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

December 18, 1984

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 fan operating at 3000 scfm will be used for scrubber air transport.

[illegible]

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) <u>Pollution collection</u>: 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.

b) <u>Scrubber action</u>:
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 usable 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) $$\text{ft/sec} = \frac{3000}{\pi r^2 \times 60} = 4.0 \text{ ft/sec}$$

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

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

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* 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

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

$$= 0.74\ \mu$$

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

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

Using the table from patent No 39,423 -- 1947* and a ne a straight line function, and extrapolating to %HF= 0.1868 at 8 then:
$\%\text{HF/lbs dry air} = 6.576 \times 10^{-6}$

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

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 Ke ce dust which is doing a satisfactory job. It is anticipated that C-78 scrubber should perform satisfactorily, however tests shoul 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

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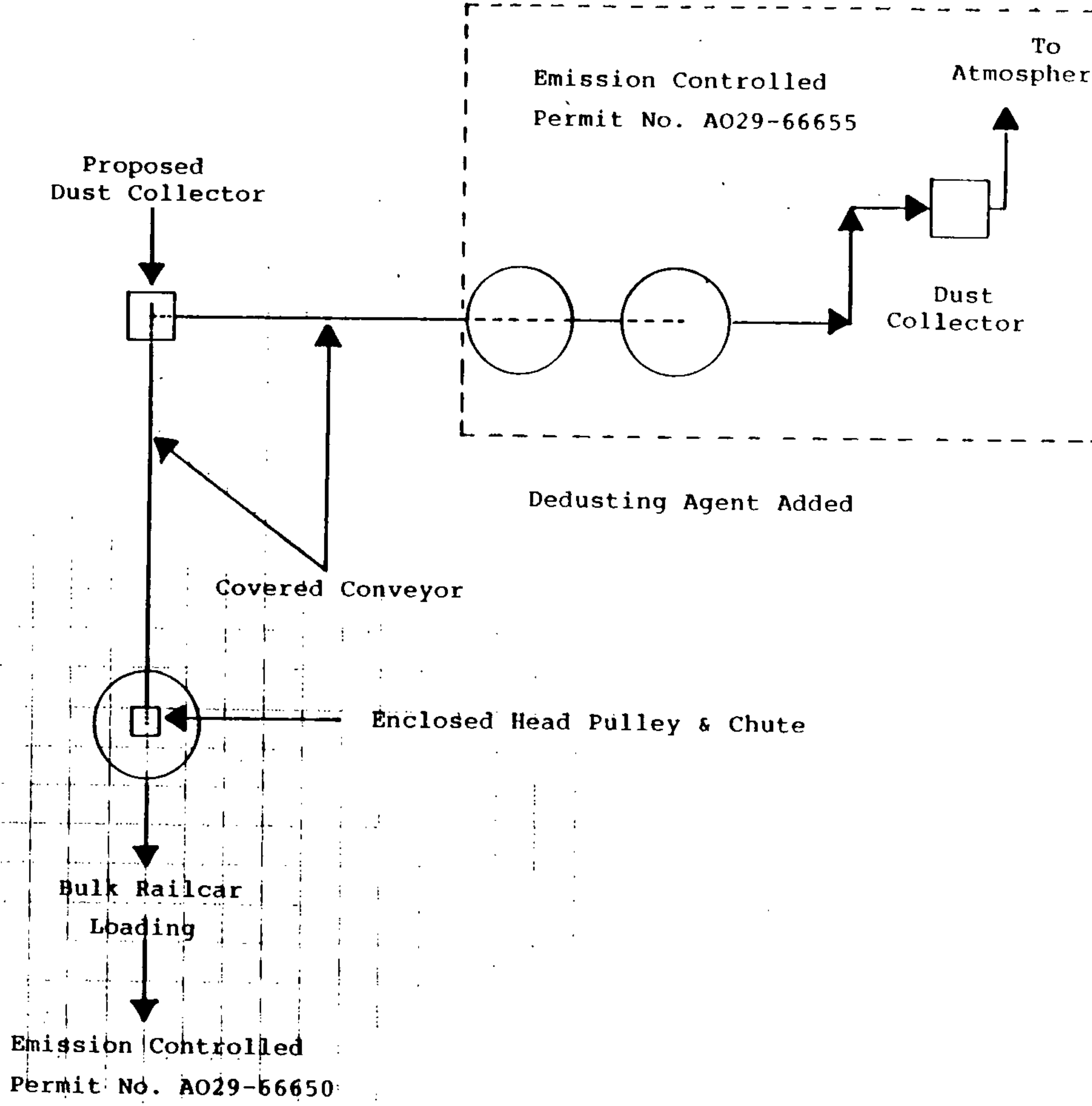
* See attached patent computer printout.
** Water vapor pressure," Hg at 80° F.

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	1.39768E-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	4.35766E-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	2.35372E-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	2.71228E-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	3.50637E-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	3.32330E-3
14.5	4.69815E-4	9.36759E-4	1.82010E-3	3.51132E-3
15	4.96566E-4	9.89390E-4	1.92262E-3	3.70656E-3
15.5	5.24394E-4	1.04515E-3	2.03013E-3	3.96930E-3
16	5.53341E-4	1.10261E-3	2.13993E-3	4.11932E-3
16.5	5.83450E-4	1.16226E-3	2.25504E-3	4.33341E-3
17	6.14766E-4	1.22442E-3	2.37467E-3	4.56533E-3
17.5	6.47305E-4	1.27900E-3	2.49493E-3	4.80103E-3
18	6.81[illegible]E-4	1.33604E-3	2.62817E-3	5.04570E-3
18.5	7.16483E-4	1.4[illegible]E-3	2.76240E-3	5.29971E-3
19	7.53082E-4	1.49364E-3	2.90138E-3	5.56343E-3
19.5	7.91101E-4	1.57469E-3	3.04600E-3	5.83721E-3
20	8.30721E-4	1.65951E-3	3.19736E-3	6.12142E-3

ATTACHMENT B



ATTACHMENT C

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] ☒ Existing[1]

APPLICATION TYPE: ☒ Construction ☐ Operation ☒ 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: JJ 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)

AMAX Chemical Corporation
Company Name (Please Type)

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

(Affix Seal)

Florida Registration No. 8716

Date: 1 4 85 Telephone No. (813)752-1161

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[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 O (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

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

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.

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

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:

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

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

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

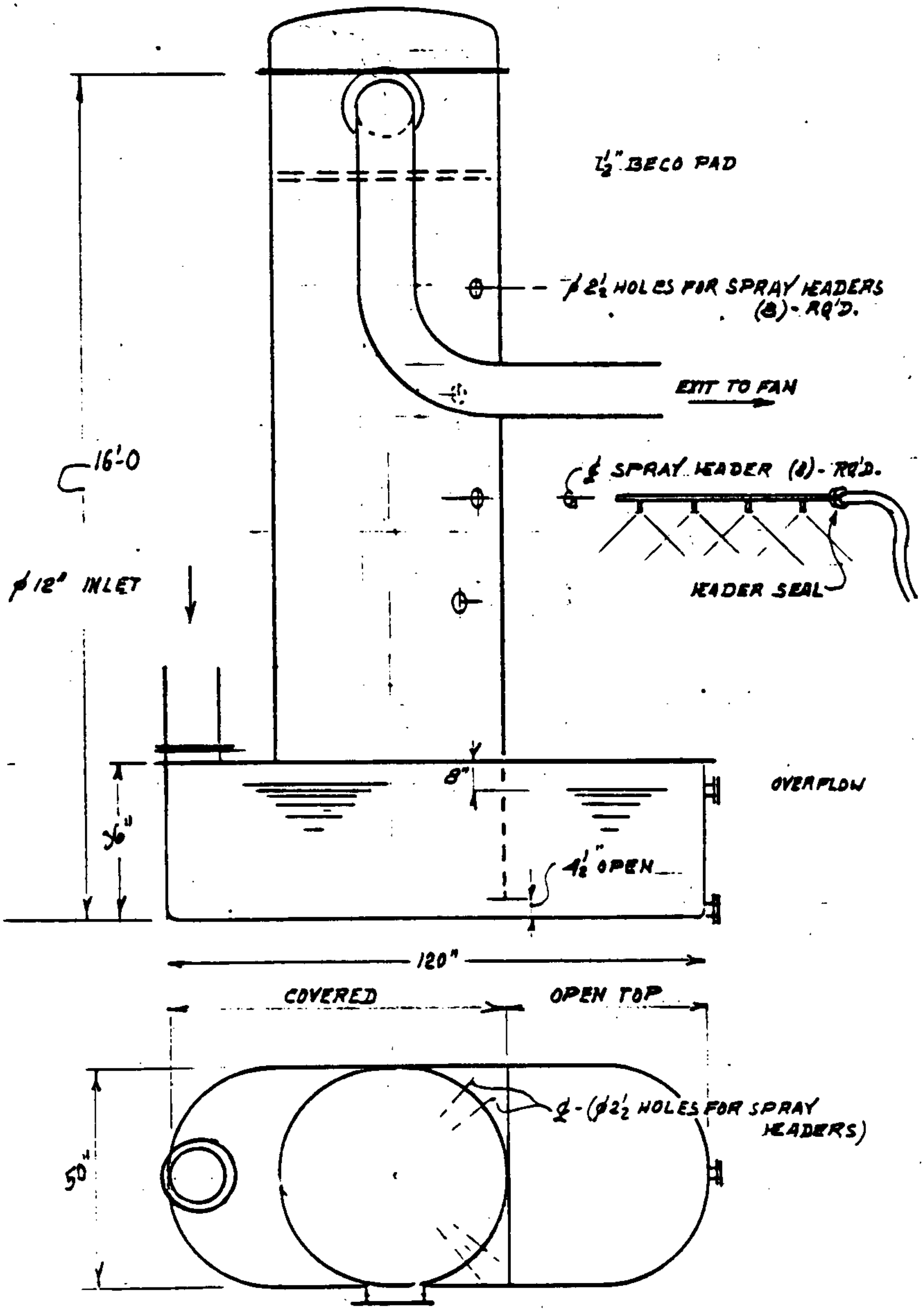
Potential Emissions*

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

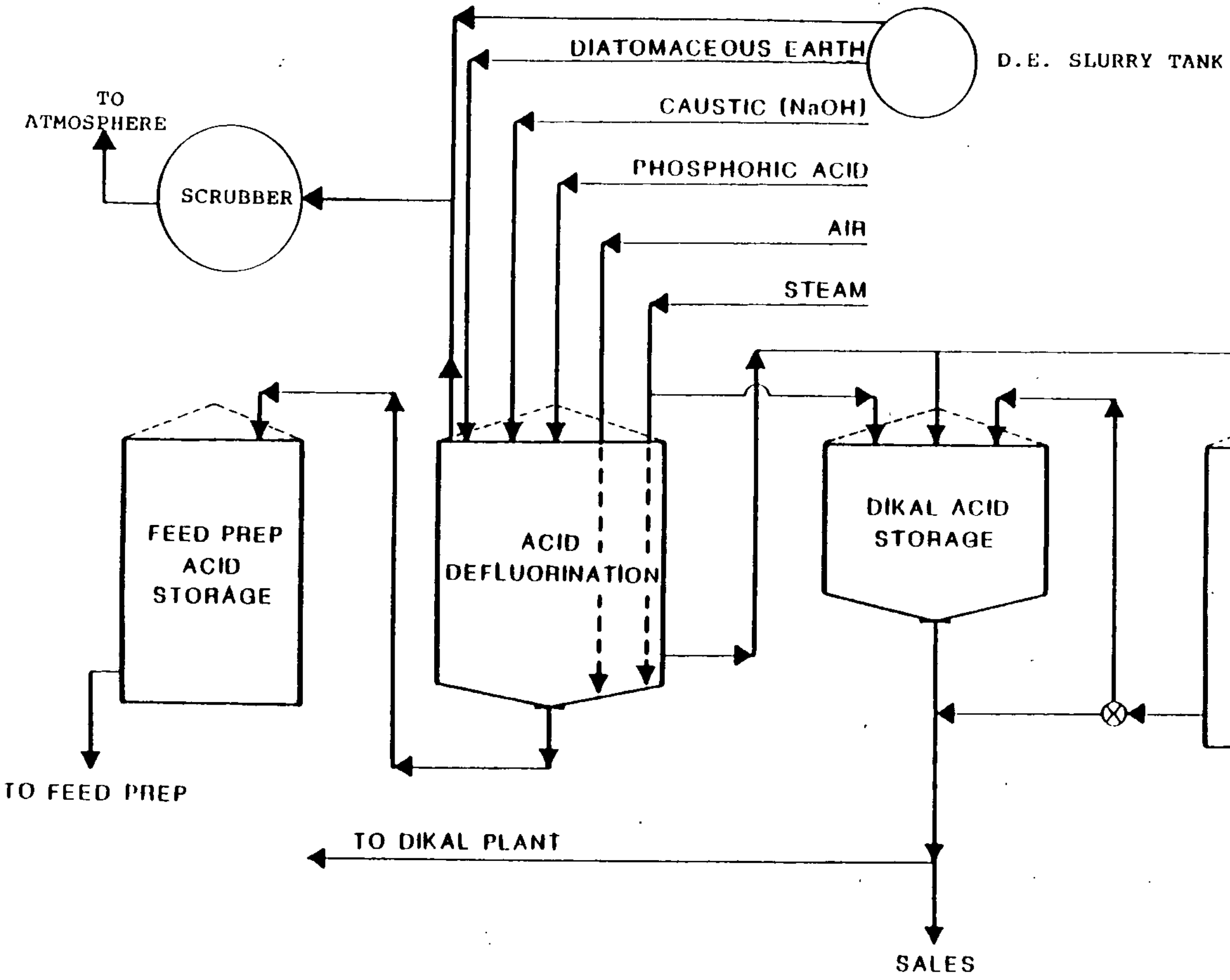
*Potential emissions are based on the data collected during the peak D.E. emission period; to reflect the maximum potential emissions. The peak D.E. emission period would not be applicable to the entire 2,080 annual operating hours. However, we are showing the maximum possible particulate emissions from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

Particulate emission compliance will be demonstrated using Method 5.

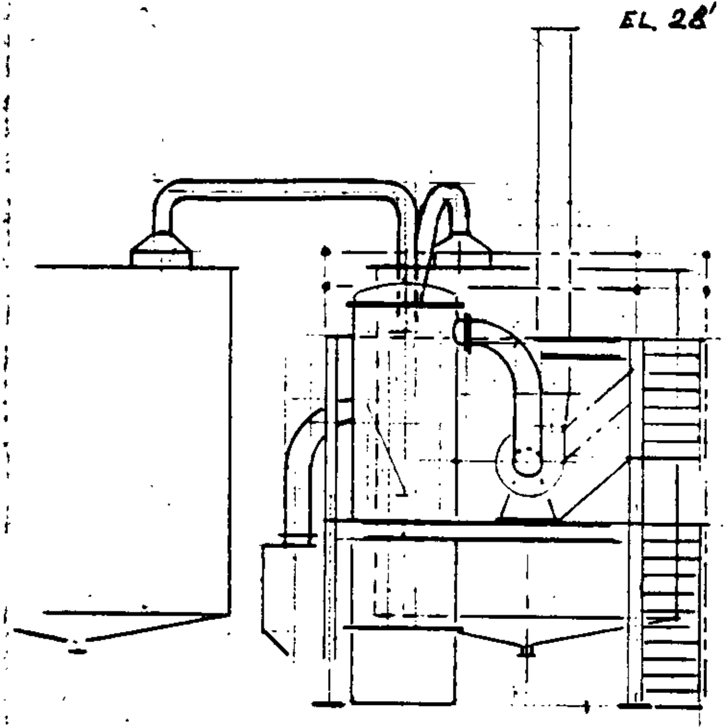
ATTACHMENT C



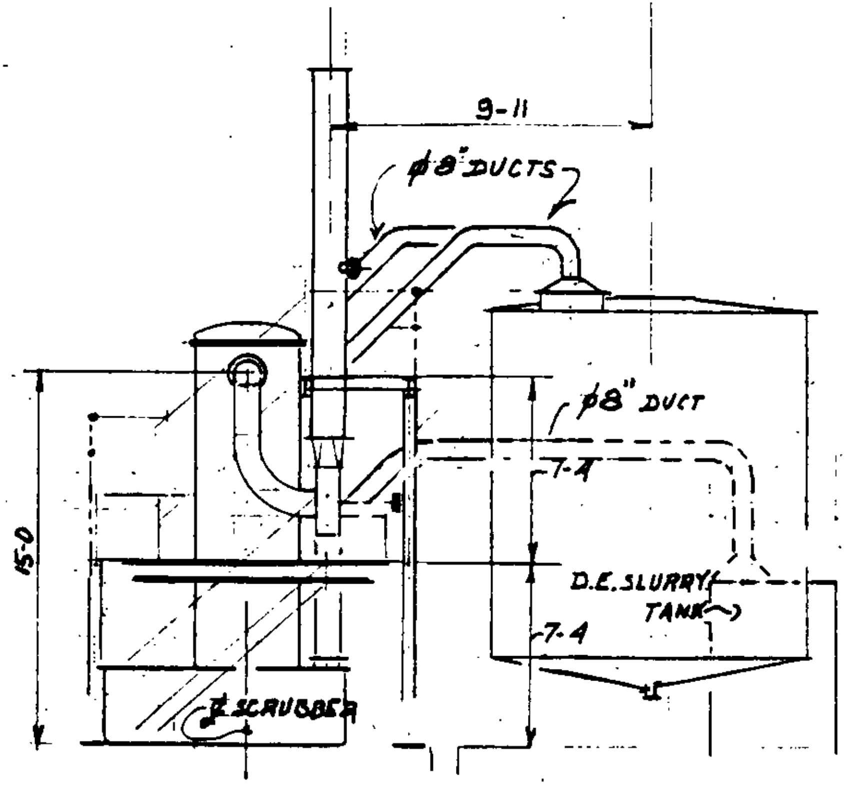
DEFLU PLANT
SCRUBBER C-78



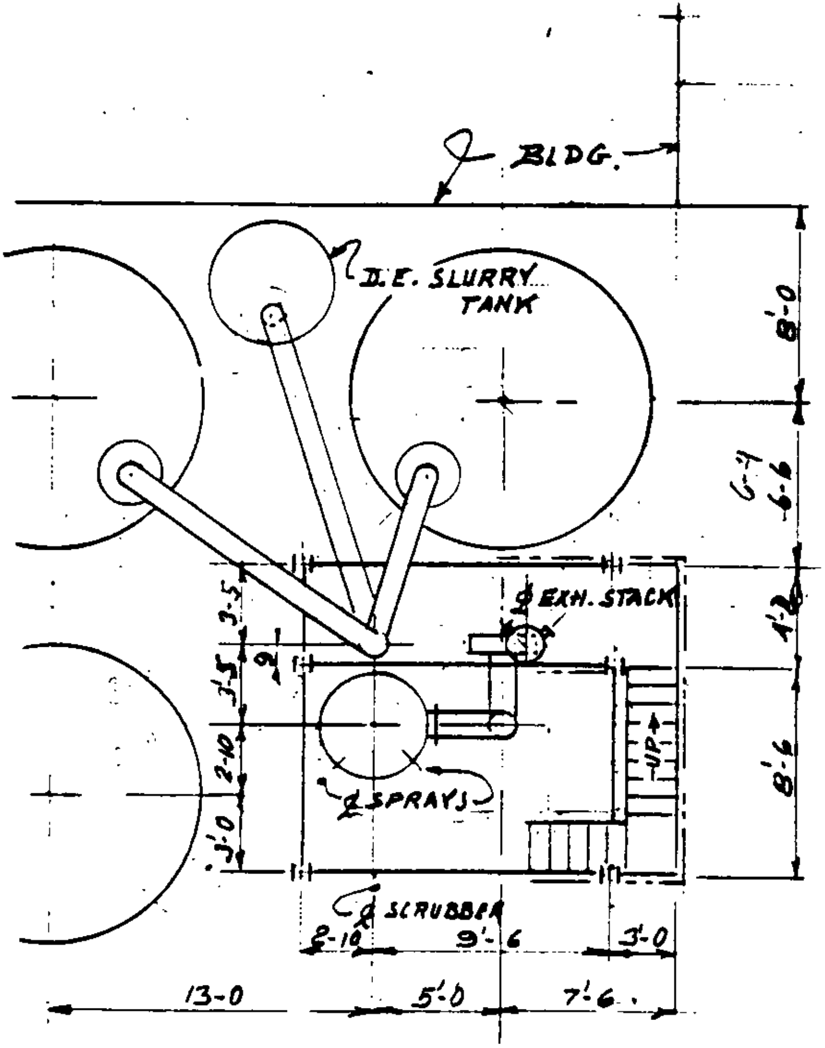
DEFLUORINATED PHOSPHORIC ACID FLOW SHEET



SOUTH ELEVATION



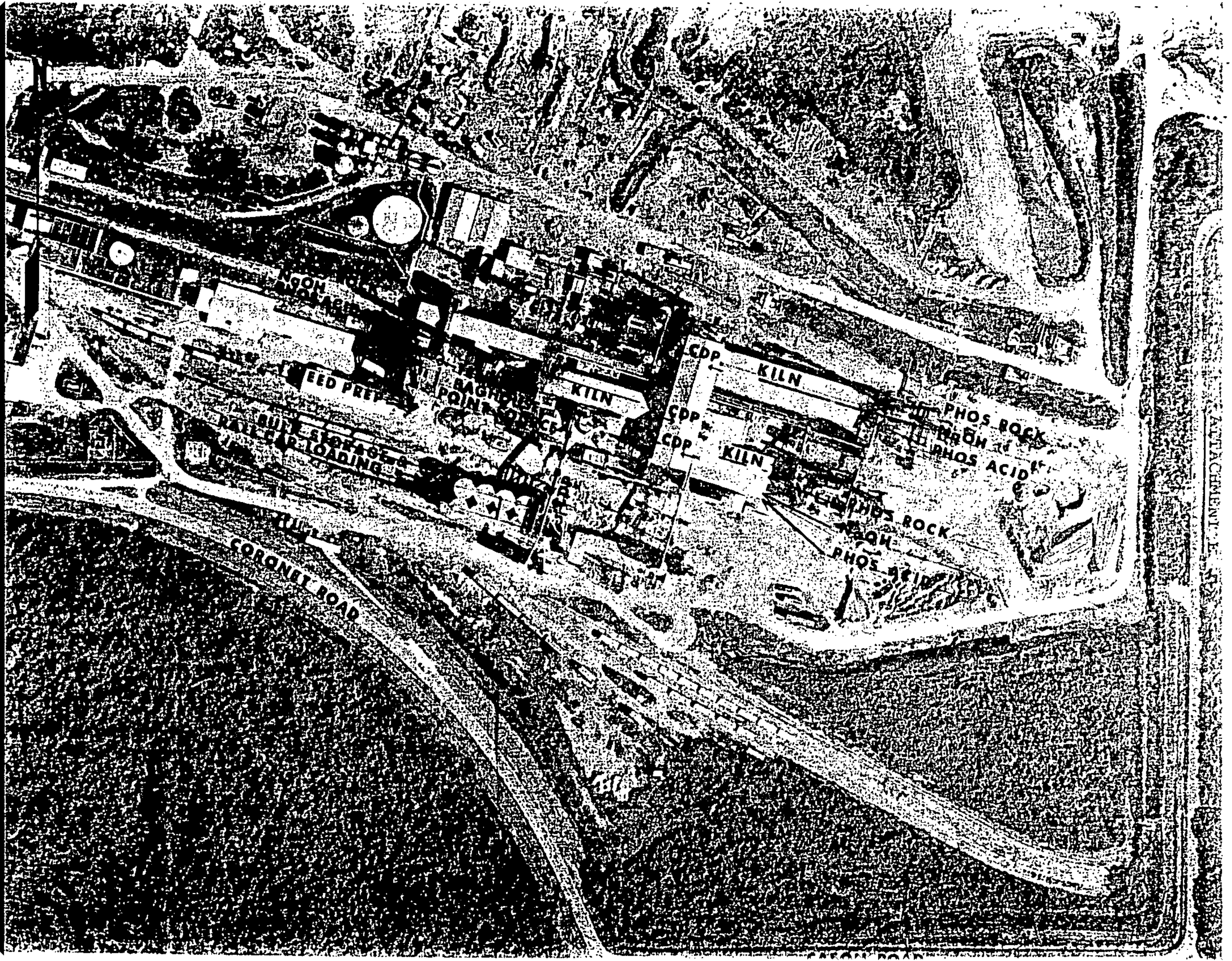
EAST ELEVATION



PLAN

PRESSURE DROP : 5.3" 2964 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) <u>Pollution collection</u>: 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.

<u>Fluoride</u>: 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

<u>Kennite dust</u>: 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.

<u>Kennite</u>: 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 usable 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
*** [illegible]

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

$$\text{Average particle size} = \frac{[\Sigma\mu \times (100 - \%)]}{n}^{1,+2,} = 0.74\ \mu$$

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

Using the table from patent No 39,423 -- 1947* and assume a straight line function, and extrapolating$_6$ to %HF= 0.1868 at 80° F then:
$\%\text{HF/lbs dry air} = 6.576 \times 10^{-6}$

14) $\text{Lbs dry air/hr} = \frac{3000 \times 60 \times \left[\frac{29.92 - 1.032^{**}}{29.92}\right] \times 29.00 \times 528}{359 \times 540} = 13{,}72$

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

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* 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	4.42691E-5	8.65759E-5	1.69481E-4
.9	2.43840E-5	4.89289E-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	9.41108E-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	8.54658E-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	4.19382E-4	8.36543E-4	1.62653E-3	3.14024E-3
14	4.44101E-4	8.85668E-4	1.72147E-3	3.32330E-3
14.5	4.69815E-4	9.36759E-4	1.82010E-3	3.51132E-3
15	4.96566E-4	[illegible]	1.92262E-3	3.70656E-3
15.5	5.24394E-4	1.04515E-3	[illegible]	3.90930E-3
16	5.53341E-4	1.10261E-3	2.13993E-3	4.11292E-3
16.5	5.83450E-4	1.16026E-3	2.25504E-3	4.32341E-3
17	[illegible]	[illegible]	2.37467E-3	[illegible]
17.5	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]
18.5	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	5.56242E-3
19.5	[illegible]	[illegible]	[illegible]	5.83701E-3
20	[illegible]	[illegible]	3.19726E-3	6.10148E-3

State of Florida ATTACHMENT 1

DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To Other Than The Addressee 77

To:		Loctn.:	
To:		Loctn.:	
To:		Loctn.:	
From:		Date:	

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 (baghou

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: DK 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)