AirQ.

GARDINIER INC.

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

February 4, 1987

Mr. Clair H. Fancy, P.E.
Florida Department
of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Subject: Gardinier, Inc., No. 8 Sulfuric Acid Plant
Construction Permit Application - PSD Analysis

Dear Mr. Fancy:

Enclosed is a Gardinier construction permit application with the appropriate fee for the increase in the production of sulfuric acid from our No. 8 contact acid plant. Expansion of the plant will increase the efficiency of steam production to support planned new electrical cogeneration facilities. Total annual production of sulfuric acid for the facility is not expected to increase.

Gardinier plans to add 32 megawatts of cogeneration capability which will replace our power demand from the coal fire powered generators of Tampa Electric Company. This project will have a positive impact on the environment and energy conservation.

On December 10, 1986 I met with Mr. Bill Thomas and Mr. Willard Hanks to discuss the planned project. At that time we discussed the possibility of modifying the exsisting construction permit for the No. 8 plant by extending the expiration date and modifying the production rate from 2200 tons per day to 2500 tons per day. Mr Thomas advised me to resubmit a construction application and update the past PSD analysis at which time the Department would decide if a new construction permit was appropriate or modification of the present construction permit was appropriate.

This cogeneration project is on a very fast track. Gardinier personnel and consultants are ready to meet with your staff to discuss the application and PSD analysis as soon as possible.

RECEIVED
DER - MAIL ROOM
1987 FEB -9 PM 2: 25

Very truly yours,

E. O. Morris
Manager
Environmental & Development

EOM:rw
Enclosures
cc: Mr. Rudy J. Cabina
Mr. S. T. Boswell
Mr. Henk Mathot
Mr. R. Nettles
Mr. David Buff

BAQM
1031

GARDINIER, INC. BOX 3269 TAMPA, FLORIDA 33601

| VENDOR NUMBER | INVOICE NUMBER | INVOICE DATE | | | GROSS AMOUNT | DISCOUNT | NET AMOUNT |
|---|---|---|---|---|---|---|---|
| 3351 | | 1 | 29 | 87 | 1000 00 | | 1000 00 |
| TOTAL | | | | | 1000 00 | | 1000 00 |

Permit processing fee for No. 8 Sulfuric Acid Plant construction permit to increase capacity of plant to 2500 tons per day.

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

---

Dep# 1692

GARDINIER, INC. TAMPA, FLORIDA

NO. 446113893

17-1
910

| DATE MO. DAY YR. |
|---|
| 1/31/87 |

PAY EXACTLY ******1,000 DOLLARS AND 00 CENTS

| DOLLARS | CENTS |
|---|---|
| ******1,000 | 00 |

TO THE ORDER OF

FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION
7601 HIGHWAY 301 N
TAMPA FL 33610

GARDINIER, INC.

David Wilson
AUTHORIZED SIGNATURE

NORWEST BANK, N.A.
MINNEAPOLIS, MINNESOTA

⑈446113893⑈ ⑆091000019⑆ 07 81 900⑈

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would decide if a new construction permit was appropriate or modification of the present construction permit was appropriate.

This cogeneration project is on a very fast track. Gardinier personnel and consultants are ready to meet with your staff to discuss the application and PSD analysis as soon as possible.

Very truly yours,

E. O. Morris
Manager
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cc: Mr. Rudy J. Cabina
Mr. S. T. Boswell
Mr. Henk Mathot
Mr. R. Nettles
Mr. David Buff

BAQM
1031

AC 29-130391
PSD-FL-118

STATE OF FLORIDA

# DEPARTMENT OF ENVIRONMENTAL REGULATION

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

DER
FEB 9 1987
BAQM

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

## APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Phosphate Fertilizer Complex ☐ New[1] ☒ Existing[1]

APPLICATION TYPE: ☒ 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.8 Sulfuric Acid Plant

SOURCE LOCATION: Street Intersection of U.S. Highway 41 and Riverview Drive, south of Tampa City south of Tampa

UTM: East 363.3 North 3082.4

Latitude 27 ° 51 ' 28 "N Longitude 82 ° 23 ' 15 "W

APPLICANT NAME AND TITLE: Rudy J. Cabina, Vice-President

APPLICANT ADDRESS: P.O. Box 3269, Tampa, Florida 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-PSD 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: Rudy J Cabina

Rudy J. Cabina, Vice-President
Name and Title (Please Type)

Date: 2/4/87 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

---

[1] 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 Richard

Richard J. Nettles, P.E.
Name (Please Type)

Gardinier, Inc.
Company Name (Please Type)

P.O. Box 3269, Tampa, Florida 33601
Mailing Address (Please Type)

Florida Registration No. 29483 Date: 2/4/87 Telephone No. (813)-677-9111

## 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 modify Gardinier's No.8 Sulfuric Acid Plant to produce 2500 tons per day of sulfuric acid and install electric power co-generation. An increase in production of 300 tons per day of sulfuric acid and an extension of the current construction permit (AC-29-089696) expiration date to 12/31/88 is required. Emissions from this source will comply with all applicable Fla. and Hills. Co. regulatio

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

Start of Construction upon permit issue Completion of Construction 12/31/88

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.)

Modifications to converter, steam system, blower - $6,000,000

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

| | | | | | |
|---|---|---|---|---|---|
| Permit No. | AC-29-089696 | AO-29-84015 | AO-29-18228 | AO-29-2390 | AC-29-2390 |
| Issued | Feb., 1985 | Jun., 1984 | April ~~May~~, 1979 | Apr., 1977 | Nov.,1974 |
| Expires | Oct., 1987 | Apr., 1989 | Apr., 1984 | May, 1979 | Apr., 1977 |

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr N/A; if seasonal, describe: Not seasonal.

F. 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. Total Suspended Particulates, Ozone

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) requirement apply to this source? If yes, see Sections VI and VII. yes

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Already being met.

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? no

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

   a. If yes, for what pollutants? N/A

   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 justification for any answer of "No" that might be considered questionable.

Please see attached discussion.

## 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 | | |
| Sulfur | - | - | 68,324 | A |
| Atmospheric Oxygen | - | - | 102,173 | B |
| Water | - | - | 38,270 | C |
| | | | | |
| | | | | |

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

1. Total Process Input Rate (lbs/hr): 208,767
2. Product Weight (lbs/hr): 208,333 as 100% $H_2SO_4$

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

| Name of Contaminant | Emission[1] | | Allowed[2] Emission Rate per Rule 17-2 | Allowable[3] Emission lbs/hr | Potential[4] Emission | | Relate to Flow Diagram |
|---|---|---|---|---|---|---|---|
| | Maximum lbs/hr | Actual T/yr | | | lbs/yr | T/yr | |
| Sulfur Dioxide | 416.7 | 1826.4 | 4.0 lbs/Ton of acid | 416.7 | 416.7 | 1826.4 | D |
| Acid Mist | 15.6 | 68.5 | 0.15 lbs/ton of acid | 15.6 | 15.6 | 68.5 | D |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

[1] See Section V, Item 2.

[2] 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)

[3] Calculated from operating rate and applicable standard.

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

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) |
|---|---|---|---|---|
| Final Converter | Sulfur Dioxide | 99.7+ | N/A | AP-42 |
| | | | | |
| Final Absorber and Mist Eliminator | Acid Mist | 99+ | Greater than one micron | AP-42 |
| | | | | |
| | | | | |
| | | | | |

E. Fuels No fuel is used.

| 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: N/A

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 N/A

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

There are no solid wastes. Cooling tower and boiler blowdown will be discharged to Plant Outfall 005.

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

Stack Height: 149.5 ft. Stack Diameter: 8.0 ft.

Gas Flow Rate: 105,000 ACFM 90,800 DSCFM Gas Exit Temperature: 151 °F.

Water Vapor Content: 0 % Velocity: 34.8 FPS

## SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

| 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.) |
|---|---|---|---|---|---|---|---|
| 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. ______

NOT APPLICABLE

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

Stack Height: ______ ft. Stack Diamter: ______ 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.):

NOT APPLICABLE

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

## SECTION V: SUPPLEMENTAL REQUIREMENTS SEE ATTACHMENTS

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

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 |
|---|---|
| Sulfur Dioxide | 4.0 lbs $SO_2$/ton 100% $H_2SO_4$ |
| Acid Mist | 0.15 lbs mist/ton 100% $H_2SO_4$ |
| | |
| | |

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[x] Yes [ ] No

| Contaminant | Rate or Concentration |
|---|---|
| Sulfur Dioxide | 4.0 lbs $SO_2$/ton 100% $H_2SO_4$ |
| Acid Mist | 0.15 lbs mist/ton 100% $H_2SO_4$ |
| | |
| | |

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

| Contaminant | Rate or Concentration |
|---|---|
| Sulfur Dioxide | 4.0 lbs $SO_2$/ton 100% $H_2SO_4$ |
| Acid Mist | 0.15 lbs mist/ton 100% $H_2SO_4$ |
| | |
| | |

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

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 |
|---|---|
| | |
| | |
| | |
| | |

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:[1] d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy [2] 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:[1] d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy:[2] h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

---

[1] Explain method of determining efficiency.

[2] 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:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

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:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

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: SEE ATTACHMENT

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

---

[1] Explain method of determining efficiency.

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1] 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

SEE ATTACHED SUPPLEMENT

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.

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

SEE ATTACHED SUPPLEMENT

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 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.

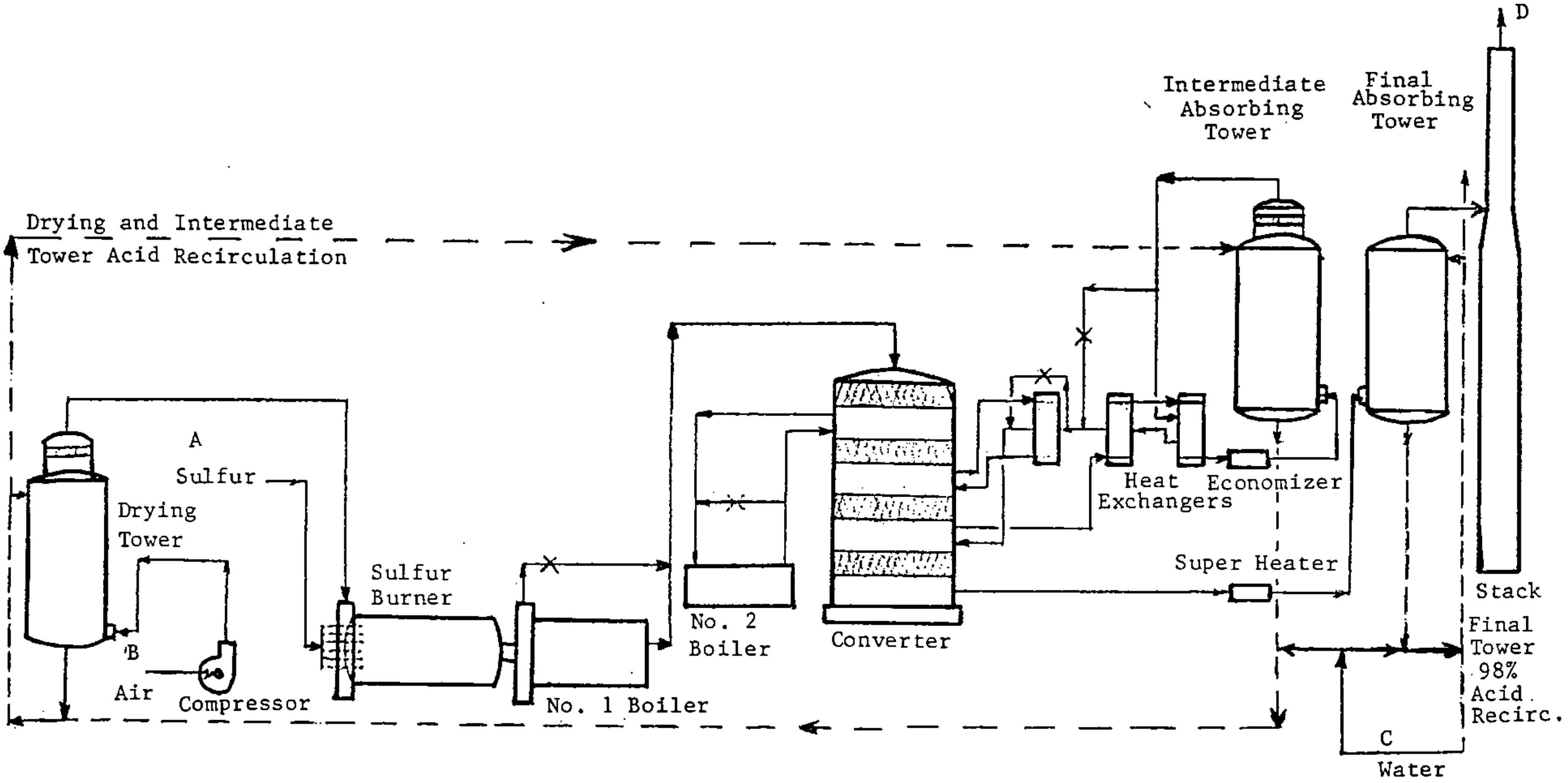
H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

# Basis of Emission Estimates
# No. 8 Sulfuric Acid Plant

1. Design Parameters
   100% sulfuric acid = 208,333 lb/hr = 104.17 tons/hr
   Operating hours = 365.25 days/yr = 8766 hr/yr

2. Sulfur Dioxide
   Allowable = 4.0 lb/ton $H_2SO_4$
   104.17 tons/hr x 4.0 lb/ton = 416.7 lb/hr
   416.7 lb/hr x 8766 hr/yr / 2000 lb/ton = 1826.4 tons/yr

3. Sulfuric Acid Mist
   Allowable = 0.15 lb/ton $H_2SO_4$ mist
   104.17 tons/hr x 0.15 lb/ton = 15.6 lb/hr
   15.6 lb/hr x 8766 hr/yr / 2000 lb/ton = 68.5 tons/yr



FLOW DIAGRAM

KBN

# PREVENTION OF SIGNIFICANT DETERIORATION ANALYSIS

## No. 8 Sulfuric Acid Plant Expansion
## GARDINIER, INC.
## Tampa, Florida

KBN Engineering and Applied Sciences, Inc.
P.O. Box 14288
Gainesville, Florida 32604
(904) 375-8000
87001

January 1987

# TABLE OF CONTENTS

## TABLE OF CONTENTS
(Continued)

## LIST OF TABLES

## LIST OF TABLES
(Continued)

## LIST OF FIGURES

## 1.0 PROJECT DESCRIPTION

Gardinier, Inc. of Tampa, Florida, is proposing to expand the production capacity of the No. 8 Sulfuric Acid ($H_2SO_4$) plant at the Tampa phosphate fertilizer complex. The No. 8 $H_2SO_4$ plant is currently permitted to produce 2,200 tons per day (TPD) of $H_2SO_4$. It is proposed to increase the $H_2SO_4$ production capabilities of the No. 8 $H_2SO_4$ plant to 2,500 TPD. The proposed project will also involve the installation of electric cogeneration facilities. These facilities will utilize steam from the $H_2SO_4$ plants (Nos. 7, 8 and 9) to produce electric power for use in the Gardinier plant and for sale to the electric power grid.

Phosphate fertilizers are manufactured at the Gardinier plant. Sulfuric acid is used to produce phosphoric acid from mined phosphate rock. The Gardinier plant currently has sufficient $H_2SO_4$ production capabilities to meet phosphoric acid and phosphate fertilizer production capacities which are allowed under existing air pollution permits for those specific facilities. Expansion of the No. 8 $H_2SO_4$ plant will increase the efficiency of steam production to support the electric cogeneration facilities. Total annual production of sulfuric acid at the facility is not expected to increase.

Gardinier received a construction permit and PSD permit from the Florida Department of Environmental Regulation (FDER) in February 1985 for increasing the production capacity of the No. 8 $H_2SO_4$ plant from 1,770 TPD to 2,200 TPD. The construction permit limited $SO_2$ emissions from the source to 4 pounds sulfur dioxide per ton (lb/ton) of $H_2SO_4$ produced (366.7 lb/hr $SO_2$), and limited $H_2SO_4$ mist emissions to 0.15 lb/ton (13.75 lb/hr). The No. 8 $H_2SO_4$ plant is currently operating under the conditions specified in the construction permit.

The Gardinier plant is located south of Tampa on Hillsborough Bay (Figures 1-1 and 1-2). The surrounding land area is rural in nature. Other significant air pollution sources located nearby include the Tampa Electric Company (TEC) Big Bend, Hookers Point, and Gannon generating stations.

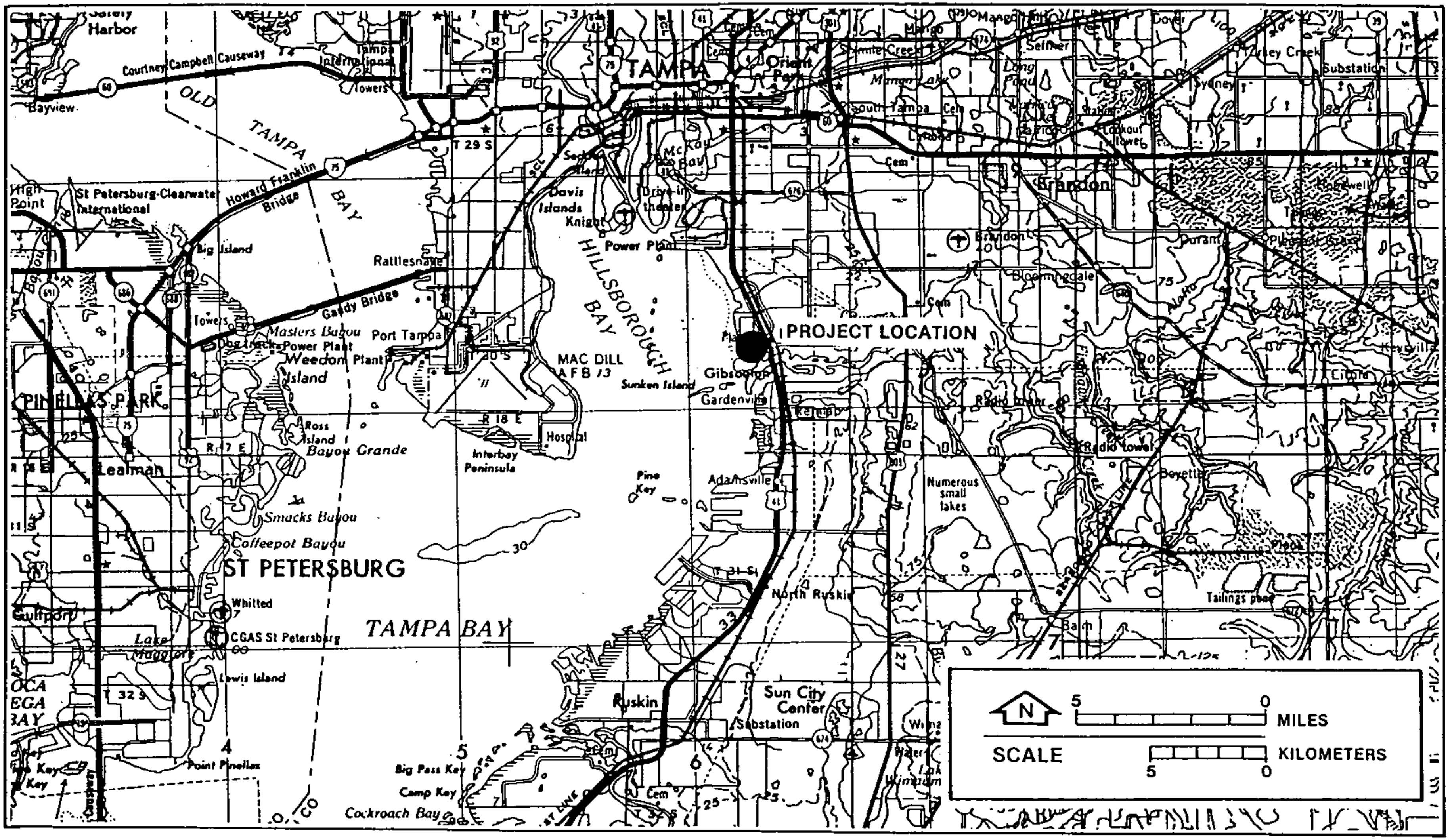


**Figure 1-1**
**GENERAL LOCATION MAP OF GARDINIER, INC.**

**SOURCE: USGS, 1972.**

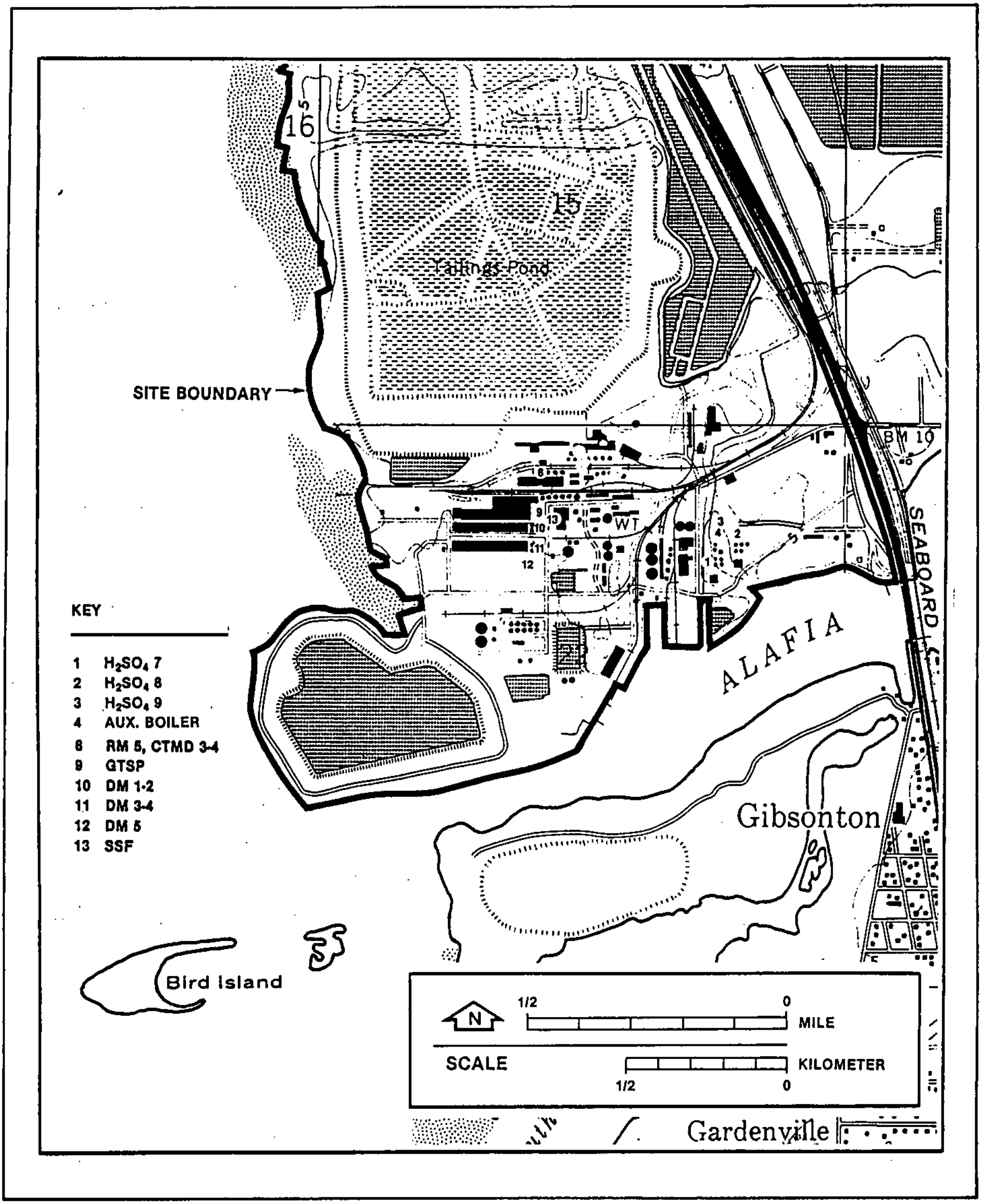


Figure 1-2
SITE LOCATION MAP OF GARDINIER, INC.

SOURCE: USGS, 1981.

KBN

The only pollutants emitted by the No. 8 $H_2SO_4$ plant are sulfur dioxide ($SO_2$) and sulfuric acid mist ($H_2SO_4$ mist). As a result, these are also the only pollutants affected by the proposed expansion. The $H_2SO_4$ plants are the only $H_2SO_4$ mist-emitting sources at the Gardinier plant. Several other small $SO_2$ emission sources exist at the plant as a result of fuel oil burning. The majority of these sources do not have any emission limit or allowable emission rate for $SO_2$. Shown in Table 1-1 are the calculated $SO_2$ emissions from each source other than the $H_2SO_4$ plants, based on the rated heat input ($10^6$ Btu/hr) and the type oil fired. Many of the fuel-burning sources can use and have historically used natural gas. Price and availability dictate which fuel is used. The values in Table 1-1 reflect all fuel oil burning, which is the worst-case for $SO_2$ emissions.

The No. 5 diammonium phosphate plant $SO_2$ emissions are limited by permit condition to 10 pounds per hour (lb/hr). It is noted that Table 1-1 does not include one permitted source of $SO_2$ emissions--the Auxiliary Boiler. This boiler will operate only when one of the $H_2SO_4$ plants is shutdown, and therefore will operate very infrequently. In addition, maximum $SO_2$ emissions from the Auxiliary Boiler are only 55.6 lb/hr, which is much lower than the emissions from any one of the $H_2SO_4$ plants.

Stack parameters and emissions for all $SO_2$ sources operating in the future at Gardinier, including the expanded No. 8 $H_2SO_4$ plant, are presented in Table 1-2. The locations of the various sources within the Gardinier complex are shown in Figure 1-2. The No. 7 $H_2SO_4$ plant emissions are based upon 2,200 TPD $H_2SO_4$ production and 4 lb/ton $H_2SO_4$ produced, while the No. 9 $H_2SO_4$ plant emissions are based upon 2,600 TPD $H_2SO_4$ and 4 lb $SO_2$/ton. These are maximum rates allowed in the current operating permits for these sources. Stack parameters for the $H_2SO_4$ plants are based upon the source tests described in the footnotes to Table 1-2. No modifications will be made to the existing stack serving the No. 8 $H_2SO_4$ plant.

Stack parameters for all other $SO_2$ sources are based upon available information, such as recent Air Pollution Emissions reports submitted to

Table 1-1. Maximum $SO_2$ Emissions from Fuel-Burning Sources at Gardinier

| Source | Unit Code | Maximum Heat Input ($10^6$ Btu/hr) | Type Oil | Maximum Gallons Per Hour | Maximum $SO_2$ Emissions (lb/hr) |
|---|---|---|---|---|---|
| No. 5 Mill | RM 5 | 0.2 | #2 | 1.5 | 0.084 |
| No. 3 Triple Dryer | CTMD 3 | 13.5 | #6 | 91.2 | 38.4 |
| No. 4 Triple Dryer | CTMD 4 | 13.5 | #6 | 91.2 | 38.4 |
| Granular Triple Super Phosphate | GTSP | 40 | #6 | 270.3 | 113.7 |
| Nos. 1 and 2 Diammonium phosphate* | DM 1-2 | 3.6 | #2 | 27.5 | 1.54 |
| Nos. 3 and 4 Diammonium phosphate* | DM 3-4 | 3.6 | #2 | 27.5 | 1.54 |
| No. 5 Diammonium phosphate | DM 5 | -- | #2 | -- | 10.0+ |
| Sodium Fluosilicate | SSF | 1.3 | #2 | 9.9 | 0.55 |

* Values represent total of both sources.

\+ Based upon PSD permit (PSD-FL-026) of July 11, 1980.

Table 1-2. Maximum $SO_2$ Emissions and Stack Parameters for Gardinier After Expansion of No. 8 $H_2SO_4$ Plant

| Unit Code | Maximum $SO_2$ Emission Rate (g/s) | Height (m) | Diameter (m) | Velocity (m/s) | Temperature (K) | UTM Coordinates (km) X | UTM Coordinates (km) Y |
|---|---|---|---|---|---|---|---|
| RM 5 | 0.01 | 20.1 | 0.61 | 14.9 | 336 | 362.65 | 3082.60 |
| CTMD 3 | 4.84 | 20.7 | 1.07 | 10.7 | 316 | 362.65 | 3082.60 |
| CTMD 4 | 4.84 | 20.7 | 1.07 | 12.2 | 316 | 362.65 | 3082.60 |
| GTSP | 14.3 | 38.4 | 2.44 | 11.0 | 327 | 362.60 | 3082.45 |
| DM 1-2* | 0.19 | 27.4 | 1.22 | 16.8 | 336 | 362.60 | 3082.40 |
| DM 3-4* | 0.19 | 27.4 | 1.07 | 20.4 | 336 | 362.60 | 3082.30 |
| DM 5 | 3.05 | 40.4 | 2.13 | 16.0 | 314 | 362.60 | 3082.25 |
| SSF | 0.069 | 12.2 | 0.51 | 9.1 | 322 | 362.75 | 3082.45 |
| $H_2SO_4$ 7+ | 46.2 | 45.6 | 2.29 | 14.0 | 340 | 363.20 | 3082.30 |
| $H_2SO_4$ 8** | 52.5 | 45.6 | 2.44 | 10.6 | 339 | 363.30 | 3082.40 |
| $H_2SO_4$ 9++ | 54.6 | 45.6 | 2.74 | 11.9 | 350 | 363.20 | 3082.45 |

* Emissions represent total for both plants; stack parameters represent individual plants

\+ Emissions for No. 7 $H_2SO_4$ based upon 2,200 TPD (91.7 TPH) $H_2SO_4$ and 4 lb $SO_2$/ton $H_2SO_4$. Stack parameters based on source test of 4/9/85, which reflected production rate of 87.8 TPH.

** Emissions for No. 8 $H_2SO_4$ based upon 2,500 TPD (104.2 TPH) and 4 lb $SO_2$/ton $H_2SO_4$. Stack parameters based upon source test of 6/14/85 which reflected production rate of 98.4 TPH.

++ Emissions for No. 9 $H_2SO_4$ based upon 2,600 TPD (108.3 TPH) $H_2SO_4$ and 4 lb $SO_2$/ton. Stack parameters based upon stack test of 4/26/84, with 110.8 TPH production.

FDER, and generally represent average values. $SO_2$ emissions represent maximum values due to fuel oil burning, as presented in Table 1-1.

## 2.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the regulatory requirements that must be met for the construction and operation of the modified No. 8 $H_2SO_4$ plant at Gardinier. Both federal and state of Florida air quality regulations are discussed.

## 2.1 NATIONAL AND STATE AAQS

The existing applicable National and Florida ambient air quality standards (AAQS) are presented in Table 2-1. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse affects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Hillsborough County is currently designated an attainment or unclassifiable area for all criteria pollutants except particulate matter and ozone.

## 2.2 PSD REQUIREMENTS

### 2.2.1 General Requirements

Under federal Prevention of Significant Deterioration (PSD) review requirements, all major new or modified sources of air pollutants regulated under The Clean Air Act (CAA) must be reviewed and approved by the U.S. Environmental Protection Agency (USEPA) [in this case, reviewed and approved by the Florida Department of Environmental Regulation (FDER) since PSD review authority has been delegated to the state]. A "major stationary source" is defined as any one of 28 named source categories which has the potential to emit 100 tons per year (TPY) or more, or any other stationary source which has the potential to emit 250 TPY or more, of any pollutant regulated under CAA. "Potential to emit" means the capability at maximum design capacity to emit a pollutant after the application of control equipment.

Table 2-1. Federal and State of Florida Ambient Air Quality Standards

| Pollutant | Averaging Time | AAQS (ug/m$^3$) Federal Primary Standard | AAQS (ug/m$^3$) Federal Secondary Standard | AAQS (ug/m$^3$) State of Florida |
|---|---|---|---|---|
| Suspended Particulate Matter | Annual Geometric Mean | 75 | 60 | 60 |
| | 24-Hour Maximum* | 260 | 150 | 150 |
| Sulfur Dioxide | Annual Arithmetic Mean | 80 | N/A | 60 |
| | 24-Hour Maximum* | 365 | N/A | 260 |
| | 3-Hour Maximum* | N/A | 1,300 | 1,300 |
| Carbon Monoxide | 8-Hour Maximum* | 10,000 | 10,000 | 10,000 |
| | 1-Hour Maximum* | 40,000 | 40,000 | 40,000 |
| Nitrogen Dioxide | Annual Arithmetic Mean | 100 | 100 | 100 |
| Ozone | 1-Hour Maximum+ | 235 | 235 | 235 |
| Lead | Calendar Quarter | 1.5 | 1.5 | 1.5 |

Notes: N/A = Not applicable.
ug/m$^3$ = micrograms per cubic meter

*Maximum concentration not to be exceeded more than once per year.
+Maximum concentration not to be exceeded more than an average of 1 calendar day per year.

Sources: 40 CFR, Parts 50 and 52.
Florida Administrative Code (FAC), Chapter 17-2

A "major modification" is defined under PSD regulations as a change at an existing major stationary source which increases emissions by greater than "significant amounts". PSD significant emission rates are shown in Table 2-2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified source. PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. Major sources and modifications are required to undergo the following analysis related to PSD for each pollutant emitted in "significant" amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. Additional impact analyses.

In addition to these analyses, a new source must also be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements are presented in the following sections.

### 2.2.2 Increments/Classifications

In promulgating the 1977 CAA Amendments, Congress specified that certain increases above an air quality "baseline concentration" level of $SO_2$ and PM concentrations would constitute "significant deterioration". The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications were designated based on criteria established in the CAA Amendments. Initially, Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. EPA then promulgated as regulations the requirements for classifications and

Table 2-2. PSD Significant Emission Rates

| Pollutant | Regulated Under | Significant Emission Rate (TPY) |
|---|---|---|
| Sulfur Dioxide | NAAQS, NSPS | 40 |
| Particulate Matter | NAAQS, NSPS | 25 |
| Nitrogen Oxides | NAAQS, NSPS | 40 |
| Carbon Monoxide | NAAQS, NSPS | 100 |
| Volatile Organic Compounds (Ozone) | NAAQS, NSPS | 40 |
| Lead | NAAQS | 0.6 |
| Sulfuric Acid Mist | NSPS | 7 |
| Total Fluorides | NSPS | 3 |
| Total Reduced Sulfur | NSPS | 10 |
| Reduced Sulfur Compounds | NSPS | 10 |
| Hydrogen Sulfide | NSPS | 10 |
| Asbestos | NESHAP | 0.007 |
| Beryllium | NESHAP | 0.0004 |
| Mercury | NESHAP | 0.1 |
| Vinyl Chloride | NESHAP | 1 |
| Benzene | NESHAP | 0 |
| Radionuclides | NESHAP | 0 |
| Inorganic Arsenic | NESHAP | 0 |
| Any Regulated Pollutant | -- | Class I Impact* |

* Any emission rate for a source located within 10 km of a Class I area which causes impacts of 1 ug/m$^3$, 24-hour average, or greater.

Notes: TPY = Tons per year.
NAAQS = National Ambient Air Quality Standards.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.

Source: 40 CFR 52.21.
FAC, Chapter 17-2.

area designations. The Florida DER has adopted the EPA class designations and allowable PSD increments, which are presented in Table 2-3.
The term "baseline concentration" evolves from federal and state PSD regulations and denotes a fictitious concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition in the PSD regulations, as amended August 7, 1980, baseline concentration means the ambient concentration level which exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

1. The actual emissions representative of sources in existence on the applicable baseline date; and
2. The allowable emissions of major stationary sources which commenced construction before January 6, 1975, but were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

1. Actual emissions from any major stationary source on which construction commenced after January 6, 1975; and
2. Actual emission increases and decreases at any stationary source occurring after the baseline date.

"Baseline date" means the earliest date after August 7, 1977, on which the first complete application under 40 CFR 52.21 is submitted by a major stationary source or major modification subject to the requirements of 40 CFR 52.21. The baseline date for the entire state of Florida, including Hillsborough County, has been set as December 27, 1977 (FAC, Chapter 17-2).

### 2.2.3 Control Technology Review

The control technology review requirements of the federal PSD regulations require that all applicable federal and state emission limiting standards be met and that Best Available Control Technology (BACT) be applied to control emissions from the source (40 CFR 52.21). The BACT requirements are

Table 2-3. Federal and State of Florida PSD Allowable Increments

| Pollutant/Averaging Time | Allowable Increment ($ug/m^3$)<br>Class I | <br>Class II | <br>Class III |
|---|---|---|---|
| Particulate Matter | | | |
| Annual Geometric Mean | 5 | 19 | 37 |
| 24-Hour Maximum** | 10 | 37 | 75 |
| Sulfur Dioxide | | | |
| Annual Arithmetic Mean | 2 | 20 | 40 |
| 24-Hour Maximum** | 5 | 91 | 182 |
| 3-Hour Maximum** | 25 | 512 | 700 |

** Maximum concentration not to be exceeded more than once per year.

Source: 40 CFR Part 52, Section 52.21.
Florida Administrative Code, Chapter 17-2

applicable to all regulated pollutants for which the increase in emissions from the source or modification exceeds the significant emission rate (see Table 2-2).

BACT is defined in 40 CFR 52.21 as:

> An emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act...which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable...through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.... If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology.

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increment and thereby enlarge the potential for future economic growth without significantly degrading air quality (USEPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in USEPA's "Guidelines for Determining Best Available Control Technology (BACT)", (USEPA, 1978) and in the "PSD Workshop Manual" (USEPA, 1980). These guidelines were promulgated by USEPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to USEPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgement, balancing environmental benefits with energy, economic, and other impacts (USEPA, 1978).

### 2.2.4 Air Quality Analysis

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary source or major modification. For a new major source, the affected pollutants are those that the source would potentially emit in a significant amount. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 2-2).

According to CAA, ambient air monitoring for a period of up to 1 year generally is appropriate to satisfy the PSD monitoring requirements. A minimum of four (4) months of data is required. Existing data from the vicinity of the proposed source may be utilized if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in USEPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (USEPA, 1981).

The regulations include an exemption which excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that the Administrator may exempt a proposed major stationary source or major modification from the monitoring requirements of 40 CFR 52.21(m) with respect to a particular pollutant if the emissions increase of the pollutant from the source or modification would cause, in any area, air quality impacts less than the *de minimis* levels presented in Table 2-4.

The state of Florida has passed PSD air quality analysis requirements identical to the federal requirements. In February 1981, USEPA revised the *de minimis* levels and averaging times for three of the pollutants (USEPA, 1981). The averaging period for lead was changed to 3 months and the *de minimis* impact levels for beryllium and hydrogen sulfide were changed to 0.001 ug/m$^3$ and 0.2 ug/m$^3$, respectively. These revisions have been proposed in the Federal Register, but have not yet been promulgated. The state of Florida recently (August 1986) adopted the revised *de minimis* levels.

### 2.2.5 Source Impact Analysis

A source impact analysis must be performed by a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 2-2). The PSD regulations specifically require the use of atmospheric dispersion models in performing impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated USEPA models must normally be used in performing the impact analysis. Specific applications for other than USEPA-approved models require USEPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the USEPA publications, "Guideline on Air Quality Models (Revised)" (USEPA, 1986a) and "Regional Workshops on Air Quality Modeling: A Summary Report" (USEPA, 1983). Criteria pollutants may be exempt from the source impact analysis if the net increase in impacts due to the new source is below significance levels, as presented in Table 2-5.

Table 2-4. EPA and Florida PSD _De_ _Minimis_ Impact Levels

| Pollutant | De Minimis Air Quality Impact Level (ug/m$^3$) | |
|---|---|---|
| | Code of Federal Regulations | EPA Ambient Monitoring Guidelines and Florida |
| Sulfur Dioxide | 13, 24-hour | 13, 24-hour |
| Particulate Matter | 10, 24-hour | 10, 24-hour |
| Nitrogen Oxides | 14, annual | 14, annual |
| Carbon Monoxide | 575, 8-hour | 575, 8-hour |
| Ozone | 100 TPY* | 100 TPY* |
| Lead | 0.1, 24-hour | 0.1, 3-month |
| Sulfuric Acid Mist | ** | ** |
| Total Fluoride | 0.25, 24-hour | 0.25, 24-hour |
| Total Reduced Sulfur | 10, 1-hour | ** |
| Reduced Sulfur Compounds | 10, 1-hour | ** |
| Hydrogen Sulfide | 0.04, 1-hour | 0.2, 1-hour |
| Asbestos | ** | ** |
| Beryllium | 0.0005, 24-hour | 0.001, 24-hour |
| Mercury | 0.25, 24-hour | 0.25, 24-hour |
| Vinyl Chloride | 15, 24-hour | 15, 24-hour |
| Benzene | ** | ** |
| Radionuclides | ** | ** |
| Inorganic Arsenic | ** | ** |

* Increase in volatile organic compounds (VOC) emissions.

** No ambient air measurement method; no monitoring required.

Sources: 40 CFR 52.21(i)(8).
EPA, 1980.
EPA, 1981.

Table 2-5. Significant Impact Levels for Criteria Pollutants

| Pollutant | Average Period | Concentration ($\mu g/m^3$) |
|---|---|---|
| Sulfur Dioxide | 3-Hour | 25 |
| | 24-Hour | 5 |
| | Annual | 1 |
| Particulate Matter | 24-Hour | 5 |
| | Annual | 1 |
| Nitrogen Dioxide | Annual | 1 |
| Carbon Monoxide | 1-Hour | 2,000 |
| | 8-Hour | 500 |

Source: EPA, 1980

Various lengths of record for meteorological data can be utilized for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor must normally be used for comparison to air quality standards.

### 2.2.6 Additional Impact Analysis

In addition to air quality impact analyses, federal PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source. These analyses are to be conducted primarily for PSD Class I areas. Impacts due to general commercial, residential, industrial, and other growth associated with the source must also be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 2-2).

### 2.2.7 Good Engineering Practice Stack Height

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP, or any other dispersion technique. On July 8, 1985, USEPA promulgated final stack height regulations (USEPA, 1985a).

GEP stack height is defined as the highest of:

1. 65 meters (m), or
2. A height established by applying the formula:

   Hg = H + 1.5L

   where: $H_g$ = GEP stack height,
   H = Height of the structure or nearby structure, and
   L = Lesser dimension (height or projected width) of nearby structure(s).
3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where "plume impaction" occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with "elevated terrain." "Elevated terrain" is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of the Gardinier facility is flat, plume impaction was not considered in determining the GEP stack height.

## 2.3 SOURCE APPLICABILITY

### 2.3.1 Pollutant Applicability

As described in Section 1.0, the only regulated pollutants affected by the proposed No. 8 $H_2SO_4$ plant expansion are $SO_2$ and $H_2SO_4$ mist. Since phosphate rock processing plants are one of the 28 listed PSD source categories, and the Gardinier plant is a phosphate rock processing plant, the plant is an existing major source if emissions of any regulated pollutant exceed 100 tons per year. Permitted $SO_2$ emissions from the three

$H_2SO_4$ plants alone are greater then 5,300 TPY. As a result, the Gardinier plant is an existing major source for PSD purposes.

A major modification, as described in Section 2.2, is a significant increase in emissions of any regulated pollutant at a major stationary source. PSD review applies to each pollutant for which the increase in emissions exceeds the PSD significant emission rate (Table 2-2). Since emission increases at the Gardinier plant due to the proposed modification will only occur at the No. 8 $H_2SO_4$ plant, only this source was considered in determining the net emissions increase. Emissions from all other $SO_2$ sources will not exceed current permit conditions, although emissions may fluctuate below these levels depending upon phosphate fertilizer market conditions and fuel type and quality. Since such fluctuations constitute normal routine operation, they are not considered in determining the net emissions increase [40 CFR 52.21(2)(i) and FAC 17-2.100(102)].

Current allowable emissions, proposed allowable emissions, and the net increase in allowable emissions of $SO_2$ and $H_2SO_4$ mist from the No. 8 $H_2SO_4$ plant are shown in Table 2-6. The net increase in both $SO_2$ and $H_2SO_4$ mist emissions are estimated to exceed the PSD significant emission rates. As a result, both of these pollutants are required to undergo the PSD review described in Section 2.2.

### 2.3.2 Emission Standards

The No. 8 $H_2SO_4$ plant is currently required to emit no more than 4 lb $SO_2$/ton $H_2SO_4$ produced and 0.15 lb $H_2SO_4$ mist per ton H2SO4 produced. These limits are equivalent to the federal NSPS for new $H_2SO_4$ plants. These emission limits will be retained after the expansion of the $H_2SO_4$ production capacity of the No. 8 $H_2SO_4$ plant.

### 2.3.3 Increment Consumption

The PSD increments allow a specified amount of deterioration in air quality to occur as judged against a "baseline" air quality level. The baseline date has been established for the entire state of Florida by DER as

Table 2-6. Net Emission Increases at Gardinier, Inc., Due to the Proposed Modification

| Emission Scenario | $SO_2$ (tons/yr) | $H_2SO_4$ Mist (tons/yr) |
|---|---|---|
| Current Permitted Emissions | | |
| No. 8 $H_2SO_4$ @ 2,200 TPD | 1,606.0 | 60.2 |
| Proposed Allowable Emissions | | |
| No. 8 $H_2SO_4$ @ 2,500 TPD | 1,825.0 | 68.4 |
| Net Increase | 219.0 | 8.2 |
| PSD Significant Emission Rate | 40 | 7 |

Note: Emission calculations reflect maximum production rates and allowable emissions of 4.0 lb/ton for $SO_2$ and 0.15 lb/ton for $H_2SO_4$ mist.

December 27, 1977. Several provisions exist in FAC 17-2.500(4) which identify emissions which affect PSD increment consumption. These provisions relate to emission increases and decreases at facilities due to construction commencing after January 6, 1975.

A review of the history of the Gardinier plant in regard to $SO_2$ emissions was presented in the 1984 PSD application for the No. 7 and No. 8 $H_2SO_4$ plant expansions (ESE, 1984). This permit history, shown in Table 2-7, reflects changes in only the $H_2SO_4$ plants at Gardinier. A brief review of this history follows:

Nos. 4, 5 and 6 $H_2SO_4$ - Units shutdown in 1976.
No. 7 $H_2SO_4$ - Modified to double absorption in 1974; increased capacity to 1,750 TPD in 1979; increased capacity to 2,200 TPD in 1985.
No. 8 $H_2SO_4$ - Modified to double absorption in 1974; increased capacity to 2,200 TPD in 1985.
No. 9 $H_2SO_4$ - Construction permit for 2,600 TPD plant issued in 1974; current operating permit is for 2,600 TPD.

The $SO_2$ emission decreases and increases at the Gardinier $H_2SO_4$ plants which affect increment consumption, including the presently proposed expansion, are summarized in Table 2-8. Both actual and allowable emissions are shown, based upon a 100-percent capacity factor on all units. The post-January 6, 1975 capacity increases at the No. 7 and No. 8 $H_2SO_4$ plants represent increases in actual emissions which consume PSD increment. Although the allowable $SO_2$ emission rates for both these plants were reduced from 10 lb/ton to 4 lb/ton, review of historic source test data shows that the units had generally met the 4-lb/ton limit since converting to double adsorption in 1977. Thus, for purposes of calculating actual emission changes from No. 7 and No. 8 $H_2SO_4$ plants, the 4-lb/ton factor was used.

Table 2-7. Permit History of $H_2SO_4$ Plants at Gardinier.

| Permit No. | Date | Comments |
|---|---|---|
| No. 7 $H_2SO_4$ | | |
| AC 29-2384 | 11/25/74 | Modify to double absorption plant |
| AO 29-5763 | 11/02/77 | Operating permit for double absorption plant (1,380 TPD) |
| AC 29-21337 | 9/07/79 | Increase to 1,750 TPD $H_2SO_4$ and reduce allowable $SO_2$ emissions from 10 lb/ton to 4 lb/ton |
| AO 29-22820 | 9/10/82 | Operating permit for 1,750 TPD expansion |
| AC 29-089697 | 2/8/85 | Modify to 2,200 TPD |
| AO 29-104895 | 8/23/85 | Operating permit (2,200 TPD) |
| No. 8 $H_2SO_4$ | | |
| AC 29-3290 | 11/25/74 | Modify to double absorption plant |
| AO 29-2390 | 5/21/77 | Operating permit for double absorption plant (1,784 TPD) |
| AO 29-18228 | 5/26/79 | Renew operating permit |
| AO 29-84015 | 6/8/84 | Renew operating permit |
| AC 29-089696 | 2/8/85 | Increase to 2,200 TPD $H_2SO_4$ and reduce allowable $SO_2$ emissions from 10 lb/ton to 4 lb/ton |
| No. 9 $H_2SO_4$ | | |
| AC 29-2391 | 11/25/74 | Original construction permit for 2,600 TPD double absorption plant |
| AO 29-2391 | 3/29/77 | Operating permit (2,800 TPD) |
| AO 29-16532 | 2/09/79 | Renew operating permit (2,631 TPD) |
| AO 29-78960 | 2/28/84 | Renew operating permit (2,600 TPD) |
| Nos. 4, 5, and 6 $H_2SO_4$ | | |
| | October 1976 | Units shutdown |

Table 2-8. Summary of $SO_2$ Emission Changes at Gardinier $H_2SO_4$ Plants Which Affect PSD Increment Consumption

| Unit/Date | Change | Actual $SO_2$ (tons/yr)* | Allowable $SO_2$ (tons/yr)* |
|---|---|---|---|
| No. 7 $H_2SO_4$ | | | |
| 9/07/79 | Increase capacity from 1,380 TPD to 1,750 TPD and reduce allowables from 10 lb/ton to 4 lb/ton | +270+ | -1,241 |
| 2/8/85 | Increase capacity from 1,750 TPD to 2,200 TPD | +329+ | + 329 |
| No. 8 $H_2SO_4$ | | | |
| 2/8/85 | Increase capacity from 1,770 TPD to 2,200 TPD and reduce allowables from 10 lb/ton to 4 lb/ton | +314+ | -1,624 |
| Proposed | Increase capacity from 2,200 TPD to 2,500 TPD | +219+ | + 219 |
| No. 4 $H_2SO_4$ | | | |
| 1976 | Unit shutdown, 274 TPD @ 6,992 lb $SO_2$/day | -892** | -1,276 |
| No. 5 $H_2SO_4$ | | | |
| 1976 | Unit shutdown, 475 TPD @ 12,140 lb $SO_2$/day | -1,773** | -2,216 |
| No. 6 $H_2SO_4$ | | | |
| 1976 | Unit shutdown, 650 TPD @ 16,598 lb $SO_2$/day | -2,469** | -3,029 |
| Net Change | | -4,002 | -8,838 |

* Based upon year-round, continuous operation. Negative numbers indicate emission decreases; positive numbers indicate emission increases.

\+ Based upon 4 lb/ton before and after increase in capacity.

** Average of last 2 years of operation (1975 and 1976) based upon Air Pollutant Emissions Reports.

No change has been made in the $H_2SO_4$ production capacity of No. 9 $H_2SO_4$ plant since it was permitted to construct in 1974. As a result, the No. 9 $H_2SO_4$ plant does not affect PSD increment consumption.

The currently proposed increase in production capacity of the No. 8 $H_2SO_4$ plant will also represent a post-January 6, 1975 emissions increase which consumes PSD increments. Actual emissions for No. 8 $H_2SO_4$ are based upon 4 lb/ton, since historic source test data show that this level has been generally approached in actual operation, and the 4 lb/ton emission rate is the source-specific allowable emission rate determined as BACT in the 1985 PSD permit issued for the unit. The shutdown of the No. 4, No. 5, and No. 6 $H_2SO_4$ plants in 1976 represents post-January 6, 1975 emission decreases which expand the available PSD increments. The actual emissions for these units are based upon the last 2 years of operation (1975 through October 1976), as reported in the Air Pollutant Emissions Report submitted to the state of Florida for 1975 and 1976.

As shown in Table 2-8, the net change in increment-affecting emissions at Gardinier, including the proposed expansion of the No. 8 $H_2SO_4$ plant, reflects a large decrease in both actual and allowable $SO_2$ emissions. In addition to these increment-affecting changes in emissions, the stack heights of the No. 7 and No. 8 $H_2SO_4$ plants are currently 149.5 feet. The shutdown No. 4, No. 5, and No. 6 $H_2SO_4$ plants all had shorter stacks, ranging from 72 feet to 80 feet. Thus, the air quality impacts from the older units would be proportionately greater than that for the No. 7 and No. 8 units.

Changes to other $SO_2$-emitting sources at Gardinier since January 6, 1975, have been minimal and would not significantly affect the results shown in Table 2-8. These changes include the addition of the No. 5 diammonium phosphate plant (10 lb/hr, 44 TPY), and the shutdown of the ammonia plant (less than 5 TPY), Concentrators No. 7 and No. 8 (171 lb/hr, 747 TPY), mills KVS 12 (1.3 lb/hr, 5.6 TPY), and RM 6-10 (0.4 lb/hr and 1.7 TPY).

Based upon the above considerations, it is concluded that the proposed expansion of the No. 8 $H_2SO_4$ plants at Gardinier will not cause or contribute to any violation of the allowable $SO_2$ PSD increments. The Gardinier plant is not located in an area where the PSD increments are known to be violated. Emission reductions at Gardinier since January 6, 1975, provide greatly expanded PSD increments in the vicinity of the plant. These emission decreases are of such magnitude that no detailed modeling analysis is needed, either for the PSD Class II area surrounding the Gardinier site, or for the PSD Class I area located 85 km to the north of the site (Chassahowitzka National Wilderness Area).

### 2.3.4 GEP Stack Height

The height of the existing No. 8. $H_2SO_4$ plant is 149.5 feet (45.6 m). This existing stack will not be modified as a result of the proposed expansion. This stack height is less than the 65-m de minimis height allowed under the GEP stack height regulations and, therefore, the stack will not exceed the GEP stack height.

### 2.3.5 Ambient Monitoring

An ambient monitoring analysis for $SO_2$ is presented in Section 3.0 to satisfy PSD preconstruction monitoring requirements. Currently, no ambient monitoring requirements exist for $H_2SO_4$ mist under PSD, as no acceptable ambient monitoring technique has been approved (see Table 2-4).

## 3.0 AIR QUALITY ANALYSIS

### 3.1 MONITORING REQUIREMENTS

The Clean Air Act Amendments of 1977 require that the owner or operator of any proposed major new source or major modification conduct ambient air monitoring for applicable pollutants. As discussed in the source applicability section, Section 2.3, only $SO_2$ requires an air quality analysis to meet PSD preconstruction monitoring requirements for the proposed Gardinier expansion. Monitoring must be conducted for a period of up to 1 year prior to submission of a construction permit application. However, if the increase in impacts due to the proposed new source or modification is less than the PSD de minimis monitoring concentrations, the applicant may be exempted from the PSD preconstruction monitoring requirements. For $SO_2$, the de minimis level is 13 $ug/m^3$, 24-hour average. As demonstrated in Section 4.0, the predicted maximum increase in 24-hour $SO_2$ impacts due to the proposed modification at Gardinier is 7.6 $ug/m^3$. As a result, the proposed modification may be exempted from preconstruction $SO_2$ monitoring.

### 3.2 BACKGROUND $SO_2$ CONCENTRATIONS

A background $SO_2$ concentration must be estimated to account for $SO_2$ sources which are not explicitly included in the atmospheric dispersion modeling analysis. In order to estimate reasonable background $SO_2$ concentrations, a review of recent, available $SO_2$ monitoring data in the area of Gardinier was performed. Presented in Table 3-1 is a summary of ambient $SO_2$ data available from 1983 to 1985 for all monitors located within 10 km of the Gardinier site. A total of five stations are located within 10 km of Gardinier, three of which have continuous $SO_2$ monitors. The monitors are operated by Hillsborough County Environmental Protection Commission. Data recoveries exceed 85 percent for all the stations.

Annual average, 24-hour maximums, and 3-hour maximums for $SO_2$ are shown in Table 3-1. Since all of the monitors are located in an area of multisource emissions (refer to Section 4.0), these concentrations are expected to include substantial contributions from sources in the area, including the

Table 3-1. Summary of Ambient $SO_2$ Concentrations for Sites Within 10 km of Gardinier, Inc., 1983 - 1985.

| SAROAD Site No. (Distance Away) | City | Monitoring Method | Period | No. of Obs. | Percent Data Recovery | $SO_2$ Concentration ($ug/m^3$) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 3-Hour* | 24-Hour* | Annual Average |
| 1800-021+ (8.2 km) | South of Gibsonton | Continuous | 1983 | 8506 | 97.1 | 729 | 114 | 14 |
| | | | 1984 | 8638 | 98.3 | 437 | 82 | 13 |
| | | | 1985 | 8657 | 98.8 | 637 | 134 | 15 |
| 1800-066+ (3.9 km) | Gibsonton | Gas bubbler | 1983 | 5 | - | - | 29 | 7 |
| | | | 1984 | 55 | - | - | 29 | 8 |
| | | | 1985 | 56 | - | - | 39 | 11 |
| 1800-083+ (0.6 km) | Riverview | Gas bubbler | 1983 | 57 | - | - | 31 | 8 |
| | | | 1984 | 62 | - | - | 39 | 10 |
| | | | 1985 | 61 | - | - | 47 | 13 |
| 1800-95+ (7.0 km) | Tampa | Continuous | 1983 | 8404 | 95.9 | 396 | 80 | 18 |
| | | | 1984 | 8392 | 95.5 | 456 | 103 | 15 |
| | | | 1985 | 7731 | 88.3 | 376 | 83 | 21 |
| 4360-035+ (9.8 km) | Tampa | Continuous | 1983 | 8241 | 94.1 | 291 | 77 | 21 |
| | | | 1984 | 8673 | 98.7 | 393 | 82 | 19 |
| | | | 1985 | 8146 | 93.0 | 287 | 67 | 14 |
| 4360-053** (9.5 km) | Tampa | Continuous | 1983 | 8062 | 92.0 | 222 | 68 | 15 |
| | | | 1984 | 8684 | 98.9 | 383 | 69 | 16 |
| | | | 1985 | 8121 | 92.7 | 265 | 69 | 15 |

* Second-highest concentrations for calendar year are shown

\+ Monitoring objective for this site is to measure the impact of a significant source

**Monitoring objective for this site is to measure pollutant concentrations representative of areas of high population density

Source: Florida DER, 1984, 1985, 1986.

existing Gardinier facility. These potential major contributing sources are explicitly included in the modeling analysis. As a result, for the short-term averaging times, these concentrations would not be representative of actual background concentrations which would be expected to occur in conjunction with the worst-case meteorology. For the annual averaging time, the actual background concentration would be significantly lower than the values shown in Table 3-1.

A representative background $SO_2$ concentration was considered to be the 1985 annual average concentration of 15 $ug/m^3$ recorded at monitoring site 1800-021. This value is consistent with the background concentration assumed from a previous air modeling analysis performed for Gardinier (ESE, 1984), which used the same monitoring site to develop a background concentration. Site 1800-021 is located 8.2 km southeast of Gardinier and 5 km west of the TEC Big Bend power plant. These two sources are the only nearby sources of $SO_2$ that would directly influence the monitor. Therefore, the data from this site were considered to be more representative of the background concentration than the data from the other monitoring sites listed in Table 3-1, which could be impacted by a number of $SO_2$ sources.

The 15 $ug/m^3$ background $SO_2$ level was used for all averaging times and was added to dispersion modeling results, presented in Section 4.0, in order to estimate total air quality impacts. The highest and second-highest 3-hour and 24-hour concentrations reported for monitoring site 1800-021 in Table 3-1 are assumed to be due to either the Gardinier plant or the TEC Big Bend plant, and therefore were considered not to be representative of the short-term background concentration. Since all major $SO_2$ sources located within 50 km of the Gardinier plant were considered in the dispersion modeling analysis, the 15 $ug/m^3$ annual average recorded at Station 1800-021 was also considered to be representative of the short-term background concentration level.

# 4.0 SOURCE IMPACT ANALYSIS

## 4.1 ANALYSIS APPROACH AND ASSUMPTIONS

### 4.1.1 General Modeling Approach

The general modeling approach followed USEPA and FDER modeling guidelines for determining compliance with AAQS. In general, when model predictions are used to determine compliance with AAQS, current USEPA and FDER policies stipulate that the highest annual average and highest, second-highest short-term (i.e., 24 hours or less) concentrations can be compared to the applicable AAQS. If concentrations are predicted with only 1 year of meteorological data, the highest short-term concentration calculated among the field of receptors should be compared with AAQS. The use of a 5-year meteorological database allows comparison of the predicted highest, second-highest short-term concentration with short-term AAQS. The highest, second-highest concentration is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

This approach is consistent with AAQS, which permits a short-term average concentration to be exceeded once per year at each receptor.

Model predictions for all averaging periods were performed using the Industrial Source Complex Short-Term (ISCST) model. A brief description of the ISCST model is given in Section 4.2. To develop the maximum short-term $SO_2$ concentrations for the proposed Gardinier expansion, the general modeling approach was divided into screening and refined phases to reduce the computation time required to perform the modeling analysis. The basic difference between the two phases is the receptor grid used when predicting concentrations, the number of emission points, and the number of meteorological periods evaluated. In general, concentrations for the screening phase were predicted using a coarse receptor grid, limited number of major sources, and a 5-year meteorological record.

After a final list of highest, second-highest short-term concentrations was developed, the refined phase of the analysis was conducted by predicting concentrations for a refined receptor grid centered on the receptor at which the highest, second-highest concentration from the screening phase was produced. The ISCST model was executed for the meteorological periods during which both the highest and second-highest concentrations were predicted to occur at that receptor, based on the screening phase results. This approach was used to ensure that valid highest, second-highest concentrations were obtained. More detailed descriptions of the emission inventory and receptor grids used in the screening and refined phases of the analysis are presented in Sections 4.1.4 and 4.1.5, respectively.

### 4.1.2 Model Selection

The ISC dispersion model (USEPA, 1986b) was used to evaluate the $SO_2$ emissions from the Gardinier facility. This model is contained in USEPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6 (USEPA, 1986c). The ISC model was selected primarily for the following reasons:

1. USEPA and FDER have approved the general use of the model for air quality dispersion analysis because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (USEPA, 1986a).
2. The ISC model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain.
3. The results from the ISC model are appropriate for addressing compliance with AAQS.

The ISC model consists of two sets of computer codes which are used to calculate short- and long-term ground level concentrations. The main differences between the two codes are the input format of the meteorological data and the method of estimating the plume's horizontal dispersion.

The first model code, the ISCST model, is an extended version of the single-source (CRSTER) model (USEPA, 1977). The ISCST model is designed to calculate hourly concentrations based on hourly meteorological parameters (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The hourly concentrations are processed into non-overlapping, short-term and annual averaging periods. For example, a 24-hour average concentration is based on twenty-four 1-hour averages calculated from midnight to midnight of each day. For each short-term averaging period selected, the highest and second-highest average concentrations are calculated for each receptor. As an option, a table of the 50 highest concentrations over the entire field of receptors can be produced.

The second model code of the ISC model is the ISC long-term (ISCLT) model, which is an extension of the Air Quality Display Model (AQDM) and the Climatological Dispersion Model (CDM). The ISCLT model uses joint frequencies of wind direction, wind speed, and atmospheric stability to calculate seasonal and/or annual average ground-level concentrations. Because the input wind directions are for 16 sectors, with each sector defined as 22.5 degrees, the model calculates concentrations by assuming that the pollutant is uniformly distributed in the horizontal plane within a 22.5-degree sector.

In this analysis, the ISCST model was used to calculate both short-term and annual average concentrations because these concentrations are readily obtainable from the model output.

Major features of the ISCST model are presented in Table 4-1. Concentrations due to stack and volume sources are calculated by the ISCST model using the steady-state Gaussian plume equation for a continuous source. The area source equation in the ISCST model is based on the equation for a continuous and finite crosswind line source.

Table 4-1. Major Features of the ISCST Model

| ISCST Model Features |
|---|
| • Polar or Cartesian coordinate systems for receptor locations |
| • Rural or one of three urban options which affect wind speed profile exponent, dispersion rates, and mixing height calculations |
| • Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1972, and 1975) |
| • Procedures suggested by Huber and Snyder (1976) and Huber (1977) for evaluating building wake effects |
| • Procedures suggested by Briggs (1974) for evaluating stack-tip downwash |
| • Separation of multiple point sources |
| • Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations |
| • Capability of simulating point, line, volume and area sources |
| • Capability to calculate dry deposition |
| • Variation with height of wind speed (wind speed-profile exponent law) |
| • Concentration estimates for 1-hour to annual average |
| • Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm |
| • Consideration of time-dependent exponential decay of pollutants |
| • The method of Pasquill (1976) to account for buoyancy-induced dispersion |
| • A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used) |
| • Procedure for calm-wind processing |

Source: EPA, 1986b

The ISC model has rural and urban options which affect the wind speed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground level concentrations. The criteria used to determine when the rural or urban mode is appropriate are based on land use near the proposed plant's surroundings (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3 km radium circle centered on the proposed source, the urban option should be selected. Otherwise, the rural option is more appropriate.

For modeling analyses that will undergo regulatory review, such as PSD permit applications, the following model features are recommended by USEPA (1986c) and are referred to as the regulatory options in the ISCST model:

1. Final plume rise at all receptor locations,
2. Stack-tip downwash,
3. Buoyancy-induced dispersion,
4. Default wind speed profile coefficients for rural or urban option,
5. Default vertical potential temperature gradients,
6. Calm wind processing, and
7. A decay half life of 4 hours for $SO_2$ concentration calculations in urban areas.

Some of the above model features have been recommended for use by USEPA over the last 5 years. These assumptions include the use of final plume rise, default wind speed profile coefficients, default vertical potential temperature gradients, and calm wind processing of maximum ground level concentrations. The recently revised USEPA modeling guidelines recommend use of the remaining features, including the use of calm wind processing regardless if impacts are expected to occur under such meteorological conditions. The effect of using these options to predict maximum ground level concentrations from elevated point sources is to produce higher concentrations than if these options were not used by:

- Lowering the effective plume height (stack-tip downwash),
- Increasing the plume width such that the plume may have an impact over areas where it previously would not (buoyancy-induced dispersion), and
- Mathematically adjusting the longer term averaging concentration (i.e., 24 hours or more) by the number of non-calm hours (calm wind processing).

In this analysis, the regulatory options were used to address maximum impacts from the Gardinier facility. Based on a review of the land use around the Gardinier facility, the rural mode was selected because of the general lack of, or minimal residential, industrial and commercial development.

### 4.1.3 Meteorological Data

Meteorological data used in the ISCST model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations from the National Weather Service (NWS) station at Tampa International Airport and twice-daily radiosonde soundings from the NWS station at Ruskin, Florida. The 5-year period of meteorological data consisted of 1974, 1975, 1978, 1979, and 1981. Based on discussions with the FDER (KBN, 1986), this database is acceptable for use in assessing impacts for an air quality permit application.

The NWS station in Tampa, located approximately 18 km to the northwest of the Gardinier plant site, and Ruskin, located approximately 15 km to the south-southwest of the plant site, were selected for use in the study because they are the closest primary weather stations to the study area with similar surrounding topographical features and land-water boundaries. These stations also have the most readily available and complete database which is representative of the proposed plant site.

The surface observations included wind direction, wind speed, temperature, cloud cover, and cloud ceiling. The wind speed, cloud cover, and cloud ceiling values were used in the ISCST meteorological preprocessor program to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at Tampa, Florida, morning and afternoon mixing heights were calculated with the radiosonde data at Ruskin using the Holzworth approach (1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by USEPA (Holzworth, 1972). The hourly surface data and mixing heights were used to develop a sequential series of hourly meteorological data (i.e., wind direction, wind speed, temperature, stability, and mixing heights). Because the observed hourly wind directions were classified into one of thirty-six 10-degree sectors, the wind directions were randomized within each sector using an USEPA preprocessing program to account for the expected variability in air flow.

### 4.1.4 Emission Inventory

A listing of all sources, other than Gardinier, considered in the $SO_2$ modeling analyses for determining total air quality impacts is presented in Table 4-2. The emission and stack parameters for the Gardinier sources were presented in Table 1-2 in Section 1.0. The emission and stack parameters for all other sources were obtained from the FDER, Southwest District office. These data were based on information developed for the PSD permit application for the Hillsborough County Resource Recovery facility, and updated to reflect changes made by the FDER (1985). Data for several of the utility sources were obtained from the Florida Air Pollution Inventory System (APIS) and the previous air quality impact assessment prepared for Gardinier (ESE, 1984).

The FDER has recommended a technique for eliminating sources in the modeling analyses if the source´s emissions do not meet an emission criteria. The technique is the "Screening Threshold" method, developed by the North Carolina Department of Natural Resources and Community Development, and approved by the USEPA. The method is designed to objectively eliminate from the emission inventory those sources which are not likely to have a significant interaction with the source undergoing evaluation. In general,

Table 4-2. $SO_2$ Emission Inventory of Sources Considered in the Modeling

| No. | Source | Maximum Allowable Emissions (TPY) | Distance(D) from Gardinier (KM) | "Screening Threshold" Emissions (TPY)* | Sources Included in Modeling Analyses | |
|---|---|---|---|---|---|---|
| | | | | | Screening | Refined |
| 1 | Hillsborough County Resource Recovery Facility (RRF) | 1,029 | 11.4 | 228 | No | Yes |
| 2 | Pinellas County RRF | 1,095 | 28.3 | 566 | No | Yes |
| 3 | McKay Bay RRF | 744 | 10.1 | 202 | No | Yes |
| 4 | TECO Big Bend | 298,900 | 7.6 | 152 | Yes | Yes |
| 5 | FPC Bartow | 54,960 | 21.0 | 420 | Yes | Yes |
| 6 | FPC Higgins | 11,195 | 31.3 | 626 | No | Yes |
| 7 | FPC Anclote | 116,840 | 53.1 | 1,062 | No | Yes |
| 8 | TECO Hookers Point | 13,474 | 10.2 | 204 | Yes | Yes |
| 9 | TECO Gannon | 92,856 | 6.1 | 122 | Yes | Yes |
| 10 | General Portland | 12,132 | 9.8 | 196 | Yes | Yes |
| 11 | AMAX | 3,313 | 33.4 | 668 | No | Yes |
| 12 | CF Industries | 1,700 | 37.2 | 744 | No | Yes |
| 13 | Chloride Metals | 702 | 6.1 | 122 | No | Yes |
| 14 | Columbus Company | 167 | 4.8 | 96 | No | Yes |

Table 4-2. $SO_2$ Emission Inventory of Sources Considered in the Modeling (Continued, Page 2 of 2)

| No. | Source | Maximum Allowable Emissions (TPY) | Distance(D) from Gardinier (KM) | "Screening Threshold" Emissions (TPY)* | Sources Included in Modeling Analyses | |
|---|---|---|---|---|---|---|
| | | | | | Screening | Refined |
| 15 | Couch Construction | 115 | 15.7 | 314 | No | No |
| 16 | Delta Asphalt | 167 | 24.6 | 492 | No | No |
| 17 | Gulf Coast Lead Co. | 1,641 | 11.4 | 228 | No | Yes |
| 18 | IMC Port Sutton | 1,443 | 6.1 | 122 | No | Yes |
| 19 | Thatcher Glass | 181 | 21.0 | 420 | No | No |
| 20 | Nitram | 108 | 6.6 | 132 | No | No |
| 21 | National Gypsum | 138 | 16.1 | 322 | No | No |
| 22 | AMAX (Manatee County) | 3,290 | 29.2 | 584 | No | Yes |
| 23 | FPL Manatee | 75,680 | 28.5 | 570 | Yes | Yes |

*"Screening Threshold" emissions (Q) are equal to 20 x D. Sources with emissions less than Q were eliminated from modeling (see text for details).

Source: KBN, 1986
Florida DER, 1986

sources that should be considered in the modeling analyses are those with emissions greater than Q (in TPY) which is calculated by the following criteria:

$$Q = 20 \times D$$

where D is the distance (km) from the source to the source undergoing evaluation.

A listing of the sources in the inventory with associated maximum allowable emissions, distance from Gardinier, and associated Q are presented in Table 4-2. Those sources with maximum allowable $SO_2$ emissions which are below the calculated "screening threshold" emissions were eliminated from further consideration in the modeling analysis. To reduce the amount of computation time required to model the remaining sources, including those at the Gardinier plant, the modeling was performed in screening and refined phases. In the screening phase, only those sources with $SO_2$ emissions above a certain threshold based on the source's location from the Gardinier plant were considered. The following criteria were used to determine the sources to be modeled:

1. For Gardinier sources, individual point sources with $SO_2$ emissions greater than or equal to 125 TPY.
2. For other sources, $SO_2$ emissions:
    - greater than 750 TPY within 10 km of Gardinier
    - greater than 2,000 TPY between 10 and 20 km from Gardinier
    - greater than 10,000 TPY between 20 and 50 km from Gardinier.

Sources located more than 50 km from Gardinier were not considered in the screening analysis. For the screening modeling, sources with similar stack heights and stack parameters were combined and treated as one stack to reduce computation time. The Gardinier screening emission inventory is presented in Table 4-3. The emissions, stack, and operating parameters for the other sources considered in the screening analysis are presented in Table 4-4.

Table 4-3. Combined Gardinier Sources Used for Screening Modeling

| Sources | $SO_2$ Emissions (g/s) | Stack Height (m) | Stack Diameter (m) | Exit Gas Velocity (m/s) | Exit Gas Temperature (K) | UTM Coordinates (km) X | UTM Coordinates (km) Y |
|---|---|---|---|---|---|---|---|
| RM 5, CTMD 3, 4 | 9.69 | 20.7 | 1.07 | 11.5 | 316 | 362.65 | 3082.6 |
| GTSP | 14.3 | 38.4 | 2.44 | 11.0 | 327 | 362.6 | 3082.45 |
| $H_2SO_4$ 7 | 46.3 | 45.6 | 2.29 | 14.0 | 340 | 363.2 | 3082.3 |
| $H_2SO_4$ 8 | 52.5 | 45.6 | 2.44 | 10.6 | 339 | 363.3 | 3082.4 |
| $H_2SO_4$ 9 | 54.6 | 45.6 | 2.74 | 11.9 | 350 | 363.2 | 3082.45 |

Source: KBN, 1986

Table 4-4. $SO_2$ Emission, Stack, and Operating Data for Sources Considered in the Modeling
(Page 1 of 3)

| No. | Source | UTM Coordinates (km) | | $SO_2$ Emissions (g/s) | Stack Data (m) | | Operating Data | |
|---|---|---|---|---|---|---|---|---|
| | | East | North | | Height | Diameter | Temperature (K) | Velocity (m/s) |
| 1 | Hillsborough Co. RRF | 368.2 | 3092.7 | 29.6 | 67.0 | 3.50 | 494 | 16.9 |
| 2 | Pinellas RRF 1-3 | 335.2 | 3084.1 | 31.5 | 49.1 | 2.37 | 505 | 26.8 |
| 3 | McKay Bay RRF | 360.0 | 3091.9 | 21.4 | 45.7 | 1.91 | 500 | 21.3 |
| 4 | TECO Big Bend | 361.9 | 3075.0 | | | | | |
| | No. 1,2 | | | 5252 | 149.4 | 7.32 | 423 | 28.7 |
| | No. 3* | | | 2692 | 149.4 | 7.32 | 418 | 14.4 |
| | No. 4 | | | 655 | 149.4 | 7.32 | 342 | 19.9 |
| 5 | FPC Bartow | 342.4 | 3082.7 | | | | | |
| | No. 1 | | | 423.0 | 91.5 | 2.74 | 429 | 36.3 |
| | No. 2 | | | 448.0 | 91.5 | 2.74 | 425 | 31.4 |
| | No. 3* | | | 710.0 | 91.5 | 3.35 | 408 | 34.6 |
| 6 | FPC Higgins | 336.5 | 3098.4 | | | | | |
| | No. 1 | | | 97.3 | 53.1 | 3.81 | 429 | 8.45 |
| | No. 2 | | | 94.9 | 53.1 | 3.81 | 427 | 8.53 |
| | No. 3 | | | 130.0 | 53.1 | 3.81 | 422 | 7.47 |
| 7 | FPC Anclote | 324.4 | 3118.7 | | | | | |
| | No. 1 | | | 1681.0 | 152.1 | 7.32 | 433 | 19.1 |
| | No. 2 | | | 1681.0 | 152.1 | 7.32 | 431 | 19.0 |
| 8 | TECO Hooker Pt. | 358.0 | 3091.0 | | | | | |
| | No. 1* | | | 41.3 | 85.4 | 3.40 | 402 | 18.2 |
| | No. 2 | | | 41.3 | 85.4 | 3.40 | 402 | 18.2 |
| | No. 3 | | | 57.0 | 85.4 | 3.70 | 397 | 11.5 |
| | No. 4 | | | 57.0 | 85.4 | 3.70 | 397 | 11.5 |
| | No. 5 | | | 84.0 | 85.4 | 3.40 | 402 | 18.2 |
| | No. 6 | | | 107.0 | 85.4 | 2.90 | 436 | 17.9 |

Table 4-4. $SO_2$ Emission, Stack, and Operating Data for Sources Considered in the Modeling (Page 2 of 3)

| No. | Source | UTM Coordinates (km) | | $SO_2$ Emissions (g/s) | Stack Data (m) | | Operating Data | |
|---|---|---|---|---|---|---|---|---|
| | | East | North | | Height | Diameter | Temperature (K) | Velocity (m/s) |
| 9 | TECO Gannon** | 360.0 | 3087.5 | | | | | |
| | No. 1 | | | 282.5 | 93.3 | 3.70 | 438 | 22.5 |
| | No. 2 | | | 282.5 | 93.3 | 3.10 | 438 | 32.4 |
| | No. 3 | | | 321.4 | 93.3 | 3.20 | 427 | 35.4 |
| | No. 4 | | | 421.6 | 93.3 | 2.90 | 443 | 24.6 |
| | No. 5 | | | 513.4 | 93.3 | 4.50 | 415 | 20.6 |
| | No. 6 | | | 853.6 | 93.3 | 5.40 | 415 | 23.7 |
| 10 | General Portland | 358.0 | 3090.6 | 349.0 | 44.3 | 4.72 | 473 | 6.6 |
| 11 | AMAX (Point No.) | 393.8 | 3096.3 | | | | | |
| | 01 | | | 12.0 | 30.5 | 1.37 | 335.1 | 12.0 |
| | 02 | | | 3.3 | 24.4 | 1.67 | 315.8 | 8.9 |
| | 03 | | | 17.6 | 46.3 | 1.76 | 308.6 | 11.0 |
| | 05 | | | 29.0 | 45.7 | 1.76 | 315.6 | 15.9 |
| | 19 | | | 2.8 | 6.1 | 0.40 | 550.2 | 15.3 |
| | 20 | | | 1.4 | 3.4 | 0.37 | 605.2 | 20.2 |
| | 26 - 28 | | | 27.1 | 46.3 | 1.76 | 298.0 | 13.1 |
| | 29 | | | 2.1 | 10.6 | 0.36 | 605.2 | 15.3 |
| 12 | CF Industries (Point No.) | 380.0 | 3115.7 | | | | | |
| | 01 | | | 6.1 | 7.5 | 1.07 | 560.0 | 19.7 |
| | 10 | | | 6.2 | 28.7 | 3.05 | 316.3 | 7.2 |
| | 11 | | | 9.2 | 54.9 | 2.79 | 321.9 | 12.6 |
| | 12 | | | 13.7 | 54.9 | 2.79 | 315.2 | 9.8 |
| | 13 | | | 13.7 | 54.9 | 2.79 | 324.7 | 10.5 |
| 13 | Chloride Metals (Point No.) | 361.8 | 3088.3 | | | | | |
| | 01 | | | 10.1 | 32.2 | 0.58 | 346.7 | 27.8 |
| | 04 | | | 10.1 | 29.9 | 0.61 | 363.0 | 14.4 |

Table 4-4. $SO_2$ Emission, Stack, and Operating Data for Sources Considered in the Modeling
(Page 3 of 3)

| No. | Source | UTM Coordinates (km) East | UTM Coordinates (km) North | $SO_2$ Emissions (g/s) | Stack Data (m) Height | Stack Data (m) Diameter | Operating Data Temperature (K) | Operating Data Velocity (m/s) |
|---|---|---|---|---|---|---|---|---|
| 14 | Columbus Company | 361.9 | 3077.8 | 4.8 | 12.6 | 1.24 | 449.7 | 20.0 |
| 17 | Gulf Coast Lead | 363.9 | 3093.8 | 47.2 | 29.6 | 0.62 | 347.4 | 24.9 |
| 18 | IMC Port Sutton | 360.1 | 3087.5 | 41.5 | 19.8 | 2.41 | 338.6 | 10.5 |
| 22 | AMAX (Manatee County) | 348.5 | 3057.3 | | | | | |
| | 2-01, 02 | | | 90.7 | 61.0 | 2.40 | 337.0 | 10.3 |
| | 2-06, 07 | | | 3.1 | 61.0 | 2.10 | 311.0 | 20.5 |
| | 2-11 | | | 0.83 | 12.5 | 1.40 | 299.0 | 10.0 |
| 23 | FPL Manatee, No. 1, 2 | 367.3 | 3054.2 | 2177.0 | 152.1 | 7.98 | 426.0 | 23.6 |

*For the screening modeling analysis, the emissions from the source were combined and modeled using the stack and operating data for this unit.

**For the screening modeling analysis, the emissions from No. 1 and No. 2 were combined and modeled using the stack and operating data for No. 1. Similarly, emissions from No. 3 and No. 5 were combined and modeled using using data for No. 5.

Source: Florida DER, 1986

After the screening modeling was performed and the worst-case meteorological periods identified, all the sources shown in Table 4-4, and the Gardinier sources shown in Table 1-2 were modeled using a refined receptor grid.

A summary of the $SO_2$ emissions considered in the screening and refined phases of the analysis is presented in Table 4-5. As shown in this table, emissions from sources located within 50 km of Gardinier and considered in the screening and refined phases represent approximately 95.3 and 99.9 percent, respectively, of all $SO_2$ emissions. For sources located within 10 km of the Gardinier plant, the emissions considered in the screening and refined phases represent approximately 99.3 and 100.0 percent, respectively, of the total emissions. In the refined analysis, the FPC Anclote facility was included even though it is located approximately 53 km from Gardinier. Emissions from this source are also included in the total emissions shown in Table 4-5. For the Gardinier sources, the emissions considered in the screening phase represent approximately 99 percent of all emissions from the Gardinier plant.

### 4.1.5 Receptor Locations

As discussed in Section 4.1.1, the general modeling approach considered screening and refined phases to address compliance with AAQS. For the screening phase, concentrations were predicted for a main receptor grid using a limited number of receptors and sources. The receptor grid consisted of 180 receptors located in a radial grid centered on the Gardinier facility with 36 radials separated by 10 degree increments. Along each radial, receptors were located at 0.2, 0.5, 0.8, 1.1, and 1.6 km from the Gardinier facility.

After the screening modeling was completed, the refined modeling consisted of modeling all sources in the refined phase (see Section 4.1.4) using a receptor grid centered on the receptor which had the highest, second-highest 3- and 24-hour concentrations. The receptors were located at intervals of 100 m between the distances considered in the screening phase along 7 radials, at 2 degree increments, centered on the radial along which the

Table 4-5. Summary of $SO_2$ Emissions for Sources Located at Various Distances from Gardinier

| Distance (km) from Gardinier | Total Emissions* (TPY) | Emissions (TPY) Considered in Modeling Analysis: Screening | Emissions (TPY) Considered in Modeling Analysis: Refined |
|---|---|---|---|
| | | (% of total for Distance) | |
| 0 - 10 | 406,308 | 403,888<br>(99.4) | 406,201<br>(100.0) |
| 10 - 20 | 17,141 | 13,474<br>(78.6) | 16,888<br>(98.5) |
| 20 - 50 | 151,581 | 130,640<br>(86.2) | 151,233<br>(99.8) |
| 0 - 50 | 575,030 | 548,002<br>(95.3) | 574,322<br>(99.9) |

*Does not include emissions from Gardinier or from sources located more than 50 km from Gardinier

Source: KBN, 1986

maximum concentration was produced. For example, if the maximum concentration was produced along the 90 degree radial at a distance of 0.9 km, the refined receptor grid would consist of receptors at the following locations:

| Directions (degrees) | Distance (km) |
|---|---|
| 84, 86, 88, 90, 92, 94, 96 | 0.6, 0.7, 0.8., 0.9, 1.1, 1.2, 1.3, per direction |

To ensure that a valid highest, second-highest concentration was calculated, concentrations were predicted for the refined grid for the periods that produced both the highest and second-highest concentration from the screening receptor grid. Refined modeling analysis was not performed for the annual averaging period because the spatial distribution of annual average concentrations is not expected to vary significantly from those produced from the screening analysis.

To determine if the impacts from Gardinier are significant in the $SO_2$ nonattainment area located in Pasco County, concentrations were calculated for the Gardinier sources at 3 receptor locations located along the southern and eastern boundaries of the nonattainment area. These boundaries are the nearest boundaries to the Gardinier facility. The receptor locations were:

| Receptor | UTM Coordinates (km) | | Relative location from Gardinier | |
|---|---|---|---|---|
| No. | East | North | Direction (°) | Distance (km) |
| 1 | 325.0 | 3112.0 | 308 | 48.5 |
| 2 | 329.0 | 3112.0 | 311 | 45.4 |
| 3 | 329.0 | 3117.0 | 315 | 48.8 |

Because the impacts from the proposed modification were well below the significant impact levels, only screening modeling was performed.

### 4.1.6 Background Concentrations

To estimate total air quality concentrations, a background concentration must be added to the modeling results. The background concentration is considered to be the air quality concentration contributed by sources not included in the modeling evaluation.

The derivation of the background concentration for the modeling analysis was presented in Section 3.0. Based on this analysis, the background $SO_2$ concentration was determined to be 15 ug/m$^3$. This background level was considered to be representative of all averaging times. This background level was added to model-predicted concentrations to estimate total air quality levels for comparison to AAQS.

## 4.2 MODEL RESULTS

A summary of the maximum 3-hour, 24-hour, and annual average total $SO_2$ concentrations predicted for all sources for the screening and refined analyses is presented in Table 4-6. The total concentrations are determined from the impacts of Gardinier and other modeled sources, added to background concentrations determined from monitoring data. Based on the results presented in these tables, the maximum $SO_2$ concentrations due to all sources are predicted to be less than the AAQS for all averaging periods.

As shown in Table 4-6, the total 3-hour average concentrations for all receptor locations considered in the modeling are predicted to be less than the Florida 3-hour AAQS of 1,300 ug/m$^3$, which is not to be exceeded more than once per year. The maximum predicted 3-hour concentration from the refined analysis was 870 ug/m$^3$ and occurred on Gardinier property, approximately 0.7 km to the north of the $H_2SO_4$ plants. This maximum concentration is primarily due to sources to the north of the Gardinier facility with sources at Gardinier contributing only 36 percent of the total concentration.

The total 24-hour average concentrations for all receptors considered in the modeling are predicted to be less than the Florida 24-hour AAQS of

Table 4-6. Maximum Total $SO_2$ Concentrations Predicted in the Vicinity of the Gardinier Facility

| Averaging Period | Modeling Analysis | $SO_2$ Concentration ($ug/m^3$) | | | | Receptor Location+ | | Period | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Due To | | | | | | | |
| | | TOTAL | Gardinier | Other Modeled Sources | Back-ground | Direction (°) | Distance (km) | Julian Day | Hour Ending | Year |
| 3-Hour* | Screening | 885 | 313 | 557 | 15 | 10 | 0.8 | 220 | 12 | 1981 |
| | Refined | 870 | 310 | 545 | 15 | 10 | 0.7 | 220 | 12 | 1981 |
| 24-Hour* | Screening | 239 | 108 | 116 | 15 | 10 | 0.8 | 248 | 24 | 1979 |
| | Refined | 226 | 94 | 117 | 15 | 12 | 0.6 | 248 | 24 | 1979 |
| Annual | Screening | 60 | 25 | 20 | 15 | 90 | 0.8 | - | - | 1981 |

Note: Florida 3- and 24-hour AAQS are 1300 and 260 $ug/m^3$, respectively, not to be exceeded more than once per year. Florida annual AAQS is 60 $ug/m^3$.

+With respect to the Gardinier facility

*Highest, second-highest concentration presented for this averaging period

260 ug/$m^3$, which is not to be exceeded more than once per year. From the refined analysis, the maximum predicted 24-hour concentration of 226 ug/$m^3$ occurred approximately 0.6 km to the north of the sulfuric acid units. This maximum concentration is approximately equally due to other modeled sources and the Gardinier sources, which contributed 42 percent to the total concentration.

The total annual average concentrations for all receptors considered in the modeling are predicted to be equal to the Florida annual AAQS of 60 ug/$m^3$. The maximum predicted annual average concentration occurred approximately 0.8 km to the east of the sulfuric acid units. The Gardinier sources contributed 42 percent to the maximum concentration. This maximum concentration is a conservative estimate (i.e., higher than expected) of the annual average concentration because all sources were modeled at their maximum allowable emissions for every hour in the year. By considering actual operating conditions, the emissions are expected to be lower which would result in lower ambient impacts. Also, because the calm wind processing option was used, all calm hours were eliminated from the meteorological database. As a result, the annual concentration was based on the number of non-calm hours in the year.

A summary of the maximum $SO_2$ concentrations predicted for the proposed modification only in the screening analysis is presented in Table 4-7. These results indicate the proposed increase in $SO_2$ emissions from the No. 8 $H_2SO_4$ plant will result in low ambient impacts and that the maximum concentrations are slightly greater than the significance levels for the 3- and 24-hour averaging periods. Based on these results, the significant impact area for the proposed modification extends approximately out to 0.8 km from the location of No. 8 $H_2SO_4$ plant, which in most directions, is on Gardinier property.

A summary of the maximum $SO_2$ concentrations predicted for the proposed modification only at the $SO_2$ nonattainment area in the screening analysis is presented in Table 4-8. These results indicate the proposed increase in $SO_2$

Table 4-7. Maximum $SO_2$ Concentrations Predicted for the Proposed Modification Only -- Screening Analysis

| Averaging Period | Concentration ($ug/m^3$) | Period | | | Location+ | |
|---|---|---|---|---|---|---|
| | | Julian Day | Hour Ending | Year | Direction | Distance (km) |
| 3-Hour* | 28.6 | 235 | 15 | 1978 | 220 | 0.5 |
| 24-Hour* | 7.6 | 212 | 24 | 1979 | 90 | 0.8 |
| Annual | 1.0 | - | - | 1981 | 90 | 0.8 |

Note: Significance levels for 3-, 24-hour, and annual averaging periods are 25, 5, and 1.0 $ug/m^3$, respectively.

+With respect to Gardinier

*Highest, second highest concentration for this averaging period

Table 4-8. Maximum $SO_2$ Concentrations Predicted for the Proposed Modification Only at the $SO_2$ Nonattainment Area -- Screening Analysis

| Averaging Period | Concentration (ug/m$^3$) | Period | | | Location+ | |
|---|---|---|---|---|---|---|
| | | Julian Day | Hour Ending | Year | Direction | Distance (km) |
| 3-Hour* | 1.1 | 333 | 3 | 1978 | 311 | 45.4 |
| 24-Hour* | 0.20 | 66 | 24 | 1978 | 315 | 48.8 |
| Annual | 0.02 | - | - | 1974 | 311 | 45.4 |

Note: Significance levels for 3-, 24-hour, and annual averaging periods are 25, 5, and 1.0 ug/m$^3$, respectively.

+With respect to Gardinier
*Highest, second highest concentration for this averaging period

emissions from the No. 8 $H_2SO_4$ plant will result in maximum concentrations that are much lower than the significance levels. Therefore, the proposed modification will produce no significant impact on the $SO_2$ nonattainment area located more than 45 km from Gardinier.

## 5.0 ADDITIONAL IMPACT ANALYSIS

### 5.1 IMPACTS UPON VEGETATION

Cut-over pine flatwoods and mixed forest comprise the natural vegetation in the vicinity of the Gardinier site. Mangrove trees and salt-tolerant plants are found near the coast. Winter vegetables and pasture grasses are cultivated inland from the facility.

The response of plants to atmospheric pollutants is a function of the concentration during exposure, duration of each exposure, and the frequency of exposures. The usual pattern of pollutant exposure is that of a few episodes of relatively high concentrations for a short duration interspersed with long periods of extremely low concentrations. Effects on most plants will be from the short-term higher doses (a dose is the product of the concentration of the pollutant and the duration of exposure).

The total maximum (highest, second-highest) predicted 3-hour concentration of $SO_2$ predicted in the vicinity of the Gardinier facility is 870 $ug/m^3$. This concentration is predicted to occur within 1 km of Gardinier. Concentrations will diminish appreciably with distance beyond the location of the maximum concentration.

The total maximum predicted 24-hour average $SO_2$ concentration is 226 $ug/m^3$, and is predicted to occur 0.6 km northwest of the Gardinier sources in Hillsborough Bay. The total maximum predicted annual $SO_2$ concentration, including the background concentration level, is 60 $ug/m^3$, and also occurs within 1 km of Gardinier.

Woltz and Howe (1981) investigated the effects of pollutants on some species of native vegetation in Florida. They showed that exposure to 1,300 $ug/m^3$ $SO_2$ for 8 hours caused no visible injury to bald cypress (*Taxodium distichum*), slash pine (*Pinus elliottii*), live oak (*Quercus virginiana*), or red mangrove (*Rhizophora mangle*).

The predicted maximum concentrations are below values shown to cause injury to native vegetation and below the threshold $SO_2$ doses known to adversely affect the growth of some common vegetables and grasses. These values are shown in Table 5-1. As a result, no adverse impacts to vegetation are predicted due to the proposed Gardinier modification.

## 5.2 **IMPACTS UPON SOILS**

Soils in the vicinity of the Gardinier site consist primarily of tidal lands and poorly drained sands with organic pans (Leighty et al., 1958). These tidal lands occur along the coast between the tidal swamps and the flatwoods. The tidal lands consist of mucky fine sand to dark-gray fine sand overlying gray fine sand, mixed with broken and whole shells. These soils will not be affected by $SO_2$ concentrations resulting from facility emissions, because both the underlying substrate and the sea spray from the nearby Hillsborough bay are neutral to alkaline and would neutralize any acidifying effects of $SO_2$ deposition.

The poorly drained sands are already naturally strongly acidic. Normal liming practices currently used on soils in the vicinity of Gardinier by agricultural interests will effectively mitigate the small effects of any increased $SO_2$ deposition resulting from the increased $SO_2$ emissions from the proposed expansion.

## 5.3 **IMPACTS UPON VISIBILITY**

The existing No. 8 $H_2SO_4$ plant must currently meet an opacity limitation of 10 percent. This opacity limit is expected to be met after the plant is expanded to greater capacity. This opacity level produces essentially no visible emissions and, therefore, no increase in the visible plume from the No. 8 $H_2SO_4$ due to the expansion is expected.

Since the Chassahowitzka PSD Class I area is located approximately 85 km to the north of the Gardinier site, a visibility impact assessment of the Class I area is required. A Level I visibility screening analysis was conducted following the procedures outlined in "Workbook for Estimating

Table 5-1. Lowest Doses of $SO_2$ Reported to Affect Growth of Some Grasses and Vegetables

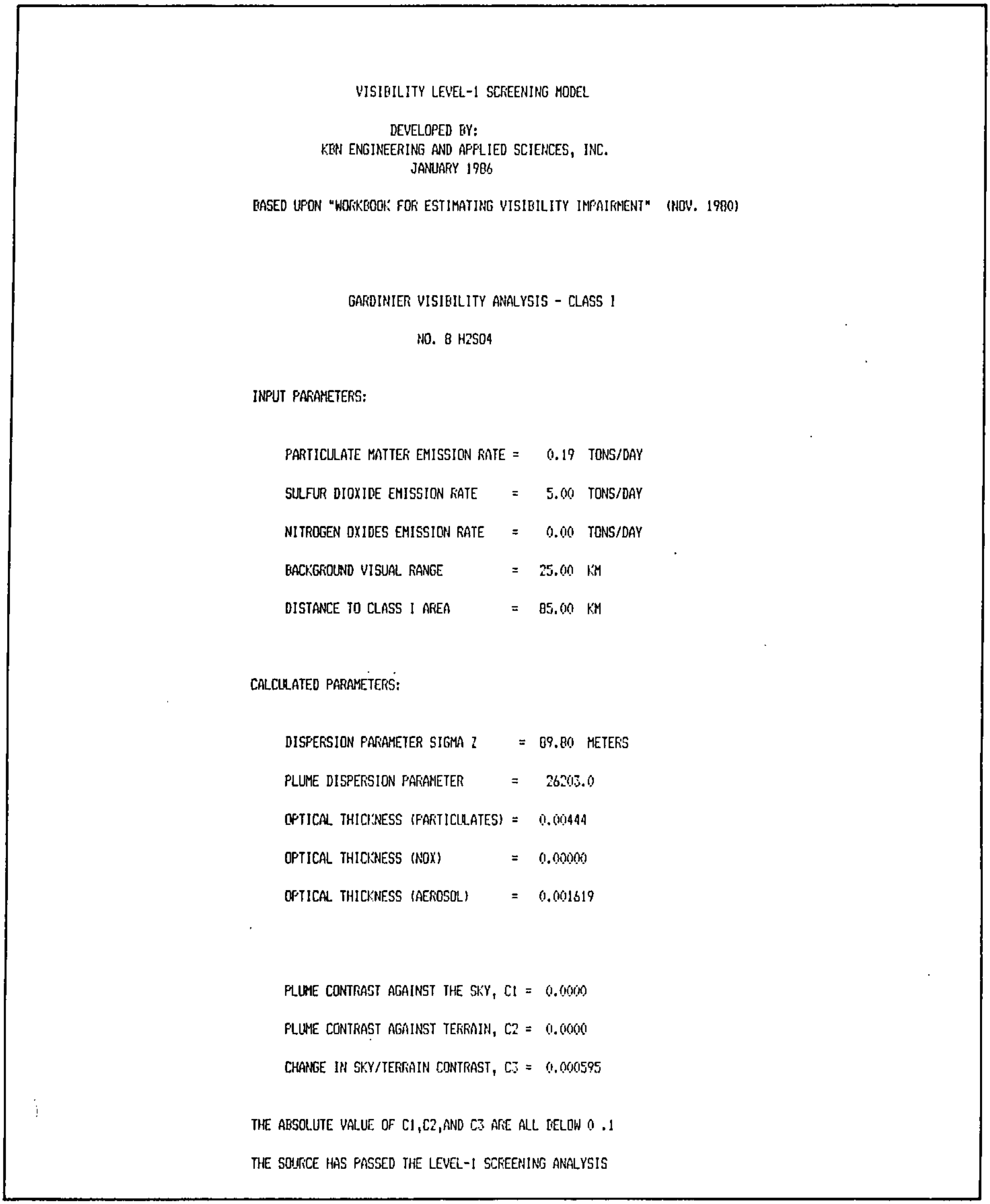
| Species | Lowest $SO_2$ Dose Known to Affect Species ($ug/m^3$) | Reference |
|---|---|---|
| Rye grass | 367, for 131 days reduced growth | Ayazloo and Bell, 1981 |
| Orchard grass | 37 to 62, for 72 days reduced growth | Crittenden and Read, 1979 |
| Oats | 1,048, for 3 hours four times during life cycle reduced growth | Heck and Dunning, 1978 |
| Sweet corn | 812, for 7 days causes chlorosis, but no yield effects | Mandl _et al_., 1975 |
| Tomato | 1,258, for 5 hours on each of 57 days reduced growth | Kohut _et al_., 1982 |
|  | 520, for 15 days, threshold for initial symptoms of tissue death, etc. | Unzicker _et al_., 1975 |
| Radish | 262, for 3 hours reduced growth | Reinert _et al_., 1982 |
| Cucumber | 52, for 672 hours reduced growth | Meistrik, 1980 |

Visibility Impairment" (USEPA, 1980). The procedure calculates three visibility parameters: plume contrast against the sky ($C_1$), plume contrast against terrain ($C_2$), and change in sky/terrain contrast ($C_3$). If the absolute value of each of these parameters is less than 0.1, then it is highly unlikely that the emissions from the source would cause visibility impairment in the Class I area.

Parameter $C_1$ is dependent upon $NO_x$ emissions; since the $H_2SO_4$ plants do not emit $NO_x$, the resulting value of $C_1$ is zero. Parameter $C_2$ is dependent upon both particulate and $NO_x$ emissions, where particulate emissions would include $H_2SO_4$ mist. Parameter $C_3$ is dependent upon particulate and $SO_2$ emissions. Particulate ($H_2SO_4$ mist) and $SO_2$ emissions used for the calculations were based upon the total allowable emissions from the No. 8 $H_2SO_4$ plant after expansion (not just the increase in allowables due to the proposed expansion). Following the Workbook procedure, the value of $C_2$ was calculated to be less than $1 \times 10^{-4}$ and $C_3$ was calculated to be 0.0006 (see Figure 5-1). Since the absolute values of $C_2$ and $C_3$ are below the threshold criteria of 0.10, no visibility impacts are expected upon the Class I area due to emissions from the proposed No. 8 $H_2SO_4$ plant expansion.

### 5.4 ADDITIONAL GROWTH

Only the existing No. 8 $H_2SO_4$ plant is being expanded at the Gardinier facility, along with the addition of cogeneration facilities. Total $H_2SO_4$ production capacity for the Gardinier plant will increase by 300 tons per day, representing only a 4 percent increase in total capacity. A small increase in jobs, payroll, and taxes in the area is expected as a result of these changes. As a result, no significant growth-related impacts are expected due to the proposed expansion.



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                    VISIBILITY LEVEL-1 SCREENING MODEL

                              DEVELOPED BY:
                  KBN ENGINEERING AND APPLIED SCIENCES, INC.
                               JANUARY 1986

BASED UPON "WORKBOOK FOR ESTIMATING VISIBILITY IMPAIRMENT"  (NOV. 1980)


                 GARDINIER VISIBILITY ANALYSIS - CLASS I

                              NO. 8 H2SO4

INPUT PARAMETERS:

    PARTICULATE MATTER EMISSION RATE =    0.19  TONS/DAY

    SULFUR DIOXIDE EMISSION RATE     =    5.00  TONS/DAY

    NITROGEN OXIDES EMISSION RATE    =    0.00  TONS/DAY

    BACKGROUND VISUAL RANGE          =   25.00  KM

    DISTANCE TO CLASS I AREA         =   85.00  KM


CALCULATED PARAMETERS:

    DISPERSION PARAMETER SIGMA Z      =  89.80  METERS

    PLUME DISPERSION PARAMETER       =    26203.0

    OPTICAL THICKNESS (PARTICULATES) =   0.00444

    OPTICAL THICKNESS (NOX)          =   0.00000

    OPTICAL THICKNESS (AEROSOL)      =   0.001619


    PLUME CONTRAST AGAINST THE SKY, C1 =  0.0000

    PLUME CONTRAST AGAINST TERRAIN, C2 =  0.0000

    CHANGE IN SKY/TERRAIN CONTRAST, C3 =  0.000595

THE ABSOLUTE VALUE OF C1,C2,AND C3 ARE ALL BELOW 0 .1

THE SOURCE HAS PASSED THE LEVEL-1 SCREENING ANALYSIS
```

**Figure 5-1.** Level-1 Visibility Screening Analysis for Gardinier Expansion

## 6.0 BEST AVAILABLE CONTROL TECHNOLOGY

The source applicability analysis for the proposed Gardinier No. 8 $H_2SO_4$ plant expansion, presented in Section 2.0, identified $SO_2$ and $H_2SO_4$ mist as air pollutants requiring a BACT review under federal and state PSD regulations. This section describes the proposed BACT and emission limits for each pollutant subject to BACT. An analysis of alternative control technologies is also presented.

## 6.1 SULFUR DIOXIDE

### 6.1.1 Proposed $SO_2$ BACT

The No. 8 $H_2SO_4$ plant at Gardinier is a double-absorption, 5-stage converter plant. $SO_2$ to $H_2SO_4$ conversion efficiency depends primarily on the number of converter stages and, to a lesser extent, on the amount of catalyst. No $H_2SO_4$ plant in the United States is known to currently have more than five converter stages. The double absorption, 5-stage converter plant is considered to be state-of-the-art in reducing $SO_2$ emissions from $H_2SO_4$ plants and is already in operation at the No. 8 $H_2SO_4$ plant. Therefore, this control technology is proposed as BACT for $SO_2$. The proposed BACT $SO_2$ emission limit is the current allowable level of 4 lb/ton of $H_2SO_4$ produced, and is equivalent to the BACT emission rate determined by FDER in the 1985 PSD construction permit for the No. 8 $H_2SO_4$ expansion (see Appendix C).

$SO_2$ and $H_2SO_4$ mist source test data for the No. 8 $H_2SO_4$ plant from 1977 to the present are presented in Table 6-1. The data show that compliance test results for $SO_2$ have ranged from 0.73 lb/ton to 6.01 lb/ton, with two values exceeding the 4-lb/ton level. Of greatest interest is the June 14, 1985 test which displayed an $H_2SO_4$ production rate (98.4 TPH) closest to that of the proposed increased production rate (104.2 TPH). This test showed $SO_2$ emissions to average 3.2 lb/ton, with a maximum of 3.4 lb/ton. Thus, $SO_2$ emissions are approaching the 4.0 lb/ton level at the higher production levels. Day-to-day variations in process variables and catalyst aging effects could cause $SO_2$ emissions to increase above the historic measured levels for this plant. Thus, the 4.0 lb/ton $SO_2$ emission rate proposed as BACT and determined previously as BACT for this plant is considered to be

Table 6-1. Summary of No. 8 $H_2SO_4$ Plant Source Emission Tests, 1977 - 1986.

| Date | Average Production Rate (tons/hr) | Sulfur Dioxide (lb/hr) Avg. | Sulfur Dioxide (lb/hr) Max. | Sulfur Dioxide (lb/ton) Avg. | Sulfur Dioxide (lb/ton) Max. | $H_2SO_4$ Mist (lb/hr) Avg. | $H_2SO_4$ Mist (lb/hr) Max. | $H_2SO_4$ Mist (lb/ton) Avg. | $H_2SO_4$ Mist (lb/ton) Max. |
|---|---|---|---|---|---|---|---|---|---|
| 03/02/77 | 74.0 | 127 | 133 | 1.73 | 1.81 | 4.5 | 5.7 | 0.061 | 0.077 |
| 12/09/77 | 53.4 | 39 | 41 | 0.73 | 0.78 | 9.3 | 11.0 | 0.174 | 0.207 |
| 08/04/78 | 63.5 | 86 | 95 | 1.36 | 1.49 | 6.8 | 9.4 | 0.107 | 0.147 |
| 03/07/79 | 73.8 | 299 | 307 | 4.05 | 4.16 | 2.6 | 2.7 | 0.035 | 0.036 |
| 10/25/79 | 65.1 | 391 | 404 | 6.01 | 6.20 | 2.7 | 3.7 | 0.042 | 0.057 |
| 08/05/80 | 69.1 | 231 | 245 | 3.35 | 3.55 | 4.2 | 4.5 | 0.060 | 0.065 |
| 03/03/81 | 68.2 | 118 | 120 | 1.70 | 1.80 | 3.4 | 6.2 | 0.050 | 0.090 |
| 01/26/82 | 69.8 | 110 | 111 | 1.58 | 1.59 | 7.0 | 10.3 | 0.100 | 0.150 |
| 08/18/82 | 66.0 | 93 | 93 | 1.40 | 1.41 | 2.2 | 2.4 | 0.040 | 0.040 |
| 11/15/83 | 70.5 | 138 | 145 | 1.95 | 2.05 | 2.7 | 3.4 | 0.04 | 0.05 |
| 07/31/84 | 68.5 | 195 | 200 | 2.85 | 2.92 | 4.5 | 5.9 | 0.07 | 0.09 |
| 06/14/85 | 98.4 | 253 | 264 | 3.20 | 3.40 | 3.0 | 3.3 | 0.04 | 0.04 |
| 08/19/86 | 43.1 | 131 | 137 | 3.04 | 3.20 | 2.0 | 3.5 | 0.05 | 0.08 |

Source: Gardinier, Inc., 1987.

achievable at the proposed higher production rate. However, a lower $SO_2$ emission level may not be achievable on a continuous basis, particularly in light of the potential effects of catalyst aging and other process variables.

### 6.1.2 Alternative $SO_2$ Control Technologies

EPA's latest review of New Source Performance Standards (NSPS) for $H_2SO_4$ plants (MITRE Corp., 1979) presents a comprehensive assessment of alternative control technologies for removing $SO_2$ from $H_2SO_4$ plant tail gases. Alternative technologies identified included the double-absorption contact $H_2SO_4$ plant, sodium sulfite-bisulfite scrubbing, ammonia scrubbing, and molecular sieves. The study concluded that the best demonstrated control technology to reduce $SO_2$ emissions is the double-absorption $H_2SO_4$ plant. Nearly all the $H_2SO_4$ plants built in the United States since 1971 have used the double-absorption process, wherein two absorber stages are used. The $SO_2$ conversion efficiency for the double-absorption plant is 96 percent or greater.

A review of $H_2SO_4$ plant BACT determinations was conducted to determine control technologies and emission rates associated with plants constructed or modified since the EPA study was conducted in 1979. Summarized in Table 6-2 are the results of the review. This information was obtained from the EPA's BACT/LAER Clearinghouse publications (EPA 1985b, 1986d). As indicated in the table, all BACT determinations since 1979 have resulted in allowable $SO_2$ levels equivalent to the NSPS of 4.0 lb/ton. These plants have ranged in capacity from 1750 TPD to 2750 TPD. All have utilized the double-absorption technology. In addition, the FDER determined BACT for $SO_2$ emissions from the No. 8 $H_2SO_4$ plant to be 4.0 lb/ton in the recent (1985) PSD permit issued for the No. 8 $H_2SO_4$ expansion (see Appendix C). Since this determination, no significant changes have occurred at Gardinier or in regards to air quality levels to warrant a lower BACT limit.

Reduction of $SO_2$ emissions below those currently achieved by the No. 8 $H_2SO_4$ double-absorption plant would require add-on control equipment, such as one

Table 6-2. Previous BACT Determinations for $H_2SO_4$ Plants in U.S., 1980-1985.

| | | | Sulfur Dioxide | | $H_2SO_4$ Mist | |
|---|---|---|---|---|---|---|
| Date Permit Issued | Company Name | Plant Capacity (TPD) | Allowable Emissions (lb/ton) | Basis | Allowable Emissions (lb/ton) | Basis |
| 06/13/84 | Chevron Co., USA | 1900 | 4.0 | NSPS | 0.15 | NSPS |
| 10/02/81 | Conserv, Inc. | 2000 | 4.0 | NSPS, Double Absorption | 0.15 | NSPS, Acid Mist Eliminator |
| 06/01/81 | New Wales Chemical, Inc. | 2750 | 4.0 | NSPS, Double Absorption | 0.15 | NSPS |
| 04/01/81 | U.S.S. Agri-Chemicals | 1850 | 4.0 | NSPS | - | - |
| 07/11/80 | Gardinier, Inc. (No. 7 $H_2SO_4$ Plant) | 1750 | 4.0 | NSPS, Double Absorption | 0.15 | NSPS |

Source: USEPA, 1985b, 1986d.

of the flue gas desulfurization (FGD) processes described above. This would add considerable capital and operating costs to the present system, produce a waste disposal problem, and would not result in significant benefits to the environment. The proposed Gardinier expansion will increase allowable $SO_2$ emissions from the entire plant by 50.0 lb/hr. This represents less than a 15 percent increase in allowable $SO_2$ emissions from the No. 8 $H_2SO_4$ plant. The air quality impact analysis presented in Section 3.0 demonstrated that the proposed increase in emissions will have a very minor impact upon current air quality levels, i.e., maximum impacts are less than 1 ug/m$^3$, annual average; 8 ug/m$^3$, 24-hour average; and 30 ug/m$^3$, 3-hour average.

The EPA NSPS review analyzed the $SO_2$ control alternative of replacing the catalyst bed in the dual-absorption plant more frequently than is normally practiced. Complete replacement of the first three beds of a 4-stage converter at a frequency rate three times greater than is normally practiced was estimated to result in a cost impact of $0.50/ton of $H_2SO_4$ produced. This was considered to be an unacceptable method because pretax profits to the plant could be reduced by 20 percent or more.

None of the alternative $SO_2$ control technologies is considered to be superior to the selected BACT, based on economic, energy, and environmental impacts. The chosen $SO_2$ BACT for the No. 8 $H_2SO_4$ plant is the currently operating double-absorption plant, reflective of a maximum $SO_2$ emission rate of 4.0 lb/ton.

## 6.2 **SULFURIC ACID MIST**

### 6.2.1 Proposed $H_2SO_4$ Mist BACT

The No. 8 $H_2SO_4$ plant at Gardinier is currently equipped with a Brinks vertical pad-type, high efficiency mist eliminator to control $H_2SO_4$ mist emissions. Current emission limits are 0.15 lb/ton for $H_2SO_4$ mist based upon FDER's 1985 PSD permit and BACT determination. The proposed BACT emission level for $H_2SO_4$ mist is the current allowable for the unit—0.15 lb/ton.

All $H_2SO_4$ plants operating in the United States in 1979 that were required to meet the NSPS level for $H_2SO_4$ mist of 0.15 lb/ton used high efficiency mist eliminators, primarily of the vertical pad type (MITRE Corp., 1979). Acid mist emissions are primarily related to moisture levels in the sulfur feedstock and in the air fed to the furnace, and the efficiency of the mist eliminator. Since the Gardinier No. 8 $H_2SO_4$ plant currently uses a high efficiency mist eliminator, and this technology is considered to be the state-of-the-art control, it is proposed as BACT for $H_2SO_4$ mist emissions. The EPA NSPS review study (MITRE Corp., 1979) identified these types of mist eliminators as the best demonstrated control technology for $H_2SO_4$ emissions. In addition, FDER previously determined this technology as BACT for the No. 8 $H_2SO_4$ expansion permitted in 1985 (see Appendix C).

Review of the source test data presented in Table 6-1 shows that past $H_2SO_4$ mist compliance test values have ranged from 0.035 lb/ton to 0.174 lb/ton for the No. 8 $H_2SO_4$ plant. These data indicate that emissions can fluctuate significantly, due to the factors discussed previously, and can range up to the 0.15-lb/ton current allowable limit. Based on the source test data, no reduction in the current allowable level is justified.

### 6.2.2 Alternative $H_2SO_4$ Mist Control Technologies

EPA's review of the $H_2SO_4$ plant NSPS (MITRE Corp., 1979) identified three types of fiber mist eliminators and an electrostatic precipitator (ESP) as control techniques for controlling $H_2SO_4$ mist emissions from $H_2SO_4$ plants. EPA chose the fiber mist eliminator as the best demonstrated technology for the following reasons:

1. No evidence exists that any new $H_2SO_4$ plants have installed ESPs to control mist emissions.
2. ESPs require a relatively large space for erection.
3. ESPs would have high capital and installation costs, as well as high operating costs as a result of high maintenance due to the acid environment in which the ESP would operate.

The three types of fiber mist eliminators identified as applicable to $H_2SO_4$ plants are the vertical tube, the vertical panel, and the horizontal pad filters. Source test data in the EPA review indicated that all types can meet the NSPS level of 0.15 lb/ton, and no one type is superior to the others, although the majority of plants use the vertical tube type. Therefore, it is concluded that the alternative filter types cannot achieve a degree of $H_2SO_4$ mist reduction that is significantly better than the vertical pad filters currently in use on the No. 8 $H_2SO_4$ plant.

Previous BACT determinations for $H_2SO_4$ plants throughout the U.S. are summarized in Table 6-2. This information was obtained from the EPA's BACT/LAER Clearinghouse publications (EPA, 1985b, 1986d). The data show that all BACT determinations for $H_2SO_4$ plants constructed or modified since 1980 have resulted in allowable $H_2SO_4$ mist emission rates equivalent to the NSPS of 0.15 lb/ton. Based upon these considerations, the selected BACT for control of $H_2SO_4$ mist emissions is the currently operating, high efficiency mist eliminators to control mist emissions to 0.15 lb/ton.

The proposed Gardinier $H_2SO_4$ expansion will increase allowable $H_2SO_4$ mist emissions by 1.9 lb/hr. This will result in only a 14 percent increase in the current allowable $H_2SO_4$ emissions of 13.8 lb/hr. A lower BACT emission limit would not result in significant benefits to the environment.

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# APPENDIX A

## Basis of Stack Parameters for Nos. 7, 8, and 9 $H_2SO_4$ Plants

$SO_2$

## SOURCE TEST RESULTS

Company Name: Gardinier, Inc. - U. S. Phosphoric Products

Company Conducting Test: Gardinier, Inc. - U. S. Phosphoric Products

Source Identification: #7 CAP Sulfuric Acid Mfg. System - Exit Stack

Date: 4/9/85

| Run | Molecular Weight | Dry Gas Meter DSCF | ACFM | SCFM | Stack Temp. °F | Production Rate, Tons 100% $H_2SO_4$/Hr. | Percent Isokinetic | Emissions Lbs/Hr. | Emissions, Lbs/Ton 100% $H_2SO_4$ | Allowable Emissions, Lbs/Ton 100% $H_2SO_4$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28.33 | 46.110 | 116269 | 100879 | 153 | 87.8 | 104 | 334 | 3.8 | |
| 2 | 28.33 | 44.734 | 120095 | 104370 | 152 | 87.8 | 97 | 337 | 3.8 | |
| 3 | 28.33 | 44.423 | 115657 | 100037 | 154 | 87.8 | 101 | 314 | 3.6 | |
| | | | | | | | | | | |
| | 28.33 | 45.089 | 117340 | 101762 | 153 | 87.8 | 101 | 328 | 3.7 | 4.0 |

Standard Conditions = Dry, 68 °F, 29.92 in. Hg.

$SO_2$

# SOURCE TEST RESULTS

Company Name: Gardinier, Inc. - U. S. Phosphoric Products

Company Conducting Test: Gardinier, Inc. - U. S. Phosphoric Products

Source Identification: Sulfuric Acid Mfg. System - No. 8 CAP Process Scrubber

Date: 6/14/85

| Run | Molecular Weight | Dry Gas Meter DSCF | ACFM | SCFM | Stack Temp. °F | Production Rate, Tons 100% $H_2SO_4$/Hr. | Percent Isokinetic | Emissions Lbs/Hr. | Emissions, Lbs/Ton 100% $H_2SO_4$ | Allowable Emissions, Lbs/Ton 100% $H_2SO_4$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28.24 | 44.906 | 96,929 | 83,598 | 153 | 98.3 | 104 | 244 | 3.1 | |
| 2 | 28.24 | 39.009 | 99,940 | 86,763 | 150 | 98.5 | 102 | 264 | 3.4 | |
| 3 | 28.24 | 39.472 | 100,606 | 86,895 | 151.5 | 98.3 | 103 | 251 | 3.2 | |
| | | | | | | | | | | |
| Mean | 28.24 | 41.129 | 99,158 | 85,752 | 151.5 | 98.4 | 103 | 253 | 3.2 | 4.0 |

Standard Conditions = Dry, 68°F, 29.92 in. Hg.

$SO_2$

## SOURCE TEST RESULTS

Company Name: Gardinier, Inc. - U. S. Phosphoric Products

Company Conducting Test: Gardinier, Inc. - U. S. Phosphoric Products

Source Identification: Sulfuric Acid Mfg. - No. 9 Contact Acid Plant

Date: 4/26/84

| Run | Molecular Weight | Dry Gas Meter DSCF | ACFM | SCFM | Stack Temp. °F | Production Rate, Tons 100% $H_2SO_4$/Hr. | Percent Isokinetic | Emissions Lbs/Hr. | Emissions, Lbs/Ton 100% $H_2SO_4$ | Allowable Emissions, Lbs/Ton 100% $H_2SO_4$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28.24 | 46.87 | 149,154 | 125,671 | 168 | 110.8 | 103 | 221.0 | 1.99 | |
| 2 | 28.24 | 48.06 | 153,483 | 129,029 | 170 | 110.8 | 103 | 226.1 | 2.04 | |
| 3 | 28.24 | 47.41 | 152,567 | 128,215 | 170 | 110.8 | 102 | 212.3 | 1.92 | |
| | | | | | | | | | | |
| Mean | 28.24 | 47.45 | 151,738 | 127,638 | 170 | 110.8 | 103 | 219.8 | 1.98 | 4.0 |

Standard Conditions = Dry, 68°F, 29.92 in. Hg.

# APPENDIX B

Previous BACT Determinations for $H_2SO_4$ Plants

Source: BACT/LAER Clearinghouse: A Compilation
of Control Technology Determinations
May 1986. PB 86-226974

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                                                                                  05/21/1985
============================================================================================


SOURCE TYPE/SIZE         FERTILIZER PLANTS                                      1.80 MMT/YR
                        ---------------------------------------------------------------------

COMPANY NAME/SITE LOCATION  CHEVRON CO., USA                               ROCK SPRINGS, WY
                        ---------------------------------------------------------------------

DETERMINATION IS BACT FOR A NEW SOURCE.                         DATE OF PERMIT ISSUANCE--  06/13/84
PERMIT NO. CT-550                                               ESTIMATED DATE OF START-UP--   1986
DETERMINATION MADE BY       WYOMING AQD           CHUCK COLLINS          (307)-777-7391
                             (AGENCY)        (AGENCY CONTACT PERSON)       (PHONE)

============================================================================================

PROCESSES SUBJECT                 THROUGHPUT     POLLUTANT   EMISSION LIMITS                          ... & BASIS
TO THIS PERMIT                     CAPACITY       EMITTED          CONTROL EQUIPMENT OR PROCESS MODIFICATION  ... PCT EFF
--------------------------------------------------------------------------------------------
ACID PLANT, PHOSPHORIC, 2 EA      880.00 T/D EQUIV. *
                                                  F         0.0200 LB/T EQUIV. P205                         NSPS
                                                                   REACTOR/EVAP/PACKED TOWER SCRUB H2SIF6   99.90
                                                                   BAROMETRIC CONDEN/FILTRATE RECEIVERS
ACID PLANT, SUPERPHOSPHORIC       300.00 T/D EQUIV. *
                                                  F         0.0100 LB/T EQUIV. P205                         NSPS
                                                                   68% EVAP/H2SIF6 SCRUB/BAROMETRIC CONDEN/PACKED*  99.90
                                                                   STOR TANK/VAC FILTER + FALLING CURTAIN SCRUB
BOILER, 2 EA                      105.60 MMBTU/H
                                                  NOX       0.2000 LB/MMBTU                                 SIP
                                                                   FUEL
DRYER, CONCENTRATE               2300.00 T/D
                                                  PM        0.0070 GR/ACF                                   BACT
                                                                   VENTURI SCRUBBERS                        99.00
CONCENTRATE HANDLING
                                                  PM        0.0200 GR/ACF                                   BACT
                                                                   BAGHOUSE                                 99.50
CONCENTRATE LOADOUT
                                                  PM        0.0200 GR/ACF                                   BACT
                                                                   HOOD & BAGHOUSE                          99.50
ACID PLANT, SULFURIC, 2 EA       1900.00 T/D
                                                  SO2       4.0000 LB/T ACID                                NSPS
                                                                   DESIGN
                                                  H2S*      0.1500 LB/T ACID                                NSPS
                                                                   DESIGN



                                                                          INITIAL REVIEW  POST STARTUP
(*) INDICATES DATUM WAS TRUNCATED FOR THIS TABLE.                  REVIEW STATUS:
============================================================================================
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==========================================================================================================

SOURCE TYPE/SIZE          FERTILIZER PLANTS
                         ---------------------------------------------------------------------------------

COMPANY NAME/SITE LOCATION  CONSERV, INC.                                   NICHOLS, FL 33863
                            P.O. BOX 314                                                       POLK COUNTY
                         ---------------------------------------------------------------------------------

DETERMINATION IS BACT FOR A MODIFIED SOURCE.                          DATE OF PERMIT ISSUANCE--  10/02/81
PERMIT NO. FL-076                                                     ESTIMATED DATE OF START-UP--   1983
DETERMINATION MADE BY       FLORIDA DER              WILLARD HANKS              (904)-488-1344
                             (AGENCY)            (AGENCY CONTACT PERSON)          (PHONE)

==========================================================================================================

PROCESSES SUBJECT                   THROUGHPUT    POLLUTANT   EMISSION LIMITS                        ... & BASIS
TO THIS PERMIT                       CAPACITY      EMITTED        CONTROL EQUIPMENT OR PROCESS MODIFICATION ... PCT EFF
---------------------------------------------------------------------------------------------------- ---
SULFURIC ACID PLANT               2000.00 T/D
                                                   SO2     333.4000 LB/H                                    NSPS
                                                                    DOUBLE ADSORPTION                       98.00
                                                   ACI*     12.5000 LB/H                                    NSPS
                                                                    ACID MIST ELIMINATION


(*) INDICATES DATUM WAS TRUNCATED FOR THIS TABLE.                                INITIAL REVIEW  POST STARTUP
                                                                      REVIEW STATUS:  04/01/1983    01/25/1984
==========================================================================================================
```

SOURCE TYPE/SIZE FERTILIZER PLANTS

COMPANY NAME/SITE LOCATION NEW WALES CHEMICALS, INC.
P.O. BOX 1035
MULBERRY, FL 33860
POLK COUNTY

DETERMINATION IS BACT FOR A MODIFIED SOURCE.
PERMIT NO. FL-072
DETERMINATION MADE BY FLORIDA DER (AGENCY) WILLARD HANKS (AGENCY CONTACT PERSON) (904)-488-1344 (PHONE)

DATE OF PERMIT ISSUANCE-- 06/01/81
ESTIMATED DATE OF START-UP-- 1982

| PROCESSES SUBJECT TO THIS PERMIT | THROUGHPUT CAPACITY | POLLUTANT EMITTED | EMISSION LIMITS | CONTROL EQUIPMENT OR PROCESS MODIFICATION | ... & BASIS ... PCT EFF |
|---|---|---|---|---|---|
| SULFURIC ACID PLANT | 2750.00 T/D H2SO4 | | | | |
| | | SO2 | 458.3000 LB/H | | NSPS |
| | | | | DOUBLE ADSORPTION | 70.00 |
| | | ACI* | 17.2000 LB/H | | NSPS |

(*) INDICATES DATUM WAS TRUNCATED FOR THIS TABLE.

| | INITIAL REVIEW | POST STARTUP |
|---|---|---|
| REVIEW STATUS: | 04/01/1983 | 01/25/1984 |

ID NUMBER FL-0027

SOURCE TYPE CODE 7.6

05/21/1985

SOURCE TYPE/SIZE FERTILIZER PLANTS

484000.00 T/YR PHOSPHORIC FERT

COMPANY NAME/SITE LOCATION
USS AGRI-CHEMICALS
P. O. BOX 150
BARTON (FT. MEADE COMPLEX), FL 38830
POLK COUNTY

DETERMINATION IS BACT FOR A MODIFIED SOURCE.
PERMIT NO. PSD-FL-064
DETERMINATION MADE BY FLORIDA DER (AGENCY)
WILLARD HANKS (AGENCY CONTACT PERSON)
(904)-488-1344 (PHONE)

DATE OF PERMIT ISSUANCE-- 04/01/81
ESTIMATED DATE OF START-UP-- 1981

| PROCESSES SUBJECT TO THIS PERMIT | THROUGHPUT CAPACITY | POLLUTANT EMITTED | EMISSION LIMITS<br>CONTROL EQUIPMENT OR PROCESS MODIFICATION | ... & BASIS<br>... PCT EFF |
|---|---|---|---|---|
| SULFURIC ACID PROD. | 1.35 MMT/YR | SO2 | 40.0000 LB/T 100% H2SO4<br>DOUBLE ADSORPTION | NSPS<br>70.00 |
| PHOSPHORIC ACID PROD. | 484000.00 T/YR | F | 0.0200 LB/T P2O5<br>SCRUBBERS | NSPS<br>95.00 |

(*) INDICATES DATUM WAS TRUNCATED FOR THIS TABLE.

| | INITIAL REVIEW | POST STARTUP |
|---|---|---|
| REVIEW STATUS: | 04/01/1983 | 01/25/1984 |

SOURCE TYPE CODE 7.6

# APPENDIX C

## No. 8 Sulfuric Acid Plant Construction Permit and BACT Determination, February 8, 1985

29

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

PERMITTEE:
Gardinier, Inc.
P. O. Box 3269
Tampa, Florida 33601

Permit Number:AC 29-089696
Expiration Date: October 1, 1987
County: Hillsborough
Latitude/Longitude: 27° 51' 28"N
82° 23' 15"W/
Project: No. 8 Sulfuric Acid Plant

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-2 and 17-4, and 40 CFR 52.21. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

Modifications to the No. 8 sulfuric acid plant that will increase production from 1770 to 2200 TPD. The modifications involve installing parallel gas ducting to the last two catalyst masses, installing larger steam piping from the plant, installing a superheater parallel with the No. 1 boiler, installing a superheater/economizer in the exit of the 3A pass, installing additional catalyst in the main converter, replacing the existing acid cast iron cooling coils with stainless steel heat exchangers, and other major modifications that have prior approval of the department and the Hillsborough County Environmental Protection Commission.

The UTM coordinates of the site are 17-363.3 Km E and 3082.4 Km N.

Construction shall be in accordance with the application for a permit to construct the No. 8 sulfuric acid plant that was signed by Mr. Rudy J. Cabina on July 3, 1984, and the additional information supplied in Gardinier, Inc.'s September 11, 1984, and October 15, 1984, letters except for the changes mentioned in the Technical Evaluation and Preliminary Determination and listed as specific conditions in the permit to construct.

PERMITTEE:
Gardinier, Inc.

Permit Number: AC 29-089696
Expiration Date: October 1, 1987

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

GENERAL CONDITIONS:

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

(x) Determination of Best Available Control Technology (BACT)
(x) Determination of Prevention of Significant Deterioration (PSD)
(x) Compliance with New Source Performance Standards.

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. Sulfuric acid production, measured as 100 percent $H_2SO_4$, shall not exceed 2,200 TPD.

2. Sulfur dioxide emissions shall not exceed 4.0 lb/ton acid and 8,800 lb/day.

3. Acid mist emissions shall not exceed 0.15 lb/ton acid and 330 lb/day.

4. Visible emissions shall not exceed 5 percent opacity, average for any consecutive 6 minute period.

SPECIFIC CONDITIONS:

5. All compliance tests shall be conducted while the plant is operating within 5 percent of its permitted capacity of 91.7 TPH acid. The test methods and procedures described in 40 CFR 60.85 shall be used to determine the compliance status of the source with the sulfur dioxide and acid mist standards. Method 9, as described in 40 CFR 60, Appendix A, shall be used to determine the compliance status of the source with the visible emissions standard. Hillsborough County Environmental Protection Commission shall be notifed in writing 15 days prior to any compliance test.

6. A continuous monitoring system for the measurement of sulfur dioxide shall be installed, calibrated, maintained, and operated on this plant as specified in 40 CFR 60.84. Excess emissions shall be reported to the Hillsborough County Environmental Protection Commission.

7. The applicant shall comply with all requirements of 40 CFR 60, Subpart H, Standards of Performance for Sulfuric Acid Plants.

8. The plant may operated continuously, 8760 hours per year.

9. This construction permit replaces the current operating permit for this sulfuric acid plant. During the modifications of this plant, the emissions shall not exceed 10 lb $SO_2$ per ton of acid and 0.15 lb acid mist per ton of acid while the plant is operating commercially.

10. Construction shall reasonably conform to the plans and schedule in the application and October 15, 1984 letter. Bi-annual reports describing the status of the modifications shall be submitted to the state and county regulatory agencies. Gardinier, Inc. shall obtain prior approval from the department and county before proceeding with any construction referred to as "Third Modification" in the October 15, 1984 letter.

11. Gardinier, Inc. shall take precautionary measures to prevent emissions from leaks at the plant. All reasonable precautions shall be taken to prevent and control generation of unconfined emissions of particulate matter in accordance with the provisions in Section 17-2.610(3), FAC. These provisions are applicable to any source, including, but not limited to, vehicular movement, transportation of materials, construction, alteration, demolition or wrecking, or industrial related activities such as loading, unloading, storing and handling.

SPECIFIC CONDITIONS:

12. Gardinier, Inc. shall submit a complete application for a permit to operate the sulfuric acid plant, which includes an emissions test report, to the Hillsborough County Environmental Protection Commission at least 90 days prior to the expiration date of this construction permit. Gardinier, Inc. may continue to operate this sulfuric acid plant, if the source is in compliance with the conditions in this permit, until the expiration date of this construction permit or until the expiration date of any permit to operate that is issued for this source.

13. Upon obtaining a permit to operate, the applicant will be required to submit annual operation reports which shall include, as a minimum, the annual production of the plant and a recent emissions test report.

Issued this 8th day of Feb, 1985

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

for VICTORIA J. TSCHINKEL, Secretary

____ pages attached.

# Best Available Control Technology (BACT) Determination
Gardinier, Inc.
Hillsborough County

The applicant plans to increase the product rate from their Number 7 and Number 8 sulfuric acid plants that are located at their Tampa phosphate fertilizer complex. The production of sulfuric acid from the No. 7 plant will be increased from 1750 tons per day (TPD) to 2200 TPD, and the No. 8 plant from 1770 TPD also to 2200 TPD. No restrictions to limit the hours of operation of either plant has been requested.

Increasing the product output from the two sulfuric acid plants will also result in more air pollutants being emitted to the atmosphere. The air pollutants emitted from a sulfuric acid plant are sulfur dioxide ($SO_2$) and acid mist. The amount of $SO_2$ emitted to the atmosphere is an inverse function of sulfur conversion efficiency. When sulfur trioxide combines with water vapor at a temperature below the dew point of sulfur trioxide, acid mist is formed. The amount of acid mist is usually dependent upon the type of sulfur feedstock, the strength of acid produced, and the operational parameters in the absorber. Based upon the applicant's data, the net increase in air pollutant emissions would be 2327 tons of $SO_2$ and 92 tons of acid mist per year.

Under the regulations in Chapter 17-2, Florida Administrative Code, the increase in $SO_2$ and acid mist emissions exceed the significant emission rates as listed in Table 500-2. A BACT determination, therefore, is required for the regulated air pollutants sulfur dioxide and acid mist.

## BACT Determination Requested by the Applicant:

The air pollutant emissions from No. 7 sulfuric acid plant would be limited to 4 pounds of $SO_2$ and 0.15 pounds of acid mist per ton of 100% acid produced.

The air pollutant emissions from No. 8 sulfuric acid plant would be limited to 10 pounds of $SO_2$ and 0.30 pounds of acid mist per ton of 100% acid produced.

## Date Receipt of a BACT application:

July 6, 1984

## Date of Publication in the Florida Administrative Weekly:

July 27, 1984

## Review Group Members:

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

## BACT Determined by DER:

Sulfuric Acid Plants No. 7 and No. 8

| Pollutant | Emission Limit |
|---|---|
| Sulfur Dioxide ($SO_2$) | Not to exceed 4 pounds per ton of 100% acid produced |
| Acid Mist[1] | Not to exceed 0.15 pounds per ton of 100% acid produced |
| Visible Emissions | 5% opacity maximum |

[1] Acid mist means sulfuric acid mist, as measured by Method 8 of 40 CFR 60, Appendix A.

Compliance with the emission limits will be in accordance with the test methods and procedures prescribed in subsection 60.85, Subpart H, New Source Performance Standards.

DER Method 9 (17-2.700(6)(a)9, FAC) will be used to determine compliance with the visible emission limit.

## BACT Determination Rationale:

Florida Administrative Code Rule 17-2.100(105) defines "modification" as any physical change in, or addition to a stationary facility which increase the actual emissions of any air pollutant, regulated under this Chapter, including any not previously emitted, from any source within such facility.

If the increase in emissions as a result of the major source modification are equal to or greater than the significant emission rates listed in Table 500-2, Regulated Air Pollutants - Significant Emission Rates; a Best Available Control Technology (BACT) determination is required, Rule 17-2.500(5)(c). In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed under 40 CFR Part 60 - New Source Performance Standards (NSPS), Rule 17-2.630(1)(a).

Sulfuric acid plants are subject to the provisions of the New Source Performance Standards, 40 CFR 60.80, Subpart H. The standards under Subpart H are; 4.0 pounds of $SO_2$ per ton of acid produced and 0.15 pound of acid mist per ton of acid produced, expressed as 100 percent sulfuric acid. The visible emissions limit is less than 10 percent opacity.

The NSPS standards, Subpart H, were reviewed by EPA in 1979 and EPA concluded that from the standpoint of technology, and considering costs, and the small quantity of emissions in question, that it did not appear necessary to revise the standards. The department has reviewed the test results obtained from several different sulfuric acid plants and concurs with EPA's conclusion. The provisions of Subpart H are judged to be BACT.

The visible emissions limitation determined as BACT is equal to Hillsborough County's requirement as per Chapter 1-3.03 Vl.C - visible emissions shall not exceed 5% opacity except for 30 minute periods during plant startups when opacity shall be no greater than 40%.

The air quality impact of the proposed emissions has been analyzed. Atmospheric dispersion modeling has been completed and used in conjunction with an analysis of existing air quality to determine maximum ground-level ambient concentrations of the pollutants subject to BACT. Based on these analyses, the department has reasonable assurance that the proposed sulfuric acid plant modifications, subject to the these BACT emission limitations, will not cause or contribute to a violation of the PSD increment or ambient air quality standard.

Details of the Analysis may be Obtained by Contacting:

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

Recommended by:

C. H. Fancy, Deputy Bureau Chief

Date: 2/8/85

Approved by:

for Victoria J. Tschinkel, Secretary

Date: 2/12/85