

**PREVENTION OF SIGNIFICANT  
DETERIORATION APPLICATION**

**No. 9 Sulfuric Acid Plant  
Expansion  
CARGILL FERTILIZER, INC.  
Riverview, Florida**

**Prepared For:**

**Cargill Fertilizer, Inc.  
8813 Highway 41 South  
Riverview, Florida 33569**

**Prepared By:**

**KBN Engineering and Applied Sciences, Inc.  
1034 NW 57th Street  
Gainesville, Florida 32605**

**April 1993  
12258C1**

**CARGILL  
FERTILIZER, INC.**

ASSIGNED TO: JOHN REYNOLDS  
DATE ASSIGNED: 11-30-93  
SUPV: GM

8813 Highway 41 South - Riverview, Florida 33569 - Telephone 813-677-9111 - TWX 810-876-0648 - Telex 52666 - FAX 813-671-6146

November 18, 1993

Certified Mail: P-266-884-766

Mr. H. Fancy; Bureau Chief  
Florida Department of Environmental Protection  
Blair Stone Road  
Tallahassee, Florida 32399-2405

Air Construction/Modification Permit Application  
AO29-157890 #9 Sulfuric Acid Plant

Mr. Fancy:

Enclosed are four certified copies of an air construction  
modification permit application for the above mentioned permit.  
The modification is for increased production capacity.

If you have any questions, or the need for further  
clarification, please call my office.

Sincerely,

*John C. Curran*

John C. Curran  
Environmental Superintendent  
J. Campbell (HCEPC)  
B. Thomas (DEP)  
O. Morris  
D. Jellerson  
P-10-9

Enclosures: Construction/Modification Permit Application  
Check FLDEP \$7,500 (#158034)

003 NOV 24 11 12 20  
MAIL ROOM



**PART A**

**AIR CONSTRUCTION PERMIT APPLICATION  
NO. 9 SULFURIC ACID PLANT**

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

\$7,500 pd  
11-24-93  
Receipt # 180892



AC 29-241660  
PSD-FL-209

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Sulfuric Acid Plant [ ] New<sup>1</sup> [X] Existing<sup>1</sup>  
APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification  
COMPANY NAME: Cargill Fertilizer, 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. 9 Sulfuric Acid Plant  
SOURCE LOCATION: Street 8813 Highway 41 South City Riverview  
UTM: East 363.3 North 3082.4  
Latitude 27 ° 51 ' 28 "N Longitude 82 ° 23 ' 15 "W  
APPLICANT NAME AND TITLE: David Jellerson, Environmental Supervisor  
APPLICANT ADDRESS: 8813 Highway 41 South, Riverview, FL 33569

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative\* of Cargill Fertilizer, Inc.

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

\*Attach letter of authorization

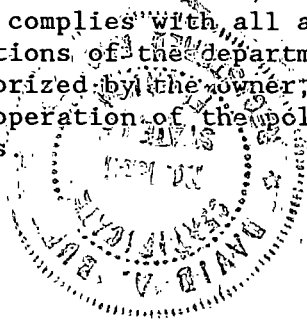
Signed: David B. Jellerson  
David Jellerson, Environmental Supervisor  
Name and Title (Please Type)

Date: 10/29/93 Telephone No. (813) 677-6153

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 judgement, that

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

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.



Signed David A. Buff

David A. Buff  
Name (Please Type)

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

1034 N.W. 57th Street, Gainesville, FL 32605  
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 4/16/93 Telephone No. (904) 331-9000

SECTION II: GENERAL PROJECT INFORMATION

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

See PSD report

B. Schedule of project covered in this application (Construction Permit Application Only)  
Start of Construction upon permit issuance Completion of Construction 24 mos after permit issued

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.)

Air pollution controls already in place.

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

See PSD report

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

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

1. Is this source in a non-attainment area for a particular pollutant? Yes
- a. If yes, has "offset" been applied? No
  - b. If yes, has "Lowest Achievable Emission Rate" been applied? No
  - c. If yes, list non-attainment pollutants. 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 Deterioration" (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? Yes
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? \_\_\_\_\_
  - 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.

No. 9 Sulfuric Acid Plant

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	--	--	87,455	A
Atmos. Oxygen	--	--	130,782	B
Water	--	--	48,986	C

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

1. Total Process Input Rate (lbs/hr): 267,223

2. Product Weight (lbs/hr): 266,667 as 100% H<sub>2</sub>SO<sub>4</sub>

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

Name of Contaminant	Emission <sup>1</sup>		Allowed <sup>2</sup> Emission Rate per Rule 17-2	Allowable <sup>3</sup> Emission lbs/hr	Potential <sup>4</sup> Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Sulfur dioxide	533.3	2,336	4.0 lb/ton	533.3	533.3	2,336	D
Sulfuric acid mist	20.0	87.6	0.15 lb/ton	20.0	20.0	87.6	D

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

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

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

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

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)
<i>Final Converter</i>	<i>Sulfur dioxide</i>	<i>99.7+</i>	<i>N/A</i>	<i>AP-42</i>
<i>Final Absorber/Mist</i>	<i>Acid Mist</i>	<i>99+</i>	<i>&gt;1 micron</i>	<i>AP-42</i>
<i>Eliminator</i>				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
<i>Not Applicable</i>			

\*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, others--lbs/hr.

Fuel Analysis:

Percent Sulfur: \_\_\_\_\_ Percent Ash: \_\_\_\_\_

Density: \_\_\_\_\_ lbs/gal Typical Percent Nitrogen: \_\_\_\_\_

Heat Capacity: \_\_\_\_\_ BTU/lb \_\_\_\_\_ BTU/gal

Other Fuel Contaminants (which may cause air pollution): \_\_\_\_\_

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average Not applicable Maximum \_\_\_\_\_

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

Cooling tower and boiler blowdown will be discharged to plant recirculation system or to the NPDES outfalls.



No. 9 Sulfuric Acid Plant

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

Stack Height: 149.5 ft. Stack Diameter: 9.0 ft.  
 Gas Flow Rate: 158,600 ACFM 132,900 DSCFM Gas Exit Temperature: 170 °F.  
 Water Vapor Content: 0 % Velocity: 41.6 FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

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

Description of Waste \_\_\_\_\_  
 Total Weight Incinerated (lbs/hr) \_\_\_\_\_ Design Capacity (lbs/hr) \_\_\_\_\_  
 Approximate Number of Hours of Operation per day \_\_\_\_\_ day/wk \_\_\_\_\_ wks/yr. \_\_\_\_\_  
 Manufacturer \_\_\_\_\_  
 Date Constructed \_\_\_\_\_ Model No. \_\_\_\_\_

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

Stack Height: \_\_\_\_\_ ft. Stack Diameter: \_\_\_\_\_ Stack Temp. \_\_\_\_\_  
 Gas Flow Rate: \_\_\_\_\_ ACFM \_\_\_\_\_ DSCFM\* Velocity: \_\_\_\_\_ FPS

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

Type of pollution control devices:  Cyclone  Wet Scrubber  Afterburner  
 Other (specify) \_\_\_\_\_

Brief description of operating characteristics of control devices: \_\_\_\_\_

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

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

### SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods, 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8 ½" 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 ½" 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 (Examples: Copy of relevant portion of USGS topographic map).
8. An 8 ½" 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?

Yes [ ] No

Contaminant	Rate or Concentration
<u>Sulfur dioxide</u>	<u>4.0 lb/ton</u>
<u>Sulfuric acid mist</u>	<u>0.15 lb/ton</u>

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

Yes [ ] No

Contaminant	Rate or Concentration
<u>Sulfur dioxide</u>	<u>4.0 lb/ton</u>
<u>Sulfuric acid mist</u>	<u>0.15 lb/ton</u>

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

Contaminant	Rate or Concentration
<u>Sulfur dioxide</u>	<u>4.0 lb/ton</u>
<u>Sulfuric acid mist</u>	<u>0.15 lb/ton</u>

- D. Describe the existing control and treatment technology (if any). See PSD report

- |                           |                          |
|---------------------------|--------------------------|
| 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). See PSD report

1.

a. Control Devices:

b. Operating Principles:

c. Efficiency:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

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

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:<sup>1</sup>

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

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

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

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

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

- j. Applicability to manufacturing processes:
  - k. Ability to construct with control device, install in available space, and operate within proposed levels:
- 3.
- a. Control Device:
  - b. Operating Principles:
  - c. Efficiency:<sup>1</sup>
  - d. Capital Cost:
  - e. Useful Life:
  - f. Operating Cost:
  - g. Energy:<sup>2</sup>
  - h. Maintenance Cost:
  - i. Availability of construction materials and process chemicals:
  - j. Applicability to manufacturing processes:
  - k. Ability to construct with control device, install in available space, and operate within proposed levels:
- 4.
- a. Control Device:
  - b. Operating Principles:
  - c. Efficiency:<sup>1</sup>
  - d. Capital Cost:
  - e. Useful Life:
  - f. Operating Cost:
  - g. Energy:<sup>2</sup>
  - h. Maintenance Cost:
  - i. Availability of construction materials and process chemicals:
  - j. Applicability to manufacturing processes:
  - k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected: *See PSD report*

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

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

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

- (5) Environmental Manager:
- (6) Telephone No.:
- (7) Emissions:<sup>1</sup>

Contaminant

Rate or Concentration


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

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

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

Contaminant

Rate or Concentration


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

10. Reason for selection and description of systems: *See PSD report*

<sup>1</sup>Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

*See PSD report*

A. Company Monitored Data

1. \_\_\_\_\_ no. sites \_\_\_\_\_ TSP \_\_\_\_\_ ( ) SO<sup>2\*</sup> \_\_\_\_\_ 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).



**PART B**  
**PSD REPORT**



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## ACRONYMS AND ABBREVIATIONS

AAQS	ambient air quality standards
API	American Petroleum Institute
APIS	Air Pollutant Information System
AQDM	Air Quality Display Model
BACT	best available control technology
CAA	Clean Air Act
CDM	Climatological Dispersion Model
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
ESP	electrostatic precipitator
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulation
FGD	flue gas desulfurization
g/s	grams per second
GEP	good engineering practice
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid
ISCLT2	Industrial Source Complex Long-Term
ISCST2	Industrial Source Complex Short-Term
K	Kelvin
km	kilometer
lb/hr	pounds per hour
lb/day	pounds per day
lb/ton	pounds per ton
lb	pound
m/s	meters per second
m	meter
NO <sub>2</sub>	nitrogen dioxide
NSPS	new source performance standards
NWS	National Weather Service
PM(TSP)	total suspended particulate matter
PM10	particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
%	percent
PSD	prevention of significant deterioration
SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
TPD	tons per day
TPH	tons per hour
TPY	tons per year
UNAMAP	Users Network for Applied Modeling of Air Pollution
μg/m <sup>3</sup>	micrograms per cubic meter

## 1.0 INTRODUCTION

Cargill Fertilizer, Inc., is proposing to modify the existing No. 9 sulfuric acid ( $H_2SO_4$ ) plant at its phosphate fertilizer manufacturing facility located in Riverview, Florida. The modifications will allow the No. 9  $H_2SO_4$  plant to increase its maximum  $H_2SO_4$  production rate from 2,800 tons per day (TPD) to 3,200 TPD, of 100 percent  $H_2SO_4$ . As a result of this production rate increase, an increase in the allowable sulfur dioxide ( $SO_2$ ) and  $H_2SO_4$  mist emissions for the plant is being requested.

Based on the requested maximum emissions for the affected source, the proposed modification will constitute a major modification at a major stationary source under current federal and state air quality regulations. This report addresses the requirements of the prevention of significant deterioration (PSD) review procedures pursuant to rules and regulations implementing the Clean Air Act (CAA) Amendments of 1977. The Florida Department of Environmental Regulation (FDER) has PSD review and approval authority in Florida. Based on the PSD source applicability analysis, a PSD review is indicated for  $SO_2$  and  $H_2SO_4$  mist.

This application contains six additional sections. A complete description of the project, including air emission rates, is presented in Section 2.0. The air quality review requirements and new source review applicability of the project are discussed in Section 3.0.

Ambient monitoring requirements under PSD are addressed in Section 4.0. The best available control technology (BACT) analysis is presented in Section 5.0. The air quality impact analysis and impacts on soils, vegetation and visibility required as part of the PSD permitting process are addressed in Sections 6.0 and 7.0, respectively.



## 2.0 PROJECT DESCRIPTION

Cargill is proposing to expand the maximum production capacity of the existing No. 9 H<sub>2</sub>SO<sub>4</sub> plant at its phosphate fertilizer manufacturing plant located in Riverview, Florida. The plant is located south of Tampa on Hillsborough Bay (see Figure 2-1). Cargill operates a total of three H<sub>2</sub>SO<sub>4</sub> plants (Nos. 7, 8 and 9) at the facility. The location of the three existing H<sub>2</sub>SO<sub>4</sub> plants at Cargill are shown in Figure 2-2.

Phosphate fertilizers are manufactured at the Cargill facility. A raw material utilized in the manufacture of phosphate fertilizers is sulfuric acid. Sulfuric acid is used to react with phosphate rock to produce phosphoric acid. In order to produce sulfuric acid, molten sulfur is burned in a sulfuric acid plant. SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> mist emissions are a byproduct of the chemical reaction. All of the H<sub>2</sub>SO<sub>4</sub> plants at Cargill use double adsorption technology to increase the efficiency of sulfuric acid recovery and to minimize emissions. A flow diagram of the process is presented in Figure 2-3.

The current capacity of the No. 9 H<sub>2</sub>SO<sub>4</sub> plant is 2,800 TPD (116.67 TPH, 24-hour average), expressed as 100 percent H<sub>2</sub>SO<sub>4</sub>. The maximum capacity after modification will be 3,200 TPD (133.33 TPH, 24-hour average). Together with the existing No. 7 and No. 8 H<sub>2</sub>SO<sub>4</sub> plants, which are permitted for 2,200 TPD and 2,500 TPD production rate, respectively, the total H<sub>2</sub>SO<sub>4</sub> production rate of the Cargill facility will be 7,900 TPD. The No. 7 and No. 8 H<sub>2</sub>SO<sub>4</sub> plants are not being modified at this time.

The No. 9 H<sub>2</sub>SO<sub>4</sub> plant at Cargill is currently subject to emission limits of 4.0 pounds per ton (lb/ton) for SO<sub>2</sub> and 0.15 lb/ton for H<sub>2</sub>SO<sub>4</sub> mist emissions. These limits are equivalent to the federal new source performance standards (NSPS) for new sulfuric acid plants. The current permit limitations for the plant at Cargill are summarized in Table 2-1. It is noted that the No. 9 plant has a permitted production rate of 2,800 TPD, but the allowable emission rate of 433.2 pounds per hour (lb/hr) is based on a 2,600 TPD production rate and 4.0 lb/ton of acid produced.

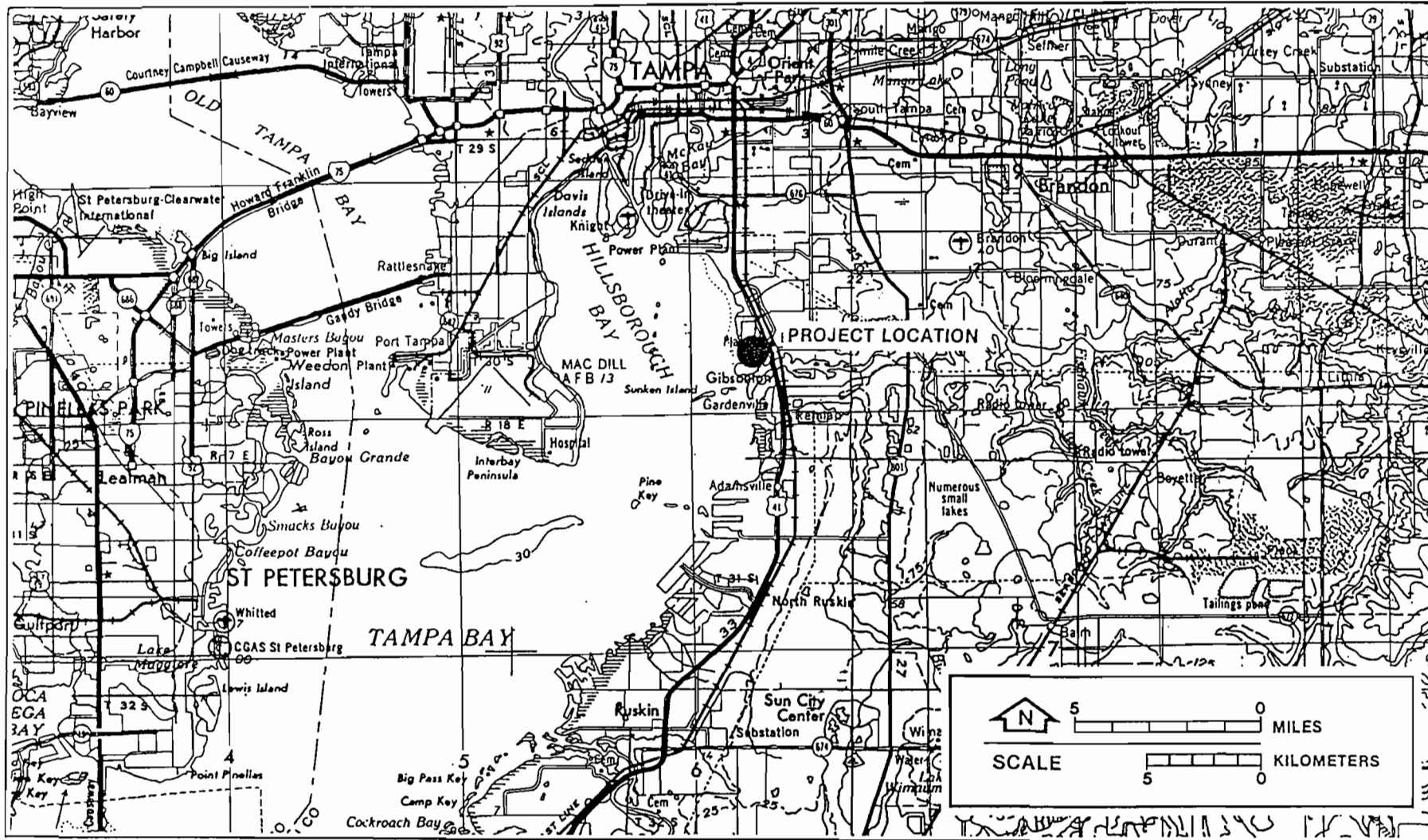
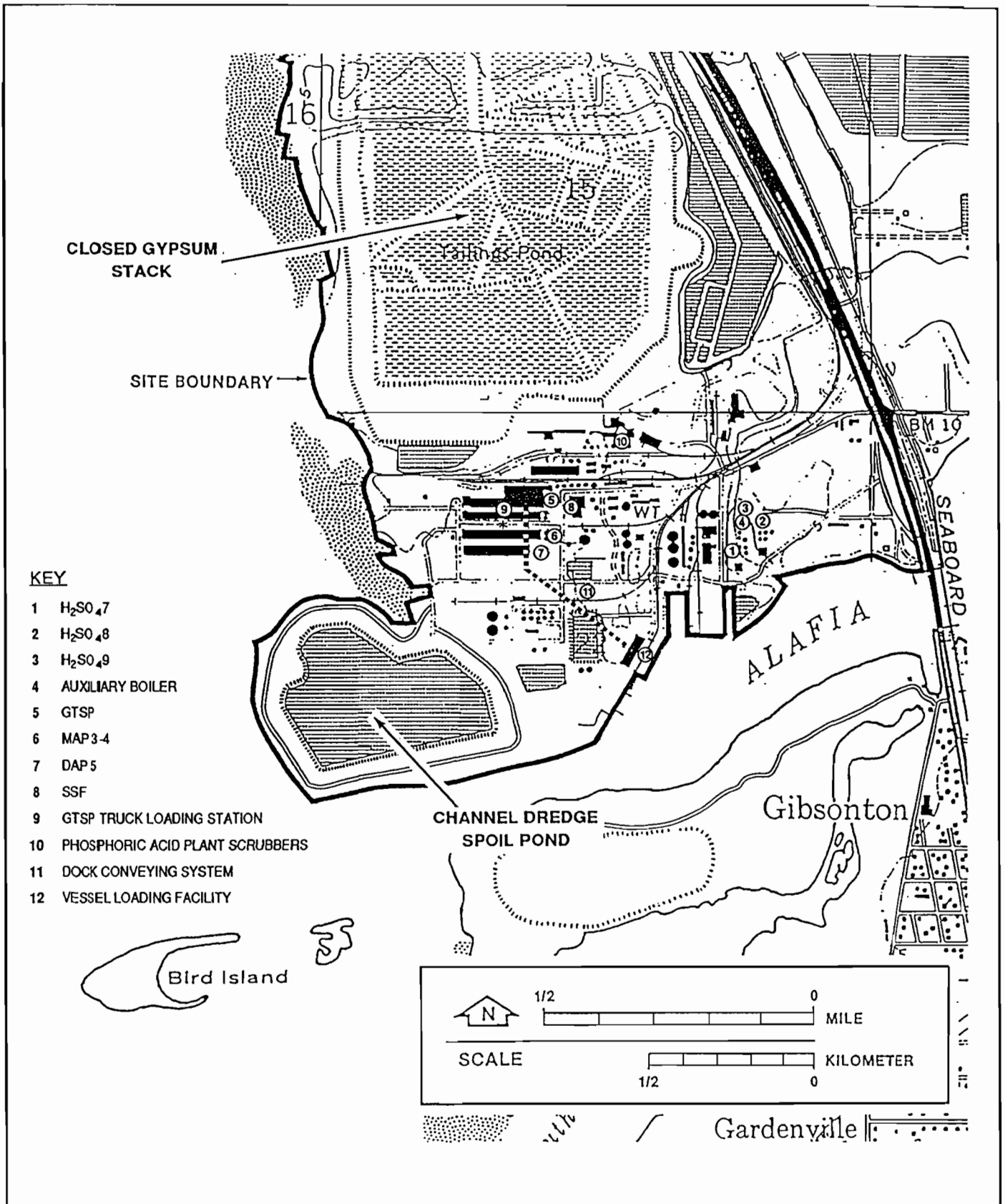


Figure 2-1 GENERAL LOCATION MAP OF CARGILL FERTILIZER, INC.

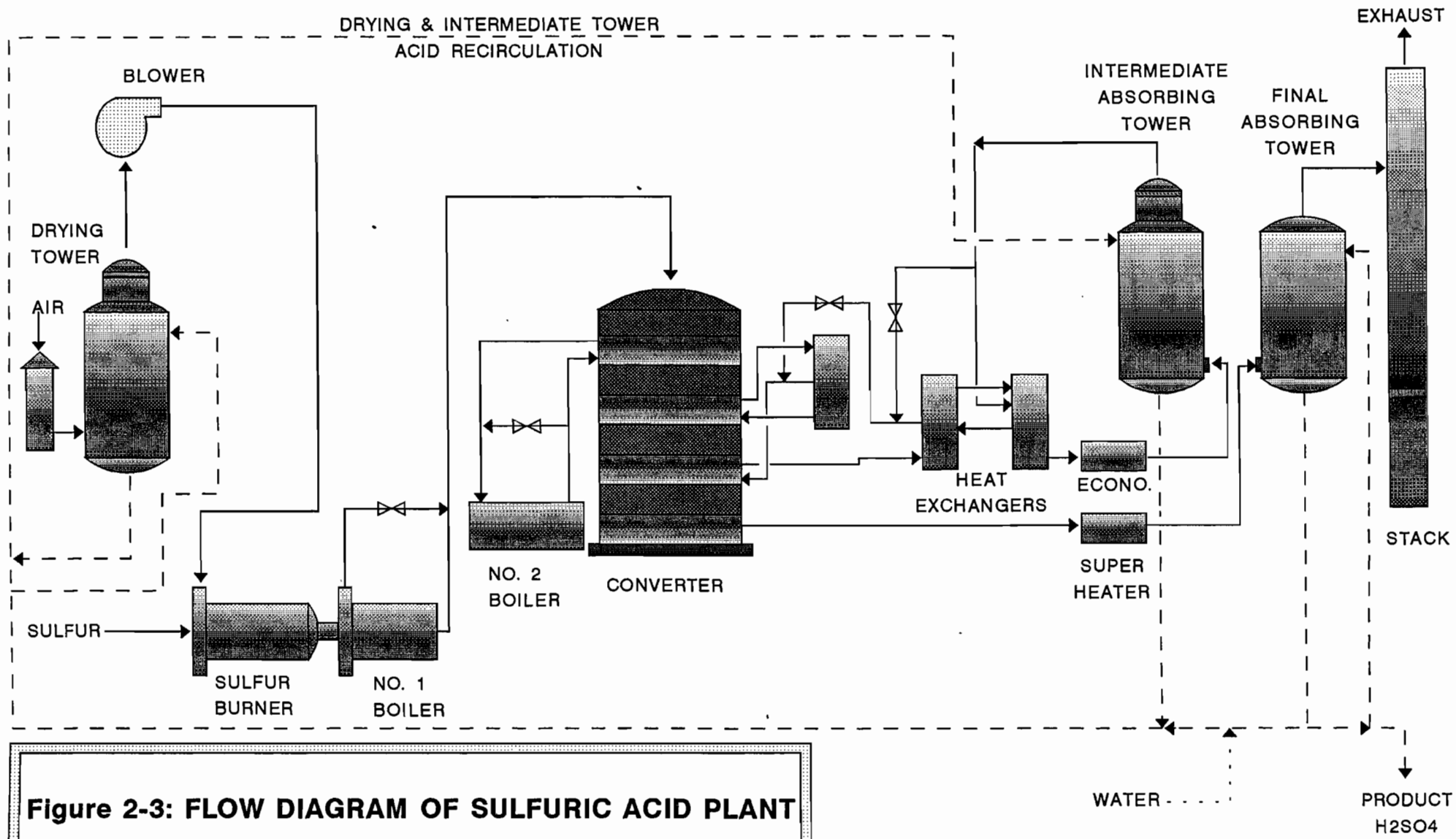
SOURCE: USGS, 1981.





SOURCE: USGS, 1981.





**Figure 2-3: FLOW DIAGRAM OF SULFURIC ACID PLANT**

Table 2-1. Current and Proposed Permit Limitations for No. 9 Sulfuric Acid Plant, Cargill Fertilizer, Inc.

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<u>Current Limitations</u>	
Production Rate (100% H <sub>2</sub> SO <sub>4</sub> )	2,800 TPD
SO <sub>2</sub> Emissions	4.0 lb/ton <sup>a</sup> 433.2 lb/hr <sup>c</sup>
H <sub>2</sub> SO <sub>4</sub> Mist Emissions	0.15 lb/ton <sup>a</sup> 16.2 lb/hr
<u>Proposed Limitations</u>	
Production Rate (100% H <sub>2</sub> SO <sub>4</sub> )	3,200 TPD
SO <sub>2</sub> Emissions	4.0 lb/ton <sup>a</sup> 12,800 lb/day 533.33 lb/hr <sup>b</sup> 2,336 TPY
H <sub>2</sub> SO <sub>4</sub> Mist Emission	0.15 lb/ton <sup>a</sup> 480 lb/day 20.0 lb/hr <sup>b</sup> 87.6 TPY

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Note: lb/day = pounds per day  
 lb/hr = pounds per hour  
 lb/ton = pounds per ton  
 H<sub>2</sub>SO<sub>4</sub> = sulfuric acid  
 % = percent  
 SO<sub>2</sub> = sulfur dioxide  
 TPD = tons per day  
 TPY = tons per year

<sup>a</sup> lb/ton of 100% H<sub>2</sub>SO<sub>4</sub>.

<sup>b</sup> 3-hour average.

<sup>c</sup> Based on 2,600 TPD (108.33 TPH) production rate.

The proposed permit limitations for the expanded No. 9 plant are presented in Table 2-1. It is proposed to retain the current NSPS limits of 4.0 lb/ton for SO<sub>2</sub> and 0.15 lb/ton for H<sub>2</sub>SO<sub>4</sub> mist. The basis for these limits as BACT is presented in Section 5.0.

Stack parameters for the both the current and expanded No. 9 H<sub>2</sub>SO<sub>4</sub> plant are presented in Table 2-2. The existing stack at Cargill serving the No. 9 H<sub>2</sub>SO<sub>4</sub> plant will be utilized for the expanded plant. The stack parameters shown in Table 2-2 will be used in the modeling analysis to determine the net increase in impacts due to the proposed expansion, as well as the total ambient impacts due to the expanded facility.

Recently the subject of nitrogen oxides (NO<sub>x</sub>) emissions from sulfuric acid plants has been addressed in Florida (e.g., Agrico Chemical Company and IMC Fertilizer air construction permits). In each of these cases, an NO<sub>x</sub> emission factor of 0.12 lb/ton H<sub>2</sub>SO<sub>4</sub> was used. In addition, IMC subsequently performed NO<sub>x</sub> emission tests on one sulfuric acid plant, which exhibited average NO<sub>x</sub> emissions of 0.08 lb/ton H<sub>2</sub>SO<sub>4</sub>. Without actual test data from Cargill's sulfuric acid plants, the emission factor of 0.12 lb/ton was used to estimate NO<sub>x</sub> emissions. The estimated maximum emissions from No. 9 H<sub>2</sub>SO<sub>4</sub> plant are listed in Table 2-3.

Table 2-2. Stack Parameters for Existing and Expanded No. 9 H<sub>2</sub>SO<sub>4</sub> Plant

Plant	H <sub>2</sub> SO <sub>4</sub> Production Rate <sup>a</sup> (TPH)	Stack Height (ft)	Stack Diameter (ft)	Gas Flow Rate (acfm)	Gas Velocity (fps)	Gas Temperature (°F)
<u>Existing Conditions</u>						
No. 9 H <sub>2</sub> SO <sub>4</sub>	108.33 <sup>b</sup>	149.5	9.0	128,900	33.8	170
<u>Future Conditions</u>						
No. 9 H <sub>2</sub> SO <sub>4</sub>	133.33	149.5	9.0	158,600	41.6	170

Note: acfm = actual cubic feet per minute.  
 °F = degrees fahrenheit.  
 fps = feet per second.  
 ft = feet.  
 H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
 TPD = tons per day.  
 TPH = tons per hour.

<sup>a</sup> As 100% H<sub>2</sub>SO<sub>4</sub>.

<sup>b</sup> Lower production rate of 2,600 TPD was used to reflect conservative gas flow rate (maximum permitted rate is 2,800 TPD).

Table 2-3. Estimated Maximum NO<sub>x</sub> Emissions From No. 9 Sulfuric Acid Plant

Plant	Production Rate (TPD)	NO <sub>x</sub> Emissions
H <sub>2</sub> SO <sub>4</sub> No. 9 (current)	2,800	14.0 lb/hr 61.3 TPY
H <sub>2</sub> SO <sub>4</sub> No. 9 (expanded)	3,200	16.0 lb/hr 70.1 TPY

Note: lb/hr = pounds per hour.  
 TPD = tons per day.  
 TPY = tons per year.



### **3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY**

The following discussion pertains to the federal and state air regulatory requirements and their applicability to Cargill's proposed modifications. These requirements must be satisfied before construction can begin on the proposed project.

#### **3.1 NATIONAL AND STATE AAQS**

The existing applicable national and Florida ambient air quality standards (AAQS) are presented in Table 3-1. National primary AAQS were promulgated to protect the public health, and national secondary AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as non-attainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

#### **3.2 PSD REQUIREMENTS**

##### **3.2.1 GENERAL REQUIREMENTS**

Federal PSD requirements are contained in the Code of Federal Regulations (CFR), Title 40, Part 52.21, prevention of significant deterioration of air quality. The State of Florida has adopted PSD regulations [Chapter 17-2.500, Florida Administrative Code (F.A.C.)] that essentially are identical to the federal regulations. PSD regulations require that all new major stationary sources or major modifications to existing major sources of air pollutants regulated under CAA be reviewed and a construction permit issued. Florida's State Implementation Plan (SIP), which contains PSD regulations, has been approved by the U.S. Environmental Protection Agency (EPA) and PSD approval authority in Florida has been granted to FDER.

A "major facility" is defined under Florida PSD regulations as any one of 28 named source categories that has the potential to emit 100 tons per year (TPY) or more of any pollutant regulated under the CAA, or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. A "source" is defined as an identifiable piece of process equipment or emissions unit. "Potential to emit" means the capability, at maximum

Table 3-1. National and State AAQS, Allowable PSD Increments, and Significance Levels ( $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time	AAQS			PSD Increments		Significant Impact Levels
		Primary Standard	Secondary Standard	State of Florida	Class I	Class II	
Particulate Matter (TSP)	Annual Geometric Mean	NA	NA	NA	5	19	1
	24-Hour Maximum <sup>a</sup>	NA	NA	NA	10	37	5
Particulate Matter (PM10)	Annual Arithmetic Mean	50	50	50	4 <sup>c</sup>	17 <sup>c</sup>	1
	24-Hour Maximum <sup>b</sup>	150	150	150	8 <sup>c</sup>	30 <sup>c</sup>	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum <sup>b</sup>	365	NA	260	5	91	5
	3-Hour Maximum <sup>b</sup>	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum <sup>b</sup>	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum <sup>b</sup>	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone	1-Hour Maximum <sup>d</sup>	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

Note: AAQS = Ambient Air Quality Standards.  
 NA = Not applicable, i.e., no standard exists.  
 Particulate matter (PM10) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.  
 Particulate matter (TSP) = total suspended particulate matter.  
 PSD = Prevention of significant deterioration.  
 $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter.

<sup>a</sup>Maximum concentration not to be exceeded more than once per year.  
<sup>b</sup>Achieved when the expected number of exceedances per year is less than 1.  
<sup>c</sup>Proposed by EPA in the Federal Register on October 5, 1989.  
<sup>d</sup>Achieved when the expected number of days per year with concentrations above the standard is less than 1.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978.  
 40 CFR 50.  
 40 CFR 52.21.  
 Chapter 17-2.400, F.A.C.

design capacity, to emit a pollutant, considering the application of control equipment and any other federally enforceable limitations on the source's capacity. A "major modification" is defined under PSD regulations as a change at an existing major stationary facility that increases emissions by greater than significant amounts. PSD significant emission rates are shown in Table 3-2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Major new facilities and major modifications are required to undergo the following analyses related to PSD for each pollutant emitted in significant amounts:

1. Source information,
2. Control technology review,
3. Source impact analysis,
4. Preconstruction air quality monitoring analysis, and
5. Additional impact analyses.

In addition to these analyses, a new source also must be reviewed with respect to good engineering practices (GEP) stack height regulations. If the proposed new source or modification is located in a non-attainment area for any pollutant, the source may be subject to non-attainment new source review requirements.

Discussions concerning each of these requirements are presented in the following sections.

### **3.2.2 INCREMENTS/CLASSIFICATIONS**

The 1977 CAA amendments address the prevention of significant deterioration of air quality. The law specifies that certain increases in air quality concentrations above the baseline concentration level of SO<sub>2</sub> and total suspended particulate matter [PM(TSP)] 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 will have an impact. Congress also directed EPA to evaluate PSD increments for other criteria pollutants and, if appropriate, promulgate PSD increments for such pollutants.

Table 3-2. PSD Significant Emission Rates and De Minimis Monitoring Concentrations

Pollutant	Regulated Under	Significant Emission Rate (TPY)	<u>De Minimis</u> Monitoring Concentration ( $\mu\text{g}/\text{m}^3$ )
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter (TSP)	NAAQS, NSPS	25	10, 24-hour
Particulate Matter (PM10)	NAAQS	15	10, 24-hour
Nitrogen Oxides	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY <sup>a</sup>
Lead	NAAQS	0.6	0.1, 3-month
Sulfuric Acid Mist	NSPS	7	NM
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Asbestos	NESHAP	0.007	NM
Beryllium	NESHAP	0.0004	0.001, 24-hour
Mercury	NESHAP	0.1	0.25, 24-hour
Vinyl Chloride	NESHAP	1	15, 24-hour

Note: Ambient monitoring requirements for any pollutant may be exempted if the impact of the increase in emissions is below de minimis monitoring concentrations.

NAAQS = National Ambient Air Quality Standards.

NESHAP = National Emission Standards for Hazardous Air Pollutants.

NM = No ambient measurement method.

NSPS = New Source Performance Standards.

PM10 = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.

PSD = prevention of significant deterioration.

TPY = tons per year.

TSP = total suspended particulate matter.

$\mu\text{g}/\text{m}^3$  = micrograms per cubic meter.

<sup>a</sup> No de minimis concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.

Source: F.A.C., Rule 17-2.500, Table 500-2.

Three classifications were designated, based on criteria established in the CAA amendments. Certain types of areas (international parks, national wilderness areas, memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) were designated as Class I areas. All other areas of the country were designated as Class II. PSD increments for Class III areas were defined, but no areas were designated as Class III. However, Congress made provisions in the law to allow the redesignation of Class II areas to Class III areas.

In 1978, EPA promulgated PSD regulations related to the requirements for classifications, increments, and area designations as set forth by Congress. PSD increments were initially set for only SO<sub>2</sub> and PM(TSP). However, in 1988, EPA promulgated final PSD regulations for NO<sub>x</sub> and established PSD increments for nitrogen dioxide (NO<sub>2</sub>).

The current federal PSD increments are shown in Table 3-1. As shown, Class I increments are the most stringent, allowing the smallest amount of air quality deterioration, while the Class III increments allow the greatest amount of deterioration. FDER has adopted the EPA class designations and allowable PSD increments for PM(TSP), SO<sub>2</sub>, and NO<sub>2</sub>. The Florida NO<sub>2</sub> increments were adopted in August 1990.

On October 5, 1989, EPA proposed PSD increments for particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM<sub>10</sub>). Those proposed increments are shown in Table 3-1. The PM<sub>10</sub> increments as proposed are somewhat lower in magnitude than the current PM(TSP) increments.

The term "baseline concentration" evolves from federal and state PSD regulations and refers to a fictitious concentration level corresponding to a specified baseline date and certain additional baseline sources. In reference to the baseline concentration, the baseline date actually includes three different dates:

1. The major source baseline date, which is January 6, 1975, in the cases of SO<sub>2</sub> and PM(TSP), and February 8, 1988, in the case of NO<sub>2</sub>;
2. The minor source baseline date, which is the earliest date after the trigger date on which a major stationary source or major modification subject to PSD regulations submits a complete PSD application; and

3. The trigger date, which is August 7, 1977, for SO<sub>2</sub> and PM(TSP), and February 8, 1988, for NO<sub>2</sub>.

By definition in the PSD regulations, baseline concentration means the ambient concentration level that 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 minor source baseline date, and
2. The allowable emissions of major stationary facilities that began construction before January 6, 1975, for SO<sub>2</sub> and PM(TSP) sources, or February 8, 1988, for NO<sub>x</sub> sources, but which 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 representative of a major stationary source on which construction began after January 6, 1975, for SO<sub>2</sub> and PM(TSP) sources, and after February 8, 1988, for NO<sub>x</sub> sources; and
2. Actual emission increases and decreases at any stationary facility occurring after the major source baseline date that result from a physical change or change in the method of operation of the facility.

The minor source baseline date for SO<sub>2</sub> and PM(TSP) has been set as December 27, 1977, for the entire State of Florida (Chapter 17-2.450, F.A.C.). The minor source baseline date for NO<sub>2</sub> has been set as March 28, 1988, for all of Florida.

### 3.2.3 CONTROL TECHNOLOGY REVIEW

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that BACT be applied to control emissions from the source [Chapter 17-2.500(5)(c), F.A.C]. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the significant emission rate (see Table 3-2).

BACT is defined in Chapter 17-2.100(28), F.A.C. as:

An emissions limitation, including a visible emission standard, based on the maximum degree of reduction of each pollutant emitted which the department, 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 and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of such pollutant. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice, or operation.

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 increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (EPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in EPA's Guidelines for Determining Best Available Control Technology (BACT) (EPA, 1978) and in the PSD Workshop Manual (EPA, 1980). These guidelines were promulgated by EPA 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 EPA (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 New Source Performance Standards (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 judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

Historically, a "bottom-up" approach consistent with the BACT Guidelines and PSD Workshop Manual has been used. With this approach, an initial control level, which is usually NSPS, is evaluated against successively more stringent controls until a BACT level is selected.

Recently, EPA issued a draft guidance document on the top-down approach entitled Top-Down Best Available Control Technology Guidance Document (EPA, 1990a). The "draft" guidance requires starting with the most stringent (or top) technology and emissions limits that have been applied elsewhere to the same or a similar source category. The applicant must next provide a basis for rejecting this technology in favor of the next most stringent technology or propose to use it. Rejection of control alternatives may be based on technical or economic infeasibility. Such decisions are made on the basis of physical differences (e.g., fuel type), locational differences (e.g., availability of water), or significant differences that may exist in the environmental, economic, or energy impacts. The differences between the proposed facility and the facility on which the control technique was applied previously must be justified.

It is noted that the American Paper Institute (API) initiated legal action in 1989 against the EPA over the implementation of the top-down approach. EPA and API recently reached a settlement agreement (July 9, 1991) which requires EPA to initiate formal rulemaking for BACT procedures. A proposed rule is required by January, 1992. However, until new rules are issued, EPA is requiring that the top-down approach still be used to determine BACT.

#### **3.2.4 AIR QUALITY MONITORING REQUIREMENTS**

In accordance with requirements of 40 CFR 52.21(m) and Chapter 17-2.500(5)(f), F.A.C, 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 facility or major modification. For a new major facility, the affected pollutants are those that the facility potentially would emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 3-2).



Ambient air monitoring for a period of up to 1 year is generally appropriate to satisfy the PSD monitoring requirements. A minimum of 4 months of data is required. Existing data from the vicinity of the proposed source may be used 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 EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA, 1987a).

Under the exemption rule, FDER may exempt a proposed major stationary facility or major modification from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility or modification would cause, in any area, air quality impacts less than the de minimis levels presented in Table 3-2 [Chapter 17-2.500(3)(e), F.A.C.].

### 3.2.5 SOURCE IMPACT ANALYSIS

A source impact analysis must be performed for a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-2). The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated EPA models normally must be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval.

Guidance for the use and application of dispersion models is presented in the EPA publication Guideline on Air Quality Models (EPA, 1987b). The source impact analysis for criteria pollutants can be limited to the new or modified source if the net increase in impacts as a result of the new or modified source is below significance levels, as presented in Table 3-1.

Various lengths of record for meteorological data can be used for impact analyses. 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" (HSH) 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.

### 3.2.6 ADDITIONAL IMPACT ANALYSES

In addition to air quality impact analyses, federal and State of Florida PSD regulations require analysis of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21; Chapter 17-2.500(5)(e), F.A.C.]. These analyses are to be conducted primarily for PSD Class I areas. Impacts from general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 3-2).

### 3.2.7 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, EPA promulgated final stack height regulations (EPA, 1985). Identical regulations have been adopted by FDER [Chapter 17-2.270, F.A.C.]. GEP stack height is defined as the highest of:

1. 65 meters (m); or
2. A height established by applying the formula:  
$$H_g = H + 1.5L$$

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); or
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 kilometer (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 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 that exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of the Cargill facility is generally flat, plume impaction was not considered in determining the GEP stack height.

### **3.3 NON-ATTAINMENT RULES**

Based on the current non-attainment provisions (Chapter 17-2.510, F.A.C.), all major new facilities and modifications to existing major facilities located in a non-attainment area must undergo non-attainment review if the proposed pieces of equipment have the potential to emit 100 TPY or more of the non-attainment pollutant, or if the modification results in a significant net emission increase of the non-attainment pollutant.

For major facilities or major modifications that locate in an attainment or unclassifiable area, the non-attainment review procedures apply if the source or modification is located within the area of influence of a non-attainment area. The area of influence is defined as an area that is outside the boundary of a non-attainment area but within the locus of all points that are 50 km outside the boundary of the non-attainment area. Based on Chapter 17-2.510(2)(a)2.a, F.A.C., all VOC sources that are located within an area of influence are exempt from the provisions of new source review for non-attainment areas. Sources that emit other non-attainment pollutants and are located within the area of influence are subject to non-attainment review unless the maximum allowable emissions from the proposed source do not have a significant impact within the non-attainment area.

### **3.4 SOURCE APPLICABILITY**

#### **3.4.1 PSD REVIEW**

##### **3.4.1.1 Pollutant Applicability**

The Cargill facility is located in Hillsborough County, which has been designated by EPA and FDER as an attainment area for SO<sub>2</sub>. Hillsborough County and surrounding counties are designated as PSD Class II areas for SO<sub>2</sub>. The site is located about 85 km from a PSD Class I area (Chassahowitzka National Wilderness Area).

The Cargill facility is considered to be an existing major stationary facility because potential emissions of certain regulated pollutants exceed 100 TPY (for example, potential SO<sub>2</sub> emissions currently exceeds 100 TPY). As a result, PSD review is required for the proposed modification for each pollutant for which the net increase in emissions exceeds the PSD significant emission rates presented in Table 3-2 (i.e., a major modification).

The net increase in allowable emissions due to the proposed expansion is shown in Table 3-3 (reference Table 2-1). As shown, the increase in allowable SO<sub>2</sub> emissions is 439 TPY, and the increase in allowable H<sub>2</sub>SO<sub>4</sub> mist emissions is 16.6 TPY. The increase in SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> mist emissions will exceed the PSD significant emission rates. Therefore, the proposed project is subject to PSD review for these pollutants. The increase in NO<sub>x</sub> emissions is 8.8 TPY, which is below the PSD significant emission rate of 40 TPY.

There have been no contemporaneous SO<sub>2</sub> emission increases occurring during the last five years at the Cargill facility. The phosphoric acid plants at Cargill will utilize the increased H<sub>2</sub>SO<sub>4</sub> produced by the No. 9 H<sub>2</sub>SO<sub>4</sub> plant. The phosphoric acid plants were recently issued a construction permit for increased capacity (Permit No. AC29-186726, issued February 6, 1991). The increased H<sub>2</sub>SO<sub>4</sub> capacity will allow the phosphoric acid plants to meet their permitted capacities, while reducing requirements for purchase of H<sub>2</sub>SO<sub>4</sub> from outside producers.

#### **3.4.1.2 Ambient Monitoring**

Based upon the increase in emissions from Cargill's proposed project, a PSD preconstruction ambient monitoring analysis is required for SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> mist. However, if the increase in impacts of a pollutant is less than the de minimis monitoring concentration, then an exemption from the preconstruction ambient monitoring requirement may be granted for that pollutant. In addition, if an acceptable ambient monitoring method for the pollutant has not been established by EPA, monitoring is not required.

For SO<sub>2</sub>, the maximum 24-hour impact due to the proposed expansion (see Table 6-7) is 7.2 µg/m<sup>3</sup>, which is below the de minimis monitoring concentration of 13 µg/m<sup>3</sup>. In addition, there is no approved ambient monitoring method for H<sub>2</sub>SO<sub>4</sub> mist. As a result, the proposed modification can be exempted from the preconstruction monitoring requirements for both these pollutants.

Table 3-3. PSD Source Applicability Analysis, Cargill No. 9 Sulfuric Acid Plant Expansion

Emission Scenario	Emission Rate (TPY)		
	SO <sub>2</sub>	H <sub>2</sub> SO <sub>4</sub> Mist	NO <sub>x</sub>
<u>Current Allowable Emissions</u>			
No. 9 H <sub>2</sub> SO <sub>4</sub>	1,897	71.0	61.3
<u>Proposed Allowable Emissions</u>			
No. 9 H <sub>2</sub> SO <sub>4</sub> @ 3,200 TPD	2,336	87.6	70.1
Total Net Increase	439	16.6	8.8
PSD Significant Emission Rate	40	7	40

Note: H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
 NO<sub>x</sub> = nitrogen oxides.  
 PSD = prevention of significant deterioration.  
 SO<sub>2</sub> = sulfur dioxide.  
 TPD = tons per day.  
 TYP = tons per year.

#### 3.4.1.3 GEP Stack Height Analysis

The GEP stack height regulations allow any stack to be at least 65 m [213 feet (ft)] high. The No. 9 H<sub>2</sub>SO<sub>4</sub> plant at Cargill is an existing source with a stack less than 65 m. This stack will not be modified. As a result, the de minimis GEP stack height is not exceeded.

#### 3.4.1.4 PSD Increment Consumption

The PSD regulations provide that any emission increases or decreases occurring after January 6, 1975, due to construction at major stationary sources affects PSD increment consumption. A review of the history of the Cargill H<sub>2</sub>SO<sub>4</sub> plants in regards to SO<sub>2</sub> emissions is presented in Table 3-4. The changes to the plants which affect PSD increment consumption are described below.

The Nos. 4, 5, 6, 7 and 8 H<sub>2</sub>SO<sub>4</sub> plants were all operating at Cargill prior to the PSD SO<sub>2</sub> major source baseline date of January 6, 1975. In addition, the No. 9 plant received its initial construction permit on November 25, 1974. As a result, all of these plants (Nos. 4 through 9) are included in the baseline for the purposes of determining PSD increment consumption.

The H<sub>2</sub>SO<sub>4</sub> plant Nos. 4, 5, and 6 were shutdown in October 1976. The annual averaged baseline emissions for these units are based on an average of the actual emissions for the previous 2 years of operation (i.e., 1975 and 1976). However, the short-term baseline emissions are based on the allowable rates for that time period.

The Nos. 7 and 8 plants also received construction permits on November 25, 1974, to modify the plants from single adsorption to double adsorption, with a reduced allowable SO<sub>2</sub> level of 10 lb/ton H<sub>2</sub>SO<sub>4</sub>. Since the Nos. 7, 8 and 9 plants had received construction permits just prior to the PSD major source baseline date, but their operation did not yet reflect these modifications, the PSD baseline emissions for these plants are based on the allowable emission limits as specified in the construction permits.

The SO<sub>2</sub> emission changes that affect PSD increment consumption for the sulfuric acid plants are presented in Table 3-5. The total baseline SO<sub>2</sub> emissions are 14,194 TPY. Total future SO<sub>2</sub> emissions after expansion are 5,767 TPY. Thus, there has been a net decrease of 8,427 TPY of SO<sub>2</sub>. This represents an expansion of the available PSD increments.

Table 3-4. Permit History of H<sub>2</sub>SO<sub>4</sub> Plants at Cargill Fertilizer, Inc.

Permit No.	Date	Comments
<u>No. 7 H<sub>2</sub>SO<sub>4</sub></u> AC 29-2391	11/25/74	Modify to double absorption plant
AO 29-5762	11/02/77	Operating permit for double absorption plant (1,380 TPD)
AO 29-22820	8/24/79	Renew operating permit
AC 29-21337	9/07/79	Increase to 1,750 TPD H <sub>2</sub> SO <sub>4</sub> and reduce allowable SO <sub>2</sub> emissions from 10 lb/ton to 4 lb/ton
AO 29-56993	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)
AO 29-178406	6/29/90	Renew operating permit (2,200 TPD)
<u>No. 8 H<sub>2</sub>SO<sub>4</sub></u> 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 (1,770 TPD)
AC 29-089696	2/8/85	Increase to 2,200 TPD H <sub>2</sub> SO <sub>4</sub> and reduce allowable SO <sub>2</sub> emissions from 10 lb/ton to 4 lb/ton
AC 29-130371 (PSD-F1-118)	7/21/87	Increase to 2,500 TPD H <sub>2</sub> SO <sub>4</sub>
AO 29-162411	8/10/89	Operating permit for 2,500 TPD
<u>No. 9 H<sub>2</sub>SO<sub>4</sub></u> 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)
AO 29-157890	2/10/89	Renew operating permit (2,600 TPD)
Permit amendment	10/19/89	Revise operating permit to 2,800 TPD
<u>Nos. 4, 5, and 6 H<sub>2</sub>SO<sub>4</sub></u> October 1976		Units shutdown

Notes: H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
lb/ton = pounds per ton.  
SO<sub>2</sub> = sulfur dioxide.  
TPD = tons per day.

Table 3-5. PSD Increment Consumption Baseline and Future SO<sub>2</sub> Emissions, Cargill Fertilizer, Inc.

Emission Scenario	SO <sub>2</sub> Emissions (TPY)	Basis
<u>Baseline Emissions<sup>a</sup></u>		
No. 4 H <sub>2</sub> SO <sub>4</sub>	1,276	274 TPD; 6,992 lb SO <sub>2</sub> /day
No. 5 H <sub>2</sub> SO <sub>4</sub>	2,216	475 TPD; 12,140 lb SO <sub>2</sub> /day
No. 6 H <sub>2</sub> SO <sub>4</sub>	3,029	650 TPD; 16,598 lb SO <sub>2</sub> /day
No. 7 H <sub>2</sub> SO <sub>4</sub>	2,519	1,380 TPD; 10 lb/ton
No. 8 H <sub>2</sub> SO <sub>4</sub>	3,256	1,784 TPD; 10 lb/ton
No. 9 H <sub>2</sub> SO <sub>4</sub>	<u>1,898</u>	2,600 TPD; 4 lb/ton
Total	14,194	
<u>Future Emissions</u>		
No. 7 H <sub>2</sub> SO <sub>4</sub>	1,606	2,200 TPD; 4 lb/ton
No. 8 H <sub>2</sub> SO <sub>4</sub>	1,825	2,500 TPD; 4 lb/ton
No. 9 H <sub>2</sub> SO <sub>4</sub>	<u>2,336</u>	3,200 TPD; 4 lb/ton
Total	5,767	
<u>Net Change</u>	-8,427	

Note: H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
 lb/ton = pounds per ton.  
 PSD = prevention of significant deterioration.  
 SO<sub>2</sub> = sulfur dioxide.  
 TPD = tons per day.  
 TPY = tons per year.

<sup>a</sup> Nos. 4, 5, 6

Allowable rates for short-term, actual emissions over last 2 years of operation (1975-76) are 892; 1,773; and 2,469 TPY, respectively.

Nos. 7, 8, 9

Represents allowable SO<sub>2</sub> emissions as of January 6, 1975, representative of construction permits issued in November 1974.



Actual SO<sub>2</sub> emissions for the baseline date of January 6, 1975, can also be determined from the annual reports submitted to FDER by Gardinier. The 1974 annual report showed total SO<sub>2</sub> emissions from all sulfuric acid plants (Nos. 4 through 8) were 18,211 TPY in 1974. Copies of pertinent pages of the annual report are provided in Appendix E.

#### **3.4.2 NON-ATTAINMENT REVIEW**

The Cargill facility is located in Hillsborough County, which has been designated as an attainment area for SO<sub>2</sub>. As a result, non-attainment review does not apply to the proposed project.

#### **3.4.3 NEW SOURCE PERFORMANCE STANDARDS**

Federal NSPS have been promulgated for new and modified sulfuric acid plants (40 CFR 60, Subpart H). The NSPS currently apply to the No. 9 H<sub>2</sub>SO<sub>4</sub> plant, and will continue to apply in the future. The NSPS limits are 4.0 lb/ton for SO<sub>2</sub>, and 0.15 lb/ton for H<sub>2</sub>SO<sub>4</sub> mist emissions.

## 4.0 AMBIENT MONITORING ANALYSIS

### 4.1 MONITORING REQUIREMENTS

The CAA 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 3.4, only SO<sub>2</sub> requires an air quality analysis to meet PSD preconstruction monitoring requirements for the proposed Cargill 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<sub>2</sub>, the de minimis level is 13 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ), 24-hour average. As demonstrated in Section 6.0, the predicted maximum increase in 24-hour SO<sub>2</sub> impacts due to the proposed modification at Cargill is 7.2  $\mu\text{g}/\text{m}^3$ . As a result, the proposed modification may be exempted from preconstruction SO<sub>2</sub> monitoring.

### 4.2 BACKGROUND SO<sub>2</sub> CONCENTRATIONS

A background SO<sub>2</sub> concentration must be estimated to account for SO<sub>2</sub> sources which are not explicitly included in the atmospheric dispersion modeling analysis. In order to estimate reasonable background SO<sub>2</sub> concentrations, a review of recent, available SO<sub>2</sub> monitoring data in the area of Cargill was performed. Presented in Table 4-1 is a summary of ambient SO<sub>2</sub> data available from 1989 to 1991 for all monitors located within 10 km of the Cargill site. A total of four stations are located within 10 km of Cargill, all of which have continuous SO<sub>2</sub> monitors. The monitors are operated by Hillsborough County Environmental Protection Commission. Data recoveries exceed 94 percent for all the stations.

Annual average, 24-hour maximums, and 3-hour maximums for SO<sub>2</sub> are shown in Table 4-1. Since all of the monitors are located in an area of multisource emissions (refer to Section 6.0), these concentrations are expected to include substantial contributions from sources in the area, including the existing Cargill facility. These potential major contributing sources are explicitly included in the modeling analysis, as are almost all emissions from sources located within 50 km of the Cargill facility (refer to Section 6.2.2). As a result, these concentrations are

Table 4-1. Summary of Ambient SO<sub>2</sub> Data for Sites Within 10 km of Cargill Fertilizer, Inc., 1989 - 1991

SAROAD Site No. (Distance Away)	City	Monitoring Method	Period	No. of Obs.	Percent Data Recovery	SO <sub>2</sub> Concentration ( $\mu\text{g}/\text{m}^3$ )		
						3-Hour <sup>a</sup>	24-Hour <sup>a</sup>	Annual Average
1800-021-GO2 <sup>b</sup> (8.2 km)	South of Gibsonton	Continuous	1989	8661	98.9	521	95	19
			1990	8641	98.6	388	80	15
			1991	8254	94.2	103	34	4
1800-95-GO2 <sup>b</sup> (7.0 km)	Tampa	Continuous	1989	8593	98.1	406	92	28
			1990	8593	98.1	586	100	19
			1991	8597	98.1	449	86	14
4360-035-GO2 <sup>b</sup> (9.8 km)	Tampa	Continuous	1989	8640	98.6	364	116	29
			1990	8673	99.0	322	105	21
			1991	8719	99.5	347	125	24
4360-053-GO2 <sup>c</sup> (9.5 km)	Tampa	Continuous	1989	8420	96.1	239	82	24
			1990	8700	99.3	343	98	24
			1991	8658	98.8	308	77	17

Note: No. = number.  
 Obs. = observations.  
 SO<sub>2</sub> = sulfur dioxide.  
 $\mu\text{g}/\text{m}^3$  = micrograms per cubic meter.

<sup>a</sup> Second-highest concentrations for calendar year are shown.

<sup>b</sup> Monitoring objective for this site is to measure the impact of a significant source.

<sup>c</sup> Monitoring objective for this site is to measure pollutant concentrations representative of areas of high population density.

Source: Florida DER, 1988, 1989, 1990.

not representative of actual background concentrations which would be expected to occur in conjunction with the worst-case meteorology.

Of the data presented, the most representative annual and short-term background SO<sub>2</sub> concentrations are the 1991 data recorded at monitoring site 1800-021. These values are higher than the background concentration used in a previous air modeling analysis performed for Cargill (KBN, 1987), which used the same monitoring site to develop a background concentration. Site 1800-021 is located 8.2 km southeast of Cargill and 5 km east of the TEC Big Bend power plant. These two sources are the only nearby sources of SO<sub>2</sub> that would directly influence the monitor. Although this monitor is likely impacted by these sources, 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 4-1, which could be impacted by a number of SO<sub>2</sub> sources. These background levels are as follows: annual average—4 μg/m<sup>3</sup>; 24-hour averaging time—34 μg/m<sup>3</sup>; and 3-hour averaging time—103 μg/m<sup>3</sup>.

## **5.0 BEST AVAILABLE CONTROL TECHNOLOGY**

The source applicability analysis for the proposed Cargill No. 9 H<sub>2</sub>SO<sub>4</sub> plant expansion, presented in Section 3.0, identified SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> 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.

### **5.1 SULFUR DIOXIDE**

#### **5.1.1 PROPOSED SO<sub>2</sub> BACT**

The No. 9 H<sub>2</sub>SO<sub>4</sub> plant at Cargill is a double-absorption plant. The double absorption plant is considered to be state-of-the-art in reducing SO<sub>2</sub> emissions from H<sub>2</sub>SO<sub>4</sub> plants and is already in operation at the No. 9 H<sub>2</sub>SO<sub>4</sub> plant. Therefore, this control technology is proposed as BACT for SO<sub>2</sub>. The proposed BACT SO<sub>2</sub> emission limit for the plant is the current allowable level of 4 lb/ton of H<sub>2</sub>SO<sub>4</sub> produced, and is equivalent to the BACT emission rate determined by FDER in the 1987 PSD construction permit for the No. 8 H<sub>2</sub>SO<sub>4</sub> expansion.

SO<sub>2</sub> compliance test data for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant for the last 6 years are presented in Table 5-1. The current permitted production rate for the plant is 2,800 TPD (116.7 TPH), which is the original permitted capacity of the unit (1977 operating permit). The permitted capacity was 2,600 TPD (108.3 TPH) from February 1984 to October 1989. As shown, the two most recent tests were conducted at the higher production rate and ranged from 3.36 to 3.41 lb/ton, with a maximum individual test of 3.56 lb/ton. These levels are close to the 4.0 lb/ton limit, and higher operating rates, process variables, and catalyst aging could cause higher emissions. In 1986, an individual test reflected an emission rate of 3.99 lb/ton. This demonstrates that the sulfuric acid plant can emit and has emitted at actual levels close to the 4.0 lb/ton limit. As a result, BACT for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant is proposed as 4.0 lb/ton. A lower SO<sub>2</sub> emission level may not be achievable on a continuous basis, particularly in light of the potential effects of higher production, catalyst aging, and other process variables.

#### **5.1.2 ALTERNATIVE SO<sub>2</sub> CONTROL TECHNOLOGIES**

EPA's latest review of NSPS for H<sub>2</sub>SO<sub>4</sub> plants (MITRE Corp., 1979) presents a comprehensive assessment of alternative control technologies for removing SO<sub>2</sub> from H<sub>2</sub>SO<sub>4</sub> plant tail gases.

Table 5-1. Summary of Recent No. 9 H<sub>2</sub>SO<sub>4</sub> Plant SO<sub>2</sub> Emission Tests

Date	Average Production Rate <sup>a</sup> (tons/hr)	Sulfur Dioxide			
		(lb/hr)		(lb/ton)	
		Avg.	Max.	Avg.	Max.
07/22/86	100.7	373	402	3.70	3.99
10/30/87	107.0	300	334	2.80	3.12
01/10/89	106.0	298	303	2.81	2.86
09/29/89	109.4	265	267	2.42	2.44
10/19/89	117.5	394	400	3.36	3.41
11/02/90	114.2	389	407	3.41	3.56
12/07/91	114.9	332	346	2.88	3.01

Note: avg. = average.  
H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
lb/hr = pounds per hour.  
lb/ton = pounds per ton.  
max. = maximum.  
SO<sub>2</sub> = sulfur dioxide.  
tons/hr = tons per hour.

<sup>a</sup> As 100 percent sulfuric acid.

Alternative technologies identified included the double-absorption contact H<sub>2</sub>SO<sub>4</sub> plant, sodium sulfite-bisulfite scrubbing, ammonia scrubbing, and molecular sieves. The study concluded that the best demonstrated control technology to reduce SO<sub>2</sub> emissions is the double-absorption H<sub>2</sub>SO<sub>4</sub> plant. Nearly all the H<sub>2</sub>SO<sub>4</sub> plants built in the United States since 1971 have used the double-absorption process, wherein two absorber stages are used. The SO<sub>2</sub> conversion efficiency for the double-absorption plant is 96 percent or greater.

A review of H<sub>2</sub>SO<sub>4</sub> 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. The results of the review are summarized in Table 5-2. This information was obtained from the EPA's BACT/LAER Clearinghouse. As indicated in the table, all BACT determinations since 1979 have resulted in allowable SO<sub>2</sub> levels equivalent to the NSPS of 4.0 lb/ton. These plants have ranged in capacity from 700 TPD to 2,750 TPD. All have utilized the double-absorption technology. In addition, the FDER determined BACT for SO<sub>2</sub> emissions from the No. 8 H<sub>2</sub>SO<sub>4</sub> plant at Cargill to be 4.0 lb/ton in the recent (1987) PSD permit issued for the No. 8 H<sub>2</sub>SO<sub>4</sub> expansion. Since this determination, no significant changes have occurred at Cargill or in regards to air quality levels to warrant a lower BACT limit.

Reduction of SO<sub>2</sub> emissions below those currently achieved by the No. 9 H<sub>2</sub>SO<sub>4</sub> double-absorption plant would require add-on control equipment, such as one of the flue gas desulfurization (FGD) processes described above. This would add considerable capital and operating costs to the present system and produce a waste disposal problem. The proposed Cargill expansion will increase allowable SO<sub>2</sub> emissions from the entire plant by 100.13 lb/hr. This represents less than a 15-percent increase in total allowable SO<sub>2</sub> emissions from the No. 9 H<sub>2</sub>SO<sub>4</sub> plants. The air quality impact analysis presented in Section 6.0 demonstrates that the proposed increase in emissions will have a very minor impact upon current air quality levels, i.e., the maximum increase in impacts are less than 0.5 μg/m<sup>3</sup>, annual average; less than 8 μg/m<sup>3</sup>, 24-hour average; and less than 22 μg/m<sup>3</sup>, 3-hour average.

The EPA NSPS review analyzed the SO<sub>2</sub> 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

Table 5-2. Previous BACT Determinations for H<sub>2</sub>SO<sub>4</sub> Plants

Date Permit Issued	Company Name	Plant Capacity (TPD)	Sulfur Dioxide		H <sub>2</sub> SO <sub>4</sub> Mist	
			Allowable Emissions (lb/ton)	Basis	Allowable Emissions (lb/ton)	Basis
02/29/88	Coal Gasification, Inc.	700	4.0	NSPS	0.15	NSPS
07/21/87	Gardinier, Inc. (No. 8 H <sub>2</sub> SO <sub>4</sub> plant)	2,500	4.0	NSPS	0.15	NSPS
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 <sub>2</sub> SO <sub>4</sub> Plant)	1750	4.0	NSPS, Double Absorption	0.15	NSPS

Note: BACT = best available control technology.  
H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
TPD = tons per day.  
lb/ton = pounds per ton.  
NSPS = New Source Performance Standards.



practiced was estimated to result in a cost impact of \$0.50/ton of H<sub>2</sub>SO<sub>4</sub> produced. This was considered to be an unacceptable method because pretax profits to the plant could be reduced by 20 percent or more.

FGD systems have not been applied to sulfuric acid plants. This is because the double adsorption plants result in a high degree of reduction in potential SO<sub>2</sub> emissions (greater than 99 percent), resulting in rather low SO<sub>2</sub> flue gas concentrations. For example, proposed SO<sub>2</sub> emissions for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant equate to approximately 400 ppm SO<sub>2</sub> in the flue gases.

A significant impediment to applying an FGD system to a sulfuric acid plant is the economic impact, reflected in an increase in capital costs, annual operating costs, and the cost per ton of H<sub>2</sub>SO<sub>4</sub> manufactured.

A recent PSD permit issued to Agrico Chemical Company (March 1992) was not required to address FGD systems as part of the BACT evaluation. As a result of these considerations, FGD systems were not considered further as BACT.

None of the alternative SO<sub>2</sub> control technologies is considered to be superior to the selected BACT, based on economic, energy, and environmental impacts. The chosen SO<sub>2</sub> BACT for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant is the currently operating double-absorption plant, reflective of a maximum SO<sub>2</sub> emission rate of 4.0 lb/ton.

## **5.2 SULFURIC ACID MIST**

### **5.2.1 PROPOSED H<sub>2</sub>SO<sub>4</sub> MIST BACT**

The No. 9 H<sub>2</sub>SO<sub>4</sub> plant at Cargill is currently equipped with a high efficiency mist eliminator to control H<sub>2</sub>SO<sub>4</sub> mist emissions. Current emission limits are 0.15 lb/ton for H<sub>2</sub>SO<sub>4</sub> mist based upon the NSPS. The proposed BACT emission level for H<sub>2</sub>SO<sub>4</sub> mist is the current allowable for the units of 0.15 lb/ton.

All H<sub>2</sub>SO<sub>4</sub> plants operating in the United States in 1979 that were required to meet the NSPS level for H<sub>2</sub>SO<sub>4</sub> 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 Cargill H<sub>2</sub>SO<sub>4</sub> plants currently use high efficiency mist eliminators, and this technology is considered to be the state-of-the-art control, it is proposed as BACT for H<sub>2</sub>SO<sub>4</sub> mist emissions. The EPA NSPS review study (MITRE Corp., 1979) identified these types of mist eliminators as the best demonstrated control technology for H<sub>2</sub>SO<sub>4</sub> emissions. In addition, FDER previously determined this technology as BACT for the No. 8 H<sub>2</sub>SO<sub>4</sub> expansion permitted in 1987.

H<sub>2</sub>SO<sub>4</sub> mist source test data from the No. 9 plant operating near its current permitted rate are presented in Table 5-3. Review of the source test data presented in Table 5-3 shows that past H<sub>2</sub>SO<sub>4</sub> mist compliance test values have ranged from 0.024 lb/ton to 0.099 lb/ton for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant. Individual tests have been as high as 0.134 lb/ton, near the 0.15 lb/ton limit. These data indicate that emissions can fluctuate significantly, due to the factors discussed previously for SO<sub>2</sub>, 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 for the No. 9 H<sub>2</sub>SO<sub>4</sub> plant.

#### 5.2.2 ALTERNATIVE H<sub>2</sub>SO<sub>4</sub> MIST CONTROL TECHNOLOGIES

EPA's review of the H<sub>2</sub>SO<sub>4</sub> plant NSPS (MITRE Corp., 1979) identified three types of fiber mist eliminators and an electrostatic precipitator (ESP) as control techniques for controlling H<sub>2</sub>SO<sub>4</sub> mist emissions from H<sub>2</sub>SO<sub>4</sub> plants. EPA chose the fiber mist eliminator as the best demonstrated technology for the following reasons:

1. No evidence exists that any new H<sub>2</sub>SO<sub>4</sub> 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<sub>2</sub>SO<sub>4</sub> 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. Since these types of filters are currently in use on the No. 9 H<sub>2</sub>SO<sub>4</sub> plant, it is concluded that the alternative mist eliminators cannot achieve a degree of H<sub>2</sub>SO<sub>4</sub> mist reduction that is significantly better than is now being achieved.

Table 5-3. Summary of Recent No. 9 H<sub>2</sub>SO<sub>4</sub> Plant Sulfuric Acid Mist Emission Tests

	Average Production Rate <sup>a</sup> (tons/hr)	Sulfuric Acid Mist			
		(lb/hr)		(lb/ton)	
		Avg.	Max.	Avg.	Max.
07/22/86	100.7	4.6	8.20	0.047	0.080
10/30/87	107.0	10.6	14.4	0.099	0.134
01/10/89	106.0	3.5	5.7	0.043	0.054
09/29/89	109.4	2.7	3.7	0.024	0.033
10/19/89	117.5	5.1	5.9	0.043	0.050
11/02/90	114.2	3.0	3.5	0.027	0.030
12/07/91	114.9	2.8	5.2	0.025	0.045

Note: H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
 lb/hr = pounds per hour.  
 lb/ton = pounds per ton.  
 tons/hr = tons per hour.

<sup>a</sup> As 100 percent sulfuric acid.

Previous BACT determinations for H<sub>2</sub>SO<sub>4</sub> plants throughout the U.S. are summarized in Table 5-2. This information was obtained from the EPA's BACT/LAER Clearinghouse. The data show that all BACT determinations for H<sub>2</sub>SO<sub>4</sub> plants constructed or modified since 1980 have resulted in allowable H<sub>2</sub>SO<sub>4</sub> mist emission rates equivalent to the NSPS of 0.15 lb/ton. Based upon these considerations, the selected BACT for control of H<sub>2</sub>SO<sub>4</sub> mist emissions is the currently operating, high efficiency mist eliminators to control mist emissions to 0.15 lb/ton.

The proposed Cargill H<sub>2</sub>SO<sub>4</sub> expansion will increase allowable H<sub>2</sub>SO<sub>4</sub> mist emissions by 3.8 lb/hr. This will result in only a 23 percent increase in the current allowable H<sub>2</sub>SO<sub>4</sub> emissions from the No. 9 H<sub>2</sub>SO<sub>4</sub> plant of 16.2 lb/hr. A lower BACT emission limit would not result in significant benefits to the environment.

## 6.0 AIR QUALITY MODELING APPROACH

### 6.1 GENERAL MODELING APPROACH

#### 6.1.1 SIGNIFICANT IMPACT ANALYSIS

The general modeling approach followed EPA and FDER modeling guidelines for determining compliance with AAQS and PSD increments. For all criteria pollutants that are emitted in excess of the PSD significant emission rate due to a proposed project, a significant impact analysis is performed to determine whether the emission increase(s) alone will result in predicted impacts in excess of the EPA/FDER significant impact levels. If the project's impacts are above the significant impact levels, then a more detailed modeling analysis is performed. Current FDER policies stipulate that the highest annual average and highest short-term (i.e., 24 hours or less) concentrations are to be compared to the applicable significant impact levels. If screening analysis indicates that maximum predicted concentrations are within 75 percent of the significant impact levels, modeling refinements are performed.

#### 6.1.2 AAQS/PSD MODELING ANALYSIS

For all pollutants that have a significant impact, a full impact analysis is required. In general, when 5 years of meteorological data are used, the highest annual and the highest, second-highest (HSH) short-term concentrations are to be compared to the applicable AAQS and allowable PSD increments. The HSH 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 air quality standards and allowable PSD increments, which permit a short-term average concentration to be exceeded once per year at each receptor.

To develop the maximum short-term concentrations for the proposed project, the modeling approach was divided into screening and refined phases to reduce the computation time required to perform the modeling analysis. For this study, the only difference between the two phases is the density of the receptor grid spacing employed when predicting concentrations. Concentrations are predicted for the screening phase using a coarse receptor grid and a 5-year meteorological data record.

If the original screening analysis indicates that the highest concentrations are occurring in a selected area(s) of the grid and the area's total coverage is too vast to directly apply a refined receptor grid, then an additional screening grid(s) will be used over that area. The additional screening grid(s) will employ a greater receptor density than the original screening grid, so refinements can be performed if necessary.

Refinements of the maximum predicted concentrations are typically performed for the receptors of the screening receptor grid at which the highest and/or HSH concentrations occurred over the 5-year period. Generally, if the maximum concentration from other years in the screening analysis are within 10 percent of the overall maximum concentration, those other concentrations are refined as well. Typically, if the highest and HSH concentrations are in different locations, concentrations in both areas are refined.

Modeling refinements are performed for short-term averaging times by using a denser receptor grid, centered on the screening receptor to be refined. The angular spacing between radials is 2 degrees and the radial distance interval between receptors is 100 m. Annual modeling refinements employ an angular spacing between radials of 2 degrees and a distance interval from 100 to 300 m, depending on the concentration gradient in the vicinity of the screening receptor to be refined. If the maximum screening concentration is located on the plant property boundary, additional plant boundary receptors are input, spaced at a 2 degree angular interval and centered on the screening receptor. The domain of the refinement grid typically extends to all adjacent screening receptors. The air dispersion model is then executed with the refined grid for the entire year of meteorology during which the screening concentration occurred. This approach is used to ensure that a valid HSH concentration is obtained. A more detailed description of the model used, along with the emission inventory, meteorological data, and screening receptor grids used in the analysis, are presented in the following sections.

### 6.1.3 MODEL SELECTION

The selection of an appropriate air dispersion model was based on the model's ability to simulate impacts in areas surrounding the Cargill site. Within 50 km of the site, the terrain can be described as simple, i.e., flat to gently rolling. As defined in EPA modeling guidelines, simple terrain is considered to be an area where the terrain features are all lower in elevation than the top

of the stack(s) under evaluation. Therefore, a simple terrain model was selected to predict maximum ground-level concentrations.

The Industrial Source Complex Short-term (ISCST2, Version 92062) dispersion model (EPA, 1992b) was used to evaluate the pollutant emissions from the proposed facility and other existing major facilities. This model is contained in EPA's User's Network for Applied Modeling of Air Pollution (UNAMAP), Version 6 (EPA, 1988b). The ISCST2 model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights. The ISCST2 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 24 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.

Major features of the ISCST2 model are presented in Table 6-1. The ISCST2 model has both rural and urban mode 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 source'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 radius circle centered on the site location, the urban option should be selected. Otherwise, the rural option is more appropriate.

In this analysis, the EPA regulatory default options were used to predict all maximum impacts.

The regulatory default options include:

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,

Table 6-1. Major Features of the ISCST2 Model

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ISCST2 Model Features
<ul style="list-style-type: none"><li>• Polar or Cartesian coordinate systems for receptor locations</li><li>• Rural or one of three urban options which affect wind speed profile exponent, dispersion rates, and mixing height calculations</li><li>• Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1973, and 1975)</li><li>• Procedures suggested by Huber and Snyder (1976) and Huber (1977) for evaluating building wake effects</li><li>• Procedures suggested by Briggs (1974) for evaluating stack-tip downwash</li><li>• Separation of multiple point sources</li><li>• Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations</li><li>• Capability of simulating point, line, volume and area sources</li><li>• Capability to calculate dry deposition</li><li>• Variation of wind speed with height (wind speed-profile exponent law)</li><li>• Concentration estimates for 1-hour to annual average times</li><li>• Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm</li><li>• Consideration of time-dependent exponential decay of pollutants</li><li>• The method of Pasquill (1976) to account for buoyancy-induced dispersion</li><li>• A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)</li><li>• Procedure for calm-wind processing</li><li>• Wind speeds less than 1 m/s are set to 1 m/s.</li></ul>

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Note: ISCST2 = Industrial Source Complex Short-Term.

Source: EPA, 1992b.



6. Calm wind processing, and
7. Reducing calculated SO<sub>2</sub> concentrations in urban areas by using a decay half-life of 4 hours.

#### **6.1.4 METEOROLOGICAL DATA**

Meteorological data used in the ISCST2 model to determine air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and twice-daily upper air soundings from the National Weather Service (NWS) stations at Tampa International Airport and Ruskin, respectively. The 5-year period of meteorological data was from 1982 through 1986. The NWS station at Tampa International Airport, located approximately 18 km to the northwest of the Cargill plant site, was selected for use in the study because it is the closest primary weather station to the study area which is representative of the 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 ISCST2 meteorological preprocessor program, RAMMET, to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at morning and afternoon, mixing heights were calculated with the radiosonde data using the Holzworth approach (1972). Hourly mixing heights were derived from the morning and afternoon mixing heights using the interpolation method developed by EPA (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 36 10-degree sectors, the wind directions were randomized within each sector to account for the expected variability in air flow.

## **6.2 EMISSION INVENTORY**

### **6.2.1 CARGILL FACILITY**

The Cargill SO<sub>2</sub> emission inventory is presented in Table 6-2. Stack data for the Cargill sources were obtained from current operating permits and stack test data. SO<sub>2</sub> emissions for all Cargill sources were developed using data from current permits and AP-42 emission factors (refer to Appendix A). The fuel oil burning sources at Cargill (GTSP, DAP5, and SSF plants) all are permitted to burn No. 2 fuel oil with a maximum of 0.5 percent sulfur. Operating data for the

Table 6-2. Summary of Cargill SO<sub>2</sub> Sources Used for the Modeling Analysis

Sources	SO <sub>2</sub> Emissions (g/s)	Stack Height (m)	Stack Diameter (m)	Exit Gas Velocity (m/s)	Exit Gas Temperature (K)	Stack Location <sup>a</sup>	
						X (m)	Y (m)
GTSP	1.90	38.4	2.44	12.35	325	-520.9	22.9
DAP 5	0.96	40.4	2.13	16.09	319	-520.9	-96.1
SSF	0.16	12.2	0.51	9.28	322	-481.9	11.9
H <sub>2</sub> SO <sub>4</sub> 7 <sup>b</sup>	46.2	45.6	2.29	12.64	340	-18.9	-129.1
H <sub>2</sub> SO <sub>4</sub> 8 <sup>c</sup>	52.5	45.6	2.44	13.38	339	78.1	-28.1
H <sub>2</sub> SO <sub>4</sub> 9 <sup>d</sup> (current)	54.6	45.6	2.74	10.30	350	0	0
H <sub>2</sub> SO <sub>4</sub> 9 <sup>e</sup> (expanded)	67.2	45.6	2.74	12.66	350	0	0
H <sub>2</sub> SO <sub>4</sub> 4, 5 and 6 <sup>f</sup>	-187.6	22.6	1.52	7.00	363	-125.3	-100.3

Note: g/s = grams per second.  
H<sub>2</sub>SO<sub>4</sub> = sulfuric acid.  
K = Kelvin.  
lb = pound.  
m = meter.  
m/s = meters per second.  
SO<sub>2</sub> = sulfur dioxide.  
TPH = tons per hour.

<sup>a</sup> Relative to grid center located at the H<sub>2</sub>SO<sub>4</sub> No. 9 stack location.

<sup>b</sup> Emissions based on a production rate of 2,200 TPD (91.7 TPH) of H<sub>2</sub>SO<sub>4</sub> and 4.0 lb SO<sub>2</sub> per ton of H<sub>2</sub>SO<sub>4</sub> produced. Stack parameters based on an average of 1990 and 1991 source test data.

<sup>c</sup> Emissions based on a production rate of 2,500 TPD (104.2 TPH) of H<sub>2</sub>SO<sub>4</sub> and 4.0 lb SO<sub>2</sub> per ton of H<sub>2</sub>SO<sub>4</sub> produced. Stack parameters based on an average of 1990 and 1991 source test data.

<sup>d</sup> Emissions based on permit condition off 433.2 lb/hr. Stack parameters based on average of 1989 and 1990 source test data.

<sup>e</sup> Emissions based on a production rate of 3,200 TPD (133.3 TPH) of H<sub>2</sub>SO<sub>4</sub> and 4.0 lb SO<sub>2</sub> per ton of H<sub>2</sub>SO<sub>4</sub> produced. Stack parameters based on an average of 1989 and 1990 source test data.

<sup>f</sup> Baseline sources, shutdown in October 1976: 1,276 TPY for No. 4; 2,216 TPY for No. 5; and 3,029 TPY for No. 6; total of 6,521 TPY.

Source: KBN, 1986, 1992.

No. 9 H<sub>2</sub>SO<sub>4</sub> plant was derived by taking the average of the last 2 years of stack test data and prorating it based on the proposed production rate increase.

In order to determine the SO<sub>2</sub> significant impact area, the current and future operating conditions of the No. 9 H<sub>2</sub>SO<sub>4</sub> plant was modeled to determine the net air quality change due to the proposed expansion. The modeled SO<sub>2</sub> emissions rates are shown in Table 2-1, and stack parameters are shown in Table 2-2.

Modeling of the existing and future No. 9 H<sub>2</sub>SO<sub>4</sub> plant demonstrated that the proposed expansion would have a significant impact at a distance out to 7.3 km from the Cargill facility. Therefore, the significant impact area is established as 8.0 km.

No significance levels have been established for H<sub>2</sub>SO<sub>4</sub> mist. The maximum increase in H<sub>2</sub>SO<sub>4</sub> mist impacts due to the proposed expansion in the vicinity of the plant will be compared with the FDER No-Threat Levels (NTL) for H<sub>2</sub>SO<sub>4</sub> mist.

#### **6.2.2 AAQS EMISSION INVENTORY**

All major SO<sub>2</sub> sources located within 50 km of Cargill were identified and are presented in Table 6-2. The inventory data were based on information developed for the PSD permit application for the Hardee Power Station, data obtained from the Florida Air Pollutant Information System (APIS) and the Hillsborough County Environmental Protection Commission, and the previous air quality impact assessment prepared for Cargill (KBN, 1987).

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 EPA (refer to Appendix B). 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, 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:

1. the distance (km) from Cargill to the source undergoing evaluation for short-term analysis, or
2. the distance (km) from the edge of Cargill's significant impact area (8 km) to the source undergoing evaluation for long-term analysis.

For this analysis the long-term criteria was used since less sources would be eliminated than with the short-term criteria and would thus result in a more conservative approach.

A listing of the sources in the inventory, along with associated maximum allowable emissions, distance from Cargill, and associated Q, are presented in Table 6-3. Those sources with maximum allowable SO<sub>2</sub> emissions which are below the calculated "screening threshold" emissions were eliminated from further consideration in the modeling analysis.

In general, sources located more than 50 km from Cargill were not considered in the screening analysis. However, the Lakeland City Power and Florida Power Corporation (FPC) Anclote facilities were included in the screening analysis since they are substantial SO<sub>2</sub> emitters and are located at distances of 52.2 and 53.1 km, respectively, from Cargill. The total SO<sub>2</sub> source emissions considered for this modeling analysis is as follows.

	<u>TPY</u>
All Sources Within 50 km	669,567
City of Lakeland and FPC Anclote	<u>147,441</u>
Total All Sources	817,008
Source Emissions Included	815,306
Percent of Total Emissions Included in Modeling Analysis	99.79

Sources with similar stack heights and stack parameters were combined and treated as one stack to reduce computation time. The individual emissions, stack, and operating parameters for the

Table 6-3. SO<sub>2</sub> Emission Screening for Background Sources Considered in the Modeling Analysis

APIS Number	Facility	Distance (D) from Cargill (km)	Screening Threshold Emissions (TPY) <sup>a</sup>	Maximum Allowable Emissions (TPY)	Included in the Modeling Analysis
40HIL290024	IMC -Port Sutton	6.0	NA	1,443	Yes
40HIL290040	TECO -Gannon	6.0	NA	93,266	Yes
40HIL290029	Nitram	6.8	NA	6.3	No <sup>b</sup>
40HIL290039	TECO -Big Bend	7.3	NA	301,974	Yes
40HIL290082	Sulfur Terminal	9.2	38	210	Yes
40HIL290018	Lafarge Corp.	9.9	37	20,293	Yes
40HIL290038	TECO -Hookers Point	10.1	41	13,524	Yes
40HIL290127	McKay Bay Res. Rec.	10.1	42	745	Yes
40HIL290083	AMOCO Oil	11.0	61	46	No
40HIL290005	Central Phosphate	11.3	67	8,836	Yes
40HIL290057	Gulf Coast Lead	11.6	73	1,638	Yes
40HIL290261	Hillsborough Co. Res. Rec.	11.8	75	1,029	Yes
40HIL290099	Sulphuric Acid Trading	13.9	118	156	Yes
40HIL290028	Gold Bond Building	15.6	152	277	Yes
40HIL290223	Couch Construction	16.0	159	115	No
40PNLS20011	FPC -Bartow	20.5	250	62,618	Yes
40PNLS20013	FPC -Bayboro	26.5	369	6,876	Yes
40PNLS20117	Pinellas Co. Res. Rec.	27.8	395	2,300	Yes
40MAN410010	FPL -Manatee	28.3	407	83,351	Yes
40MAN410002	Royster Phosphate	28.8	415	1,463	Yes
40HIL290101	IMC -Fort Lonesome	30.2	444	1,547	Yes
40PNLS20012	FPC -Higgins	31.0	459	12,072	Yes
40TPA530059	IMC -New Whales	33.9	518	10,169	Yes
40HIL290076	Delta Asphalt	34.0	519	167	No
40HIL290075	Consolidated Minerals	34.0	519	1,267	Yes
40HIL290102	Mobil Oil Big Four Mine	34.2	524	569	Yes
40TPA530047	Mobil Chemical Co./Nichols	35.6	553	1,498	Yes
40TPA530057	Conserv. Chemicals	35.9	557	1,597	Yes
40TPA530059	IMC/Praire	40.3	646	137	No
40TPA530054	Agrico Chemical Co. (Pierce)	40.9	659	417	No
40TPA530060	Mobil-Electrophosphate Division	42.8	696	1,440	Yes
40TPA530080	Imperial Phosphate	43.8	716	275	No
40TPA530008	Royster Co.	44.0	720	1,232	Yes
40MAN410007	Tropicana	44.3	727	437	No
40TPA530052	C.F. Industries	45.1	742	8,443	Yes
40TPA530055	Agrico Chemical Co. (S. Pierce)	45.9	757	4,982	Yes
40TPA530053	Farmland Industries	46.6	773	2,878	Yes
40TPA530046	W.R. Grace/Seminole Fert.	47.1	782	8,180	Yes
NA	Hardee Power Station	48.7	814	11,992	Yes
40TPA530004	Lakeland City Power	52.2	897	30,567	Yes
40TPA510017	FPC-Anclote	53.1	915	116,874	Yes

<sup>a</sup> Screening Threshold emissions (Q) are equal to 20 times the distance from the source in question to the edge of Cargill's significant impact area (8 km). Sources with emissions less than Q were eliminated from the modeling analysis (see text for details).

<sup>b</sup> Eliminated from the modeling because its emissions were below 10 TPY.

background sources considered in the screening and refined analysis are presented in Appendix C, Table C-1. The combined source parameters for sources considered in the screening and refined analysis are presented in Table C-2.

### **6.2.3 PSD CLASS I EMISSION INVENTORY**

A summary of SO<sub>2</sub> sources used in the PSD Class I modeling analysis for the Chassahowitzka NWA is presented in Appendix C, Table C-3. The Class I inventory provided includes the latest source information from recent modeling efforts for this area.

## **6.3 RECEPTOR LOCATIONS**

### **6.3.1 SIGNIFICANT IMPACT ANALYSIS**

To determine the SO<sub>2</sub> significant impact area, concentrations were predicted for 252 receptors located in a radial grid centered on H<sub>2</sub>SO<sub>4</sub> No. 9 stack. Receptors were located in "rings" with 36 receptors per ring, spaced at 10° intervals and at distances of 4, 5, 6, 7, 8, 9, and 10 km from the H<sub>2</sub>SO<sub>4</sub> No. 9 stack location. The proposed expansion was determined to be significant out to 8 km from the Cargill site.

### **6.3.2 AAQS IMPACT ASSESSMENT**

A polar receptor grid was used to cover the spatial extent of the proposed project's significant impact area (8 km). The screening grid included 252 regular grid and 119 discrete receptors. The regular grid receptors were located as rings at distances of 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, and 8.0 km. Discrete receptors included 36 receptors located on the plant property boundary at 10° intervals, plus 83 additional off-property receptors at distances of 0.5, 0.8, 1.1 and 1.5 km from the H<sub>2</sub>SO<sub>4</sub> No. 9 stack to cover the area between the property boundary and the closest regular receptor grid distance (i.e., 2.0 km). The 36 property boundary receptors used for the screening analysis are presented in Table 6-4. All receptor locations are relative to the H<sub>2</sub>SO<sub>4</sub> No. 9 stack location.

For the AAQS screening analysis, three additional screening receptor grids are utilized to provide greater detail in certain areas. They are:

1. A grid near downtown Tampa comprised of direction radials every 5° from 300° to 360° and at distances from the Cargill site every 0.5 km from 5.0 to 8.0 km.

Table 6-4. Cargill Property Boundary Receptors Used in the Modeling Analysis

Direction (deg)	Distance (m)	Direction (deg)	Distance (m)
10	965	190	362
20	805	200	390
30	675	210	796
40	597	220	971
50	550	230	1,296
60	525	240	1,512
70	517	250	1,494
80	524	260	1,019
90	550	270	1,064
100	596	280	1,151
110	414	290	1,296
120	338	300	1,421
130	294	310	1,623
140	285	320	1,962
150	293	330	2,000
160	311	340	1,843
170	343	350	1,759
180	347	360	1,245

Note: Distances are relative to the H<sub>2</sub>SO<sub>4</sub> No. 9 stack location.  
deg = degree.  
m = meter.

2. A grid comprised of radials every 5° from 130° to 150° and at distances from the Cargill site every 0.5 km from 2.0 to 4.0 km.
3. A grid near Ruskin comprised of direction radials every 5° from 170° to 210° and at distances from the Cargill site every 0.5 km from 5.5 to 8.0 km.

### **6.3.3 CLASS I IMPACT ASSESSMENT**

Maximum SO<sub>2</sub> impacts for the Chassahowitzka NWA were predicted at 13 discrete receptors located along the border of the Class I area. Impacts for the proposed modification only were also compared to the Class I significance levels recommended by the National Park Service (NPS). A listing of Class I receptors is provided in Table 6-5.

### **6.4 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 4.0. Based on this analysis, the background SO<sub>2</sub> concentration was determined to be 103 and 34 µg/m<sup>3</sup> for the 3- and 24-hour averaging periods, respectively, and 4 µg/m<sup>3</sup> for the annual averaging period. These background levels were added to model-predicted concentrations to estimate total air quality levels for comparison to AAQS.

### **6.5 BUILDING DOWNWASH EFFECTS**

The procedures used for addressing the effects of building downwash are those recommended in the ISC Dispersion Model User's Guide. The building height, length, and width are input to the model, which uses these parameters to modify the dispersion parameters. For short stacks (i.e., physical stack height is less than  $H_b + 0.5 L_b$ , where  $H_b$  is the building height and  $L_b$  is the lesser of the building height or projected width), the Schulman and Scire (1980) method is used. If this method is used, then direction-specific building dimensions are input for  $H_b$  and  $L_b$  for 36 radial directions, with each direction representing a 10 degree sector. The features of the Schulman and Scire method are as follows:

1. Reduced plume rise as a result of initial plume dilution,
2. Enhanced plume spread as a linear function of the effective plume height, and



Table 6-5. Chassahowitzka Wilderness Area Receptors Used in the Modeling Analysis

UTM Coordinates	
East (km)	North (km)
340.3	3,165.7
340.3	3,167.7
340.3	3,169.8
340.7	3,171.9
342.0	3,174.0
343.0	3,176.2
343.7	3,178.3
342.4	3,180.6
341.1	3,183.4
339.0	3,183.4
336.5	3,183.4
334.0	3,183.4
331.5	3,183.4

3. Specification of building dimensions as a function of wind direction.

For cases where the physical stack is greater than  $H_b + 0.5 L_b$  but less than GEP, the Huber-Snyder (1976) method is used. For both downwash methods, the ISCST model uses direction-specific building dimensions for  $H_b$  and  $L_b$  for 36 radial directions, with each direction representing a 10-degree sector.

The building dimensions considered in the modeling analysis are presented in Table 6-6. The units at the Cargill facility affected by building downwash are limited to the SSF, GTSP, and DAP #5. Stacks for  $H_2SO_4$  Plant Nos. 7, 8, and 9 are not affected by any buildings.

## **6.6 MODEL RESULTS**

### **6.6.1 SIGNIFICANT IMPACT ANALYSIS**

A summary of the maximum  $SO_2$  concentrations predicted for the proposed modification only in the screening analysis is presented in Table 6-7. These results indicate the proposed increase in  $SO_2$  emissions from the No. 9  $H_2SO_4$  plant will result in low ambient impacts. The maximum 24-hour concentration of  $7.2 \mu g/m^3$  is above the significance level of  $5 \mu g/m^3$ . The annual and 3-hour maximum concentrations for the averaging period are 0.47 and 22.0, which are less than the significance levels of 1 and  $25 \mu g/m^3$ , respectively. It was further determined that the significant impact area for the proposed modification extends out approximately 8.0 km from the Cargill facility, based on the maximum 24-hour impacts.

### **6.6.2 AAQS ANALYSIS**

Summaries of the maximum predicted annual average, 24-hour, and 3-hour  $SO_2$  concentrations predicted for all sources for the screening analysis are presented in Table 6-8. Based on the results presented in the table, the maximum  $SO_2$  concentrations due to all sources are expected to exceed the AAQS at certain receptors for all averaging times when the appropriate  $SO_2$  background concentration is included. It is emphasized that the violations are predicted based on all modeled emission sources emitting at the maximum allowable rate. This is a "paper" violation and will likely never occur in reality.

Table 6-6. Building Dimensions Used in the Modeling Analysis for Cargill SO<sub>2</sub> Sources

Source	Area of Influence (degrees)	Building Description	Associated Building(s)			Dominant Building	
			Building Height (feet)	Building Length (feet)	Building Width (feet)	Height (feet)	Length & Width <sup>a</sup> (feet)
SSF	10-360	GTSP Production building	127	100	120	127	137
GTSP	10-360	GTSP Production building	127	100	120	127	137
DAP #5	10-150,210-360	#5 MAP Production, high section	127	36	30	127	137
		#3,4 MAP Production building	100	100	80		
	160-200	GTSP Production building	127	100	120	127	137

Note: SO<sub>2</sub> = sulfur dioxide.

<sup>a</sup> Calculated to result in model simulation of projected crosswind width.

Source: KBN, 1992.

Table 6-7. Maximum Predicted SO<sub>2</sub> Concentrations for the Proposed Project Only - Screening Analysis

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
Annual	0.30	70.	1500.	82-----
	0.21	70.	1500.	83-----
	0.29	90.	2000.	84-----
	0.38	70.	1500.	85-----
	0.47	90.	1500.	86-----
24-Hour High	4.7	360.	1500.	82082724
	5.0	50.	1100.	83083024
	4.5	90.	1100.	84060224
	7.2	120.	3000.	85010424
	5.2	90.	1100.	86081824
24-Hour HSH	4.2	360.	1500.	82060624
	3.6	250.	2000.	83061724
	3.6	90.	1500.	84083124
	3.4	80.	1100.	85101324
	4.2	90.	1500.	86060624
3-Hour High	19.9	240.	2500.	82100109
	19.5	40.	1100.	83090515
	16.7	80.	1100.	84070715
	22.0	80.	1500.	85052409
	19.2	10.	1100.	86063012
3-Hour HSH	15.5	100.	1500.	82061015
	16.4	70.	1100.	83061215
	15.7	90.	1500.	84062209
	17.3	80.	1500.	85042415
	16.9	90.	1500.	86060618

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

Table 6-8. Maximum Predicted SO<sub>2</sub> Concentrations for the AAQS Screening Analysis

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
Annual	53	300	7,000	82-----
	49	330	8,000	83-----
	54	300	7,000	84-----
	55	350	6,000	85-----
	57	350	6,000	86-----
24-Hour HSH	364	340	8,000	82060624
	301	350	6,000	83071624
	346	150	2,000	84030724
	320	350	6,000	85081724
	338	340	6,000	86080724
3-Hour HSH	1,230	350	6,000	82012015
	1,266	340	6,000	83081012
	1,165	200	8,000	84042515
	1,146	350	6,000	85091115
	1,279	340	6,000	86080712

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

To provide greater resolution in the areas of highest predicted concentrations, three additional screening grids were used with a maximum receptor resolution of 500 m and 5 degrees. The domains of each grid are:

1. A grid near downtown Tampa comprised of direction radials every 5° from 300° to 360° and at distances from the Cargill site every 0.5 km from 5.0 to 8.0 km.
2. A grid comprised of radials every 5° from 130° to 150° and at distances from the Cargill site every 0.5 km from 2.0 to 4.0 km.
3. A grid near Ruskin comprised of direction radials every 5° from 170° to 210° and at distances from the Cargill site every 0.5 km from 5.5 to 8.0 km.

The modeling results from the first grid are presented in Table 6-9. The table presents both the AAQS results due to all sources and the maximum increase in impacts due to the proposed modification over the 5-year meteorological data base. As indicated by the table and the additional information presented in the modeling printout, numerous AAQS violations are predicted to occur for all averaging times over this domain when the impacts from all modeled sources are added to appropriate SO<sub>2</sub> background concentrations. The predicted maximum annual, 24-hour, and 3-hour impacts due to the proposed Cargill modification only are 0.20, 3.54, and 11.84 µg/m<sup>3</sup>, respectively. These concentrations are below the annual, 24-hour, and 3-hour significance levels of 1, 5, and 25 µg/m<sup>3</sup>, respectively, thereby indicating that the proposed modification will not contribute significantly to any predicted AAQS violation in this area.

The modeling results from the second grid are presented in Table 6-10. The table presents both the AAQS results due to all sources and the maximum increase in impacts due to the proposed modification over the 5-year period. Numerous 24-hour AAQS violations are predicted to occur in this area due to the impacts from all sources plus background SO<sub>2</sub> levels. The maximum 24-hour impact due to the proposed modification only is 3.48 µg/m<sup>3</sup>, which is below the 24-hour significance level of 5 µg/m<sup>3</sup>. Therefore, the proposed modification will not contribute significantly to any predicted 24-hour AAQS violation in this area.

The modeling results from the third grid are presented in Table 6-11. The table presents both the AAQS results due to all sources and the maximum increase in impacts due to the proposed modification over the 5-year period. Twenty-four-hour AAQS violations are predicted to occur

Table 6-9. Maximum Predicted SO<sub>2</sub> Concentrations for the AAQS Screening Analysis - First Detailed Area

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
<u>All Sources</u>				
Annual				
	55	310	6,500	82-----
	51	325	8,000	83-----
	55	305	6,500	84-----
	55	350	6,000	85-----
	59	355	5,500	86-----
24-Hour HSH				
	380	310	6,500	82050324
	311	355	6,000	83071624
	329	355	5,500	84083124
	325	355	6,000	85081724
	356	350	5,500	86100524
3-Hour HSH				
	1,230	350	6,000	82012015
	1,266	340	6,000	83081012
	1,057	345	6,500	84070212
	1,146	350	6,000	85091115
	1,473	340	5,500	86071315
<u>Proposed Modification Only</u>				
Annual				
	0.20	300	5,000	82-----
	0.16	305	5,000	83-----
	0.17	305	5,000	84-----
	0.15	305	5,000	85-----
	0.17	300	5,000	86-----
24-Hour High				
	2.39	300	5,000	82120324
	2.74	310	5,000	83030524
	2.50	315	5,000	84022624
	3.54	310	5,000	85083024
	2.35	310	5,000	86031324
3-Hour High				
	11.84	310	5,000	82101309
	8.79	325	5,000	83110718
	8.04	315	5,000	84022621
	8.56	310	5,000	85083003
	8.69	320	5,000	86120209

Note: YY = Year, MM = Month, DD = Day, HH = Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect to the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

Table 6-10. Maximum Predicted SO<sub>2</sub> Concentrations for the AAQS Screening Analysis - Second Detailed Area

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
<u>All Sources</u>				
Annual				
	34	135	3,500	82-----
	37	130	2,500	83-----
	38	130	2,000	84-----
	39	130	2,000	85-----
	36	130	2,000	86-----
24-Hour HSH				
	120	150	2,000	82022224
	224	130	2,500	83031124
	346	150	2,000	84030724
	226	130	2,000	85110424
	182	150	2,500	86080224
3-Hour HSH				
	763	155	2,000	82071312
	862	155	4,000	83050815
	899	155	2,000	84111215
	780	135	4,000	85070212
	712	160	2,000	86062912
<u>Proposed Modification Only</u>				
Annual				
	0.10	130	3,500	82-----
	0.13	135	4,000	83-----
	0.12	130	4,000	84-----
	0.11	135	4,000	85-----
	0.09	140	2,500	86-----
24-Hour High				
	2.16	130	4,000	82030724
	2.61	160	2,000	83072724
	3.48	130	2,500	84022824
	2.72	155	2,000	85092624
	2.46	140	2,000	86052224
3-Hour High				
	11.19	150	2,000	82072812
	12.91	130	3,500	83040309
	10.40	130	2,000	84080818
	13.60	150	2,000	85122115
	10.71	150	2,000	86060218

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect the H<sub>2</sub>SO<sub>4</sub> #9 stack location.



Table 6-11. Maximum Predicted SO<sub>2</sub> Concentrations for the AAQS Screening Analysis - Third Detailed Area

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
<u>All Sources</u>				
Annual				
	31	170	6,500	82-----
	34	210	6,500	83-----
	35	210	6,000	84-----
	36	170	6,500	85-----
	37	170	6,500	86-----
24-Hour HSH				
	157	170	6,000	82071124
	201	210	7,500	83080224
	182	205	8,000	84112324
	198	175	6,500	85081124
	230	180	6,000	86090124
3-Hour HSH				
	863	185	6,000	82082012
	1,165	185	6,000	83062312
	1,165	200	8,000	84042515
	974	185	6,000	85092215
	1,137	175	7,000	86071315
<u>Proposed Modification Only</u>				
Annual				
	0.07	210	5,500	82-----
	0.09	170	5,500	83-----
	0.11	210	5,500	84-----
	0.08	210	5,500	85-----
	0.07	210	5,500	86-----
24-Hour High				
	1.81	195	5,500	82110524
	2.27	190	5,500	83122524
	2.56	185	5,500	84112324
	1.72	200	5,500	85020724
	1.66	210	5,500	86102824
3-Hour High				
	6.28	180	5,500	82012412
	8.46	180	6,500	83121424
	8.41	205	5,500	84112012
	9.13	200	5,500	85061415
	5.72	185	5,500	86032203

Note: YY = Year, MM = Month, DD = Day, HH = Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect to the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

from the total impacts of all modeled sources plus a background concentration. The maximum 24-hour impact due to the proposed modification only is  $2.56 \mu\text{g}/\text{m}^3$ , which is below the 24-hour significance level of  $5 \mu\text{g}/\text{m}^3$ . Therefore, the proposed modification will not contribute significantly to any predicted 24-hour AAQS violation in this area.

Source contributions to the maximum 24-hour and 3-hour highest, second-highest predicted concentrations are provided in Appendix G, Table G-1.

### 6.6.3 PSD CLASS II ANALYSIS

The results of the screening analysis for PSD Class II increment consumption are presented in Table 6-12. The results indicate that the area of highest predicted PSD increment consumption occurs at receptor location (340°, 6.0 km) from the Cargill site. A refined receptor grid was centered over that area and modeled with 5 years of meteorological data. The results of the refined modeling analysis are summarized in Table 6-13. The table includes both the Class Increment consumed by all PSD sources and the highest PSD increment consumed by the proposed modification only within that area.

The results of the refined analysis indicate that the maximum 24-hour PSD Class II increment due to all sources of  $94 \mu\text{g}/\text{m}^3$  slightly exceeds the allowable PSD Class II increment of  $91 \mu\text{g}/\text{m}^3$ . The maximum annual and 3-hour PSD increment consumption due to all PSD sources are 8.1 and  $322 \mu\text{g}/\text{m}^3$ , respectively, which are below the allowable annual and 3-hour PSD Class II increments of 20 and  $512 \mu\text{g}/\text{m}^3$ . The proposed modification's maximum impact is below the significance levels for all averaging times.

### 6.6.4 PSD CLASS I ANALYSIS

Maximum  $\text{SO}_2$  concentrations predicted at the PSD Class I area of the Chassahowitzka NWA for comparison to the NPS recommended Class I significance values are presented in Table 6-14. These concentrations are predicted for the proposed sulfuric acid plant modification only. The maximum predicted impacts are 1.31, 0.27, and  $0.008 \mu\text{g}/\text{m}^3$  for the 3-hour, 24-hour and annual averaging periods, respectively. These impacts exceed the NPS significance levels for the 3-hour and 24-hour time periods. Therefore, a more extensive PSD Class I modeling analysis was performed.

Table 6-12. Maximum Predicted SO<sub>2</sub> PSD Class II Increment Consumption - Screening Analysis

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
<u>All Sources</u>				
Annual	4.4	340	6,000	82-----
	2.9	340	6,000	83-----
	6.4	340	6,000	84-----
	1.9	340	6,000	85-----
	0.8	340	6,000	86-----
24-Hour HSH	64	340	6,000	82092324
	65	340	6,000	83101824
	66	340	6,000	84011524
	56	340	6,000	85120424
	66	340	6,000	86111424
3-Hour HSH	196	340	6,000	82020421
	201	340	6,000	83101509
	202	350	6,000	84080812
	212	340	6,000	85100818
	207	340	6,000	86010909

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

Table 6-13. Maximum Predicted SO<sub>2</sub> PSD Class II Increment Consumption - Refined Analysis

Averaging Time	Concentration (μg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		Direction (degrees)	Distance (m)	
<u>All Sources</u>				
Annual	6.2	344	6,000	82-----
	4.3	344	6,100	83-----
	<del>8.1</del>	344	6,000	84-----
	<del>3.4</del>	344	6,000	85-----
	3.5	346	6,100	86-----
24-Hour HSH	<del>94</del>	346	6,100	82082924
	<del>91</del>	344	6,100	83090824
	83	346	6,100	84060124
	77	342	5,900	85091724
	85	342	5,700	86102724
3-Hour HSH	274	346	6,300	82051315
	<del>322</del>	346	6,100	83061015
	287	346	6,300	84060918
	277	346	6,300	85082812
	302	346	6,200	86091515
<u>Proposed Modification Only</u>				
Annual	0.12	330	5,600	82-----
	0.11	330	5,600	83-----
	0.07	330	5,600	84-----
	0.08	330	5,600	85-----
	0.08	336	5,600	86-----
24-Hour High	1.6	342	5,600	82121124
	1.8	340	5,600	83030724
	1.3	334	5,600	84022724
	1.8	346	5,600	85112124
	1.6	340	5,600	86082024
3-Hour High	9.4	342	5,600	82121109
	7.4	334	5,600	83020203
	5.9	336	6,400	84061418
	8.0	334	5,600	85080909
	7.2	338	5,800	86080309

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported with respect the H<sub>2</sub>SO<sub>4</sub> #9 stack location.

Table 6-14. Maximum Predicted SO<sub>2</sub> Concentrations for the Proposed Modification Only at the Chassahowitzka Wilderness Area

Averaging	Concentration	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)	NPS Recommended Significance Levels (µg/m <sup>3</sup> )
		UTM-E	UTM-N		
Annual	0.007	340300	3165700	82-----	0.03
	0.008	343700	3178300	83-----	
	0.005	340300	3165700	84-----	
	0.008	340300	3165700	85-----	
	0.007	340300	3165700	86-----	
24-Hour High	0.16	331500	3183400	82121124	0.07
	0.27	343000	3176200	83080824	
	0.11	340300	3167700	84070124	
	0.25	340300	3165700	85080924	
	0.21	343000	3176200	86072624	
3-Hour High	1.06	340300	3165700	82062603	0.48
	1.31	343000	3176200	83110724	
	0.88	340300	3167700	84070103	
	1.03	331500	3183400	85071203	
	1.14	342000	3174000	86061324	

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are reported in Universal Transverse Mercator (UTM) Coordinates.

Maximum cumulative impacts predicted at the Class I area are presented in Table 6-15. These impacts are predicted using the inventory presented in Table C-3. The maximum predicted 3-hour, 24-hour and annual concentrations are 48.5, 7.4, and 1.03  $\mu\text{g}/\text{m}^3$ , respectively. The 3-hour and 24-hour impacts exceed the PSD Class I increment values of 25 and 5  $\mu\text{g}/\text{m}^3$ , respectively. In order to assess the proposed modification's contribution to any predicted Class I violations, an analysis was performed to determine all time periods and receptors at which a violation occurred. For each case, the proposed modification's impact was determined and compared to the NPS recommended significance values. These results are presented in Appendix D, Table D-1. As shown, the proposed project does not have a significant contribution to any predicted Class I increment violation.

#### 6.6.5 H<sub>2</sub>SO<sub>4</sub> MIST ANALYSIS

FDER has developed no-threat levels (NTLs) for sulfuric acid mist: 10  $\mu\text{g}/\text{m}^3$ , 8-hour average and 2.4  $\mu\text{g}/\text{m}^3$ , 24-hour average. The maximum increase in sulfuric acid mist due to the proposed H<sub>2</sub>SO<sub>4</sub> Plant No. 9 expansion is 0.53  $\mu\text{g}/\text{m}^3$ , 8-hour average and 0.28  $\mu\text{g}/\text{m}^3$ , 24-hour average. These impacts are well below the respective NTLs for this compound.

Table 6-15. Maximum Predicted SO<sub>2</sub> PSD Class I Increment Consumption at the Chassahowitzka Wilderness Area

Averaging Time	Concentration (µg/m <sup>3</sup> )	Receptor Location <sup>a</sup>		Period Ending (YYMMDDHH)
		UTM-E (m)	UTM-N (m)	
Annual	0.93	340300	3165700	82-----
	0.74	340300	3165700	83-----
	0.96	340300	3165700	84-----
	0.87	340300	3165700	85-----
	1.03	340300	3165700	86-----
24-Hour HSH	5.9	340700	3171900	82071524
	6.9	340300	3167700	83050124
	6.9	331500	3183400	84060424
	6.7	340300	3169800	85111224
	7.4	340300	3165700	86061424
3-Hour HSH	45.4	340300	3169800	82061003
	31.7	336500	3183400	83063012
	48.5	339000	3183400	84080709
	38.7	336500	3183400	85070312
	45.2	340300	3169800	86072403

Note: YY=Year, MM=Month, DD=Day, HH=Hour, HSH = Highest, Second-Highest.

<sup>a</sup> All receptor coordinates are Universal Transverse Mercator (UTM) Coordinates.

## 7.0 ADDITIONAL IMPACT ANALYSIS

### 7.1 IMPACTS UPON VEGETATION

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

Air pollutants occurring at elevated levels have long been known to potentially cause injury to plants. For SO<sub>2</sub>, acute injury usually develops within a few hours or days of exposure. Symptoms include marginal, flecked, and/or intercostal necrotic areas which appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth and possible tissue necrosis (EPA, 1982). Background levels of sulfur dioxide range from 2.5 to 25 µg/m<sup>3</sup>. Phytotoxic symptoms demonstrated by plants can occur as low as 88 µg/m<sup>3</sup> (U.S. Department of Health, Education, and Welfare, 1971). However, this occurs with the more primitive plants (i.e., mosses, ferns, lichens).

Many studies have been conducted to determine the effects of high concentration, short-term SO<sub>2</sub> exposure on agronomic and natural community plants. Sensitive plants include ragweed, legumes, blackberry, southern pine, red and black oak, white ash, and sumac. These species can be injured by exposure to 3-hour SO<sub>2</sub> concentrations ranging from 790 to 1,570 µg/m<sup>3</sup>. Intermediate sensitivity plants include maples, locust, sweetgum, cherry, elm, and many crop and garden species. These species can be injured by exposure to 3-hour SO<sub>2</sub> concentrations ranging from 1,570 to 2,100 µg/m<sup>3</sup>. Resistant species (potentially injured at concentrations above 2,100 µg/m<sup>3</sup> for 3 hours) include white oak, potato, cotton, dogwood, and peach (EPA, 1982). A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 µg/m<sup>3</sup> SO<sub>2</sub> for 8 hours were not visibly damaged. This supports the levels cited by other researchers on the effects of SO<sub>2</sub> on vegetation. It is important to note that because plants possess metabolisms that can convert SO<sub>2</sub> into cellular constituents, they are capable of recovery when exposed to elevated levels of SO<sub>2</sub> for short periods of time.

The maximum predicted 3-hour SO<sub>2</sub> concentration due to all sources, 1,473 µg/m<sup>3</sup>, may slightly damage some sensitive species. However, it is important to realize that this maximum



concentration represents an assumed worst-case scenario, since the impact is based on a combination of worst-case meteorology and all facilities modeled at their maximum allowable emissions. Plants would be exposed to this concentration for a minimal amount of time, if at all. Based on the SO<sub>2</sub> monitors in the area, the maximum measured HSH 3-hour concentration during the previous 3 years is 586 µg/m<sup>3</sup>, or only about 40 percent of the maximum modeled 3-hour concentration.

The annual and 24-hour SO<sub>2</sub> concentrations predicted within 8 km of the Cargill facility (59 and 380 µg/m<sup>3</sup>, respectively) represent levels that are lower than those known to cause damage to the majority of test species. Radish and barley are considered good indicators of SO<sub>2</sub> pollution because of their inherent sensitivities to this gas. When these two plants were exposed to 370 and 310 µg/m<sup>3</sup> SO<sub>2</sub> for 8 hours, respectively, visible damage occurred (EPA, 1982). By comparison of these levels, it is apparent that the 24-hour total maximum predicted SO<sub>2</sub> concentration is within a range that could potentially damage SO<sub>2</sub>-sensitive plants. Again, it is important to realize that this modeled concentration represents a worst-case scenario. Although the concentrations of SO<sub>2</sub> appear to be within a hazardous range for SO<sub>2</sub>-sensitive species in the 6- to 7-km area around the facility, concentrations modeled represent worst-case scenarios which, in reality, are not likely to occur. Actual measured SO<sub>2</sub> concentrations in the area have been 125 µg/m<sup>3</sup>, HSH 24-hour, and 29 µg/m<sup>3</sup>, annual average. These actual levels pose minimal threats to area vegetation.

The increase in SO<sub>2</sub> levels due to the modification only, presented in Table 6-7, are low (0.47 µg/m<sup>3</sup>, annual average and 7.2 µg/m<sup>3</sup>, 24-hr average) and well below any threshold affect level.

## **7.2 IMPACTS UPON SOILS**

Soils in the vicinity of the Cargill site consist primarily of tidal lands and poorly drained sands with organic pans. 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<sub>2</sub> 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<sub>2</sub> deposition.

The poorly drained sands are already strongly acidic. Normal liming practices currently used on soils in the vicinity of Cargill by agricultural interests will effectively mitigate the small effects of any increased SO<sub>2</sub> deposition resulting from the increased SO<sub>2</sub> emissions from the proposed expansion.

### **7.3 IMPACTS UPON VISIBILITY**

The existing No. 9 H<sub>2</sub>SO<sub>4</sub> 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. 9 H<sub>2</sub>SO<sub>4</sub> plant's expansion is expected.

Since the Chassahowitzka PSD Class I area is located approximately 85 km to the north of the Cargill 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 Visibility Impairment" (EPA, 1980). The Level-1 screening analysis is designed to provide a conservative estimate of plume visual impacts (i.e., impacts higher than expected). The EPA model, VISCREEN, was used for this analysis. Particulate (H<sub>2</sub>SO<sub>4</sub> mist) and NO<sub>x</sub> emissions used for the calculations were based upon the total allowable emissions from the No. 9 H<sub>2</sub>SO<sub>4</sub> plant after the expansion (not just the increase in allowables due to the proposed expansion).

Model input and output results are presented in Figure 7-1. As indicated, the maximum visual impacts caused by the H<sub>2</sub>SO<sub>4</sub> No. 9 plant do not exceed the screening criteria inside or outside the Class I area after the proposed expansion.

### **7.4 ADDITIONAL GROWTH**

Total H<sub>2</sub>SO<sub>4</sub> production capacity for the Cargill plant will increase by 400 tons per day, representing a 14 percent increase in total capacity for this plant. No increase in jobs, payroll, and taxes in the area is expected as a result of these changes. Therefore, no significant growth-related impacts are expected due to the proposed expansion.

Visual Effects Screening Analysis for  
 Source: CARGILL H2SO4 PLANT 9  
 Class I Area: CHASSAHOWITZKA NWR

\*\*\* Level-1 Screening \*\*\*

Input Emissions for

Particulates 20.00 LB /HR  
 NOx (as NO2) 16.00 LB /HR  
 Primary NO2 .00 LB /HR  
 Soot .00 LB /HR  
 Primary SO4 .00 LB /HR

\*\*\*\* Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone: .04 ppm  
 Background Visual Range: 25.00 km  
 Source-Observer Distance: 85.00 km  
 Min. Source-Class I Distance: 85.00 km  
 Max. Source-Class I Distance: 103.00 km  
 Plume-Source-Observer Angle: 11.25 degrees  
 Stability: 6  
 Wind Speed: 1.00 m/s

R E S U L T S

Asterisks (\*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area  
 Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	84.	85.0	84.	2.00	.032	.05	.000
SKY	140.	84.	85.0	84.	2.00	.004	.05	-.000
TERRAIN	10.	84.	85.0	84.	2.00	.004	.05	.000
TERRAIN	140.	84.	85.0	84.	2.00	.001	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area  
 Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	70.	80.8	99.	2.00	.034	.05	.000
SKY	140.	70.	80.8	99.	2.00	.004	.05	-.000
TERRAIN	10.	60.	77.7	109.	2.00	.005	.05	.000
TERRAIN	140.	60.	77.7	109.	2.00	.001	.05	.000

Figure 7-1. Level-1 Visibility Screening Analysis for Cargill No. 9 H<sub>2</sub>SO<sub>4</sub>



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**APPENDIX A**  
**SCREENING THRESHOLD TECHNIQUE**





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV  
345 COURTLAND STREET  
ATLANTA, GEORGIA 30365

SEP 5 1985

REF: APT-AP

RECEIVED

SEP 12 1985

Eldewins Haynes  
Air Permit Unit  
State of North Carolina Department of  
Natural Resources & Community Development  
512 North Salisbury Street  
Raleigh, North Carolina 27611

AIR QUALITY

Subject: A Screening Method for PSD

Dear Mr. Haynes:

This is to acknowledge receipt of your July 22, 1985, letter containing a screening procedure for eliminating sources from the emission inventory for modeling purposes. EPA has reviewed your submittal and has determined that your screening procedure is consistent with the PSD Workshop Manual. Therefore, approval is hereby given to use the screening procedure.

Sincerely yours,

*Bruce P. Miller*

Bruce P. Miller, Acting Chief  
Air Programs Branch

DER

APR 14 1986

BAQM



State of North Carolina  
Department of Natural Resources and Community Development  
Division of Environmental Management  
512 North Salisbury Street • Raleigh, North Carolina 27611

James G. Martin, Governor  
S. Thomas Rhodes, Secretary

July 22, 1985

R. Paul Wilms  
Director

Mr. Lewis Nagler  
Air Management Branch  
EPA Region IV  
345 Courtland Street  
Atlanta, Georgia 30365

Dear Mr. Nagler:

Subject: A Screening Method for PSD

A simple screening procedure which is applicable to PSD has been developed by the North Carolina Air Quality Section. The "Screening Threshold" method is designed to rapidly and objectively eliminate from the emissions inventory those sources which are beyond the PSD impact area yet within the screening area, but are not likely to have significant interaction with the PSD source. Sources which are flagged by this procedure may then be evaluated with conventional screening techniques, or else be included in refined modeling.

Page I-C-18 of the PSD Workshop Manual does state "A simple screening model technique can be used to justify the exclusion of certain emissions...Such exclusions should be justified and documented." The "Screening Threshold" method is documented in the attachment.

We would very much appreciate your comments and ultimate approval. Please feel free to direct any questions or comments to me in writing or by phone at (919) 733-7015.

Sincerely,

A handwritten signature in cursive script that reads "Eldewins Haynes".

Eldewins Haynes, Meteorologist  
Air Permit Unit

Attachment

cc: Mr. Ogden Gerald  
Mr. Mike Sewell  
Mr. Sammy Amerson  
Mr. Jerry Clayton  
Mr. Richard Laster  
Regional Air Engineers

*Pollution Prevention Pays*

"Screening Threshold" Method for PSD Modeling  
North Carolina Air Quality Section

This method is best suited for situations where a PSD source has several sources outside its impact area, but within its screening area. The object is to find an effective means to minimize the number of such sources in a model, yet to include all sources which are likely to have a significant impact inside the impact area.

As a first-level screening technique, it is suggested to include those sources within the screening area when

$$Q = 200$$

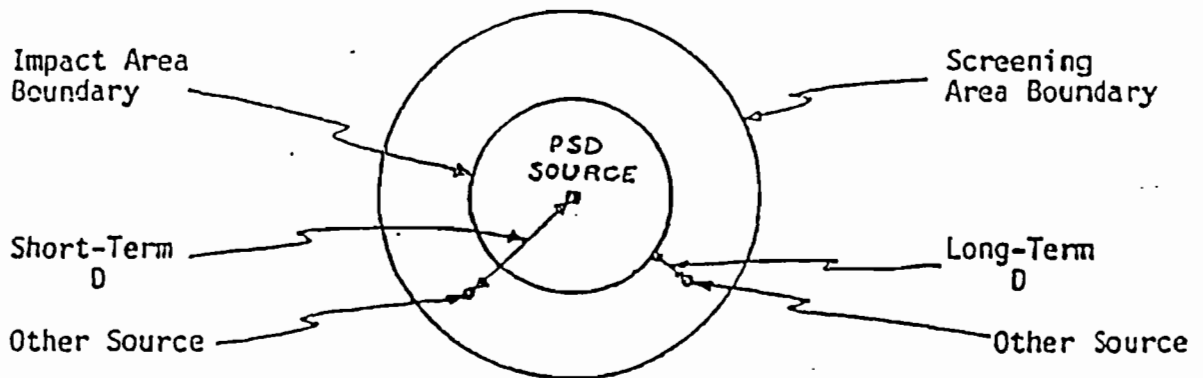
where  $Q$  is the maximum emission rate, in tons/year, of the source in the screening area; and  $D$  is a distance, in kilometers, from either:

- a. the source in the screening area to the nearest edge of the impact area, for long-term analyses

or

- b. the source in the screening area to the PSD source defining the impact area, for short-term analyses.

The figure below illustrates the difference between the long-term  $D$  and the short-term  $D$ .



This method does not preclude the use of alternate screening techniques or of more sophisticated screening techniques given the approval of the review agency. Also, this method does not prevent the review agency from specifying additional sources of interest in the modeling analysis.

The justification for this "Screening Threshold Method" rests upon the following assumptions:

- a. effective stack height = 10 meters
- b. stability class D (neutral)
- c. 2.5 meter/second wind speed
- d. mixing height = 300 meters
- e.  $Q = 200$  = critical emission rate for a given pollutant
- f. one-hour concentrations derived from figure 3-5D in Turner's WADE or from PTDIS.
- g. 3-hour and 24-hour concentrations estimated using "Vol. 10R". Annual impacts are 1/7 of 24 hour impacts.

The results, for various distances, are shown in the table below:

<u>D</u> (km)	<u>Q</u> (T/yr)	<u>1-hr Cncc.</u> (ug/m <sup>3</sup> )	<u>3-hr Cncc.</u> (ug/m <sup>3</sup> )	<u>24-hr Cncc.</u> (ug/m <sup>3</sup> )	<u>Annual Cncc.</u> (ug/m <sup>3</sup> )
0.5	10	47	42	19	2.7
1.0	20	32	29	13	1.9
1.5	30	27	24	10	1.4
2.0	40	23	21	9	1.3
3	60	18	16	7	1.0
4	80	17	15	7	1.0
5	100	14	13	6	1
6	120	13	12	5	1
10	200	10	9	4	1
20	400	7	6	3	1
30	600	6	6	3	1
40	800	6	6	3	1
50	1000	7	6	3	1

The "Screening Threshold" method is conservative. Most sources either have effective stack heights greater than 10 meters; or they have several short stacks spread out over an industrial complex. Thus, actual modeled concentrations will most likely be lower than the "Screening Threshold" would indicate in the table above. One implication of the table is that all major sources within 5 km of the subject PSD source or within 5 km of the PSD source's impact area should be scrutinized before being exempted from the final emissions inventory.

The "Screening Threshold" method is in qualitative agreement with the suggestions on page I-C-18 of the Prevention of Significant Deterioration Workshop Manual (1980). On that page, it is suggested that a 100 T/Y source 10 km outside the impact area may be excluded from the analysis. The above table would exclude a 100 T/Y source more than 5 km beyond the impact area for long-term analyses or more than 5 km away from the PSD source for short-term analyses; if the source is inside the impact area, it must be included regardless of the "Screening

Threshold". The PSD Workshop Manual also states on page I-C-18 that a 10,000 T/Y source 40 km outside the impact area would probably have to be included in the increment analysis. By the "Screening Threshold" method, the critical distance  $D = Q/20 = 10,000/20 = 500$  km. Thus a 10,000 T/Y source within 500 km would always be included for short-term and long-term analyses if within the screening area.

This "Screening Threshold" method is quick, inexpensive to execute, conservative, and consistent with the intent of the PSD Workshop Manual.

**APPENDIX B**  
**SO<sub>2</sub> EMISSION RATE CALCULATIONS**

## SO<sub>2</sub> Emission Rate Calculations

### GTSP

Maximum heat input to dryer: 30.0 MMBtu/hr (permit condition)  
Fuel oil heating capacity: 141,000 Btu/gal  
AP42 emission factor: 142 x S (S = percent sulfur in fuel)  
0.5% sulfur fuel oil

$$30.0 \times 10^6 \text{ Btu/hr} + 141,000 \text{ Btu/gal fuel} \times \\ (142 \times 0.5 \text{ lbs SO}_2/10^3 \text{ gal fuel}) = 15.11 \text{ lbs SO}_2/\text{hr}$$

### SSF

Maximum fuel use: 17.74 gal/hr (permit condition)  
AP42 emission factor: 142 x S (S = percent sulfur in fuel)  
0.5% sulfur fuel oil

$$17.74 \text{ gal fuel/hr} \times (142 \times 0.5 \text{ lbs SO}_2/10^3 \text{ gal fuel}) = 1.26 \text{ lb SO}_2/\text{hr}$$

### DAP 5

Emission rate taken from No. 5 DAP production rate increase application for construction, May 1991.

### H<sub>2</sub>SO<sub>4</sub> Plant 7

Current production rate: 2,200 tons acid/day = 91.7 tons acid/hr  
Maximum SO<sub>2</sub> emission rate: 4.0 lbs SO<sub>2</sub>/ton acid

$$91.7 \text{ tons acid/hr} \times 4.0 \text{ lb SO}_2/\text{ton acid} = 366.8 \text{ lb SO}_2/\text{hr}$$

### H<sub>2</sub>SO<sub>4</sub> Plant 8

Proposed production rate: 2,600 tons acid/day = 108.3 tons acid/hr  
Maximum SO<sub>2</sub> emission rate: 4.0 lbs SO<sub>2</sub>/ton acid

$$108.3 \text{ tons acid/hr} \times 4.0 \text{ lb SO}_2/\text{ton acid} = 433.2 \text{ lb SO}_2/\text{hr}$$

### H<sub>2</sub>SO<sub>4</sub> Plant 9

Proposed production rate: 3,200 tons acid/day = 133.3 tons acid/hr  
Maximum SO<sub>2</sub> emission rate: 4.0 lbs SO<sub>2</sub>/ton acid

$$133.3 \text{ tons acid/hr} \times 4.0 \text{ lb SO}_2/\text{ton acid} = 533.2 \text{ lb SO}_2/\text{hr}$$

**APPENDIX C**  
**SO<sub>2</sub> EMISSION INVENTORY**





Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (2 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions		
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)
40HIL290082	Sulfur Terminals Co.	-4900	7800	9.2	01	30.0	9.14	1.8	0.55	17.0	5.18	660	622	48.0	210	6.0
40HIL290018	Lafarge Corp.	-5000	8500	9.9	29	146.0	44.50	8.0	2.44	132.0	40.23	431	495	4633.0	20293	583.8
40HIL290038	TECO - Hookers Point	-4900	8800	10.1	01	280.0	85.34	11.3	3.44	20.0	6.10	295	419	328.0	1437	41.3
					02	280.0	85.34	11.3	3.44	18.0	5.49	329	438	328.0	1437	41.3
					03	280.0	85.34	12.0	3.66	26.0	7.92	322	434	452.7	1983	57.0
					04	280.0	85.34	12.0	3.66	24.0	7.32	300	422	452.0	1980	57.0
					05	280.0	85.34	11.3	3.44	36.0	10.97	347	448	671.0	2939	84.5
					06	280.0	85.34	9.4	2.87	73.0	22.25	322	434	<u>856.0</u>	<u>3749</u>	<u>107.9</u>
TOTAL													3087.7	13524	389.1	
40HIL290127	McKay Bay Resource Recovery	-2900	9700	10.1	01	160.0	48.77	5.8	1.77	97.0	29.57	540	555	42.5	186	5.4
					02	160.0	48.77	5.8	1.77	97.0	29.57	540	555	42.5	186	5.4
					03	160.0	48.77	5.8	1.77	97.0	29.57	540	555	42.5	186	5.4
					04	160.0	48.77	5.8	1.77	97.0	29.57	540	555	<u>42.5</u>	<u>186</u>	<u>5.4</u>
TOTAL													170.0	745	21.4	
40HIL290083	AMOCO Oil	-5100	9800	11.0	01	36.0	10.97	2.8	0.85	12.0	3.66	520	544	10.6	46.4	1.3

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (3 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions							
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)					
40HIL290005	Central Phosphate	-4000	10600	11.3	01	25.0	7.62	3.5	1.07	58.0	17.68	550	561	158.5	694	20.0					
					02	110.0	33.53	5.0	1.52	64.0	19.51	110	316	350.0	1533	44.1					
					03	110.0	33.53	5.0	1.52	64.0	19.51	110	316	350.0	1533	44.1					
					07	199.0	60.66	8.0	2.44	53.0	16.15	175	353	400.0	1752	50.4					
					08	199.0	60.66	8.0	2.44	31.0	9.45	148	338	317.0	1388	39.9					
					10	94.0	28.65	10.0	3.05	26.0	7.92	128	326	23.5	103	3.0					
					11	180.0	54.86	9.2	2.80	43.0	13.11	137	331	104.6	458	13.2					
					12	180.0	54.86	9.2	2.80	26.0	7.92	105	314	104.6	458	13.2					
					16	180.0	54.86	9.2	2.80	32.0	9.75	125	325	104.6	458	13.2					
					17	180.0	54.86	9.2	2.80	4.0	1.22	125	325	104.6	458	13.2					
					TOTAL													2017.4	8836	254.2	
					40HIL290057	Gulf Coast Lead	1000	11600	11.6	01	97.0	29.57	2.0	0.61	123.0	37.49	160	344	374.0	1638	47.1
					40HIL290261	Hillsborough County Resource Recovery	5300	10500	11.8	01	219.8	67.00	11.5	3.50	55.4	16.90	430	494	234.9	1029	29.6
					40HIL290099	Sulphuric Acid Trading	-13900	700	13.9	01	25.0	7.62	1.7	0.52	14.0	4.27	373	480	35.7	156.4	4.50
					40HIL290028	Gold Bond Building Products	-15600	500	15.6	21	42.0	12.80	1.1	0.34	59.0	17.98	350	450	6.5	28.8	0.82
										23	42.0	12.80	1.1	0.34	50.0	15.24	350	450	6.5	28.8	0.82
										24	42.0	12.80	1.1	0.34	61.0	18.59	350	450	6.5	28.8	0.82
28	42.0	12.80	1.1	0.34						71.0	21.64	350	450	2.1	9.3	0.27					
29	42.0	12.80	1.1	0.34						71.0	21.64	350	450	2.1	9.3	0.27					
30	42.0	12.80	1.1	0.34						71.0	21.64	350	450	2.1	9.3	0.27					
31	42.0	12.80	1.1	0.34						71.0	21.64	350	450	2.1	9.3	0.27					
34	47.0	14.33	2.5	0.76						67.0	20.42	309	427	0.092	0.4	0.012					
36	64.0	19.51	3.5	1.07						40.0	12.19	185	358	12.2	40	1.5					
47	35.0	10.67	2.8	0.85						64.0	19.51	300	422	27.0	113	3.4					
TOTAL													67.2	277	8.5						

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (4 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions			
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)	
40PNL520011	FPC - Bartow	-20500	500	20.5	01	300.0	91.44	9.0	2.74	119.0	36.27	312	429	3558.0	15584	448.3	
						02	300.0	91.44	9.0	2.74	102.0	31.09	305	425	3558.0	15584	448.3
						03	300.0	91.44	11.0	3.35	113.0	34.44	275	408	5635.0	24681	710.0
						04	30.0	9.14	3.0	0.91	17.0	5.18	515	541	14.4	63	1.8
						05	45.0	13.72	17.3	5.27	73.0	22.25	930	772	569.2	2493	71.7
						06	45.0	13.72	17.3	5.27	73.0	22.25	930	772	569.2	2493	71.7
						08	45.0	13.72	17.3	5.27	73.0	22.25	930	772	<u>392.5</u>	<u>1719</u>	<u>49.5</u>
						TOTAL											
40PNL520013	FPC - Bayboro	-24100	-10900	26.5	01	40.0	12.19	22.9	6.98	21.0	6.40	900	755	392.5	1719	49.5	
						02	40.0	12.19	22.9	6.98	21.0	6.40	900	755	392.5	1719	49.5
						03	40.0	12.19	22.9	6.98	21.0	6.40	900	755	392.5	1719	49.5
						04	40.0	12.19	22.9	6.98	21.0	6.40	900	755	<u>392.5</u>	<u>1719</u>	<u>49.5</u>
TOTAL													1569.9	6876	197.8		
40PNL520117	Pinellas County Resource Recovery	-27700	1900	27.8	03	161.0	49.07	9.0	2.74	90.0	27.43	450	505	525.0	2300	66.2	
40MAN410010	FPL - Manatee	4400	-28000	28.3	01	475.0 (b)	144.78	26.2	7.99	56.0	17.07	307	426	9515.0	41676	1198.9	
						02	475.0 (b)	144.78	26.2	7.99	56.0	17.07	307	426	<u>9515.0</u>	<u>41676</u>	<u>1198.9</u>
TOTAL													19030.0	83351	2397.8		
40MAN410002	Royster Phosphate	-14400	-24900	28.8	01	200.0	60.96	7.8	2.38	33.0	10.06	147	337	334.0	1463	42.1	

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (5 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions			
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)	
40HIL290101	IMC - Fort Lonesome	26600	-14300	30.2	01	125.0	38.10	8.0	2.44	49.0	14.94	151	339	195.0	683	24.6	
						02	125.0	38.10	8.0	2.44	55.0	16.76	151	339	195.0	854	24.6
						05	20.0	6.10	1.0	0.30	27.0	8.23	650	616	<u>1.0</u>	<u>10</u>	<u>0.1</u>
						TOTAL			391.0	1547	49.3						
40PNL520012	FPC - Higgins	-26400	16200	31.0	01	174.0	53.04	12.5	3.81	27.0	8.23	312	429	771.9	3381	97.3	
					02	174.0	53.04	12.5	3.81	27.0	8.23	310	428	753.0	3298	94.9	
					03	174.0	53.04	12.5	3.81	24.0	7.32	301	423	1031.1	4516	129.9	
					04	55.0	16.76	15.1	4.60	372.0	113.39	850	728	33.4	146	4.2	
					05	55.0	16.76	15.1	4.60	372.0	113.39	850	728	44.7	196	5.6	
					06	55.0	16.76	15.1	4.60	372.0	113.39	850	728	7.6	33	1.0	
					07	53.0	16.15	15.1	4.60	372.0	113.39	850	728	<u>114.6</u>	<u>502</u>	<u>14.4</u>	
					TOTAL			2756.2	12072	347.3							
40TPA530059	IMC - New Wales	33800	-2800	33.9	02	200.0	60.96	8.5	2.59	41.0	12.50	170	350	402.7	1764	50.7	
					03	200.0	60.96	8.5	2.59	41.0	12.50	170	350	395.0	1730	49.8	
					04	200.0	60.96	8.5	2.59	41.0	12.50	170	350	410.5	1798	51.7	
					09	133.0	40.54	7.0	2.13	49.0	14.94	105	314	74.6	327	9.4	
					13	95.0	28.96	5.6	1.71	56.0	17.07	556	564	52.6	230	6.6	
					27	172.0	52.43	8.0	2.44	43.0	13.11	120	322	18.3	80	2.3	
					42	200.0	60.96	8.5	2.59	41.0	12.50	170	350	458.0	2006	57.7	
					44	200.0	60.96	8.5	2.59	41.0	12.50	170	350	458.3	2007	57.7	
					45	171.0	52.12	6.0	1.83	58.0	17.68	110	316	9.7	43	1.2	
					46	171.0	52.12	6.0	1.83	58.0	17.68	110	316	22.0	96	2.8	
					47	94.0	28.65	6.0	1.83	35.0	10.67	175	353	<u>19.9</u>	<u>87</u>	<u>2.5</u>	
TOTAL			2321.6	10169	292.5												

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (6 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions		
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)
40HIL290075	Consolidated Minerals	30900	14100	34.0	20	20.0	6.10	1.2	0.37	66.0	20.12	630	605	1.0	4	0.1
					22	152.0	46.33	5.8	1.77	39.0	11.89	80	300	91.8	402	11.6
					24	152.0	46.33	5.8	1.77	36.0	10.97	72	295	74.0	324	9.3
					26	152.0	46.33	5.8	1.77	43.0	13.11	77	298	<u>122.4</u>	<u>536</u>	<u>15.4</u>
					TOTAL											289.2
40HIL290102	Mobil Oil Big Four Mine	31800	-12600	34.2	01	100.0	30.48	6.0	1.83	41.0	12.50	140	333	130.0	569	16.38
40TPA530047	Mobil Chemical Co. (Nichols)	35500	3100	35.6	01	80.0	24.38	7.5	2.29	41.0	12.50	160	344	156.6	686	19.7
					02	80.0	24.38	7.5	2.29	41.0	12.50	160	344	156.6	686	19.7
					03	100.0	30.48	3.6	1.10	62.0	18.90	150	339	0.4	2	0.05
					04	85.0	25.91	7.5	2.29	52.0	15.85	150	339	19.4	85	2.4
					08	13.0	3.96	2.5	0.76	6.0	1.83	480	522	<u>13.9</u>	<u>40</u>	<u>1.8</u>
TOTAL											346.9	1498	43.7			
40TPA530057	Conserv. Chemicals	35800	2000	35.9	02	52.0	15.85	2.5	0.76	66.0	20.12	120	322	2.5	11	0.3
					05	150.0	45.72	7.5	2.29	33.0	10.06	170	350	333.3	1460	42.0
					12	81.0	24.69	7.5	2.29	12.0	3.66	130	328	26.5	116	3.3
					15	27.0	8.23	2.0	0.61	45.0	13.72	500	533	0.9	4	0.1
					16	39.0	11.89	3.2	0.98	29.0	8.84	500	533	<u>1.3</u>	<u>6</u>	<u>0.2</u>
					TOTAL											364.5
40TPA530060	Mobil-Electrophosphate Division	42700	-2800	42.8	02	96.0	29.26	7.0	2.13	25.0	7.62	93	307	56.4	247	7.1
					04	100.0	30.48	4.3	1.31	40.0	12.19	115	319	228.1	999	28.7
					06	24.0	7.32	1.5	0.46	42.0	12.80	300	422	17.5	77	2.2
					07	24.0	7.32	3.0	0.91	10.0	3.05	375	464	8.7	38	1.1
					08	60.0	18.29	2.5	0.76	47.0	14.33	120	322	<u>18.0</u>	<u>79</u>	<u>2.3</u>
TOTAL											328.7	1440	41.4			

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (7 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions			
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)	
40TPA530008	Royster Co.	43900	2900	44.0	02	200.0	60.96	7.0	2.13	32.0	9.75	200	366	283.3	1190	35.7	
						05	102.0	31.09	8.8	2.68	26.0	7.92	110	316	9.0	39	1.1
						09	45.0	13.72	3.7	1.13	8.0	2.44	80	300	<u>0.5</u>	<u>2</u>	<u>0.1</u>
						TOTAL										292.8	1232
40TPA530055	Agrico Chemical	44600	-10700	45.1	01	35.0	10.67	4.8	1.46	51.0	15.54	430	494	63.5	278	8.0	
						04	150.0	45.72	5.1	1.55	92.0	28.04	170	350	287.7	1260	36.3
						05	150.0	45.72	5.1	1.55	85.0	25.91	160	344	287.7	1260	36.3
						06	150.0	45.72	9.5	2.90	31.0	9.45	170	350	333.0	1459	42.0
						10	125.0	38.10	10.0	3.05	47.0	14.33	130	328	33.5	147	4.2
						23	140.0	42.67	9.0	2.74	34.0	10.36	89	305	<u>132.0</u>	<u>578</u>	<u>16.6</u>
TOTAL										1137.4	4982	143.3					
40TPA530052	C.F. Industries	45100	200	45.9	03	112.0	34.14	4.0	1.22	57.0	17.37	90	305	316.4	1386	39.9	
						04	112.0	34.14	4.0	1.22	64.0	19.51	90	305	399.8	1751	50.4
						05	206.0	62.79	7.0	2.13	21.0	6.40	150	339	439.3	1924	55.4
						06	206.0	62.79	7.0	2.13	21.0	6.40	140	333	459.4	2012	57.9
						14	201.0	61.26	8.5	2.59	28.0	8.53	170	350	<u>312.8</u>	<u>1370</u>	<u>32.4</u>
TOTAL										1927.7	8443	242.9					
40TPA530053	Farmland Industries	46600	-2100	46.6	01	100.0	30.48	4.5	1.37	61.0	18.59	95	308	221.0	449	27.8	
						02	100.0	30.48	4.5	1.37	60.0	18.29	95	308	169.5	446	21.4
						03	100.0	30.48	7.5	2.29	28.0	8.53	170	350	347.5	1522	43.8
						04	100.0	30.48	7.5	2.29	31.0	9.45	174	352	86.6	379	10.9
						28	95.0	28.96	5.5	1.68	11.0	3.35	630	605	<u>18.6</u>	<u>81</u>	<u>2.3</u>
TOTAL										843.2	2878	106.2					

Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (8 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions		
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(*F)	(K)	(lb/hr)	(TPY)	(g/s)
40TPA530046	W.R. Grace/ Seminole Fertilizer	46900	4500	47.1	08	150.0	45.72	6.7	2.04	30.0	9.14	88	304	460.0	2015	58.0
					12	200.0	60.96	5.0	1.52	80.0	24.38	155	341	283.1	1240	35.7
					13	100.0	30.48	6.7	2.04	43.0	13.11	125	325	1.4	6	0.2
					14	53.0	16.15	2.2	0.67	13.0	3.96	84	302	0.7	3	0.1
					21	132.0	40.23	7.0	2.13	86.0	26.21	110	316	35.0	153	4.4
					30	80.0	24.38	6.6	2.01	54.0	16.46	105	314	0.01	1	0.001
					31	50.0	15.24	6.7	2.04	56.0	17.07	140	333	326.0	1428	41.1
					32	200.0	60.96	5.0	1.52	93.0	28.35	165	347	264.8	1160	33.4
					33	200.0	60.96	5.0	1.52	93.0	28.35	165	347	170.5	747	21.5
					39	50.0	15.24	6.7	2.04	56.0	17.07	140	333	<u>326.0</u>	<u>1428</u>	<u>41.1</u>
TOTAL													1867.5	8180	235.3	
NA	Hardee Power Station	41900	-24800	48.7	--	75.0	22.86	16.0	4.88	54.2	16.52	240	389	2738.0	11992	345.0
40TPA530004	Lakeland City Power	46300	24000	52.2	01	150.0	45.72	9.0	2.74	78.0	23.77	295	419	2797.9	12255	352.5
					02	20.0	6.10	2.6	0.79	77.0	23.47	715	653	11.6	51	1.5
					03	20.0	6.10	2.6	0.79	77.0	23.47	715	653	11.6	51	1.5
					04	36.0	10.97	9.2	2.80	1.0	0.30	965	791	66.0	289	8.3
					05	150.0	45.72	10.4	3.17	69.0	21.03	265	403	203.7	892	25.7
					06	250.0	76.20	16.0	4.88	107.0	32.61	170	350	<u>3888.0</u>	<u>17029</u>	<u>489.9</u>
TOTAL													6978.8	30567	879.3	



Table C-1. Summary of Individual Source Emission and Operating Parameters for Facilities Considered in the AAQS Modeling Analysis (9 of 9)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Src #	Stack Height		Stack Diameter		Exit Velocity		Temperature		Emissions		
		X (m)	Y (m)			(ft)	(m)	(ft)	(m)	(ft/s)	(m/s)	(°F)	(K)	(lb/hr)	(TPY)	(g/s)
40TPA510017	FPC - Anclote	-38500	36500	53.1	--	499.0	152.10	24.0	7.32	62.7	19.10	320	433	13341.3	58437	1681.0
					--	499.0	152.10	24.0	7.32	62.3	19.00	316	431	<u>13341.3</u>	<u>58437</u>	<u>1681.0</u>
TOTAL														26682.5	116874	3362.0

- \* TECO Big Bend Units 1,2,3 are subject to a 3-hour limit of 31.5 tons per hour for all 3 units, and a 24-hour and annual limit of 25 tons per hour for all 3 units.
- <sup>b</sup> GEP stack height. Actual stack height is 499 feet (152.1 m).
- <sup>c</sup> Used to predict 3-hour impacts based on permit limitations.
- <sup>d</sup> Used to predict 24-hour and annual impacts based on permit limitations.
- <sup>e</sup> Used to predict 3- and 24-hour impacts.
- <sup>f</sup> Used to predict annual impacts.

Table C-2. Summary of Combined Source Emission and Operating Parameters for the AAQS Facilities Considered in the Modeling Analysis (Page 1 of 5)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Source Number(s)	Stack Data		Operating Data		Emissions Data (g/s)	Modeled Source Number
		X (m)	Y (m)			Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)		
40HIL290024	IMC - Port Sutton	-2800	5300	6.0	01	19.80	2.41	10.50	339	41.5	1
40HIL290040	TECO - Gannon			6.0	01,02	93.27	3.17	24.08	427	760.2 (e)	2
					03	93.27	3.35	30.18	422	556.2 (f)	
					04	93.27	3.05	21.95	438	483.6 (e)	
					05	93.27	3.29	37.49	415	353.9 (f)	
					06	93.27	5.33	23.47	418	567.3 (e)	
					07	10.67	1.52	5.00	816	415.1 (f)	
								505.4 (f)			
								1,148.5 (e)			
									840.4 (f)		
									11.9		
									TOTAL	3,662.2 (e)	
										2,682.9 (f)	
40HIL290039	TECO - Big Bend (a)			7.3	01	149.35	7.32	28.65	422	5292.0 (c)	3
					03	149.35	7.32	14.33	418	4200.0 (d)	
					04	149.35	7.32	19.81	342	2646.0 (c)	
					05	22.86	4.27	8.17	771	2100.0 (d)	
					06	22.86	4.27	8.17	771	653.9	
					07	10.67	3.17	5.55	816	41.6	
								11.9			
									TOTAL	8687.0 (c)	
										7049.0 (d)	
40HIL290082	Sulfur Terminals Co.	-4900	7800	9.2	01	9.14	0.55	5.18	622	6.0	4

Table C-2. Summary of Combined Source Emission and Operating Parameters for the AAQS Facilities Considered in the Modeling Analysis (Page 2 of 5)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Source Number(s)	Stack Data		Operating Data		Emissions Data (g/s)	Modeled Source Number
		X (m)	Y (m)			Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)		
40HIL290018	Lafarge Corp.	-5000	8500	9.9	29	44.50	2.44	40.23	495	583.8	5
40HIL290038	TECO - Hookers Point	-4900	8800	10.1	01,02,03,04,05 06	85.34 85.34	3.44 2.87	10.97 22.25	448 434	281.1 <u>107.9</u>	6
TOTAL										389.0	
40HIL290127	McKay Bay Resource Recovery	-2900	9700	10.1	01,02,03,04	48.77	1.77	29.57	555	21.6	7
40HIL290083	AMOCO Oil	-5100	9800	11.0	01	10.97	0.85	3.66	544	1.3	8
40HIL290005	Central Phosphate	-4000	10600	11.3	01,10 02,03 07,08 11,12,16,17	7.62 33.53 60.66 54.86	1.07 1.52 2.44 2.80	17.68 19.51 9.45 7.92	561 316 338 314	23.0 88.2 90.3 <u>52.8</u>	9
TOTAL										254.3	
40HIL290057	Gulf Coast Lead	1000	11600	11.6	01	29.57	0.61	37.49	344	47.1	10
40HIL290261	Hillsborough County Resource Recovery	5300	10500	11.8	01	67.00	3.50	16.90	494	29.6	11
40HIL290099	Sulphuric Acid Trading	-13900	700	13.9	01	7.62	0.52	4.27	480	4.5	
40HIL290028	Gold Bond Building Products	-15600	500	15.6	21,23,24,28,29 30,31,34,36,47	14.33	0.76	20.42	427	8.5	12

Table C-2. Summary of Combined Source Emission and Operating Parameters for the AAQS Facilities Considered in the Modeling Analysis (Page 3 of 5)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Source Number(s)	Stack Data		Operating Data		Emissions Data (g/s)	Modeled Source Number
		X (m)	Y (m)			Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)		
40PNL520011	FPC - Bartow	-20500	500	20.5	01,02,03 04,05,06,08	91.44	3.35	34.44	408	1606.6	13
						13.72	5.27	22.25	772	194.7	
										TOTAL	1801.3
40PNL520013	FPC - Bayboro	-24100	-10900	26.5	01,02,03,04	12.19	6.98	6.40	755	197.8	14
40PNL520117	Pinellas County Resource Recovery	-27700	1900	27.8	03	49.07	2.74	27.43	505	66.2	15
40MAN410010	FPL - Manatee	4400	-28000	28.3	01,02	144.78 (b)	7.99	17.07	426	2397.8	16
40MAN410002	Royster Phosphate	-14400	-24900	28.8	01	60.96	2.38	10.06	337	42.1	17
40HIL290101	IMC - Fort Lonesome	26600	-14300	30.2	01,02,05	38.10	2.44	16.76	339	49.3	18
40PNL520012	FPC - Higgins	-26400	16200	31.0	01,02,03 04,05,06,07	53.04	3.81	7.32	423	322.1	19
						16.15	4.60	113.39	728	25.2	
										TOTAL	347.3
40TPA530059	IMC - New Wales	33800	-2800	33.9	02,03,04,09, 13,27,42,44, 45,46,47	60.96	2.59	12.50	350	292.4	20
40HIL290075	Consolidated Minerals	30900	14100	34.0	20,22,24,26	46.33	1.77	13.11	298	36.4	21
40HIL290102	Mobil Oil Big Four Mine	31800	-12600	34.2	01	30.48	1.83	12.50	333	16.38	

Table C-2. Summary of Combined Source Emission and Operating Parameters for the AAQS Facilities Considered in the Modeling Analysis (Page 4 of 5)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Source Number(s)	Stack Data		Operating Data		Emissions Data (g/s)	Modeled Source Number
		X (m)	Y (m)			Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)		
40TPA530047	Mobil Chemical Co.	35500	3100	35.6	01,02,03,04,08	24.38	2.29	12.50	344	43.6	22
40TPA530057	Conserv. Chemicals	35800	2000	35.9	02,05,12,15,16	45.72	2.29	10.06	350	45.9	23
40TPA530060	Mobil-Electrophosphate	42700	-2800	42.8	02,04,06,07,08	30.48	1.31	12.19	319	41.4	24
40TPA530008	Royster Co.	43900	2900	44.0	02,05,09	60.96	2.13	9.75	366	36.9	25
40TPA530052	C.F. Industries	45100	200	45.1	03,04 05,06 14	34.14 62.79 61.26	1.22 2.13 2.59	19.51 6.40 8.53	305 333 350	90.3 113.3 <u>39.4</u>	26
									TOTAL	243.0	
40TPA530055	Agrico Chemical	44600	-10700	45.9	01,04,05,06 10,23	45.72	2.90	9.45	350	143.4	27
40TPA530053	Farmland Industries	46600	-2100	46.6	01,02 03,04,28	30.48 30.48	1.37 2.29	18.59 8.53	308 350	49.2 <u>57.0</u>	28
									TOTAL	106.2	
40TPA530046	W.R. Grace/ Seminole Fertilizer	46900	4500	47.1	08,13,14,30 12,21,32,33 31,39	45.72 60.96 15.24	2.04 1.52 2.04	9.14 28.35 17.07	304 347 333	58.3 95.0 <u>82.2</u>	29
									TOTAL	235.5	

Table G-2. Summary of Combined Source Emission and Operating Parameters for the AAQS Facilities Considered in the Modeling Analysis (Page 5 of 5)

APIS Number	Facility	Location Relative to Cargill		Distance from Cargill (km)	APIS Source Number(s)	Stack Data		Operating Data		Emissions Data (g/s)	Modeled Source Number
		X (m)	Y (m)			Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)		
NA	Hardee Power Station	41900	-24800	48.7	--	22.86	4.88	16.52	389	345.0	30
40TPA530004	Lakeland City Power	46300	24000	52.2	01 02,03,04,05,06	45.72 76.20	2.74 4.88	23.77 32.61	419 350	352.5 <u>526.9</u>	31
									TOTAL	879.4	
40TPA510017	FPC - Anclote	-38500	36500	53.1	--	152.10	7.32	19.10	433	3362.0	32

<sup>a</sup> TECO Big Bend Units 1,2,3 are subject to a 3-hour limit of 31.5 tons per hour for the 3 units combined, and a 24-hour and annual limit of 25 tons per hour for the 3 units combined.

<sup>b</sup> GEP stack height. Actual stack height is 499 feet (152.1 meters).

<sup>c</sup> Used for predicting 3-hour impacts based on permit limitations.

<sup>d</sup> Used for predicting 24-hour and annual impacts based on permit limitations.

<sup>e</sup> Used for predicting 3- and 24-hour impacts.

<sup>f</sup> Used for predicting annual impacts.

Table C-3. Summary of SO2 Emission Sources Used in PSD Class I Modeling Analysis (Page 1 of 2)

Modeled Source ID	Source Description	UTM Coordinates (m)		Stack Data (m)		Operating Data		Modeled SO2 Emissions (g/sec)
		-----		-----		Temperature (K)	Velocity (m/s)	
		East	North	Height	Diameter			
AGRICOB	Agrico Baseline	407500	3071300	45.73	1.60	350.0	26.40	-75.60
AGRICO	Agrico Proposed	407500	3071300	45.73	1.60	350.0	39.06	113.50
AMAX1	AMAX	394800	3067720	7.57	0.41	505.0	8.20	0.60
AMAX2	AMAX	394850	3069770	7.26	1.82	334.0	30.50	16.35
ASPAV4	Asphalt Pavers 4	361400	3168400	8.50	1.08	357.4	10.95	2.25
ASPAV3	Asphalt Pavers 3	359900	3162400	12.20	1.37	377.0	10.58	2.25
AUBRN	Auburndale	420800	3103300	48.80	5.50	411.0	14.30	6.40
BB4	Teco Big Bend 4	361900	3075000	149.40	7.32	342.2	19.81	654.70
BB12	Teco Big Bend 1,2	361900	3075000	149.40	7.32	422.0	28.65	-2436.00
BB3	Teco Big Bend 3	361900	3075000	149.40	7.32	418.0	14.33	-1218.00
CFBRT	CF Industries Bartow Ret	408500	3083000	30.50	1.68	350.0	14.60	-110.60
CFBRT7	CF Industries Bartow 7	408500	3083000	67.10	2.40	351.0	9.80	52.90
CFBRTDAP	CF Industries Bartow DAP	408500	3083000	9.10	0.70	450.0	22.50	4.30
CFINDC	CF Industries C Proposed	388000	3116000	60.35	2.44	353.0	17.77	54.60
CFINDCB	CF Industries C Baseline	388000	3116000	60.35	2.44	353.0	16.40	-50.40
CFINDD	CF Industries D Proposed	388000	3116000	60.35	2.44	353.0	17.77	54.60
CFINDDB	CF Industries D Baseline	388000	3116000	60.35	2.44	353.0	16.40	-50.40
CG7	Cargill H2SO4 7	363400	3082400	45.70	2.29	355.0	9.20	-26.26
CG8	Cargill H2SO4 8	363300	3082400	45.60	2.44	339.0	13.38	-41.17
CG9	Cargill H2SO4 9	363300	3082400	45.60	2.74	350.0	12.66	67.20
CG9B	Cargill H2SO4 9 Baseline	363300	3082400	45.60	2.74	350.0	10.30	-54.60
CLMCHL	CLM CH1	361800	3088300	30.00	0.61	375.0	20.00	21.02
CNSRV	Conserve	398400	3084200	30.50	1.80	308.0	18.90	-15.20
CNSRV1	Conserve H2SO4 #1	398400	3084200	45.70	2.30	352.0	10.30	42.00
COHODESA	Couch Const-Odessa (Asp)	340700	3119500	9.14	1.40	436.0	22.30	7.25
COHZEPHY	Couch Const-Zephyr (Asp)	390300	3129400	6.10	1.38	422.0	21.00	3.54
CRYRIV1	Crystal River 1	334200	3204500	152.00	4.57	422.0	42.00	-314.00
CRYRIV2	Crystal River 2	334200	3204500	153.00	4.86	422.0	42.00	-1859.00
CRYRIV4	Crystal River 4	334200	3204500	182.90	6.90	398.0	21.00	1008.80
CRYRIV5	Crystal River 5	334200	3204500	182.90	6.90	398.0	21.00	1008.00
DEBARY	FPC Debary	467500	3197200	15.24	4.21	819.8	56.21	466.40
DRISPAV	Dris Paving (Asphalt)	340600	3119200	12.20	3.05	339.0	6.47	0.23
ERJLDR	ER Jahna (Lime Dryer)	386700	3155800	10.67	1.83	327.0	8.99	0.82
EVANS	Evans Packing	383300	3135800	12.30	0.40	466.2	9.20	0.20
FARML12	Farmland 1,2 H2SO4	409500	3079500	30.48	1.37	311.0	20.18	-54.56
FARML34	Farmland 3,4 H2SO4	409500	3079500	30.48	2.29	355.0	9.27	67.16
FARML5	Farmland 5 H2SO4	409500	3079500	45.72	2.44	355.0	9.65	41.96
FCS1	FL Crushed Stone Kiln 1	360000	3162398	97.60	4.88	469.3	27.80	98.40
FDOC3	FDOC Boiler #3	382200	3166100	9.14	0.61	478.0	4.57	2.99
FLMNM	Fl Mining and Metals	356200	3169900	27.40	4.88	470.2	7.48	1.45
HARDEE	Hardee	404800	3057400	22.90	4.88	389.0	23.9	277.60
HCAM1	Hospital Corp America 1	333400	3141000	10.98	0.31	533.0	4.00	0.08
HCAM2	Hospital Corp America 2	333400	3141000	10.98	0.31	533.0	4.00	0.08
HCRRF	Hills. Cty RRF	368200	3092700	50.00	1.80	491.0	18.30	21.40
IMC123	IMC SAP 1,2,3 Proposed	396600	3078900	61.00	2.60	350.0	15.31	182.85
IMC123B	IMC SAP 1,2,3 Baseline	396600	3078900	61.00	2.60	350.0	14.28	-170.10

Table C-3. Summary of SO2 Emission Sources Used in PSD Class I Modeling Analysis (Page 2 of 2)

Modeled Source ID	Source Description	UTM Coordinates (m)		Stack Data (m)		Operating Data		Modeled SO2 Emissions (g/sec)
		East	North	Height	Diameter	Temperature	Velocity	
						(K)	(m/s)	
IMC45	IMC SAP 4,5 Proposed	396600	3078900	60.70	2.60	350.0	15.31	121.90
IMCDAP	IMC DAP	396600	3078900	36.60	1.83	319.1	20.15	5.54
IMCLDR1	IMC Lonesome Mine Dryer	389550	3067930	38.10	2.90	339.0	10.13	18.40
IMCLDR2	IMC Lonesome Mine Dryer	389550	3067930	38.10	2.44	346.0	18.40	21.17
INT7EA	FPC Int City/7EA	446300	3126000	15.24	4.21	819.8	56.21	124.40
INT7FA	FPC Int City/7FA	446300	3126000	15.24	7.04	880.8	32.07	110.40
KSMECT	Kissimmee CTs	447684	3127924	12.20	3.00	654.0	29.10	29.40
KSMEUTL	Kissimmee Util	460100	3129300	18.30	3.66	422.0	38.00	32.10
LAKCGNP	Proposed Lake Cogen	434000	3198800	30.48	3.35	384.3	17.13	5.04
LAKMC3	Lakeland McIntosh 3	408500	3105800	76.20	4.88	350.0	19.70	500.10
LAKUTCT	Lakeland Util CT	409185	3102754	30.48	5.79	783.2	28.22	29.11
MKBAY	McKay Bay	360000	3091900	45.70	1.30	500.0	21.30	21.40
MOBILN	Mobil-Nichols	398290	3084290	25.90	2.29	339.0	15.20	2.44
NPRH1	New Port Richey Hosp 1	331200	3124500	10.98	0.31	544.0	3.88	0.06
NPRH2	New Port Richey Hosp 2	331200	3124500	10.98	0.31	544.0	3.88	0.03
OUCSTN1	OUC Stanton 1	483500	3150600	167.60	5.80	325.7	21.60	601.00
OUCSTN2	OUC Stanton 2 (24-hour)	483500	3150600	167.60	5.80	324.2	23.50	91.80
OVRSPAV	Overstreet Paving	355900	3143700	9.14	1.30	408.0	16.00	3.67
PASCGNP	Proposed Pasco Cogen	385600	3139000	30.48	3.35	384.3	17.13	5.04
PASRRF	Pasco Cty RRF	347100	3139200	83.82	3.05	394.3	15.70	14.10
PINLS	Pinellas	335300	3084400	49.10	2.74	522.0	27.72	62.24
RIDGE	Ridge	416700	3100400	99.10	3.00	350.0	14.50	13.80
ROYSTER	Royster #1	406700	3085200	51.00	2.13	356.0	9.90	-257.60
ROYSTER2	Royster #2	406700	3085200	61.00	2.13	360.0	12.20	35.70
STAUFRR	Stauffer Shutdown	325600	3116700	49.00	1.20	293.0	3.60	-52.07
TC4CC	Teco 4 CCs	402480	3067150	45.70	4.40	389.0	16.10	17.60
TC6CT	Teco 6 CTs	402520	3067680	22.90	5.50	785.0	31.40	40.10
TCIGCC	Teco IGCC	402480	3067360	45.70	5.80	400.0	16.80	49.70
TCOTHRM	Teco Thermal-Ox 2 comb.	402280	3067410	60.70	1.10	1033.0	9.10	9.50
TCOXBL	Teco Auxillary Boiler	402500	3067350	6.10	0.90	533.0	13.10	0.30
USSAC1	USSAC Ft Meade H2SO4	416120	3068620	53.40	2.59	355.0	15.91	63.00
USSAC2	USSAC Ft Meade H2SO4	416120	3068620	53.40	2.59	355.0	15.91	63.00
USSACX	USSAC Ft Meade H2SO4	416210	3068740	29.00	3.02	314.0	6.77	-78.80
WRG216	WR Grace 2 46 16	409700	3086000	61.00	2.80	346.0	7.30	73.60
WRG217	WR Grace 2 46 17	409500	3086500	61.00	1.52	347.0	28.40	72.00
WRGRT	WR Grace Retired	409700	3086000	45.70	1.40	352.0	16.50	-216.00



**APPENDIX D**

**PSD CLASS I ANALYSIS - PROPOSED MODIFICATION  
CONTRIBUTION TO PSD CLASS I VIOLATIONS**

Table D-1. Proposed Modification Contributions to 24-Hour PSD Class I Violations (Page 1 of 4)

Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1982	5.916	0.000	340700	3171900	82071524
	5.862	0.000	340300	3169800	82071524
	5.647	0.000	340300	3165700	82101224
	5.638	0.000	331500	3183400	82061024
	5.592	0.008	340700	3171900	82120124
	5.530	0.001	340300	3169800	82081124
	5.468	0.000	340300	3167700	82081124
	5.345	0.001	340700	3171900	82090924
	5.290	0.000	343000	3176200	82060324
	5.280	0.000	340300	3169800	82013024
	5.250	0.000	340300	3167700	82071524
	5.233	0.000	340300	3169800	82122424
	5.226	0.000	340700	3171900	82122424
	5.113	0.001	340700	3171900	82122224
	5.100	0.000	343700	3178300	82060324
5.020	0.000	340700	3171900	82081824	
1983	6.7041	0.023	340300	3165700	83080424
	6.301	0.022	340300	3167700	83080424
	6.038	0.000	340300	3169800	83050124
	6.028	0.000	340300	3169800	83073024
	5.674	0.002	340300	3165700	83090324
	5.527	0.004	340300	3169800	83083124
	5.380	0.001	340300	3165700	83073024
	5.359	0.000	340300	3165700	83103024
	5.348	0.065	342000	3174000	83050324
	5.336	0.000	342000	3174000	83082324
	5.230	0.000	340300	3169800	83071324
	5.179	0.000	340700	3171900	83071124
	5.178	0.004	340300	3165700	83042824
	5.118	0.000	340700	3171900	83090324
	5.102	0.005	340700	3171900	83083124
	5.079	0.000	340300	3169800	83071124
	5.074	0.000	340300	3167700	83073024
5.052	0.000	340300	3167700	83071124	
5.022	0.001	340700	3171900	83050224	
1984	6.853	0.000	331500	3183400	84060424
	6.362	0.000	340700	3171900	84123024
	6.326	0.000	340700	3171900	84080724
	6.114	0.000	342000	3174000	84061424
	5.991	0.000	340300	3169800	84080724
	5.946	0.000	340300	3169800	84123024
	5.660	0.000	340300	3167700	84032324
	5.602	0.000	340300	3167700	84080724

Table D-1. Proposed Modification Contributions to 24-Hour PSD Class I Violations (Page 2 of 4)

Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1984	5.588	0.000	340300	3169800	84032324
(cont)	5.369	0.000	340300	3165700	84080724
	5.321	0.000	340300	3165700	84123124
	5.315	0.000	342000	3174000	84123024
	5.194	0.014	343700	3178300	84101724
	5.193	0.000	342000	3174000	84072124
	5.148	0.000	343000	3176200	84061724
	5.145	0.000	331500	3183400	84122424
	5.140	0.000	340300	3165700	84032324
	5.087	0.000	340300	3165700	84121424
	5.078	0.000	340300	3167700	84071524
	5.066	0.000	343700	3178300	84082624
	5.063	0.000	340300	3169800	84123124
	5.060	0.026	343000	3176200	84091524
	5.018	0.000	336500	3183400	84080724
	5.006	0.000	340300	3167700	84123024
1985	6.677	0.000	340300	3169800	85111224
	6.034	0.000	340300	3165700	85110724
	5.676	0.000	331500	3183400	85012924
	5.557	0.000	340300	3167700	85111224
	5.479	0.000	340300	3165700	85111624
	5.400	0.000	340300	3167700	85092424
	5.360	0.000	340300	3167700	85110724
	5.288	0.003	340300	3169800	85112724
	5.268	0.000	336500	3183400	85070324
	5.265	0.000	340300	3167700	85111624
	5.134	0.032	334000	3183400	85083024
	5.097	0.000	340700	3171900	85111224
	5.067	0.000	340300	3169800	85022324
	5.063	0.000	340300	3165700	85112524
	5.050	0.006	340300	3165700	85082024
	5.044	0.000	340300	3165700	85022324
	5.041	0.005	340300	3167700	85082024
1986	7.377	0.012	340300	3165700	86061424
	7.266	0.000	341100	3183400	86071224
	7.226	0.025	340300	3169800	86072424
	7.192	0.000	342400	3180600	86080324
	7.098	0.000	343000	3176200	86071224
	6.868	0.014	336500	3183400	86053124
	6.862	0.000	343700	3178300	86053124
	6.857	0.000	339000	3183400	86080324
	6.659	0.000	342400	3180600	86053124
	6.632	0.000	343700	3178300	86080324

Table D-1. Proposed Modification Contributions to 24-Hour PSD Class I Violations (Page 3 of 4)

Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1986	6.568	0.000	343000	3176200	86121924
(cont)	6.297	0.000	342000	3174000	86060124
	6.260	0.007	340300	3169800	86020524
	6.247	0.000	343700	3178300	86121924
	6.245	0.000	331500	3183400	86091324
	6.163	0.000	339000	3183400	86071224
	6.141	0.000	340300	3167700	86020124
	6.141	0.000	340300	3167700	86061924
	6.113	0.003	336500	3183400	86080324
	6.021	0.000	336500	3183400	86091324
	6.016	0.000	340300	3167700	86062824
	5.989	0.009	331500	3183400	86102524
	5.975	0.000	342000	3174000	86070524
	5.953	0.000	340300	3169800	86061924
	5.891	0.012	340300	3167700	86020524
	5.876	0.000	340300	3167700	86083024
	5.855	0.010	340300	3169800	86061424
	5.849	0.011	340300	3167700	86061424
	5.847	0.000	340700	3171900	86060124
	5.836	0.000	341100	3183400	86053124
	5.821	0.000	340300	3169800	86092724
	5.817	0.006	334000	3183400	86102524
	5.815	0.005	340700	3171900	86053124
	5.712	0.004	340700	3171900	86020524
	5.701	0.012	334000	3183400	86080324
	5.677	0.000	343000	3176200	86080324
	5.677	0.009	340700	3171900	86061424
	5.612	0.000	340300	3165700	86020124
	5.574	0.000	340300	3165700	86062524
	5.547	0.000	342000	3174000	86121924
	5.542	0.000	340700	3171900	86061924
	5.530	0.000	340700	3171900	86062424
	5.527	0.000	340300	3165700	86112524
	5.519	0.000	343000	3176200	86060124
	5.505	0.000	340300	3165700	86062824
	5.496	0.000	340700	3171900	86110524
	5.455	0.019	340300	3165700	86020524
	5.447	0.000	342400	3180600	86121924
	5.437	0.000	340300	3165700	86061924
	5.434	0.000	340300	3169800	86062824
	5.378	0.000	340300	3169800	86062124
	5.377	0.000	336500	3183400	86061624
	5.363	0.000	340300	3169800	86020124
	5.362	0.000	331500	3183400	86112524
	5.356	0.000	343000	3176200	86070524

Table D-1. Proposed Modification Contributions to 24-Hour PSD Class I Violations (Page 4 of 4)

Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1986	5.320	0.000	343000	3176200	86100324
(cont)	5.312	0.000	331500	3183400	86041824
	5.300	0.000	340300	3169800	86110524
	5.292	0.000	340300	3167700	86062124
	5.237	0.000	340300	3169800	86112924
	5.214	0.000	343000	3176200	86030824
	5.211	0.000	340700	3171900	86030824
	5.180	0.000	334000	3183400	86021024
	5.160	0.000	334000	3183400	86061624
	5.156	0.000	340300	3167700	86112924
	5.148	0.000	334000	3183400	86070524
	5.147	0.000	343700	3178300	86111124
	5.116	0.000	342000	3174000	86110524
	5.113	0.000	341100	3183400	86102624
	5.105	0.026	334000	3183400	86072424
	5.104	0.000	340300	3169800	86040424
	5.079	0.000	342000	3174000	86030824
	5.073	0.002	340700	3171900	86070524
	5.071	0.000	340300	3165700	86112924
	5.069	0.001	336500	3183400	86121924
	5.060	0.000	334000	3183400	86121924
	5.053	0.000	342000	3174000	86062424
	5.048	0.000	336500	3183400	86070524
	5.026	0.000	342000	3174000	86083024
	5.019	0.000	340300	3167700	86092724
	5.018	0.002	340700	3171900	86080324
	5.002	0.001	342000	3174000	86020524

Table D-2. Proposed Modification Contributions to 3-Hour PSD Class I Violations (Page 1 of 2)

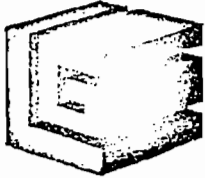
Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1982	35.416	0.000	331500	3183400	82122112
	27.640	0.000	340300	3169800	82011724
	27.449	0.000	340700	3171900	82021812
	26.956	0.000	342000	3174000	82061003
	26.193	0.001	336500	3183400	82122903
	25.916	0.000	339000	3183400	82122903
	25.736	0.000	340300	3169800	82021812
	25.381	0.000	342000	3174000	82081406
	25.183	0.000	340300	3167700	82011724
	25.072	0.000	334000	3183400	82081406
1983	29.711	0.000	336500	3183400	83051606
	26.790	0.000	340300	3167700	83090306
	26.738	0.000	340300	3165700	83081006
	26.243	0.002	334000	3183400	83060606
	25.927	0.000	342000	3174000	83051606
	25.801	0.000	340300	3169800	83060606
	25.434	0.000	334000	3183400	83051606
	25.426	0.000	340700	3171900	83050306
	25.045	0.000	336500	3183400	83050306
1984	35.538	0.000	331500	3183400	84060412
1985	37.293	0.000	331500	3183400	85012912
	34.852	0.000	339000	3183400	85070312
	33.686	0.000	331500	3183400	85011312
	31.508	0.000	336500	3183400	85113003
	30.777	0.000	336500	3183400	85070812
	28.521	0.000	340700	3171900	85070312
	27.837	0.000	340300	3167700	85070312
	25.930	0.000	340300	3165700	85070312
	25.696	0.000	343000	3176200	85110806
	25.280	0.000	339000	3183400	85110806
	25.184	0.000	341100	3183400	85040624
	1986	31.987	0.000	341100	3183400
31.874		0.000	331500	3183400	86041812
30.359		0.000	342400	3180600	86111706
30.006		0.000	340300	3165700	86072703
29.397		0.000	341100	3183400	86102603
29.387		0.000	343700	3178300	86111706
28.200		0.000	342400	3180600	86102603
28.043		0.000	343000	3176200	86100303
26.996		0.000	342400	3180600	86053103
26.978		0.000	343700	3178300	86053103

Table D-2. Proposed Modification Contributions to 3-Hour PSD Class I Violations (Page 2 of 2)

Year	Impact(ug/m <sup>3</sup> )		Receptor Location		Ending Date (YYMMDDHH)
	Total	Proposed Modification	UTM E(m)	UTM N(m)	
1986	26.453	0.000	340300	3167700	86061903
(cont)	26.411	0.000	341100	3183400	86061303
	26.370	0.000	340700	3171900	86110221
	26.296	0.000	342400	3180600	86061303
	26.188	0.000	343700	3178300	86061303
	26.179	0.000	340300	3169800	86062103
	26.108	0.000	341100	3183400	86053103
	26.086	0.000	343000	3176200	86071203
	26.040	0.000	343700	3178300	86102603
	26.039	0.000	343700	3178300	86100303
	25.899	0.000	342000	3174000	86053106
	25.883	0.000	336500	3183400	86053106
	25.747	0.000	331500	3183400	86121003
	25.236	0.000	340300	3165700	86113006
	25.225	0.000	342000	3174000	86062003
	25.197	0.000	340300	3167700	86072703
	25.028	0.000	340300	3167700	86062103

**APPENDIX E**  
**1974 ANNUAL OPERATING REPORT**  
**FOR GARDINIER, INC.**





# GARDINIER INC.

U.S. Phosphoric Products

Post Office Box 3269

Tampa, Florida 33601

Telephone 813-677-9111

TWX 810-876-0648

Telex-52656

Cable-Gardiphos

September 24, 1975

Mr. Arturo McDonald  
Hillsborough County Environmental Protection Commission  
Stovall Building  
385 Morgan  
Tampa, Florida 33601

Dear Mr. McDonald:

In accordance with your letter of August 21, 1975, the attached is our  
"Air Pollutant Emissions Report" (Form 158-1275) completed for the year 1974.

Please let me know if you have any questions concerning this data.

Very truly yours,

J. C. Gabriel  
Manager, Environmental Control

JCG:rw

Enclosure

cc: Mr. Graf

Mr. Boswell

Date Report Submitted: \_\_\_\_\_

AIR POLLUTANT EMISSIONS REPORT

SECTION I - GENERAL INFORMATION

For Official Use Only:	
Date Sent:	_____
Date Returned:	_____
UTM Grid Coordinates:	_____
SIC No.:	_____
Source ID:	_____

Plant, institution, or establishment name: Gardinier Inc., U.S. Phosphoric Products

Plant, institution, or establishment address: P.O. Box 3269, Tampa, Florida 33601  
(Street or Box Number) (City) (State) (Zip)

Person to contact regarding this report: Mr. J. C. Gabriel Title: Environmental Control Telephone: 813-677-9111

Mailing address: P.O. Box 3269, Tampa, Florida 33601  
(Street or Box Number) (City) (State) (Zip)

Approximate number of employees at plant, institution, or establishment location:  Less than 100  100 or more.

Elevation of plant, institution, or establishment in relationship to mean sea level: 6 - 8 feet above mean sea level, \_\_\_\_\_ feet below mean sea level.

Information is representative of calendar year: 1974

Land area at plant location: 637 acres. Enclose a sketch of layout if there is more than one building.

Plant location: (give nearest cross streets, describe by landmarks or enclose a map, engineering drawing, or sketch) West of Intersection of U.S. Highway 41, and Riverview Drive, East Tampa, Florida (see map attached).

Air pollutants of the type indicated in the instructions for the completion of this report, i.e., \_\_\_\_\_ are not emitted at this plant, institution or establishment. Therefore, no other Sections of the report need be completed.

\_\_\_\_\_  
(Signed) (Title)

Please return all sections of this report to: Environmental Protection Commission, Air Engineering Dept., 305 N. Morgan St., 6th Floor Tampa, Florida 33602

ENVIRONMENTAL PROTECTION AGENCY  
AIR POLLUTANT EMISSIONS REPORT

FORM APPROVED  
NOV 1970 EDITION

SECTION VI - STACK AND POLLUTANT EMISSIONS DATA

Plant, institution, or establishment name: Gardiner Inc., U.S. Phosphoric Products, East Tampa Phosphate Chemical Complex

STACK DATA							ESTIMATE OF POLLUTANT EMISSIONS			
Source Code <sup>a</sup>	Height Above Grade ft.	Inside Diameter at Top, ft.	Exit Gas Velocity, <sup>b</sup> ft./sec.	Exit Gas Temperature, <sup>b</sup> °F Approximate	Exit Gas Flow Rate, CFM <sup>c</sup>		Pollutants	Quantity		
					Average	Maximum		Tons Per Year	Lbs. Per Hour	
									Average	Maximum
CAP4	80	4.7	20.0	194	19,770	21,260	Sulfur Dioxide	1,094	266	282
							Acid Mist	17.3	4.20	5.34
CAP5	74	5.3	21.1	189	31,660	33,520	Sulfur Dioxide	1,951	462	480
							Acid Mist	23.2	5.5	7.10
CAP6	72	5.9	22.9	189	48,140	51,290	Sulfur Dioxide	2,602	657	688
							Acid Mist	37.2	9.4	11.0

- a. List code numbers corresponding to each emissions source reported in Sections II, III, and IV.
- b. Values should be representative of average flow conditions for hours of operation.
- c. At actual flow conditions.
- d. The pollutants to be covered in this survey are specified in the accompanying instructions.
- e. Give stack test data if available (indicate stack sampling method used), otherwise, specify basis used. If unknown, please do not complete these columns.

## AIR POLLUTANT EMISSIONS REPORT

## SECTION VI - STACK AND POLLUTANT EMISSIONS DATA

Plant, institution, or establishment name: Gardiner Inc., U.S. Phosphoric Products, East Tampa Phosphate Chemical Complex

STACK DATA							ESTIMATE OF POLLUTANT EMISSIONS:				
Source Code <sup>a</sup>	Height Above Grade ft.	Inside Diameter at Top, ft.	Exit Gas Velocity, <sup>b</sup> ft./sec.	Exit Gas Temperature, <sup>b</sup> °F	Exit Gas Flow Rate, CFM <sup>c</sup>		Pollutant <sup>d</sup>	Quantity			
					Average	Maximum		Tons Per Year		Lbs. Per Hour	
								Average	Maximum	Average	Maximum
CAP7	92	9.4	18.3	183	82,990	92,830	Sulfur Dioxide	6,102	1,481	1,503	
							Acid Mist	70.4	17.1	27.1	
CAP8	96	10.7	16.3	174	124,620	130,420	Sulfur Dioxide	6,462	1,612	1,679	
							Acid Mist	88.2	22	29.2	
CRS (1)	93	1.1	48.8	91	2,780	-(1)	Particulate	3.94	0.9	0.9	
RM6	95	2.0	55.5	91	10,460	10,460	Particulate	22.8	5.2	8.6	
KVS10	87	1.7	59.8	118	8,150	-(1)	Particulate	17.0	4.4	4.4 <sup>(1)</sup>	

- List code numbers corresponding to each emissions source reported in Sections II, III, and IV.
- Values should be representative of average flow conditions for hours of operation.
- At actual flow conditions.
- The pollutants to be covered in this survey are specified in the accompanying instructions.
- Give stack test data if available (indicate stack sampling method used), otherwise, specify basis used. If unknown, please do not complete these columns.

(1) 1973, One test only