

GARDINIER

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1988 OCT -7 PM 2:06  
INC.

Post Office Box 3269    Tampa, Florida 33601    Telephone 813-677-9111    TWX 810-876-0648    Telex-52666    Cable - Gardinphos

September 21, 1988

Mr. Clair Fancy  
State of Florida  
Department Environmental Regulation  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, FL 323-99-2400

SUBJECT:            Construction Permit Application  
                      Phosphoric Acid Clarifier Storage Tank

Dear Mr. Fancy:

Please find attached four copies of an air construction permit application to construct a new combination phosphoric acid clarifier and storage tank. (\$100 Check Enclosed)

This project will close down an existing phosphoric acid clarifier and storage tank and will provide a net improvement to the air quality.

If you have any question, please feel free to call.

Very truly yours,

E. O. Morris  
Environmental Manager

:gf

cc: J. Campbell/HCEPC/(\$355 Check)  
W. Thomas/DER  
D. Buff/KBN  
Above with enclosure  
Mathot  
Witte  
Osborne  
File P-45

RECEIVED  
OCT 4 1988  
DER-BAQM



# GARDINIER INC.

P. O. BOX 3269  
TAMPA, FLORIDA 33601



United States  
Environmental Protection  
Agency  
Region IV  
345 Courtland Street, N.E.  
Atlanta, GA 30365

Official Business  
Penalty for Private Use  
\$300

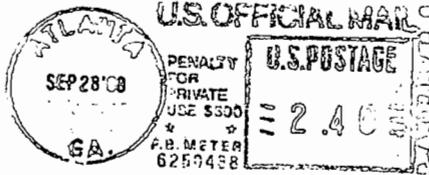
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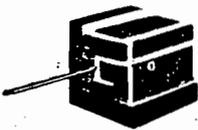
OCT 4 1988

DER - BAQM

Mr. Clair Fancy  
State of Florida

Dept. of Environmental Regulation  
Twin Towers Office Bldg.  
2600 Blair Stone Rd.  
Tallahassee, FL 32399-2400





GARDINIER, INC. TAMPA, FLORIDA

0080 NO. 577005208

10080

64-1278  
611

DATE		
MO.	DAY	YR.
10	/04/	88

PAY EXACTLY \*\*\*\*\*100 DOLLARS AND 00 CENTS

DOLLARS	CENTS
*****100	00

TO THE ORDER OF

Department of Environmental Regulation

GARDINIER, INC.

*Garrett J. Hangel*  
AUTHORIZED SIGNATURE

THE CITIZENS AND SOUTHERN NATIONAL BANK  
Atlanta, DeKalb County, Georgia

⑈577005208⑈ ⑆061112788⑆ 011 07 093⑈



GARDINIER, INC. TAMPA, FLORIDA

0080

NO.

577018476

64-1278  
611

DATE		
MO.	DAY	YR.
9	/21/	88

PAY EXACTLY \*\*\*\*\*100 DOLLARS AND 00 CENTS

DOLLARS	CENTS
*****100	00

TO THE ORDER OF

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION  
4520 OAK FAIR BOULEVARD  
TAMPA FL 33610

GARDINIER, INC.

*Tom Blanch*  
AUTHORIZED SIGNATURE

e help  
r 4,

THE CITIZENS AND SOUTHERN NATIONAL BANK  
Atlanta, DeKalb County, Georgia

⑈577018476⑈ ⑆061112788⑆ 011 07 093⑈

Genevieve Franklin for Ozzie Morris

p.s. Please send a new fee schedule.

P-45

NO. 577018476

REMITTANCE STATEMENT  
GARDINIER, INC.

BOX 3269, TAMPA, FLORIDA 33601

VENDOR NUMBER	INVOICE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT	NET AMOUNT
3351		9 20 88	10000		10000
Construction permit application for a new phosphoric acid clarifier and storage tank.					
TOTAL			10000		10000

IF CORRECT, DETACH AND RETAIN STATEMENT. IF NOT CORRECT, RETURN WITH STATEMENT.

NO. 577005208

REMITTANCE STATEMENT  
GARDINIER, INC.

BOX 3269, TAMPA, FLORIDA 33601

VENDOR NUMBER	INVOICE NUMBER	INVOICE DATE	GROSS AMOUNT	DISCOUNT	NET AMOUNT
3351		10 04 88	100 00	00	100 00
Additional \$100 due to fee increase by DER. For Construction Permit Appln. Phos Acid Clarifier Storage Tank.					
	.00		100 00	00	100 00

IF CORRECT, DETACH AND RETAIN STATEMENT. IF NOT CORRECT, RETURN WITH STATEMENT.

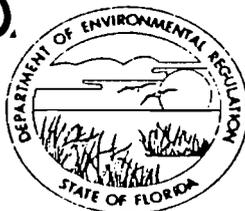
DEPARTMENT OF ENVIRONMENTAL REGULATION

#200pd.  
10-7-88

RECEIVED

OCT 7 1988

DER-BAQM



AC 29-156206

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Phosphoric Acid Plant [ ] New<sup>1</sup> [X] Existing<sup>1</sup>

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

COMPANY NAME: Gardinier, Inc. 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) No. 4 Phos. Acid Plant Scrubber

SOURCE LOCATION: Street U.S. 41 South and Riverview Drive City South of Tampa

UTM: East Zone 17: 362.6 North 3082.5

Latitude 27 ° 51 ' 30 "N Longitude 82 ° 23 ' 57 "W

APPLICANT NAME AND TITLE: Henk Mathot, President

APPLICANT ADDRESS: P.O. Box 3269, Tampa, FL 33601

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative\* of Gardinier, 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: [Signature]

Henk Mathot, President  
Name and Title (Please Type)

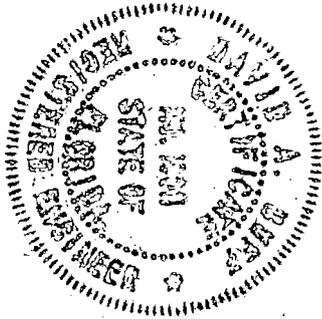
Date: 9/29/88 Telephone No. (813) 677-9111

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

<sup>1</sup> See Florida Administrative Code Rule 17-2.100(57) and (104)

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 David A. Buff

David A. Buff  
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.  
Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604  
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 9/9/88 Telephone No. (904) 375-8000

**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 Attachment A

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

Start of Construction January 1988 Completion of Construction March 1990

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.)

Enclosures and ductwork: \$50,000

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

Permit No. A029-67643 Issued 10/21/83 Expires 5/1/88

Time Waiver issued to the Hillsborough Co. Environmental Protection Commission  
for issuance of operating permit

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;  
if power plant, hrs/yr \_\_\_\_\_; if seasonal, describe: \_\_\_\_\_

F. If this is a new source or major modification, answer the following questions.  
(Yes or No) Not Applicable

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

2. Does best available control technology (BACT) apply to this source?  
If yes, see Section VI. \_\_\_\_\_

3. Does the State "Prevention of Significant Deterioration" (PSD)  
requirement apply to this source? If yes, see Sections VI and VII. \_\_\_\_\_

4. Do "Standards of Performance for New Stationary Sources" (NSPS)  
apply to this source? \_\_\_\_\_

5. Do "National Emission Standards for Hazardous Air Pollutants"  
(NESHAP) apply to this source? \_\_\_\_\_

H. Do "Reasonably Available Control Technology" (RACT) requirements apply  
to this source? \_\_\_\_\_ No

a. If yes, for what pollutants? \_\_\_\_\_

b. If yes, in addition to the information required in this form,  
any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justifi-  
cation 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		
Phosphate Rock	Fluoride	3.5	520,000	
Sulfuric Acid	N/A	N/A	385,180	

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

1. Total Process Input Rate (lbs/hr): 905,180 lb/hr (60 TPH P<sub>2</sub>O<sub>5</sub>)
2. Product Weight (lbs/hr): 230,000 lb/hr as 100% H<sub>3</sub>PO<sub>4</sub> + solids

**C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)**

Name of Contaminant	Emission <sup>1</sup>		Allowed Emission Rate per Rule 17-2	Allowable Emission lbs/hr	Potential <sup>+</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
Fluorides	1.2	5.26	0.02 lb/ton P <sub>2</sub> O <sub>5</sub> *	1.2	1.2	5.26	

<sup>1</sup>See Section V, Item 2.

<sup>2</sup>Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

<sup>3</sup>Calculated from operating rate and applicable standard.

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3).

+ Per current definition in FAC 17-2.100

\* Per FAC 17-2.600

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Dorrco (Vescor Model 2155RL) Scrubber (existing)	Fluorides	95% +	N/A	design

E. Fuels Not applicable

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

\*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--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 N/A Maximum \_\_\_\_\_

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

Scrubber water is sent to gypsum pond.

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

Stack Height: \_\_\_\_\_ ft. Stack Diameter: 4.83 ft.  
 Gas Flow Rate: 56,600 ACFM 51,300 DSCFM Gas Exit Temperature: 100 °F.  
 Water Vapor Content: 5% % Velocity: 51.5 FPS

**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.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste \_\_\_\_\_

Total Weight Incinerated (lbs/hr) \_\_\_\_\_ Design Capacity (lbs/hr) \_\_\_\_\_

Approximate Number of Hours of Operation per day \_\_\_\_\_ day/wk \_\_\_\_\_ wks/yr. \_\_\_\_\_

Manufacturer \_\_\_\_\_

Date Constructed \_\_\_\_\_ Model No. \_\_\_\_\_

	Volume (ft) <sup>3</sup>	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.):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

**SECTION V: SUPPLEMENTAL REQUIREMENTS**

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
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.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
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, design pressure drop, etc.)
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).
6. An 8 1/2" 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.
7. An 8 1/2" 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).
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. 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**

Not Applicable

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:        |

\*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

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:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:<sup>2</sup>

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>Energy to be reported in units of electrical power - KWH design rate.

- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:<sup>1</sup>
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:<sup>2</sup>
- 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:

4.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:<sup>1</sup>
- d. Capital Costs:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:<sup>2</sup>
- 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:<sup>1</sup>
- 3. Capital Cost:
- 4. Useful Life:
- 5. Operating Cost:
- 6. Energy:<sup>2</sup>
- 7. Maintenance Cost:
- 8. Manufacturer:
- 9. Other locations where employed on similar processes:
- a. (1) Company:
- (2) Mailing Address:
- (3) City:
- (4) State:

<sup>1</sup>Explain method of determining efficiency.

<sup>2</sup>Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration


(8) Process Rate:<sup>1</sup>

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration


(8) Process Rate:<sup>1</sup>

10. Reason for selection and description of systems:

<sup>1</sup>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<sub>2</sub>\* \_\_\_\_\_ 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.

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

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 <sub>2</sub>	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of 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.

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

### 1.0 PROJECT DESCRIPTION

This project involves the removal of the existing 300,000 gallon phosphoric acid storage tank and clarifier at Gardinier, and the construction of a new combination phosphoric acid clarifier/storage tank system. The new clarifier/storage tank system will be enclosed, and fumes from the system will be vented to the existing Dorrco scrubber which serves the No. 4 Phosphoric Acid Plant at Gardinier.

Sources of gaseous fluorides associated with the new combination clarifier/storage tank consist of the clarifier vent and the washbox vent. Fluoride emissions from these two sources (uncontrolled) are estimated at 0.024 lb/hr, 0.6 lb/day, and 0.11 tons/yr. This in itself is an extremely low level of fluoride emissions. Even so, the vent exhausts from the new system will be ducted to the existing Dorrco scrubber serving the existing No. 4 Phosphoric Acid Plant. This will result in a further decrease in actual fluoride emissions to the atmosphere. If a 95% fluoride removal efficiency is assumed, fluoride emissions from the proposed system would be only 0.0012 lb/hr, 0.029 lb/day, and 0.0053 tons/yr. The fluoride emissions from the existing Dorrco scrubber are on the order of 0.8 lb/hr; thus, there should result minimal change in actual fluoride emissions from the scrubber.

The estimated gas flow from the new clarifier and washbox vents is estimated at 1,150 acfm. This will increase the flow rate to the existing Dorrco scrubber by only 2% (current design flow rate to

scrubber is 62,000 acfm). Thus, the existing scrubber is capable of accommodating this additional minimal flow rate. Engineering calculations for the proposed system are presented in Attachment B, along with flow diagrams and a plot plan of the facility.

The proposed project is expected to result in full compliance with all applicable standards. The existing Dorrco scrubber is permitted under Permit No. A029-67643. Maximum allowable fluoride emissions are 1.2 lb/hr. Recent compliance tests have shown the scrubber to be emitting about 0.8 lb/hr fluorides, well within the allowable limit.

August 31, 1988

PROJECT 35

NEW CLARIFIER / CONTAINMENT AREA

LEIF E. BOUFFARD - CHIEF PROCESS ENGINEER

PHOSPHATE ENGINEERING AND CONSTRUCTION COMPANY

Determine Fluoride Loading From a new enclosed 65 Foot diameter x 27 Foot straight side clarifier to the existing DORTCO phosphoric acid plant fume scrubber.

Design BASIS Assume sat'd gas @ 100°F exiting the scrubber.

Clarifier VENT - 600 acfm

Washbox VENT - 400 acfm

TOTAL - 1000 acfm

1. Determine the flow of dry air.

$P_{H_2O}$  = Vapor Pressure of water @ 100°F = 1.933 In Hg Abs

$P_{Total}$  = Vapor Pressure of air/water mixture @ 100°F = 29.92 In Hg Abs

The vapor pressure of air =  $P_{Total} - P_{H_2O}$

$$= 29.92 - 1.933$$

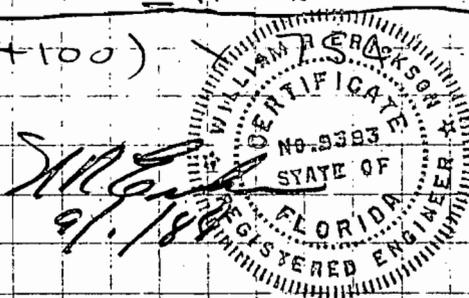
$$= 27.99 \text{ In Hg Abs}$$

Therefore the flow of dry air is

$$\frac{1000 \text{ acfm} \times 60 \frac{\text{min}}{\text{hr}}}{(460 + 100)} \times 27.99 \text{ In Hg Abs} = 3977 \text{ lb/hr}$$

(460 + 100)

$$= 137.1 \frac{\text{moles}}{\text{hr}}$$



Assuming the temperature of the air/water mixture from the clarifier and wash box is 140°F and the vapor pressure of water over 30% P<sub>2</sub>O<sub>5</sub> phosphoric acid is 100 mmHg Abs

2. Determine Total moles air/water mixture to the existing Dorrco fume scrubber.

$$\frac{P_{\text{TOTAL}} - P_{\text{H}_2\text{O}}}{P_{\text{TOTAL}}} = \frac{\text{moles air}}{\text{moles Total}} = \frac{760 - 100}{760}$$

$$\frac{137.1 \text{ moles}}{X} = \frac{660}{760}$$

therefore  $X = 157.9 \frac{\text{moles Total}}{\text{hr}}$

3. Determine mass of water vapor to the fume scrubber.

$$\frac{P_{\text{H}_2\text{O}}}{P_{\text{TOTAL}}} \times \text{Total moles/hr} = \frac{\text{mole of water}}{\text{hr}}$$

Therefore the moles of water is

$$\frac{100}{760} \times 157.9 = 20.8 \frac{\text{moles of water}}{\text{hr}}$$

$$374.4 \text{ lb/hr of water}$$

4. Determine volume of air water to the scrubber

$$\frac{15 \text{ H}_2\text{O}}{15 \text{ dry AIR}} = \frac{15 \text{ hr H}_2\text{O}}{15 \text{ hr dry AIR}} = \frac{374.4}{3977} = 0.094 \frac{15 \text{ H}_2\text{O}}{15 \text{ dry AIR}}$$

From the psychometric chart

$$V_s = 17.4 \frac{\text{ft}^3}{15 \text{ dry AIR}}$$

Therefore the flow of vapor is

$$3977 \text{ lb/hr dry AIR} \times \frac{17.4 \text{ ft}^3}{15 \text{ dry AIR}} = 69200 \frac{\text{ft}^3}{\text{hr}} = 1153 \frac{\text{ft}^3}{\text{min}}$$

Assuming the vapor pressure of Fluorine over 30% P<sub>2</sub>O<sub>5</sub> phosphoric acid with a 2.5% F concentration is 0.006 mmHg Abs

5) Determine the moles of Fluorine going to the existing Dorrco fume scrubber.

$$\frac{P_F}{P_{TOTAL}} \times \text{TOTAL MOLES per hour} = \text{moles of Fluorine}$$

$$\frac{.006}{760} \times 157.9 = .00125 \text{ moles/hr of F}$$

$$= .024 \text{ lb/hr F}$$

Therefore

$$= 0.57 \text{ lbs/day F}$$

$$\frac{\text{POUNDS OF FLUORINE}}{\text{POUNDS OF H}_2\text{O}} = \frac{.024}{374.4} = .00064$$

6) Determine the incremental increase of air flow to the existing Dorrco fume scrubber.

Design basis for existing Dorrco fume scrubber:

GAS FLOW	61,283 acfm @ 145°F
ADDED FLOW	1,153 acfm @ 140°F
TOTAL	62,436 acfm @ 145°F

Incremental Increase

$$\frac{1153}{61283} \times 100 = 1.9\%$$

7) Verify the partial pressure based on mole fraction

$$P_{\text{AIR}} = \frac{157.3 - 20.8 - 0.012}{157.3} \times 760 = 659.5 \text{ mmHg ABS}$$

USED 660 in calculation

$$P_{\text{H}_2\text{O}} = \frac{20.8}{157.3} \times 760 = 100.5 \text{ mmHg ABS}$$

USED 100 in calculation

$$P_{\text{F}} = \frac{0.0125}{157.3} \times 760 = 0.006 \text{ mmHg ABS}$$

used 0.006 in calculation

Determine Fluoride Loading from the existing classifier, pump tank, washbox and the existing 300K storage tank and washbox assuming all are enclosed and vented at the following rates

Classifier	600 ACFM
Pump Tank	600 ACFM
WASHBOX	400 ACFM
300K Tank	600 ACFM
WASHBOX	400 ACFM
TOTAL	2600 ACFM

Assuming that the gas are sat'd and 100°F leaving scrubbers then the fluoride loading would be

$$\frac{2600}{1000} \times .024 \text{ lb/hr F} = .062 \text{ lb/hr F}$$

$$= 1.5 \text{ lb/day F}$$

Flow of gases from the sources to the scrubber are:

Classifier	692 ACFM
Pump Tank	692 ACFM
WASHBOX	462 ACFM
300K TANK	692 ACFM
WASHBOX	462 ACFM
TOTAL	3000 ACFM

FIGURE #10

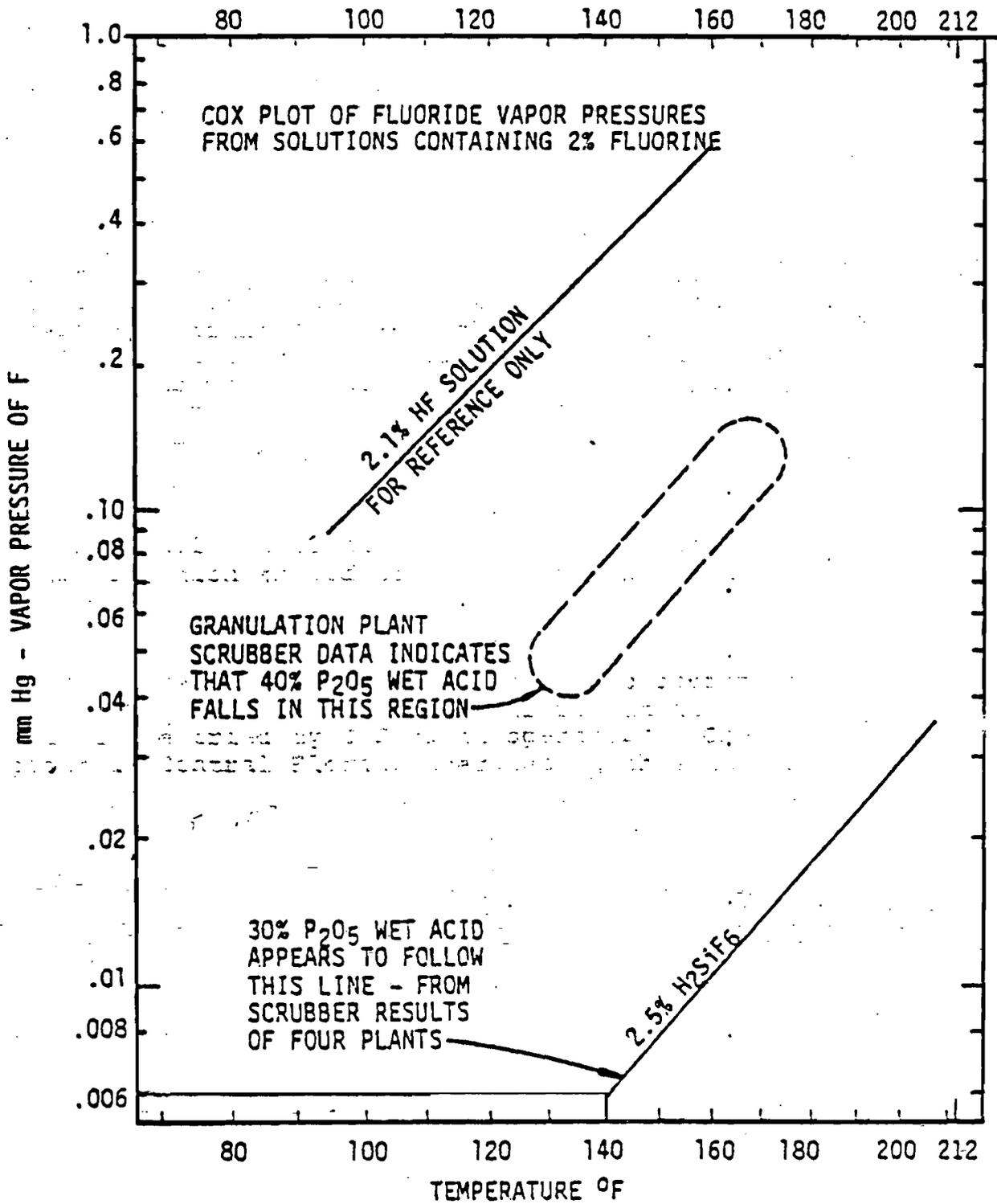
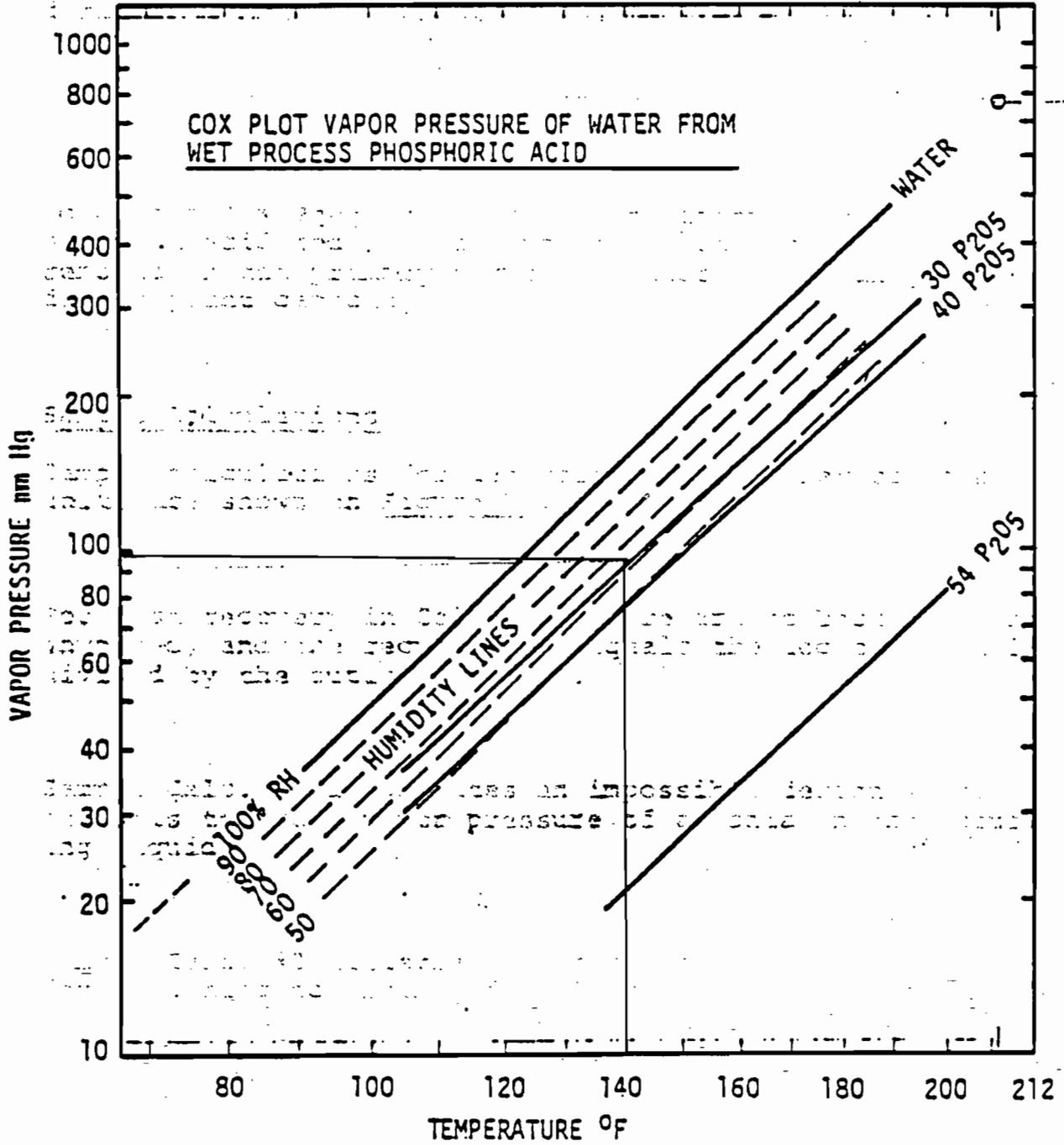
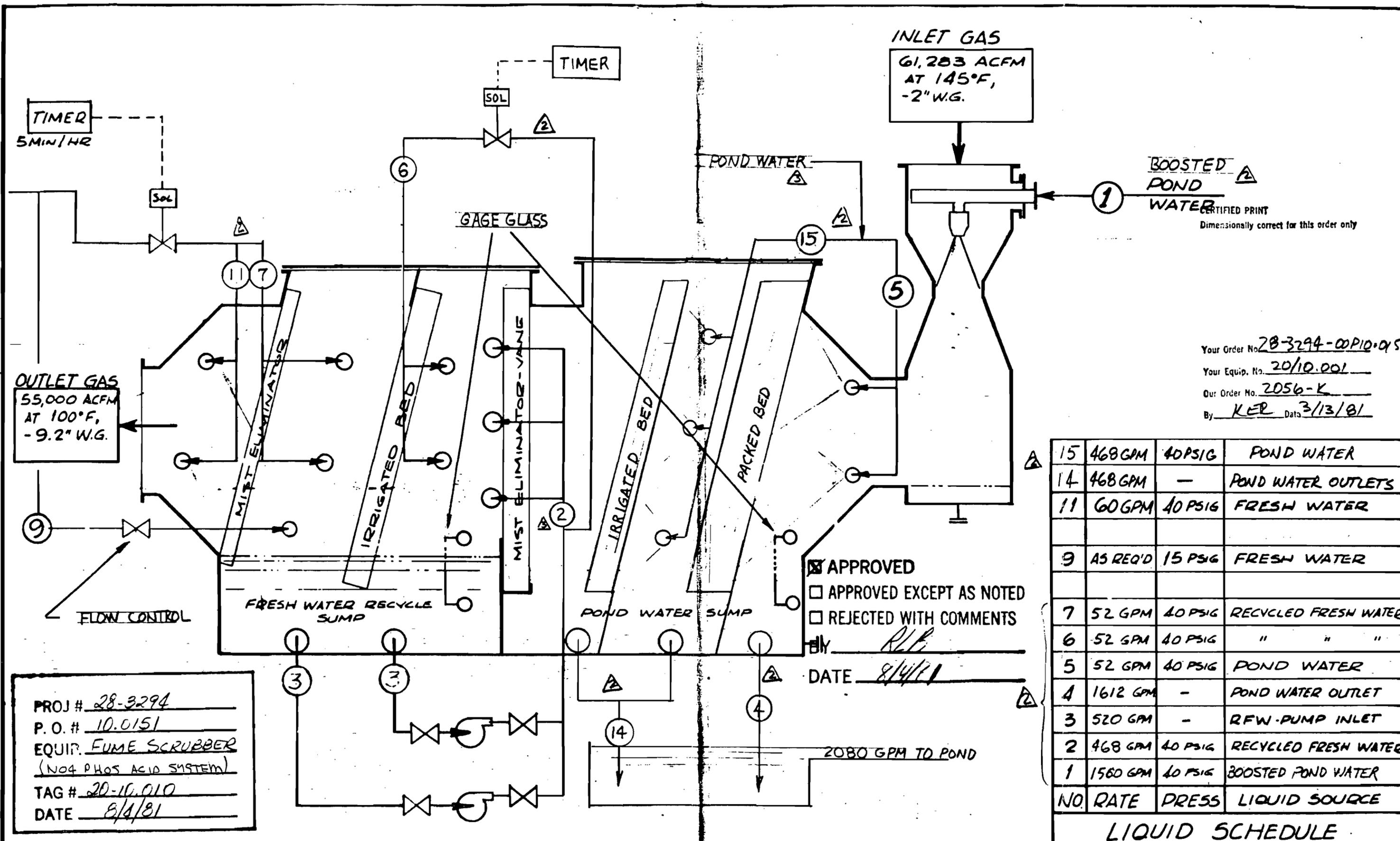


FIGURE #15





INLET GAS  
61,283 ACFM  
AT 145°F,  
-2" W.G.

TIMER  
5 MIN/HR

OUTLET GAS  
55,000 ACFM  
AT 100°F,  
-9.2" W.G.

BOOSTED POND WATER  
CERTIFIED PRINT  
Dimensionally correct for this order only

Your Order No. 28-3294-00P10.0151  
Your Equip. No. 20/10.001  
Our Order No. 2056-K  
By KER Date 3/13/81

15	468 GPM	40 PSIG	POND WATER
14	468 GPM	-	POND WATER OUTLETS
11	60 GPM	40 PSIG	FRESH WATER
9	AS REQ'D	15 PSIG	FRESH WATER
7	52 GPM	40 PSIG	RECYCLED FRESH WATER
6	52 GPM	40 PSIG	" " "
5	52 GPM	40 PSIG	POND WATER
4	1612 GPM	-	POND WATER OUTLET
3	520 GPM	-	RFW-PUMP INLET
2	468 GPM	40 PSIG	RECYCLED FRESH WATER
1	1560 GPM	40 PSIG	BOOSTED POND WATER
NO.	RATE	PRESS	LIQUID SOURCE

APPROVED  
 APPROVED EXCEPT AS NOTED  
 REJECTED WITH COMMENTS  
BY R.L.B.  
DATE 8/4/81

PROJ # 28-3294  
P. O. # 10.0151  
EQUIP. FUME SCRUBBER  
(NO4 PHOS ACID SYSTEM)  
TAG # 20-10.010  
DATE 8/4/81

3	GENERAL AS SHOWN	7/31/81	K.R.
2	GENERAL AS SHOWN	7/23/81	K.R.
REVISION	DESCRIPTION	DATE	BY

FLOW DIAGRAM

JACOBS ENGINEERING GROUP  
GARDINIER, INC.

C80.0107B10  
REV. 3

01-2302  
WASHBOX  
(ENCLOSED)

01-1201  
RAKE

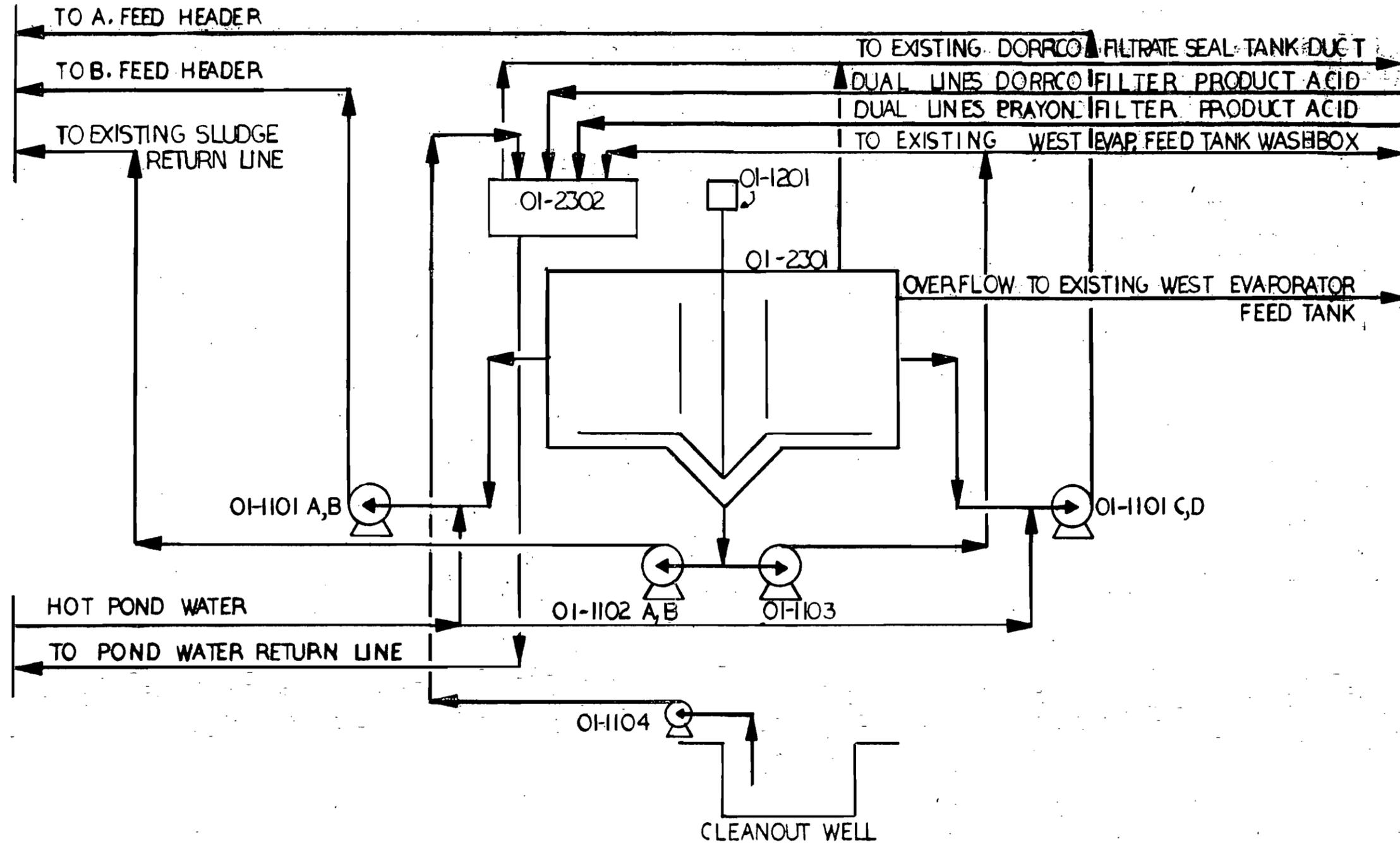
01-2301  
CLARIFIER  
(ENCLOSED)

01-1101 C,D  
PRIMARY ACID  
FEED PUMPS

01-1102 A,B  
SLUDGE  
PUMPS

01-1103  
CLARIFIER  
DRAIN  
PUMP

01-1104  
CLARIFIER  
CLEANOUT  
PUMP

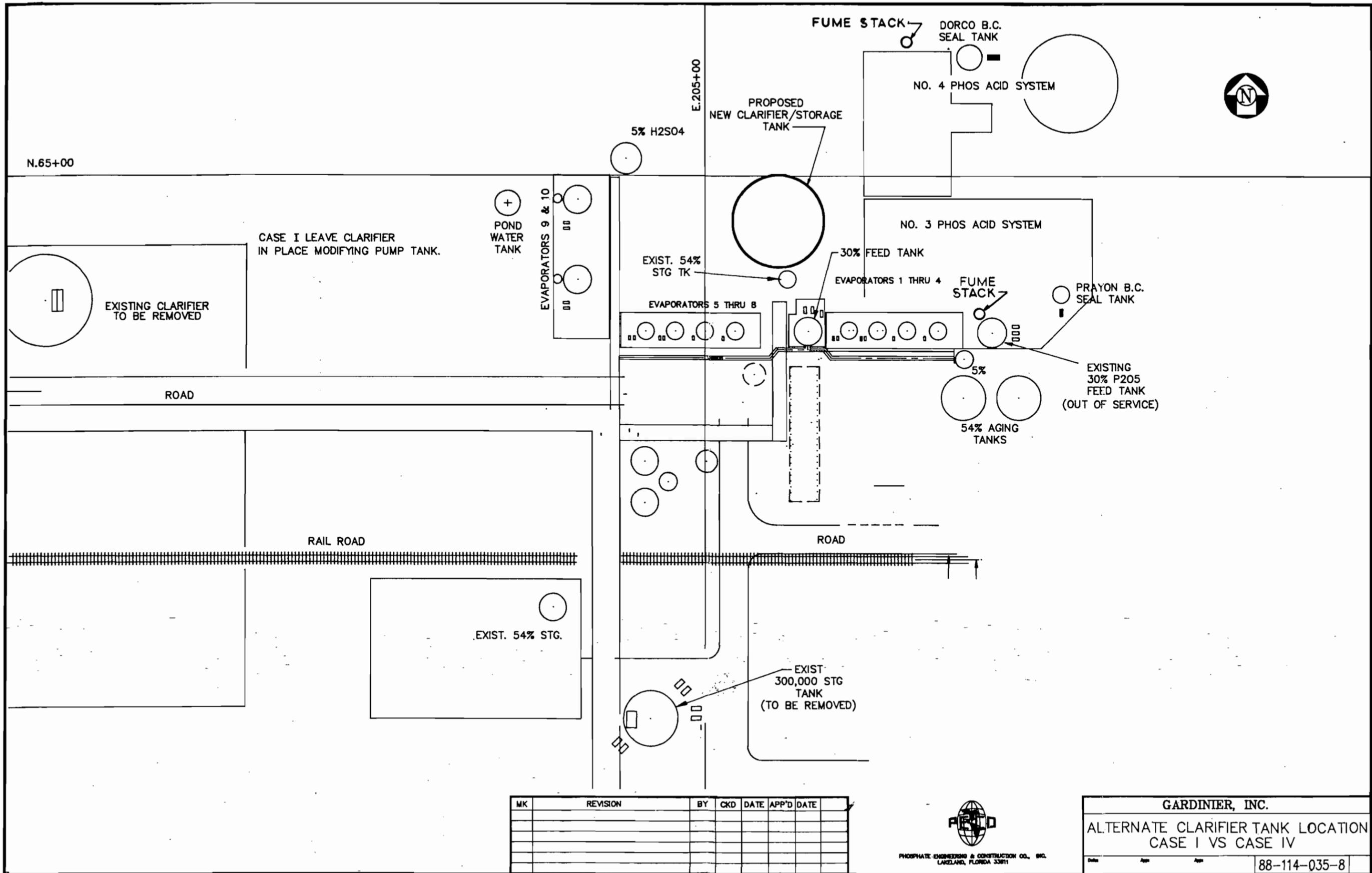


PHOSPHATE ENGINEERING & CONSTRUCTION CO., INC.  
LAKELAND, FL. 33903

GARDINER, INC

NEW CLARIFIER CONTAINMENT AREA  
PROCESS FLOW DIAGRAM

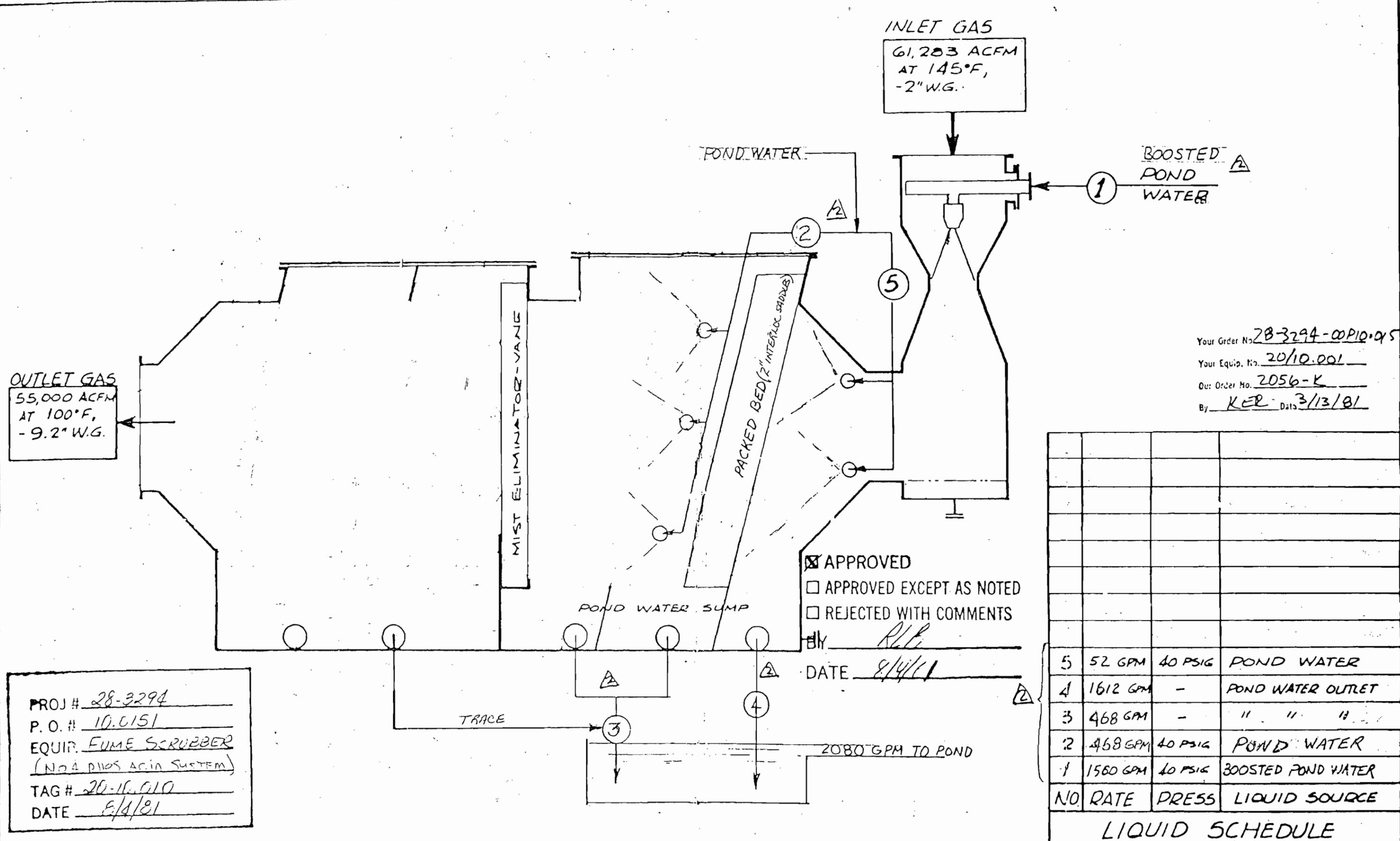
88-114-F-035-10



MK	REVISION	BY	CKD	DATE	APP'D	DATE



<b>GARDINIER, INC.</b>	
ALTERNATE CLARIFIER TANK LOCATION CASE I VS CASE IV	
Date: _____	App: _____
88-114-035-8	



Your Order No. 28-3294-COPIQ-015  
 Your Equip. No. 20/10.001  
 Our Order No. 2056-K  
 By KER Date 3/13/81

PROJ # 28-3294  
 P. O. # 10.0151  
 EQUIP. FUME SCRUBBER  
 (NO 4 PHOS ACID SYSTEM)  
 TAG # 20-10.010  
 DATE 8/4/81

NO.	RATE	PRESS	LIQUID SOURCE
5	52 GPM	40 PSIG	POND WATER
4	1612 GPM	-	POND WATER OUTLET
3	468 GPM	-	" " "
2	468 GPM	40 PSIG	POND WATER
1	1560 GPM	40 PSIG	BOOSTED POND WATER
NO.	RATE	PRESS	LIQUID SOURCE

LIQUID SCHEDULE

REVISION	DESCRIPTION	DATE	BY
3	GENERAL AS SHOWN	7/31/81	K.R.
2	GENERAL AS SHOWN	7/23/81	K.R.

FLOW DIAGRAM

JACOBS ENGINEERING GROUP  
 GARDINIER, INC.

C80.0107B10  
 REV. 3