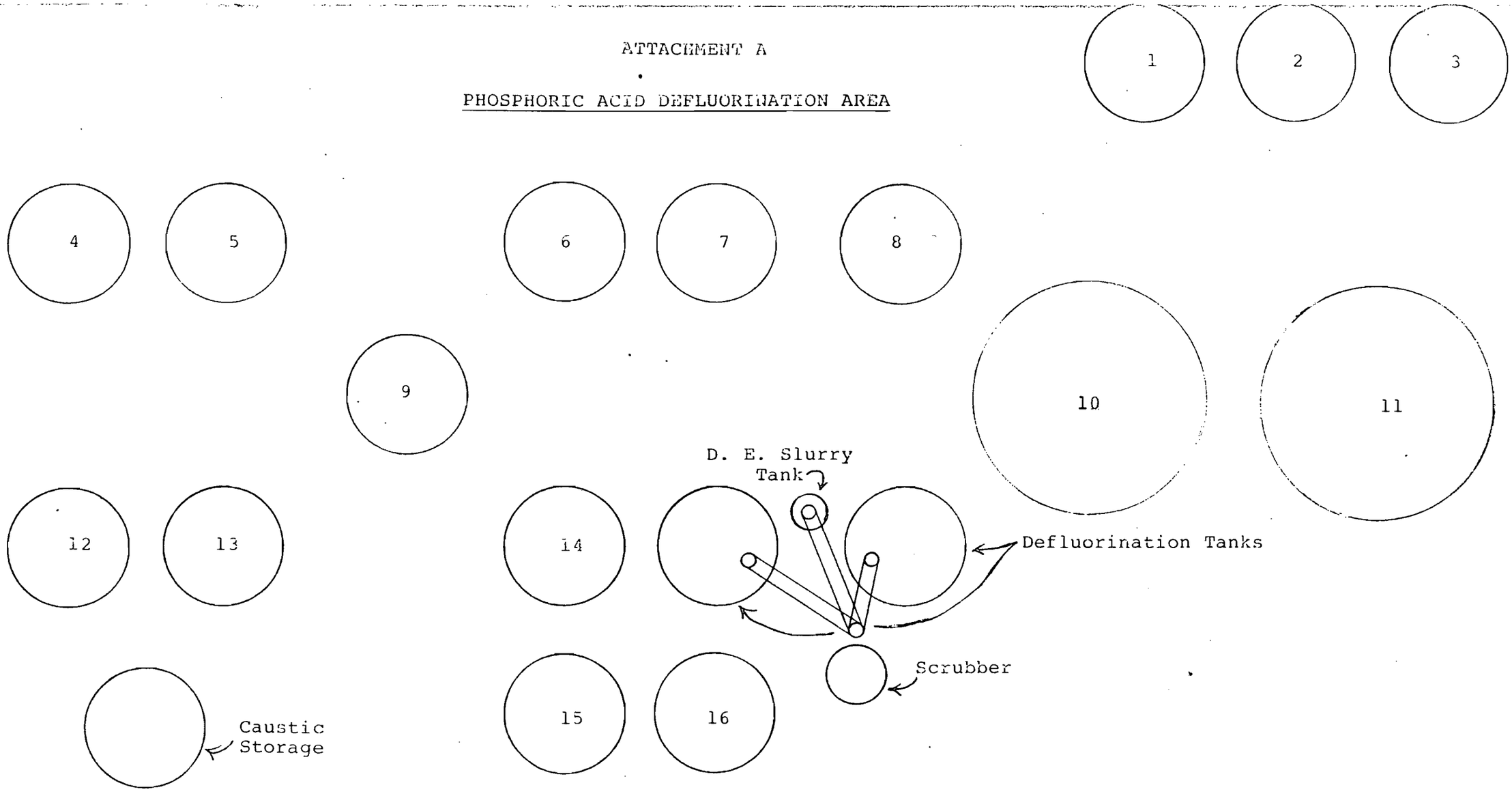
(8) Process Rate*:

10. Reason for selection and description of systems:

*Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

ATTACHMENT A

PHOSPHORIC ACID DEFLUORINATION AREA



Tanks 1-16 are acid storage tanks

AMAX Chemical Corporation
A SUBSIDIARY OF AMAX INC.
P. O. BOX 790 • PLANT CITY, FLORIDA 34289 • (813) 752-1161

April 5, 1985

Mr. C. H. Fancy, P.E.
Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Fancy:

In response to a request for additional information concerning file no. A029-091316, we are submitting the following:

1. The test data for fluoride removal from the phosphoric acid was gathered simply by determining, by analyses, the fluoride content of the acid at various stages of the defluorinating process. As referenced by Louis John Lamb to Joe Floyd; attachment F of the permit application, the maximum fluoride emissions occurred during a two hour period when the heated acid, diatomaceous earth, and caustic mixture was air sparged, worst case condition. Laboratory analysis of the acid before and after this two hour period indicated that 32.12 lbs. of fluorides had been removed. Each of the two reaction tanks will be swept with 1,025 ACFM during the defluorinating process. The 1.83 grains F_2/ft^3 calculates as follows:

$$\frac{32.12 \text{ Lbs } F_2}{2 \text{ Hours}} \times \frac{1 \text{ Hour}}{60 \text{ Min.}} \times \frac{1 \text{ Minute}}{1025 \text{ Ft}^3} \times \frac{7000 \text{ Grains}}{1 \text{ Lb}} = \frac{1.83 \text{ Grains}}{\text{Ft}^3}$$

2. Approximately 95% of the sludge produced during the phosphoric acid defluorinating process is recovered and used in another manufacturing process. The remaining 5% may be sluiced to the process water system

3. The 99+% fluoride removal capability of the Rigidome 4837 scrubber is based on the phosphoric acid fluoride removal test data and the engineering data presented by Louis John Lamb. AMAX will investigate the use of packing in this scrubber if it is needed to meet the BACT for fluoride set forth in the operating permit.

Sincerely,

George Townsend

George Townsend
Environmental Supervisor

GT:cr

cc: J. J. Lewis
G. P. Ubelhoer

COUNTY OF HILLSBOROUGH

DER

MAR 22 1985

BAQM

MEMORANDUM

Date March 19, 1985

To Willard Hanks, BAQM

From Blair Foley, HCEPC BF

Subject: Phosphoric Acid Defluorinating Scrubber (AC29-091316)

The Hillsborough County Environmental Protection Commission (HCEPC) has received Mr. Townsends reply to Mr. Fancy's incompletion letter, dated March 7, 1985, concerning the above source. A few additional items need to be addressed. The HCEPC offers the following comments.

1. Show the actual calculations or test data Mr. Lamb utilized in finding the heated acid producing 1.825 gr Fl-/ft^3.

2. What percentage of sludge is pumped to the feed prep and what percentage is sluiced to the holding pond.

3. Justify by calculations the 99% efficiency of the spray chamber "scrubber" described in section F of your application. A type of packing material could be utilized to increase the residence time (Θc), of the vapor and liquid, which would in turn increase the efficiency of the unit.

4. A best available control technology (BACT) determination is in progress for the fluoride control spray chamber.

If you have any questions concerning this, please feel free to call me at 272-5960.

cc: Bill Thomas

BF/ch

COST CENTER 30040.2

DATE 8/7/15 PHONE 8-1344

REQUESTED BY Ed Palagyi

NO. PAGES 3 NO. COPIES 25

JOB DESCRIPTION BACT

AMAX Chemical Corp.

SPECIAL INSTRUCTIONS

[✓] ONE SIDE COPY	[ ] COVER STOCK	[✓] STAPLE
[ ] TWO SIDE COPY	[ ] COLOR STOCK	[ ] DO NOT STAPLE
[✓] LETTER SIZE	[ ] CARBONLESS	
[ ] LEGAL SIZE	[✓] COLLATE	[ ] BIND
[ ] REDUCE TO 8½ x 11	[ ] REDUCE TO 2 PER PAGE	[ ] GLUE

Best Available Control Technology (BACT) Determination
AMAX Chemical Corporation
Hillsborough County

The applicant plans to construct a phosphoric acid defluorination plant at their facility located near Plant City, Florida. The process involves reacting phosphoric acid with a diatomaceous earth slurry and a caustic solution followed by sparging with compressed air and steam. The mechanics of the reaction produce fluoride compounds as a wasted gaseous overhead effluent and a precipitated by-product. The defluorination plant will have two primary reactors, each with an approximate processing time of four hours. The defluorination plant is scheduled to operate on an eight hour day, five day per week basis.

Fluoride compounds emitted to the atmosphere from the proposed defluorination plant are regulated air pollutants, Table 500-2, Rule 17-2.500. The maximum amount of fluoride compounds allowed to discharge to the atmosphere is to be determined by a BACT review as set forth in the Florida Administrative Code Rule 17-2.600(3)(a)9. - Emission Limiting and Performance Standards.

BACT Requested by the Applicant:

Fluoride emissions will not exceed 0.04 lb/ton of P_2O_5 input.

Date of Receipt of a BACT Application:

December 13, 1984

Date of Publication in the Florida Administrative Weekly:

February 1, 1985

Review Group Members:

The determination was based upon comments received from the Stationary Source Control Section, the Southwest District Office, and the Hillsborough County Environmental Protection Commission.

BACT Determined by DER:

Fluorides (water soluble or gaseous atomic weight 19) shall not exceed 0.02 pounds per ton of P_2O_5 input averaged over the first 3 hours of one normal defluorination plant operation.

Compliance with the fluoride standard will be determined using test Method 13B as specified in 40 CFR Part 60, Appendix A. One normal defluorination plant operation is defined to mean that period beginning when the first reaction vessel sparging cycle is

started followed immediately by the preparation and addition of the diatomaceous earth slurry to the second reaction vessel and subsequent sparging. The maximum time delay between the start of the two sparging cycles shall not exceed 1.5 hours.

BACT Determination Rationale:

The proposed defluorination plant will consist of two primary reaction vessels and one diatomaceous earth slurry tank. The typical reaction vessel charge is 12,000 gallons of phosphoric acid or 43 tons of P_2O_5. A specific quantity of diatomaceous earth slurry is prepared and added to one of the reaction vessels containing the phosphoric acid. The charged vessel is then sparged with air and steam until the defluorination process is complete. A second batch of diatomaceous earth slurry is quickly prepared and added to the second reaction vessel and the sparging process activated. There is approximately a 1-2 hour interval when only one vessel is in the sparging mode. The completion of two charges is defined as a batch.

The rate of fluoride emissions will peak shortly after start of the second reaction vessel sparging cycle. Compliance testing must be done when both reaction vessels are in different processing stages of defluorination. The performance test must be the average of three runs, the first run to start when the first reaction vessel sparge cycle begins. The second run must include the preparation and addition of the diatomaceous earth slurry to the second reaction vessel and the sparge cycle activated. The third run is to start when the sparging cycle of the second reaction vessel is activated. Each test run must be completed during that respective portion of the batch, as described, to be valid. Each sample run may be on a separate batch of acid.

The applicant's data indicates that the maximum hourly fluoride loading in the defluorination plant gaseous effluent will be 0.37 pounds per ton of P_2O_5 charged. The fluoride emission limit judged to be BACT is 0.02 pounds per ton of P_2O_5 charged. An emission control system that will remove 94.6 percent of the fluorides from the gaseous effluent will be required.

$$\frac{0.37 - 0.02}{0.37} = 0.946 \times 100 = 94.6\%$$

The proposed fluoride emission control device, according to the applicant's data, will remove 99 percent of the fluoride vapors produced by the defluorination process. The fluoride emission limit determined as BACT is judged to be reasonable and will allow for variations in the P_2O_5 content of the phosphoric acid feed stock.

Details of the Analysis May be Obtained by Contacting:

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended by:

H. Thomas for

C. H. Fancy, Deputy Bureau Chief

Date: 8/2/85

Approved by:

Victoria J. Tschinkel, Secretary

Date: 8/2/85