P.O. Drawer L.
Plant City, Florida 33564-9007
Telephone: 813/782-1591
Fax: 813/715-0851

CF Industries, Inc.
Phosphate Operations

January 19, 2004

RECEIVED
JAN 22 2004
BUREAU OF AIR REGULATION

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Department of Air Resources Management
2600 Blair Stone Road, MS 5500
Tallahassee, Florida 32399-2400

Dear Ms. Vielhauer:

CF Industries, Inc., is applying for a construction permit to modify the "C" and "D" Sulfuric Acid Plants at the Plant City Phosphate Complex. The modification will allow an increase in the production rate of each plant from 2,600 tons sulfuric acid per day (TPD) to 2,750 TPD.

Accompanying this transmittal letter are seven copies of the PSD permit application and a check in the amount of $7,500.00 for the permit processing fee. One copy is also being sent to the Hillsborough County Environmental Protection Commission. CF personnel and CF's consultant met with Mr. Al Linero and Hillsborough County Personnel on December 19, 2003, to discuss the submittal of the application. We believe the application addresses the issues raised in that meeting and the requirements of the applicable rules.

If there are any questions regarding the application, please direct them to Bob May at (813) 782-1591, extension 5603, or to Tom Edwards at extension 5608.

Sincerely,

Herschel E. Morris
Vice President,
Phosphate Operations and
General Manager

cc: Jerry Campbell, HCEPC
J.S. Alves, HCS

PSD APPLICATION FOR THE C AND D SULFURIC ACID PLANTS

CF INDUSTRIES, INC.
PLANT CITY PHOSPHATE COMPLEX
PLANT CITY, FLORIDA

Prepared For:
CF Industries, Inc.
10608 Paul Buchman Highway
Plant City, Florida 33565

Prepared By:
Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

January 2004
0337620

DISTRIBUTION:
7 Copies – FDEP
4 Copies – CF Industries, Inc.
1 Copy - HCEPC
2 Copies – Golder Associates Inc.

PART A

PERMIT APPLICATION

Department of Environmental Protection

Division of Air Resource Management

RECEIVED
JAN 22 2004
BUREAU OF AIR REGULATION

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit for a proposed project:

- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

Air Operation Permit – Use this form to apply for:

- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option) – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **CF Industries, Inc.**	
2. Site Name: **Plant City Phosphate Complex**	
3. Facility Identification Number: **0570005**	
4. Facility Location...: Street Address or Other Locator: **10608 Paul Buchman Highway** City: **Plant City** County: **Hillsborough** Zip Code: **33565**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **J. Michael Messina; Chief, Environmental Services**
2. Application Contact Mailing Address... Organization/Firm: **CF Industries, Inc.** Street Address: **P.O. Box Drawer L** City: **Plant City** State: **FL** Zip Code: **33564-9007**
3. Application Contact Telephone Numbers... Telephone: **(813) 364-5639** ext. Fax: **(813) 788-9126**
4. Application Contact Email Address: **mmessina@cfifl.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	1-22-2004
2. Project Number(s):	0570005-019-AC
3. PSD Number (if applicable):	PSD-FL-339
4. Siting Number (if applicable):	

APPLICATION INFORMATION

Purpose of Application

This application for air permit is submitted to obtain: (Check one)

Air Construction Permit

☒ Air construction permit.

Air Operation Permit

☐ Initial Title V air operation permit.
☐ Title V air operation permit revision.
☐ Title V air operation permit renewal.
☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.
☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

Application to increase the production rate and modify the "C" and "D" Sulfuric Acid Plants and to increase the maximum throughput rate of the Molten Sulfur Storage and Handling System. Refer to Part B for detailed description.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
007	"C" Sulfuric Acid Plant	AC1A	$7,500
008	"D" Sulfuric Acid Plant	AC1A	
022, 023, 024, 033	Molten Sulfur Storage and Handling System	AC1A	

Application Processing Fee

Check one: ☒ Attached - Amount: $ 7,500 ☐ Not Applicable

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1.	Owner/Authorized Representative Name : **Herschel E. Morris, Vice President Phosphate Operations/General Manager**
2.	Owner/Authorized Representative Mailing Address... Organization/Firm: **CF Industries, Inc.** Street Address: **P.O. Drawer L** City: **Plant City** State: **FL** Zip Code: **33564**
3.	Owner/Authorized Representative Telephone Numbers... Telephone: **(813) 782-1591** ext. Fax: **(813) 788-9126**
4.	Owner/Authorized Representative Email Address: **hmorris@cfifl.com**
5.	Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.* Herschel E. Morris (signature) 1/21/04 Signature Date

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):
   - ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
   - ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
   - ☐ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
   - ☐ The designated representative at an Acid Rain source.

3. Application Responsible Official Mailing Address...
   Organization/Firm:
   Street Address:
   City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
   Telephone: () - ext. Fax: () -

5. Application Responsible Official Email Address:

6. Application Responsible Official Certification:

   I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

   ______________________ ______________________
   Signature Date

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: David A. Buff Registration Number: 19011
2.	Professional Engineer Mailing Address... Organization/Firm: Golder Associates Inc.** Street Address: 6241 NW 23rd Street, Suite 500 City: Gainesville State: FL Zip Code: 32653
3.	Professional Engineer Telephone Numbers... Telephone: (352) 336-5600 ext.545 Fax: (352) 336-6603
4.	Professional Engineer Email Address: dbuff@golder.com
5.	Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

David A. Buff ______ 1/16/04 ______
Signature Date

(seal)

* Attach any exception to certification statement.
** Board of Professional Engineers Certificate of Authorization #00001670

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** East (km) **388.00** North (km) **3116.00**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **28/9/57** Longitude (DD/MM/SS) **82/8/27**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **28**	6. Facility SIC(s): **2874**
7. Facility Comment :			

Facility Contact

1. Facility Contact Name: **J. Michael Messina; Chief, Environmental Services**
2. Facility Contact Mailing Address... Organization/Firm: **CF Industries, Inc.** Street Address: **P.O. Drawer L** City: **Plant City** State: **FL** Zip Code: **33564-9007**
3. Facility Contact Telephone Numbers: Telephone: **(813) 364-5639** ext. Fax: **(813) 788-9126**
4. Facility Contact Email Address: **mmessina@cfifl.com**

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official Email Address:

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☐ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☐ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
Particulate Matter - Total (PM)	**A**	**N**
Fluoride (FL)	**B**	**N**
Sulfur Dioxide (SO_2)	**A**	**N**
Sulfuric Acid Mist (SAM)	**A**	**N**
Nitrogen Oxides (NO_x)	**B**	**N**
Particulate Matter (PM_{10})	**A**	**N**

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility Wide Cap [Y or N]? (all units)	3. Emissions Unit ID No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Part B** ☐ Previously Submitted, Date:____
2.	Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **CF-FI-C2** ☐ Previously Submitted, Date:____
3.	Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID:_______ ☒ Previously Submitted, Date: **August 2003**

Additional Requirements for Air Construction Permit Applications

1.	Area Map Showing Facility Location: ☐ Attached, Document ID:_____ ☒ Not Applicable (existing permitted facility)
2.	Description of Proposed Construction or Modification: ☒ Attached, Document ID: **Part B**
3.	Rule Applicability Analysis: ☒ Attached, Document ID: **CF-FI-CC3**
4.	List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable (no exempt units at facility)
5.	Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable
6.	Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): ☒ Attached, Document ID: **Part B** ☐ Not Applicable
7.	Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): ☒ Attached, Document ID: **Part B** ☐ Not Applicable
8.	Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): ☒ Attached, Document ID: **Part B** ☐ Not Applicable
9.	Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): ☒ Attached, Document ID: **Part B** ☐ Not Applicable
10.	Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:_____ ☒ Not Applicable

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☐ Attached, Document ID:_____ ☐ Not Applicable (no exempt units at facility)	

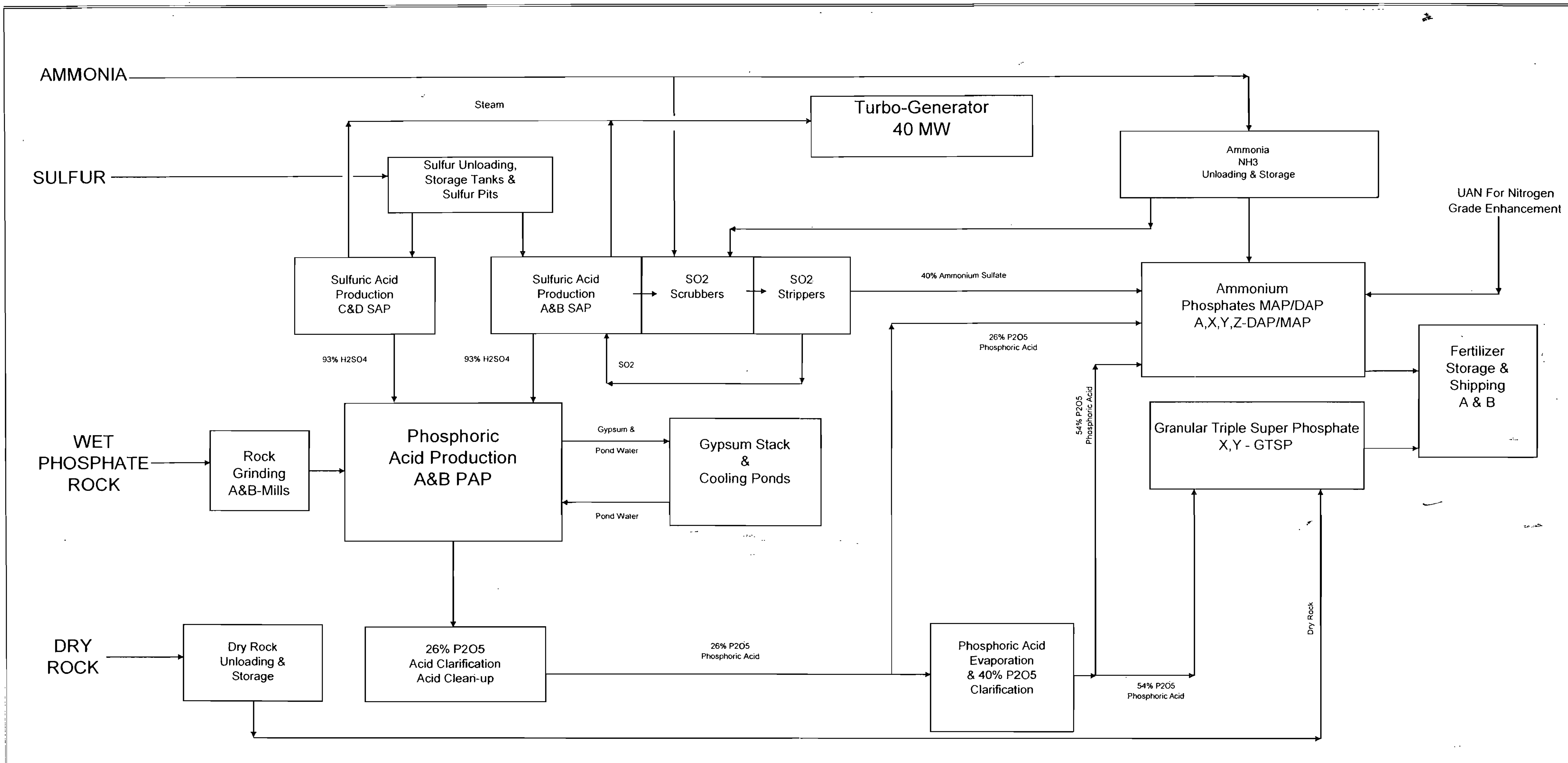
Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities (Required for initial/renewal applications only): ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application)
2. Identification of Applicable Requirements (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought): ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application with no change in applicable requirements)
3. Compliance Report and Plan (Required for all initial/revision/renewal applications): ☐ Attached, Document ID:_____ Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.
4. List of Equipment/Activities Regulated under Title VI (If applicable, required for initial/renewal applications only): ☐ Attached, Document ID:_____ ☐ Equipment/Activities On site but Not Required to be Individually Listed ☐ Not Applicable
5. Verification of Risk Management Plan Submission to EPA (If applicable, required for initial/renewal applications only) : ☐ Attached, Document ID:_____ ☐ Not Applicable
6. Requested Changes to Current Title V Air Operation Permit: ☐ Attached, Document ID:_____ ☐ Not Applicable

Additional Requirements Comment

ATTACHMENT CF-FI-C2

FACILITY PROCESS FLOW DIAGRAM



Revision	By	Date	CF Industries, Inc.	Title	DWR. NO
	Randy Charlot	1/15/02	Plant City Phosphate Complex	Attachment CF-FI-C2	
	Josh McEwen	1/31/2002	P.O. Drawer L	Facility Wide Block Flow Diagram	
			Plant City, Florida 33564		0.0-SK-113
			Phone: (813) 782-1591		
			Fax: (813) 788-9126		0.0-SK-113.xls

ATTACHMENT CF-FI-CC3

RULE APPLICABILITY ANALYSIS

ATTACHMENT CF-FI-CC3

RULE APPLICABILITY ANALYSIS

"C" and "D" Sulfuric Acid Plants

40 CFR 60.7 - NSPS – General Provisions – Notification & Recordkeeping
40 CFR 60.8 - NSPS – General Provisions – Performance Tests
40 CFR 60.11 - NSPS – General Provisions – Standards & Maintenance
40 CFR 60.12 - NSPS – Circumvention
40 CFR 60.13(a) – NSPS – Monitoring Requirements
40 CFR 60.13(b) – NSPS – Monitoring Requirements
40 CFR 60.13(c)(2) – NSPS – Monitoring Requirements
40 CFR 60.13(d)(1) – NSPS – Monitoring Requirements
40 CFR 60.13(e)(2) – NSPS – Monitoring Requirements
40 CFR 60.13(f) – NSPS – Monitoring Requirements
40 CFR 60.13(i) – NSPS – Monitoring Requirements
40 CFR 60.13(j) – NSPS – Monitoring Requirements
40 CFR 60.19 – NSPS – General Provisions – General Notification & Reporting
40 CFR 60.82 – NSPS Subpart H – SO_2 Standard
40 CFR 60.83 – NSPS Subpart H – Acid Mist Standard
40 CFR 60.84 – NSPS Subpart H – Emission Monitoring
40 CFR 60.85 – NSPS Subpart H – Test Methods & Procedures
62-204.800(8)(b)11. - Reference to NSPS
62-212.400 – PSD
62-296.402(2) – Sulfuric Acid Plants – New Plants
62-296.402(3) - Sulfuric Acid Plants – Test Methods
62-296.402(4) - Sulfuric Acid Plants – CEM Requirements
62-296.402(5) - Sulfuric Acid Plants – Quarterly Reporting
62-297.310 – General Compliance Test Requirements
62-297.520(2) – Continuous Monitor Performance Specifications – PS2

MOLTEN SULFUR STORAGE AND HANDLING SYSTEM

62-296.411(1)(a) – Sulfur Storage and Handling Facilities
62-296.411(1)(b)
62-296.411(1)(d)
62-296.411(1)(e)
62-296.411(1)(f)
62-296.411(1)(h)
62-296.411(1)(j)
62-297.310 – General Compliance Test Requirements
62-297.401 – Compliance Test Methods

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   "C" Sulfuric Acid Plant (SAP)

3. Emissions Unit Identification Number: **007**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A			**28**	☐ Yes ☒ No

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:
   There exists a potential for fugitive emissions of SO_2/NO_x/SAM to occur from this emissions unit. It is our understanding, based on past FDEP interpretations and permitting history, that these emissions are not regulated under federal/state/local emission standards.

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description: **Sulfuric Acid Plant – Double Contact Process** **Mist Eliminator – High Velocity**
2. Control Device or Method Code(s): **044,014**

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:		
2. Maximum Production Rate: **2,750 TPD 100% H_2SO_4**		
3. Maximum Heat Input Rate: million Btu/hr		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	**24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment:		

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **"C" SAP**		2. Emission Point Type Code: **1**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code: **V**	6. Stack Height: **199** feet	7. Exit Diameter: **8.0** feet
8. Exit Temperature: **158**°F	9. Actual Volumetric Flow Rate: **140,700** acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm		12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **Exit temperature and volumetric flow rate updated based on recent test data and maximum production rate.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Chemical Manufacturing; Sulfuric Acid (Contact Process); Absorber @ 99.9% Conversion.**		
2. Source Classification Code (SCC): **3-01-023-01**	3. SCC Units: **Tons 100% H_2SO_4 Produced**	
4. Maximum Hourly Rate: **114.6**	5. Maximum Annual Rate: **1,003,750**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum rates based on 2,750 TPD 100% H_2SO_4.**		

Segment Description and Rate: Segment _ of _

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
SO_2	044		EL
SAM	014		EL
NO_x			EL

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **441.15** lb/hour **1,756.56** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.5 lb/ton H_2SO_4** Reference: **Proposed Emission Limit**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **3-hour Average: 3.85 lb/ton x 2,750 TPD x 1 day/24hr = 441.15 lb/hr** **24-hour Average: 3.5 lb/ton x 2,750 TPD x 1 day/24hr = 401.04 lb/hr** **Annual: 401.04 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 1,756.56 TPY**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Potential hourly emissions represent 3-hour average (based on 3.85 lb/ton). The 24-hour average emission rate is 3.5 lb/ton.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.85 lb/ton**	4. Equivalent Allowable Emissions: **441.15** lb/hour tons/year
5. Method of Compliance: **Annual stack test using EPA Method 8.**	
6. Allowable Emissions Comment (Description of Operating Method): **Represents 3-hour average.**	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.5 lb/ton**	4. Equivalent Allowable Emissions: **401.04** lb/hour **1,756.56** tons/year
5. Method of Compliance: **Continuous SO_2 monitor.**	
6. Allowable Emissions Comment (Description of Operating Method): **Represents 24-hour average.**	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **11.46** lb/hour **50.19** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.10 lb/ton** Reference: **Proposed Emission Limit**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **Hourly: 0.10 lb/ton x 2,750 TPD x 1 day/24 hr = 11.46 lb/hr** **Annual: 11.46 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 50.19 TPY**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __1__ of __1__

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.10 lb/ton**	4. Equivalent Allowable Emissions: **11.46** lb/hour **50.19** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 8.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on proposed BACT.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **16.04** lb/hour **70.26** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.14 lb/ton** Reference: **Permit No. 0570005-017-AV**	7. Emissions Method Code: **0**

8. Calculation of Emissions:

Hourly: **0.14 lb/ton x 2,750 TPD x 1 day/24 hr = 16.04 lb/hr**

Annual: **16.04 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 70.26 TPY**

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.14 lb/ton**	4. Equivalent Allowable Emissions: **16.04** lb/hour **70.26** tons/year
5. Method of Compliance: **EPA Method 7, 7A, or 7E upon request.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on current permit limit (Permit No. 0570005-017-AV).**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE10**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: **10** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9.**	
5. Visible Emissions Comment: **Applies except during startup, shutdown, or malfunction. Based on Permit No. 0570005-017-AV.**	

Visible Emissions Limitation: Visible Emissions Limitation ____ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor 1 of 2

1. Parameter Code: **EM**	2. Pollutant(s): **SO_2**
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... Manufacturer: **Dupont** Model Number: **460-002-901**	Serial Number:
5. Installation Date: **5/27/91**	6. Performance Specification Test Date: **6/17/91, 6/18/91**
7. Continuous Monitor Comment: **Based on Rule 62-296.402(4), F.A.C.**	

Continuous Monitoring System: Continuous Monitor 2 of 2

1. Parameter Code: **Acid Production**	2. Pollutant(s):
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Rule 62-297.310(5)(b), F.A.C. and Permit No. 0570005-017-AV.**	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **Part B** ☐ Previously Submitted, Date ____

2. Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ______ ☐ Previously Submitted, Date ____

3. Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: **Part B** ☐ Previously Submitted, Date ____

4. Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date ____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date ____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records
   ☐ Attached, Document ID: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ Previously Submitted, Date: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ To be Submitted, Date (if known): __________
   Test Date(s)/Pollutant(s) Tested: ____
   ☒ Not Applicable

   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute
   ☐ Attached, Document ID: ____ ☒ Not Applicable

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) ☒ Attached, Document ID: **Part B** ☐ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.) ☒ Attached, Document ID: **Part B** ☐ Not Applicable	
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements ☐ Attached, Document ID: _____ ☐ Not Applicable	
2. Compliance Assurance Monitoring ☐ Attached, Document ID: _____ ☐ Not Applicable	
3. Alternative Methods of Operation ☐ Attached, Document ID: _____ ☐ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading) ☐ Attached, Document ID: _____ ☐ Not Applicable	
5. Acid Rain Part Application ☐ Certificate of Representation (EPA Form No. 7610-1) ☐ Copy Attached, Document ID: _____ ☐ Acid Rain Part (Form No. 62-210.900(1)(a)) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Not Applicable	

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   "D" Sulfuric Acid Plant (SAP)

3. Emissions Unit Identification Number: **008**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A			**28**	☐ Yes ☒ No

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:
   There exists a potential for fugitive emissions of SO_2/NO_x/SAM to occur from this emissions unit. It is our understanding, based on past FDEP interpretations and permitting history, that these emissions are not regulated under federal/state/local emission standards.

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description:
   Sulfuric Acid Plant – Double Contact Process
   Mist Eliminator – High Velocity

2. Control Device or Method Code(s): **044,014**

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:		
2. Maximum Production Rate: **2,750 TPD 100% H_2SO_4**		
3. Maximum Heat Input Rate: million Btu/hr		
4. Maximum Incineration Rate:	pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	**24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment:		

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **"D" SAP**		2. Emission Point Type Code: **1**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code: **V**	6. Stack Height: **199** feet	7. Exit Diameter: **8.0** feet
8. Exit Temperature: **161**°F	9. Actual Volumetric Flow Rate: **145,600** acfm	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: dscfm		12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **Exit temperature and volumetric flow rate updated based on recent test data and maximum production rate.**		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Chemical Manufacturing; Sulfuric Acid (Contact Process); Absorber @ 99.9% Conversion.**		
2. Source Classification Code (SCC): **3-01-023-01**	3. SCC Units: **Tons 100% H_2SO_4 Produced**	
4. Maximum Hourly Rate: **114.6**	5. Maximum Annual Rate: **1,003,750**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Maximum rates based on 2,750 TPD 100% H_2SO_4.**		

Segment Description and Rate: Segment _ of _

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
SO_2	044		EL
SAM	014		EL
NO_x			EL

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **441.15** lb/hour **1,756.56** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.5 lb/ton H_2SO_4** Reference: **Proposed Emission Limit**	7. Emissions Method Code: **0**

8. Calculation of Emissions:

3-hour Average: 3.85 lb/ton x 2,750 TPD x 1 day/24hr = 441.15 lb/hr
24-hour Average: 3.5 lb/ton x 2,750 TPD x 1 day/24hr = 401.04 lb/hr
Annual: 401.04 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 1,756.56 TPY

9. Pollutant Potential/Estimated Fugitive Emissions Comment:
Potential hourly emissions represent the 3-hour average (based on 3.85 lb/ton). The 24-hour average emission rate is 3.5 lb/ton.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.85 lb/ton**	4. Equivalent Allowable Emissions: **441.15** lb/hour tons/year
5. Method of Compliance: **Annual stack test using EPA Method 8.**	
6. Allowable Emissions Comment (Description of Operating Method): **Represents 3-hour average.**	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.5 lb/ton**	4. Equivalent Allowable Emissions: **401.04** lb/hour **1,756.56** tons/year
5. Method of Compliance: **Continuous SO_2 monitor.**	
6. Allowable Emissions Comment (Description of Operating Method): **Represents 24-hour average.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SAM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **11.46** lb/hour **50.19** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.10 lb/ton** Reference: **Proposed Emission Limit**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **Hourly: 0.10 lb/ton x 2,750 TPD x 1 day/24 hr = 11.46 lb/hr** **Annual: 11.46 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 50.19 TPY**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.10 lb/ton**	4. Equivalent Allowable Emissions: **11.46** lb/hour **50.19** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 8.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on proposed BACT.**	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **NO_x**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **16.04** lb/hour **70.26** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.14 lb/ton** Reference: **Permit No. 0570005-017-AV**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **Hourly: 0.14 lb/ton x 2,750 TPD x 1 day/24 hr = 16.04 lb/hr** **Annual: 16.04 lb/hr x 8,760 hr/yr ÷ 2,000 lb/ton = 70.26 TPY**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.14 lb/ton**	4. Equivalent Allowable Emissions: **16.04** lb/hour **70.26** tons/year
5. Method of Compliance: **EPA Method 7, 7A, or 7E upon request.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on current permit limit (Permit No. 0570005-017-AV).**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE10**	2. Basis for Allowable Opacity: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: **10** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9.**	
5. Visible Emissions Comment: **Applies except during startup, shutdown, or malfunction. Based on Permit No. 0570005-017-AV.**	

Visible Emissions Limitation: Visible Emissions Limitation ____ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor 1 of 2

1. Parameter Code: **EM**	2. Pollutant(s): **SO_2**
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... Manufacturer: **Dupont** Model Number: **460-002-901** Serial Number:	
5. Installation Date: **5/27/91**	6. Performance Specification Test Date: **6/20/91**
7. Continuous Monitor Comment: **Based on Rule 62-296.402(4), F.A.C.**	

Continuous Monitoring System: Continuous Monitor 2 of 2

1. Parameter Code: **Acid Production**	2. Pollutant(s):
3. CMS Requirement: ☒ Rule ☐ Other	
4. Monitor Information... Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Rule 62-297.310(5)(b), F.A.C. and Permit No. 0570005-017-AV.**	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Part B** ☐ Previously Submitted, Date _____
2.	Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: _______ ☐ Previously Submitted, Date _____
3.	Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: **Part B** ☐ Previously Submitted, Date _____
4.	Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____ ☒ Not Applicable (construction application)
5.	Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date _____ ☒ Not Applicable
6.	Compliance Demonstration Reports/Records ☐ Attached, Document ID: _____ Test Date(s)/Pollutant(s) Tested: _____ _____ ☐ Previously Submitted, Date: _____ Test Date(s)/Pollutant(s) Tested: _____ _____ ☐ To be Submitted, Date (if known):___________ Test Date(s)/Pollutant(s) Tested: _____ _____ ☒ Not Applicable Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7.	Other Information Required by Rule or Statute ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) ☒ Attached, Document ID: Part B ☐ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.) ☒ Attached, Document ID: Part B ☐ Not Applicable	
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: ____ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements ☐ Attached, Document ID: ____ ☐ Not Applicable	
2. Compliance Assurance Monitoring ☐ Attached, Document ID: ____ ☐ Not Applicable	
3. Alternative Methods of Operation ☐ Attached, Document ID: ____ ☐ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading) ☐ Attached, Document ID: ____ ☐ Not Applicable	
5. Acid Rain Part Application ☐ Certificate of Representation (EPA Form No. 7610-1) ☐ Copy Attached, Document ID: ____ ☐ Acid Rain Part (Form No. 62-210.900(1)(a)) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date: ____ ☐ Not Applicable	

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

☐ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

☒ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
Molten Sulfur Storage and Handling System: 2 Tanks, 3 Pits, Truck and Railcar Unloading

3. Emissions Unit Identification Number: **022, 023, 024, 033**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A			**28**	☐ Yes ☒ No

9. Package Unit:
Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:
There exists a potential for fugitive emissions of PM/PM_{10}/TRS/SO_2/VOC to occur from these emission units. It is our understanding, based on past FDEP interpretations and permitting history, that these emissions are not regulated under federal/state/local emission standards.

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description:
2. Control Device or Method Code(s):

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1.	Maximum Process or Throughput Rate: **965,388 TPY**
2.	Maximum Production Rate:
3.	Maximum Heat Input Rate: million Btu/hr
4.	Maximum Incineration Rate: pounds/hr tons/day
5.	Requested Maximum Operating Schedule: **24** hours/day **7** days/week **52** weeks/year **8,760** hours/year
6.	Operating Capacity/Schedule Comment: **Maximum throughput is based on maximum daily sulfuric acid production of 8,100 TPD 100% H_4SO_4. Maximum annual production: 8,100 TPD x 365 day/yr = 2,956,500 TPY 100% H_2SO_4 (x 32 tons S/98 tons H_2SO_4 = 965,388 TPY sulfur required).**

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **Truck Pits A (023), B (024); Tank (022), Tank (033), Railcar Pit**	2. Emission Point Type Code: **3**

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:

Storage Tank 022 = 022 (2,600-ton tank)
Truck Pit A = 023
Truck Pit B = 024
Storage Tank 033 = 033 (5,000-ton tank)
Railcar Unloading Pit

4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:

5. Discharge Type Code:	6. Stack Height: **12** feet	7. Exit Diameter: **0.67** feet
8. Exit Temperature: **212**°F	9. Actual Volumetric Flow Rate: acfm	10. Water Vapor: %

11. Maximum Dry Standard Flow Rate: **30** dscfm	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)

15. Emission Point Comment:
Stack parameters represent Truck Pit A. All other stack/vent parameters listed in Part B, Table 2-2.

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Mineral Products; Bulk Materials Unloading Operation; Sulfur**		
2. Source Classification Code (SCC):	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate:	5. Maximum Annual Rate: **965,388**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
SO_2			NS
PM			NS
PM_{10}			NS
VOC			NS
TRS			NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.66** lb/hour **2.87** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **7.30 E-05 lb/dscf** Reference: **Part B, Table 2-5**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **Refer to Part B, Table 2-5.**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Represents total emissions from entire system.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of _

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.65** lb/hour **2.06** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **Part B, Table 2-5** Reference:	7. Emissions Method Code: **5**
8. Calculation of Emissions: **Refer to Part B, Table 2-5.**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Represents total emissions from entire system.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.65** lb/hour **2.06** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **Part B, Table 2-5** Reference:	7. Emissions Method Code: **5**
8. Calculation of Emissions: **Refer to Part B, Table 2-5.**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Represents total emissions from entire system.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.47** lb/hour **2.04** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **5.20 E-05 lb/dscf** Reference: **Part B, Table 2-5**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **Refer to Part B, Table 2-5.**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Represents total emissions from entire system.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **TRS**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **0.32** lb/hour **1.38** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.5 E-05 lb/dscf** Reference: **Part B, Table 2-5**	7. Emissions Method Code: **5**
8. Calculation of Emissions: **Refer to Part B, Table 2-5.**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **Represents total emissions from entire system.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE10**	2. Basis for Allowable Opacity: ☐ Rule ☒ Other
3. Allowable Opacity: Normal Conditions: **10** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9**	
5. Visible Emissions Comment: **Permit No. 0570005-017-AV.**	

Visible Emissions Limitation: Visible Emissions Limitation ____ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor _ of _

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor _ of _

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☒ Attached, Document ID: Part B ☐ Previously Submitted, Date ____

2. Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ☐ Previously Submitted, Date ____

3. Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ☐ Previously Submitted, Date ____

4. Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date ____
   ☒ Not Applicable (construction application)

5. Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date ____
   ☒ Not Applicable

6. Compliance Demonstration Reports/Records
   ☐ Attached, Document ID: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ Previously Submitted, Date: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ To be Submitted, Date (if known): ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☒ Not Applicable

   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute
   ☐ Attached, Document ID: ____ ☒ Not Applicable

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) ☐ Attached, Document ID: _____ ☒ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.) ☒ Attached, Document ID: **Part B** ☐ Not Applicable	
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements ☐ Attached, Document ID: _____ ☐ Not Applicable	
2. Compliance Assurance Monitoring ☐ Attached, Document ID: _____ ☐ Not Applicable	
3. Alternative Methods of Operation ☐ Attached, Document ID: _____ ☐ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading) ☐ Attached, Document ID: _____ ☐ Not Applicable	
5. Acid Rain Part Application ☐ Certificate of Representation (EPA Form No. 7610-1) ☐ Copy Attached, Document ID: _____ ☐ Acid Rain Part (Form No. 62-210.900(1)(a)) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Not Applicable	

Additional Requirements Comment

PART B

PSD REPORT

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1.0 INTRODUCTION

CF Industries, Inc. (CF) is proposing to modify the C and D Sulfuric Acid Plants (SAPs) at its Plant City Phosphate Complex located in Plant City, Florida. The proposed changes will include improvements to allow the C and D SAPs to produce sulfuric acid (H_2SO_4) at a maximum production rate of 2,750 tons per day (TPD) each. Currently, the C and D SAPs are permitted to produce sulfuric acid up to 2,600 TPD of 100-percent H_2SO_4. To accommodate this increase in sulfuric acid production, CF is also requesting an increase in the maximum throughput rate of the Molten Sulfur Storage and Handling System from 930,750 tons per year (TPY) to 965,388 TPY.

Since the late 1980's, at the Plant City Phosphate Complex, the production rate of phosphoric acid has exceeded the availability of sulfuric acid. The C and D SAPs have not been able to attain the current permitted production rate of 2,600 TPD 100-percent H_2SO_4 each. In order to maximize fertilizer production, purchased sulfuric acid has been imported annually to makeup the imbalance.

Currently, the Plant City Complex can no longer purchase sulfuric acid at a reasonable cost. The cost of purchased sulfuric acid has increased, and DAP and MAP cannot be economically manufactured from imported sulfuric acid.

As a result, CF is proposing several improvements to increase production capacity of the C and D SAPs, including installation of a cesium catalyst, replacement of the C SAP final and drying absorption tower packing with low pressure drop packing, installation of a new tube side bypass on the No. 3 cold gas heat exchanger, installation of a bypass around the superheater/economizer, replacement of the existing No.1 hot gas heat exchanger with a cross flow design with a low pressure drop radial heat exchanger, and installation of onsite oxygen generation, storage, and injection equipment suitable to add oxygen to the C and D SAPs production process. These specific modifications will be installed during the upcoming turnaround cycles.

In addition, CF may replace the remaining absorption tower packing and gas heat exchangers during future turnaround cycles. The use of low pressure drop tower packing materials and low pressure drop, radial flow design gas heat exchangers are considered standard industry design and practice. These designs provide either improved energy efficiency or improved production capacity between turnaround cycles. The existing plan for C and D SAPs incorporates only the use of low pressure drop packing in two of the six absorption towers, and replaces only two of the six gas heat exchangers. The remaining tower packing and gas heat exchangers will be replaced as the existing components reach the end of their service lives and replacement is justified.

To accommodate this increase in sulfuric acid production, CF is also requesting an increase in the maximum throughput rate of the Molten Sulfur Storage and Handling System from 930,750 tons per year (TPY) to 965,388 TPY. There will be no physical changes to the Molten Sulfur Storage and Handling System as part of this project. Only the permitted annual throughput rate will increase.

Based on the potential increase in actual emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and sulfuric acid mist (SAM), the proposed project will constitute a major modification to a major stationary source, and thus trigger new source review (NSR) under the provisions of the prevention of significant deterioration (PSD) regulations.

For each pollutant subject to PSD review, the following analyses are required:

1. Ambient monitoring analysis, unless the net increase in emissions due to the modification causes impacts that are below specified significant impact levels;
2. Application of best available control technology (BACT) for each new or modified emissions unit;
3. Air quality impact analysis, unless the net increase in emissions due to the modification causes impacts which are below specified significant impact levels; and
4. Additional impact analysis (impact on soils, vegetation, visibility), including impacts on PSD Class I areas.

This PSD permit application addresses these requirements and is organized into six additional sections, followed by the appendices. A description of the project including air emission sources and pollution control equipment is presented in Section 2.0. A regulatory applicability analysis of the proposed project is presented in Section 3.0. An ambient air monitoring analysis is presented in Section 4.0. The BACT analysis is presented in Section 5.0. The air quality impact analysis and additional impact analysis are presented in Sections 6.0 and 7.0, respectively. Supporting documentation is presented in the appendices.

2.0 PROJECT DESCRIPTION

CF is proposing to modify its C and D SAPs at the Plant City Phosphate Complex to increase the production capacity, and to increase the annual throughput of the Molten Sulfur Storage and Handling System. The facility is currently operating under Permit No. 0570005-007-AV, issued May 20, 1998. The plant is located south of Zephyrhills and north of Plant City, in northeastern Hillsborough County. A plot plan of the facility, showing stack locations, is presented in Figure 2-1. The following sections describe the project modifications to the C and D SAPs in more detail.

2.1 C AND D SULFURIC ACID PLANTS

2.1.1 GENERAL

The Plant City Phosphate Complex operates two Monsanto double absorption sulfuric acid plants (C and D SAPs) and two Dorr-Oliver single absorption sulfuric acid plants (A and B SAPs) to produce approximately 7,800 TPD of sulfuric acid. The sulfuric acid is then reacted with phosphate rock to produce phosphoric acid, which in turn is used for diammonium phosphate (DAP) and monoammonium phosphate (MAP) fertilizer production. Since the late 1980's, the production rate of phosphoric acid at the Plant City Complex has exceeded the availability of sulfuric acid. In order to maximize fertilizer production, up to 316,000 TPY of purchased sulfuric acid has been imported annually to makeup the imbalance.

The two Monsanto designed sulfuric acid plants, C and D SAPs, were built in 1975 and are identical plants that produce approximately 2,300 to 2,400 TPD of 100-perent H_2SO_4. In 1991, the Florida Department of Environmental Protection issued a Prevention of Significant Deterioration (PSD) permit (No. AC29-186931, PSD-FL-155) for both plants to operate at maximum rates of 2,600 TPD of 100% H_2SO_4. The plants historically have not attained this maximum permitted rate.

The C and D SAPs utilize double absorption technology. In the SAPs, sulfur is burned with dried atmospheric oxygen to produce SO_2. The SO_2 is catalytically oxidized to sulfur trioxide (SO_3) over a catalyst bed. The SO_3 is then absorbed in H_2SO_4 to produce additional H_2SO_4. The remaining SO_2, not previously oxidized, is passed over a final converter bed of catalyst and the SO_3 produced is then absorbed in H_2SO_4. The process results in emissions of SO_2 and SAM, as well as a small amount of NO_x. Refer to Figure 2-2 for a flow diagram of the process.

2.1.2 PROPOSED MODIFICATIONS

Currently, the Plant City Complex can no longer purchase sulfuric acid at a reasonable cost. In order to alleviate this problem, CF is proposing to increase the sulfuric acid production capabilities of the C and D SAPs to 2,750 TPD H_2SO_4.

Technology developed in recent years will allow the C and D SAPs to increase production rates without major capital expenditures. The primary improvement will be the incorporation of cesium catalyst into the 4th pass of the converter (beds 4a and 4b). Cesium catalyst is similar to the traditional vanadium catalyst except that cesium salts are added to lower the activation temperature and increase SO_2 conversion efficiency. Higher conversion efficiency allows the plants to increase production rates by increasing burner SO_2 concentrations while at the same time lowering stack SO_2 emissions. Several other less significant changes will be implemented to increase the production rates of C and D SAPs to 2,750 TPD of 100 percent H_2SO_4. Specifically, these changes include:

- Replacement of the C SAP drying and final absorption towers packing (currently 3 inch ceramic Intalox saddles) with either "in kind" packing or lower pressure drop packing. The packing in the remaining four absorption towers may be replaced as the current packing exhibits high pressure drop and requires replacement.
- Replacement of the existing C and D SAPs No. 1 hot gas heat exchangers of cross flow design with a lower pressure drop, radial flow design heat exchangers. The remaining four gas heat exchangers in C and D SAPs will be replaced as they reach the end of their service lives.
- Installation of a bypass around the C and D SAPs superheater/economizers.
- Installation of a new tube side bypass on the C and D SAPs No. 3 cold gas heat exchangers.
- Installation of onsite oxygen generation, storage, and injection equipment suitable to add oxygen to the C and D SAPs production process.

The drying tower and final absorption towers have about 14 feet (ft) of 3-inch ceramic Intalox saddles and a 1 to 2 ft layer of smaller 2-inch packing at the top. Over the years, packing breakage and sulfate buildup have caused the pressure drop through the packing to increase, resulting in lower plant airflow and lower production. The packing in the C SAP drying tower and final tower will be replaced. As an alternative to "in kind" replacement, lower pressure drop packing is being considered. Low pressure drop packing options may include, but are not limited to, Koch structured packing, Monsanto wave style packing, and Cecebe HP perforated Intalox saddles.

The No. 1 hot gas-gas heat exchanger is a cross flow shell and tube heat exchanger. It is used to cool the converter gases between the 2nd and 3rd passes and transfer the heat into the gases returning to the converters 4th pass. This equipment is original equipment and in need of replacement. Internal gas leaks have caused SO_3 short circuiting into the gases returning to the converter's 4th pass and this has resulted in lower conversion efficiencies. As an alternative to "in kind" replacement, a lower pressure drop radial flow design heat exchangers will be installed.

Two bypasses around existing equipment will be installed to reduce pressure drop and increase airflow through the plant. The superheater-economizer is a dual heat exchanger used to superheat steam and preheat boiler feed water using waste heat from the gases leaving the converter and prior to entering the final absorption tower. A bypass will be installed to reduce the pressure drop in this piece of equipment. The cold No. 3 gas-gas heat exchanger is a shell and tube heat exchanger used to transfer heat from gases entering the interpass absorption tower to the gases returning to the converter. A new tube side bypass will be installed on the No. 3 heat exchanger.

There will be no physical modifications to the Molten Sulfur Storage and Handling System as part of this project. To accommodate the increased potential sulfuric acid production, CF is requesting an increase in the maximum annual molten sulfur throughput from 930,750 tons per year (TPY) to 965,388 TPY.

2.1.3 POLLUTION CONTROL EQUIPMENT AND AIR EMISSIONS

The air pollution control equipment for the C and D SAPs consists of two systems in series. The first system is integral to the H_2SO_4 production process and is the double contact process where the converted SO_3 emissions from the sulfur combustion are absorbed by water in a tower. This process is at least 99 percent efficient at absorbing SO_3. This system is considered process equipment and not considered control equipment. The second system is a high-velocity mist eliminator, which causes moisture (droplets containing SAM) from the double-contact process to be removed from the air stream by impingement. This process is at least 90 percent efficient at removing SAM from the air stream and, therefore, recovering the product.

The current emission limits for the C and D SAPs are 4 lb/ton 100% H_2SO_4 for SO_2 and 0.15 lb/ton 100 percent H_2SO_4 for SAM. NO_x emissions are also limited to 0.14 lb/ton 100 H_2SO_4. As part of the proposed project, CF is proposing to reduce permitted SO_2 emissions to 3.85 lb/ton 100 percent

H_2SO_4 as a 3-hour average and 3.5 lb/ton as a 24-hour average, and to reduce permitted SAM emissions to 0.10 lb/ton 100 percent H_2SO_4. These emission rates represent current BACT emission levels.

To achieve the proposed lower SO_2 emission limits of 3.85 lb/ton H_2SO_4 (3-hour average) and 3.5 lb/ton (24-hour average) for the C and D SAPs, CF will need to implement changes to each unit. The primary change includes incorporation of cesium catalyst into the 4th pass of the converter. Higher conversion efficiency allows the plants to increase production rates by increasing burner SO_2 concentrations while at the same time lowering stack SO_2 emissions.

The current and proposed allowable emission rates for the C and D SAPs are summarized in Table 2-1. The table includes the existing permitted allowable emission rates and the proposed allowable emission rates for SO_2, SAM, and NO_x for both plants. The current actual average emissions for the 2-year period October 2001 through September 2003 from the C and D SAPs are presented in Table 2-2. Refer to Appendix A for supportive information.

2.1.4 STACK DATA

Stack geometry and operating data are presented in Table 2-3 for the C and D SAPs. Each plant has a separate stack. The stacks for each plant will not be physically modified as part of the proposed project.

2.2 MOLTEN SULFUR STORAGE AND HANDLING SYSTEM

2.2.1 GENERAL

CF currently operates a molten sulfur storage and handling system with a maximum permitted throughput of 930,750 tons of molten sulfur per every consecutive 365 day period. CF is proposing to increase the maximum throughput to accommodate the increase in sulfuric acid production at the C and D SAPs. The proposed rate is 965,388 TPY sulfur. There will be no physical modifications to the Molten Sulfur Storage and Handling System as part of this project.

2.2.2 PROCESS DESCRIPTION

The Molten Sulfur Storage and Handling System currently consists of two molten sulfur storage tanks, two molten sulfur truck unloading pits (Pits A and B), a railcar unloading pit, and associated transfer pumps and piping for storage and handling of molten sulfur. Molten sulfur is delivered by truck or railcar and held in the pits prior to transfer to one of the two storage tanks or usage in the A, B, C, or D SAPs. Molten sulfur is fed to the truck pits and supplemented from the storage tanks as necessary. A flow diagram of the Molten Sulfur Storage and Handling System is presented in Figure 2-3.

2.2.3 POLLUTION CONTROL EQUIPMENT AND AIR EMISSIONS

Emissions from each storage vessel are vented uncontrolled. Estimated current emissions and future potential emissions after the increase in maximum throughput rate are presented in Tables 2-4 and 2-5, respectively. Sources of air emissions from the Molten Sulfur Storage and Handling System include particulate matter (PM/PM_{10}), SO_2, hydrogen sulfide (H_2S), and volatile organic compounds (VOC) emissions from the molten sulfur storage tanks and pits during loading and unloading and during periods of natural ventilation.

Emission rates of sulfur particulate, H_2S, SO_2, and VOC from the molten sulfur tanks were calculated using emission factors developed from historical source testing at similar sources. These emission factors are in terms of weight of pollutant per volume of ventilation gases. For particulate sulfur, separate emission factors were used for molten sulfur storage and transfer operations (tank loading and unloading). For H_2S, SO_2, and VOC, the emission factors are the same for both storage and transfer operations. Refer to Tables 2-4 and 2-5 and Appendix B for emission factor references.

Hourly emission rates were calculated by multiplying the emission factor by the exhaust flow rate for a given mode of operation (transfer or storage of molten sulfur). Annual emission rates were calculated by multiplying the hourly emission rates by the number of hours of operation in a given mode determined from the annual molten sulfur throughput and the maximum loading rates. Therefore, emission rates are a function of ventilation rate, transfer rates, and throughput.

2.2.4 STACK DATA

Vent geometry and operating data for the sources in the Molten Sulfur Storage and Handling System are presented in Table 2-3.

2.3 <u>AFFECTS ON OTHER EMISSION UNITS</u>

Due to the proposed modifications to the existing C and D SAPs, several other emission units will potentially be affected (i.e., increased production rates or actual emission rates). The following sections describe the other emission units at CF and the potential to be affected by the proposed modifications.

2.3.1 "A" AND "B" PHOSPHORIC ACID PLANTS

Sulfuric acid is used as a raw material in the "A" and "B" Phosphoric Acid Plants (PAPs). Although the potential sulfuric acid production may increase, CF will not produce any additional phosphoric acid as a result of this project. CF currently purchases sulfuric acid since the SAPs are not currently capable of producing enough sulfuric acid to meet the demands of the PAPs. Since the late 1980's, the production rate of phosphoric acid has exceeded the availability of sulfuric acid. In order to maximize fertilizer production, up to 316,000 TPY of purchased sulfuric acid has been imported annually to makeup the imbalance. CF will purchase less sulfuric acid in the future to offset the additional sulfuric acid produced in the C and D SAPs. Therefore, the PAPs will not be affected by the proposed project.

2.3.2 TRUCK TRAFFIC

Trucks are used to import molten sulfur and purchased sulfuric acid. Since the potential sulfuric acid production will be increasing as part of the proposed project, CF will purchase less sulfuric acid. Therefore, fewer trucks will be driven onsite to import the purchased sulfuric acid. Although the potential amount of molten sulfur may increase, and therefore the number of molten sulfur trucks driven onsite may increase, this increase will be offset by the reduced number of sulfuric acid trucks driven onsite. And since the number of sulfuric acid trucks driven onsite will be decreasing by a factor of three, the magnitude of truck traffic onsite will be reduced by the proposed project.

Table 2-1. Summary of Maximum Allowable Emission Rates for the C and D Sulfuric Acid Plants, CF Industries, Plant City

Source	EU ID	Operating Hours	Maximum Production Rate (TPD 100% H_2SO_4)	SO_2 Allowable Emission Rate			SAM Allowable Emission Rate			NO_x Allowable Emission Rate		
				lb/ton H_2SO_4	lb/hr	TPY	lb/ton H_2SO_4	lb/hr	TPY	lb/ton H_2SO_4	lb/hr	TPY
Current Operations [a]												
C SAP	007	8,760	2,600	4.0	433.0	1,898.0	0.15	16.25	71.2	0.14	15.17	66.43
D SAP	008	8,760	2,600	4.0	433.0	1,898.0	0.15	16.25	71.2	0.14	15.17	66.43
Future Operations												
C SAP--*3-hour average*	007	8,760	2,750	3.85	441.15	N/A	0.10	11.46	N/A	0.14	16.04	N/A
--24-hour average			2,750	3.5	401.04	N/A	0.10	11.46	N/A	0.14	16.04	N/A
--Annual average			2,750	3.5	401.04	1,756.56	0.10	11.46	50.19	0.14	16.04	70.26
D SAP--*3-hour average*	008	8,760	2,750	3.85	441.15	N/A	0.10	11.46	N/A	0.14	16.04	N/A
--24-hour average			2,750	3.5	401.04	N/A	0.10	11.46	N/A	0.14	16.04	N/A
--Annual average			2,750	3.5	401.04	1,756.56	0.10	11.46	50.19	0.14	16.04	70.26

[a] Current production rates and allowable emission rates are from Title V Permit No. 0570005-007-AV.

Table 2-2. Summary of Average Actual Emissions [a], CF Industries, Plant City

Emission Unit	EU ID	Total Emissions (TPY)					
		SO_2	SAM	NO_x	PM/PM_{10}	VOC	TRS
C SAP [b]	007	1,502.47	15.59	19.48	--	--	--
D SAP [b]	008	1,484.99	14.87	10.99	--	--	--
Molten Sulfur Storage and Handling System: [c]	022 - 024, 033	2.87	--	--	1.97	2.05	1.38

[a] Emissions for 2-year period of October 1, 2001 through September 30, 2003.

[b] Refer to Appendix A for derivation.

[c] Refer to Table 2-4 for derivation.

Table 2-3. Stack and Operating Parameters for the Project Affected Sources, CF Industries, Plant City

Emission Unit	EU ID	Height		Diameter		Flow Rate	Exit Temperature		Velocity	
		ft	m	ft	m	(acfm)	°F	K	ft/s	m/s
Current Operations										
"C" SAP [a]	007	199	60.66	8.0	2.44	123,300	158	343	40.9	12.46
"D" SAP [a]	008	199	60.66	8.0	2.44	121,200	161	345	40.2	12.25
Molten Sulfur Storage and Handling System:										
--Storage Tank (022)[c]	022	38	11.58	2.0	0.61	[f]	212	373.2	0.033	0.01
--Storage Tank (033)[d]	033	41	12.50	-	-	[f]	-	-	-	-
--Truck Pit A[c]	023	12	3.66	0.67	0.20	[f]	212	373.2	0.033	0.01
--Truck Pit B[c]	024	12	3.66	0.67	0.20	[f]	212	373.2	0.033	0.01
--Railcar Unloading Pit[e]		0	0.00	-	-	[f]	-	-	-	-
Future Operations										
"C" SAP [b]	007	199	60.66	8.0	2.44	140,700	158	343	46.7	14.22
"D" SAP [b]	008	199	60.66	8.0	2.44	145,600	161	345	48.3	14.71
Molten Sulfur Storage and Handling System:										
--Storage Tank (022)[c]	022	38	11.58	2.0	0.61	[f]	212	373.2	0.033	0.01
--Storage Tank (033)[d]	033	41	12.50	-	-	[f]	-	-	-	-
--Truck Pit A[c]	023	12	3.66	0.67	0.20	[f]	212	373.2	0.033	0.01
--Truck Pit B[c]	024	12	3.66	0.67	0.20	[f]	212	373.2	0.033	0.01
--Railcar Unloading Pit[e]		0	0.00	-	-	[f]	-	-	-	-

[a] Current flow rate, temperature, and velocity based on actual stack test data (last 2 years).

[b] Future flow rate, temperature, and velocity based on actual stack test data (last 2 years) and the maximum production rate of 2,750 TPD.

[c] Source has a rain cap. Modeled with a velocity of 0.01 m/s.

[d] Modeled as a 16.4 by 16.4 m square area source.

[e] Modeled as a 3.5 by 19 m area square.

[f] Ventilation rate is 30 dscfm.

Table 2-4. Summary of Current Actual Emission Rate Calculations for the Molten Sulfur Handling and Storage System, CF Industries, Plant City

Parameters	Units	2600 Ton Storage Tank					5000 Ton Storage Tank					Truck Pit A				
		Loading from Pits	Unloading Into Pits	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading from Pits	Unloading Into Pits	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)
SULFUR FLOW RATES																
Maximum loading rate	TPH	100	100	0			100	100	0			100	100	0		
Annual loading rate	TPY	152,969	152,969	0			298,290	298,290	0			313,587	313,587	0		
VENTILATION RATES																
Loading/Unloading	dscfm	30	0	0			30	0	0			30	0	0		
Natural Ventilation through vents	dscfm	0	30	30			0	30	30			0	30	30		
Total Ventilation Rate	dscfm	30	30	30			30	30	30			30	30	30		
TRANSFER TIMES																
Loading/Unloading	hr/yr	1,530	1,530	--			2,983	2,983	--			3,136	3,136	--		
Idle	hr/yr	--	--	5,701			--	--	2,794			--	--	2,488		
EMISSION FACTORS																
Sulfur particulate [a]	grains/dscf	0.51	0.29	0.29			0.51	0.29	0.29			0.51	0.29	0.29		
TRS (as H_2S) [b]	lb/dscf	3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05		
SO_2 [b]	lb/dscf	7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05		
VOC [b]	lb/dscf	5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05		
EMISSION RATES					Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulate	lb/hr	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13
	TPY	0.10	0.057	0.21	0.37	--	0.19	0.11	0.104	0.41	--	0.20	0.12	0.093	0.41	--
TRS (as H_2S)	lb/hr	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063
	TPY	0.048	0.048	0.18	0.28	--	0.09	0.09	0.088	0.28	--	0.10	0.10	0.078	0.28	--
Sulfur Dioxide	lb/hr	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13
	TPY	0.10	0.10	0.37	0.57	--	0.19	0.20	0.184	0.57	--	0.20	0.21	0.163	0.57	--
Volatile Organic Compounds	lb/hr	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094
	TPY	0.071	0.072	0.27	0.41	--	0.14	0.14	0.131	0.41	--	0.15	0.15	0.116	0.41	--

Notes:
Total Sulfur Throughput = 764,846 tons/yr (based on average of last 2 years of actual throughput data)

TPH = tons per hour
TPY = tons per year
Density of Sulfur (280°F) = 112 lb/cf

[a] Emission factors based on emissions tests performed at Cargill Riverview in 1988 (refer to Appendix B for reference). 0.51 grains/dscf when molten sulfur is pumped into tanks and 0.29 grains/dscf when tanks are idle.

[b] Emission factors based on Pennzoil study. Refer to Appendix B for study summary.

Table 2-4. Summary of Current Actual Emission Rate Calculations for the Molten Sulfur Handling and Storage System, CF Industries, Plant City (Page 2 of 2)

Parameters	Units	Truck Pit B					Railcar Unloading Pit				
		Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)
SULFUR FLOW RATES											
Maximum loading rate	TPH	100	100	0			100	100	0		
Annual loading rate	TPY	313,587	313,587	0			137,672	137,672	0		
VENTILATION RATES											
Loading/Unloading	dscfm	30	0	0			30	0	0		
Natural Ventilation through vents	dscfm	0	30	30			0	30	30		
Total Ventilation Rate	dscfm	30	30	30			30	30	30		
TRANSFER TIMES											
Loading/Unloading	hr/yr	3,136	3,136	--			1,377	1,377	--		
Idle	hr/yr	--	--	2,488			--	--	6,007		
EMISSION FACTORS											
Sulfur particulate [a]	grains/dscf	0.51	0.29	0.29			0.51	0.29	0.29		
TRS (as H_2S) [b]	lb/dscf	3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05		
SO_2 [b]	lb/dscf	7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05		
VOC [b]	lb/dscf	5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05		
EMISSION RATES					Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulate	lb/hr	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13
	TPY	0.20	0.12	0.093	0.41	--	0.09	0.051	0.22	0.36	--
TRS (as H_2S)	lb/hr	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063
	TPY	0.10	0.10	0.078	0.28	--	0.043	0.043	0.19	0.28	--
Sulfur Dioxide	lb/hr	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13
	TPY	0.20	0.21	0.163	0.57	--	0.09	0.09	0.39	0.57	--
Volatile Organic Compounds	lb/hr	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094
	TPY	0.15	0.15	0.116	0.41	--	0.064	0.064	0.28	0.41	--

Total Emission Rates from All Sources	Total Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulates	1.97	0.65
TRS (as H_2S)	1.38	0.32
Sulfur Dioxide	2.87	0.66
Volatile Organic Compounds	2.05	0.47

Notes:
Total Sulfur Throughput = 764,846 tons/yr (based on average of last 2 years of actual throughput data)

TPH = tons per hour
TPY = tons per year
Density of Sulfur (280°F) = 112 lb/cf

[a] Emission factors based on emissions tests performed at Cargill Riverview in 1988 (refer to Appendix B for reference).
0.51 grains/dscf when molten sulfur is pumped into tanks and 0.29 grains/dscf when tanks are idle.

[b] Emission factors based on Pennzoil study. Refer to Appendix B for study summary.

Table 2-5. Summary of Future Emission Rate Calculations for the Molten Sulfur Handling and Storage System, CF Industries, Plant City (Page 1 of 2)

Parameters	Units	2600 Ton Storage Tank					5000 Ton Storage Tank					Truck Pit A				
		Loading from Pits	Unloading Into Pits	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading from Pits	Unloading Into Pits	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)
SULFUR FLOW RATES																
Maximum loading rate	TPH	100	100	0			100	100	0			100	100	0		
Annual loading rate	TPY	193,650	193,650	0			375,922	375,922	0			395,810	395,810	0		
VENTILATION RATES																
Loading/Unloading	dscfm	30	0	0			30	0	0			30	0	0		
Natural Ventilation through vents	dscfm	0	30	30			0	30	30			0	30	30		
Total Ventilation Rate	dscfm	30	30	30			30	30	30			30	30	30		
TRANSFER TIMES																
Loading/Unloading	hr/yr	1,937	1,937	--			3,759	3,759	--			3,958	3,958	--		
Idle	hr/yr	--	--	4,887			--	--	1,242			--	--	844		
EMISSION FACTORS																
Sulfur particulate [a]	grains/dscf	0.51	0.29	0.29			0.51	0.29	0.29			0.51	0.29	0.29		
TRS (as H_2S) [b]	lb/dscf	3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05		
SO_2 [b]	lb/dscf	7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05		
VOC [b]	lb/dscf	5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05		
EMISSION RATES					Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulate	lb/hr	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13
	TPY	0.13	0.072	0.18	0.38	--	0.24	0.14	0.046	0.43	--	0.26	0.15	0.031	0.44	--
TRS (as H_2S)	lb/hr	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063
	TPY	0.061	0.061	0.15	0.28	--	0.12	0.12	0.039	0.28	--	0.12	0.12	0.027	0.27	--
Sulfur Dioxide	lb/hr	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13
	TPY	0.13	0.13	0.32	0.57	--	0.25	0.25	0.082	0.57	--	0.26	0.26	0.055	0.57	--
Volatile Organic Compounds	lb/hr	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094
	TPY	0.090	0.091	0.23	0.41	--	0.17	0.18	0.058	0.41	--	0.18	0.19	0.039	0.41	--

Notes:
Total Sulfur Throughput = 965,388 tons/yr

TPH = tons per hour
TPY = tons per year
Density of Sulfur (280°F) = 112 lb/cf

[a] Emission factors based on emissions tests performed at Cargill Riverview in 1988 (refer to Appendix B for reference).
0.51 grains/dscf when molten sulfur is pumped into tanks and 0.29 grains/dscf when tanks are idle.

[b] Emission factors based on Pennzoil study. Refer to Appendix B for study summary.

Table 2-5. Summary of Future Emission Rate Calculations for the Molten Sulfur Handling and Storage System, CF Industries, Plant City (Page 2 of 2)

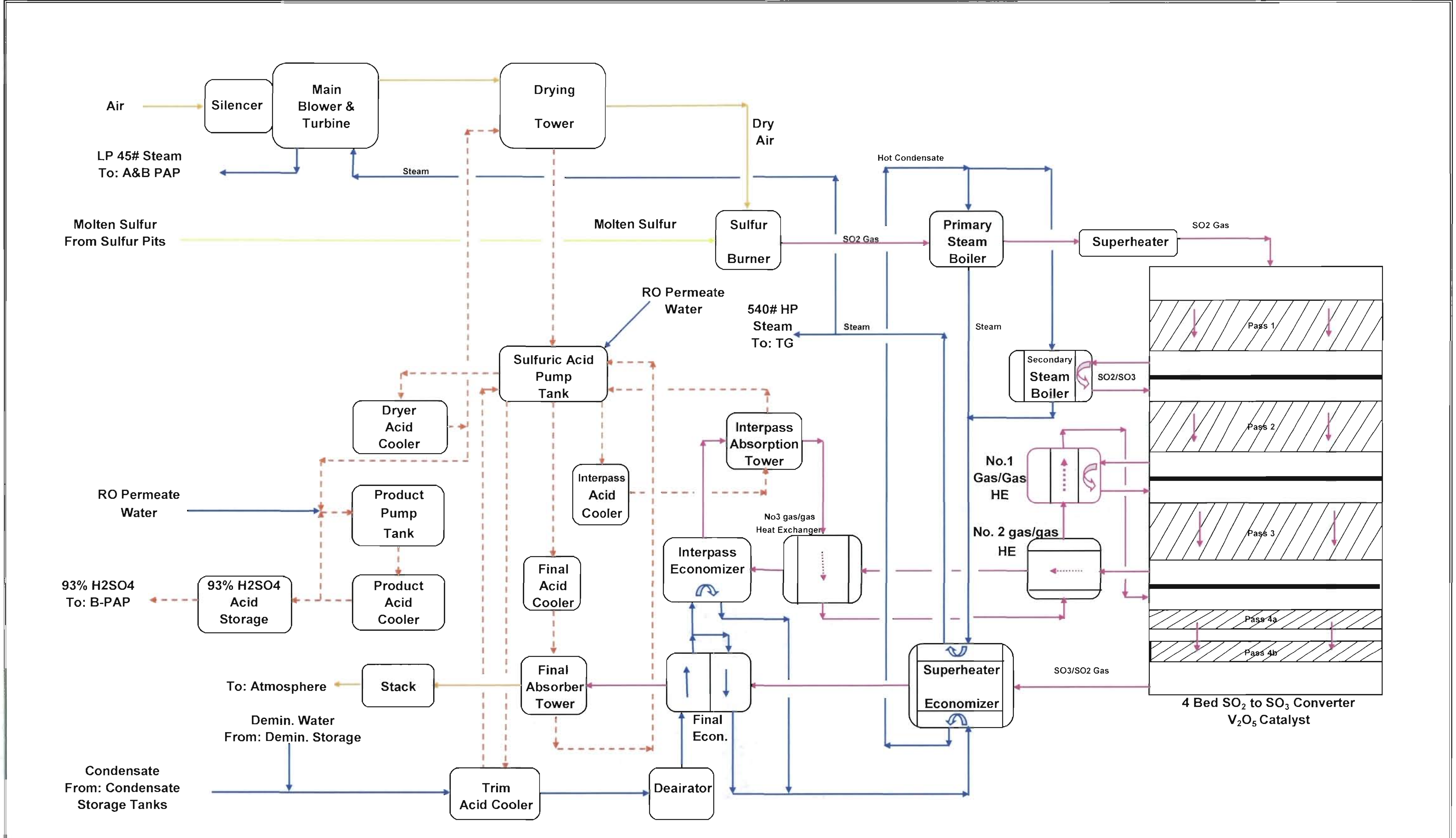
Parameters	Units	Truck Pit B					Railcar Unloading Pit				
		Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)	Loading	Unloading	Storage/ Idle	Total Emissions (TPY)	Max Emissions (lb/hr)
SULFUR FLOW RATES											
Maximum loading rate	TPH	100	100	0			100	100	0		
Annual loading rate	TPY	395,810	395,810	0			173,770	173770	0		
VENTILATION RATES											
Loading/Unloading	dscfm	30	0	0			30	0	0		
Natural Ventilation through vents	dscfm	0	30	30			0	30	30		
Total Ventilation Rate	dscfm	30	30	30			30	30	30		
TRANSFER TIMES											
Loading/Unloading	hr/yr	3,958	3,958	--			1,738	1,738	--		
Idle	hr/yr	--	--	844			--	--	5,285		
EMISSION FACTORS											
Sulfur particulate [a]	grains/dscf	0.51	0.29	0.29			0.51	0.29	0.29		
TRS (as H_2S) [b]	lb/dscf	3.50E-05	3.50E-05	3.50E-05			3.50E-05	3.50E-05	3.50E-05		
SO_2 [b]	lb/dscf	7.30E-05	7.30E-05	7.30E-05			7.30E-05	7.30E-05	7.30E-05		
VOC [b]	lb/dscf	5.20E-05	5.20E-05	5.20E-05			5.20E-05	5.20E-05	5.20E-05		
EMISSION RATES					Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)				Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulate	lb/hr	0.13	0.075	0.075	--	0.13	0.13	0.075	0.075	--	0.13
	TPY	0.26	0.15	0.031	0.44	--	0.11	0.065	0.20	0.37	--
TRS (as H_2S)	lb/hr	0.063	0.063	0.063	--	0.063	0.063	0.063	0.063	--	0.063
	TPY	0.12	0.12	0.027	0.27	--	0.054	0.055	0.17	0.28	--
Sulfur Dioxide	lb/hr	0.13	0.13	0.13	--	0.13	0.13	0.13	0.13	--	0.13
	TPY	0.26	0.26	0.055	0.57	--	0.11	0.11	0.35	0.57	--
Volatile Organic Compounds	lb/hr	0.093	0.094	0.094	--	0.094	0.093	0.094	0.094	--	0.094
	TPY	0.18	0.19	0.039	0.41	--	0.081	0.081	0.25	0.41	--

Total Emission Rates from All Sources	Total Annual Emission Rate (TPY)	Max Hourly Emission Rate (lb/hr)
Sulfur Particulates	2.06	0.65
TRS (as H_2S)	1.38	0.32
Sulfur Dioxide	2.87	0.66
Volatile Organic Compounds	2.04	0.47

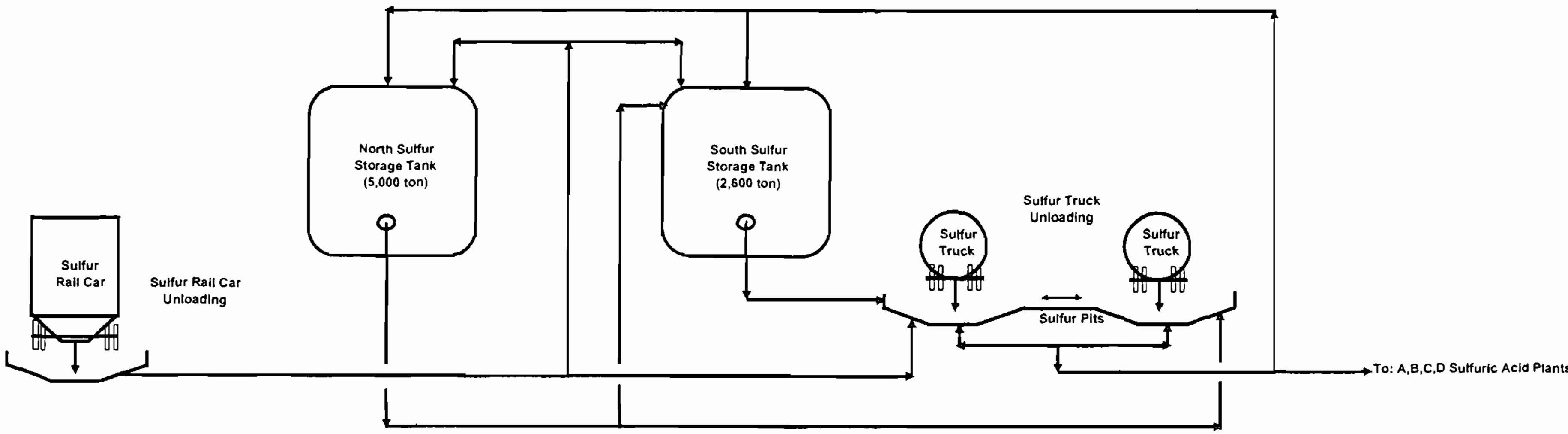
Notes:
Total Sulfur Throughput = 965,388 tons/yr

TPH = tons per hour
TPY = tons per year
Density of Sulfur (280°F) = 112 lb/cf

[a] Emission factors based on emissions tests performed at Cargill Riverview in 1988 (refer to Appendix B for reference).
0.51 grains/dscf when molten sulfur is pumped into tanks and 0.29 grains/dscf when tanks are idle.
[b] Emission factors based on Pennzoil study. Refer to Appendix B for study summary.



Legend	By	Date	CF Industries, Inc.	Title	DWR. NO
Sulfuric Acid	Randy Charlot	8/28/2001	Plant City Phosphate Complex	Figure 2-2	9.1-SK-31
Process Gases SO_2/SO_3	Randy Charlot	11/6/2002	P.O. Drawer L	C&D Sulfuric Acid Plants	
Steam/Condensate			Plant City, Florida 33564	Process Block Flow Diagram	
Air			Phone: (813) 782-1591		
Sulfuric Acid			Fax: (813) 788-9126		91-SK-31.XLS



Revision	By	Date		Title	DWR. NO
	Randy Charlot	11/21/03	**CF Industries,** Inc. Plant City Phosphate Complex P.O. Drawer L Plant City, Florida 33564 Phone: (813) 782-1591 Fax: (813) 788-9126	Figure 2-3 Molten Sulfur Storage & Handling System Process Flow Diagram	0.0-SK-115

3.0 AIR QUALITY REVIEW REQUIREMENTS

Federal and state air regulatory requirements for a major new or modified source of air pollution are discussed in Sections 3.1 through 3.4. The applicability of these regulations to the proposed CF modification is presented in Section 3.5. These regulations must be satisfied before the proposed project can be approved.

3.1 NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS (AAQS)

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

Florida has adopted state AAQS in Rule 62-204.240, Florida Administrative Code (F.A.C.). These standards are the same as the national AAQS, except in the case of SO_2. For SO_2, Florida has adopted the former 24-hour secondary standard of 260 micrograms per cubic meter ($\mu g/m^3$) and former annual average secondary standard of 60 $\mu g/m^3$.

3.2 PSD REQUIREMENTS

3.2.1 GENERAL REQUIREMENTS

Under Federal and State of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a pre-construction permit issued. Florida's State Implementation Plan (SIP), which contains PSD regulations, has been approved by the U.S. Environmental Protection Agency (EPA); therefore, PSD approval authority has been granted to the Florida Department of Environmental Protection (FDEP).

A "major facility" is defined as any one of 28 named source categories that have the potential to emit 100 TPY or more or any other stationary facility that has the potential to emit 250 TPY or more of any pollutant regulated under CAA. "Potential to emit" means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Once a new source is determined to be a "major facility" for a particular pollutant, any pollutant emitted in amounts greater than the PSD significant emission rates is subject to PSD review. For an existing source for which a modification is proposed, the modification is subject to PSD review if the net increase in emissions due to the modification is greater than the PSD significant emission rates. The PSD significant emission rates are shown in Table 3-2.

The EPA class designation and allowable PSD increments are presented in Table 3-1. The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications are designated based on criteria established in the 1990 CAA Amendments. Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. The State of Florida has adopted the EPA class designations and allowable PSD increments for SO_2, PM_{10}, and NO_2 increments.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 Code of Federal Regulations (CFR) 52.21, Prevention of Significant Deterioration of Air Quality. The State of Florida has adopted PSD regulations that are equivalent to the federal PSD regulations (Rule 62-212.400, F.A.C.). Major facilities and major modifications are required to undergo the following analyses related to PSD for each pollutant emitted in significant amounts:

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

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

3.2.2 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 Best Available Control Technology (BACT) be applied to control emissions from the source. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility exceeds the significant emission rate (see Table 3-2).

BACT is defined in 40 CFR 52.21(b)(12), as:

> *An emissions limitation (including a visible emission standard) based on the maximum degree of reduction of each pollutant subject to regulation under the Act which would be emitted by any proposed major stationary source of major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determination 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. In no event shall application of best available control technology result in emissions of any pollutant, which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator 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 and shall provide for compliance by means, which achieve equivalent results.*

BACT was promulgated within the framework of the PSD requirements 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 judgement, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

3.2.3 SOURCE IMPACT ANALYSIS

A source impact analysis must be performed for a proposed major source or major modification subject to PSD review and for each pollutant for which the increase in emissions exceeds the PSD 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, 1980).

To address compliance with AAQS and PSD Class II increments, a source impact analysis must be performed for the criteria pollutants. However, this analysis is not required for a specific pollutant if the net increase in impacts as a result of the new source or modification is below significant impact levels, as presented in Table 3-1. The significant impact levels are threshold levels that are used to determine the level of air impact analyses needed for the project. If the new or modified source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance with AAQS and PSD increments.

EPA has proposed significant impact levels for Class I areas as follows:

SO_2	3-hour	1 μg/m³
	24-hour	0.2 μg/m³
	Annual	0.1 μg/m³
PM_{10}	24-hour	0.3 μg/m³
	Annual	0.2 μg/m³
NO_2	Annual	0.1 μg/m³

Although these levels have not been officially promulgated as part of the PSD review process and may not be binding for states in performing PSD review, the proposed levels serve as a guideline in assessing a source's impact in a Class I area. The EPA action to incorporate Class I significant impact levels in the PSD process is part of implementing the NSR provisions of the 1990 CAA Amendments. Because the process of developing the regulations will be lengthy, EPA believes that the proposed rules concerning the significant impact levels is appropriate to assist states in implementing the PSD permit process.

Various lengths of record for meteorological data can be used for impact analysis. A 5-year period is normally used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The meteorological data are selected based on an evaluation of measured weather data from a nearby weather station that represents weather conditions at the project site. The criteria used in this evaluation include determining the distance of the project site to the weather station; comparing topographical and land use features between the locations; and determining availability of necessary weather parameters.

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 important because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If fewer than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor normally must be used for comparison to air quality standards.

The term "baseline concentration" evolves from federal and state PSD regulations and refers to a concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition, in the PSD regulations as amended August 7, 1980, baseline concentration means the ambient concentration level 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 facilities in existence on the applicable baseline date; and
2. The allowable emissions of major stationary facilities that commenced construction before January 6, 1975, for SO_2 and PM_{10} concentrations, or February 8, 1988, for NO_2 concentrations, but that were not in operation by the applicable baseline date.

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

1. Actual emissions from any major stationary facility on which construction commenced after January 6, 1975, for SO_2 and PM_{10} concentrations, and after February 8, 1988, for NO_2 concentrations; and
2. Actual emission increases and decreases at any stationary facility occurring after the baseline date.

In reference to the baseline concentration, the term "baseline date" actually includes three different dates:

1. The major facility baseline date, which is January 6, 1975, in the cases of SO_2 and PM_{10}, and February 8, 1988, in the case of NO_2;
2. The minor facility baseline date, which is the earliest date after the trigger date on which a major stationary facility or major modification subject to PSD regulations submits a complete PSD application; and
3. The trigger date, which is August 7, 1977, for SO_2 and PM_{10}, and February 8, 1988, for NO_2.

3.2.4 AIR QUALITY MONITORING REQUIREMENTS

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary 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 generally is 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).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that FDEP 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.

3.2.5 SOURCE INFORMATION/GEP STACK HEIGHT

Source information must be provided to adequately describe the proposed project. The general type of information required for this project is presented in Section 2.0.

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 Good Engineering Practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (EPA, 1985a). The FDEP has adopted identical regulations (Rule 62-210.550, 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:

$$Hg = H + 1.5L$$

   where: Hg = 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 above formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula.

3.2.6 ADDITIONAL IMPACT ANALYSIS

In addition to air quality impact analyses, federal and State of Florida regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source [40 CFR 52.21(o) and Rule 62-212.400, F.A.C.]. These analyses are to be conducted primarily for PSD Class I areas. Impacts as a result of 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).

3.3 NONATTAINMENT RULES

Based on the current nonattainment provisions, all major new facilities and modifications to existing major facilities located in a nonattainment area must undergo nonattainment review. A new major facility is required to undergo this review if the proposed pieces of equipment have the potential to emit 100 TPY or more of the nonattainment pollutant.

3.4 EMISSION STANDARDS

3.4.1 NEW SOURCE PERFORMANCE STANDARDS

The NSPS are a set of national emission standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated."

Federal NSPS exist for facilities producing sulfuric acid (40 CFR 60, Subpart H). The NSPS apply to all facilities constructed or modified after August 17, 1971. Subpart H regulates SO_2 and SAM emissions from sulfuric acid plants.

3.4.2 FLORIDA RULES

The C and D SAPs are subject to the emission limitations of Rule 62-296.402(2) F.A.C., pertaining to SO_2 and SAM emissions from sulfuric acid plants.

3.5 SOURCE APPLICABILITY

3.5.1 AREA CLASSIFICATION

The project site is located in Hillsborough County, which has been designated by EPA and FDEP as an attainment or maintenance area for all criteria pollutants. Hillsborough County and surrounding counties are designated as PSD Class II areas for all criteria pollutants. The site is located about 69 km from a PSD Class I area (Chassahowitzka National Wilderness Area).

3.5.2 PSD REVIEW

3.5.2.1 Pollutant Applicability

The CF Plant City facility is considered to be an existing major stationary facility because potential emissions of certain regulated pollutants exceed 100 TPY (for example, potential SO_2 emissions currently exceeds 100 TPY). Therefore, PSD review is required for any pollutant for which the increase in emissions due to the modification is greater than the PSD significant emission rates (see Table 3-2).

The net increase in emissions due to the proposed modification at the facility is shown in Table 3-3. The future potential emissions are based on information from Section 2.0. The current actual emissions for all affected sources are presented in Table 2-2 (see also Appendix A). There have not been any contemporaneous emission increases or decreases that have occurred at the Plant City Phosphate Complex in the last 5 years. As shown, the net increase in emissions exceeds the PSD significant emission rates for SO_2, SAM, and NO_x. As a result, PSD review applies for these pollutants.

3.5.2.2 Source Impact Analysis

A source impact analysis was performed for SO_2, SAM, and NO_x emissions resulting from the proposed modification. This analysis is presented in Section 6.0.

3.5.2.3 Ambient Monitoring

Based on the increase in emissions from the proposed modification (see Table 3-3), a pre-construction ambient monitoring analysis is required for SO_2, SAM, and NO_x and monitoring data is required to be submitted as part of the application. However, if the net increase in impacts of a pollutant is less than the applicable *de minimis* monitoring concentration, then an exemption from submittal of pre-construction ambient monitoring data may be obtained [40 CFR 52.21(i)(8)]. In addition, if EPA has not established an acceptable ambient monitoring method for the pollutant, monitoring is not required.

Pre-construction monitoring data for NO_x may be exempted for this project because, as shown in Table 3-4 and Section 6.0, the proposed modification's impacts are predicted to be below the applicable *de minimis* monitoring concentration for NO_x. In addition, no air monitoring data is presented for SAM since AAQS have not been established for this pollutant. Although the proposed modification's impacts are predicted to be below the applicable *de minimis* monitoring concentration for SO_2, a pre-construction monitoring analysis was performed for SO_2 to support the modeling analysis. This analysis is presented in Section 4.0.

3.5.2.4 GEP Stack Height Impact Analysis

No existing stacks at the CF facility currently exceed the *de minimis* GEP stack height of 213 feet. In addition, no new stacks are proposed as part of this project. Therefore, the proposed modification will comply with the GEP stack height regulations.

3.5.3 EMISSION STANDARDS

3.5.3.1 New Source Performance Standards

Subpart H applies to sulfuric acid production plants constructed or modified after August 17, 1971. Since the C and D SAPs produce sulfuric acid and were constructed after August 17, 1971, they are subject to NSPS requirements.

The applicable NSPS for sulfuric acid plants (40 CFR 60.82) is 4 lb/ton 100-percent H_2SO_4 for SO_2 and 0.15 lb/ton 100-percent H_2SO_4 for SAM. The proposed SO_2 and SAM emission limits will comply with the applicable limits for the C and D SAPS at CF.

3.5.3.2 State of Florida Standards

The applicable State of Florida SO_2 and SAM emissions limits for new sulfuric acid plants [Rule 62-296.402(2)] is 4 lb/ton 100-percent H_2SO_4 of SO_2 and 0.15 lb/ton 100-percent H_2SO_4 of SAM. The subject sources at CF will comply with the Florida standards contained in Rule 62-296.402(2).

Table 3-1. National and State AAQS, Allowable PSD Increments, and Significant Impact Levels (μg/m³)

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

Note: NA = Not applicable, i.e., no standard exists.

PM_{10} = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.

[a] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour standard of 65 μg/m³ (3-year average of 98th percentile) and an annual standard of 15 μg/m³ (3-year average at community monitors). Implementation of these standards are many years away. The ozone standard was modified to be 0.08 ppm for 8-hour average; achieved when 3-year average of 99th percentile is 0.08 ppm or less. FDEP has not yet adopted these standards.

[b] Short-term maximum concentrations are not to be exceeded more than once per year except for the PM_{10} AAQS (these do not apply to significant impact levels). The PM_{10} 24-hour AAQS is attained when the expected number of days per year with a 24-hour concentration above 150 μg/m³ is equal to or less than 1. For modeling purposes, compliance is based on the sixth highest 24-hour average value over a 5-year period.

[c] Achieved when the expected number of days per year with concentrations above the standard is fewer than 1.

[d] Maximum concentrations.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978; 40 CFR 50; 40 CFR 52.21; Rule 62-204, F.A.C.

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

Pollutant	Regulated Under	Significant Emission Rate (TPY)	De Minimis Monitoring Concentration[a] ($\mu g/m^3$)
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter [PM(TSP)]	NSPS	25	NA
Particulate Matter (PM_{10})	NAAQS	15	10, 24-hour
Nitrogen Dioxide	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY[b]
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
Mercury	NESHAP	0.1	0.25, 24-hour
Asbestos	NESHAP	0.007	NM
Vinyl Chloride	NESHAP	1	15, 24-hour
MWC Organics	NSPS	3.5×10^{-6}	NM
MWC Metals	NSPS	15	NM
MWC Acid Gases	NSPS	40	NM
MSW Landfill Gases	NSPS	50	NM

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

NA = Not applicable.
NAAQS = National Ambient Air Quality Standards.
NM = No ambient measurement method established; therefore, no *de minimis* concentration has been established.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.
$\mu g/m^3$ = micrograms per cubic meter.
MWC = Municipal waste combustor
MSW = Municipal solid waste

[a] Short-term concentrations are not to be exceeded.

[b] No de minimis concentration; an increase in VOC emissions of 100 TPY or more will require monitoring analysis for ozone.

Sources: 40 CFR 52.21.
Rule 62-212.400

Table 3-3. PSD Applicability Analysis

Source Description	Pollutant Emission Rate (TPY)								
	SO_2	NO_x	CO	PM	PM_{10}	VOC	TRS	SAM	Fluoride
<u>Potential Emissions From Modified/New/Affected Sources</u>[a]									
C Sulfuric Acid Plant	1,756.56	70.26	--	--	--	--	--	50.19	--
D Sulfuric Acid Plant	1,756.56	70.26	--	--	--	--	--	50.19	--
Molten Sulfur Storage and Handling	2.87	--	--	2.06	2.06	2.04	1.38	--	--
Total Potential Emission Rates	**3,515.99**	**140.52**	**0.00**	**2.06**	**2.06**	**2.04**	**1.38**	**100.38**	**0.00**
<u>Actual Emissions from Current Operations</u>[b]									
C Sulfuric Acid Plant	1,502.47	19.48	--	--	--	--	--	15.59	--
D Sulfuric Acid Plant	1,484.99	10.99	--	--	--	--	--	14.87	--
Molten Sulfur Storage and Handling [c]	2.87	--	--	1.97	1.97	2.05	1.38	--	--
Total Actual Emission Rates	**2,990.33**	**30.47**	**0.00**	**1.97**	**1.97**	**2.05**	**1.38**	**30.45**	**0.00**
TOTAL CHANGE DUE TO PROPOSED PROJECT	**525.66**	**110.05**	**0.00**	**0.09**	**0.09**	**-0.01**	**0.00**	**69.93**	**0.00**
PSD SIGNIFICANT EMISSION RATE	40	40	100	25	15	40	10	7	3
PSD REVIEW TRIGGERED?	Yes	Yes	No	No	No	No	No	Yes	No

Footnotes:

[a] Refer to Tables 2-1 and 2-5 for future potential emission calculations.

[b] Refer to Table 2-3 for current actual emissions, except where noted. Based on average actual emissions for October 2001 through September 2003.

[c] Refer to Table 2-4 for current emissions.

Table 3-4. Predicted Impacts Due to the Proposed Project Compared to Ambient Monitoring *De Minimis* Levels

Pollutant	Averaging Time	Maximum Concentration[a] ($\mu g/m^3$)	*De Minimis* Monitoring Concentration ($\mu g/m^3$)	Ambient Monitoring Review Applies?
Sulfur Dioxide	24-hour	1.76	13	No
Nitrogen Oxides	Annual	0.15	14	No

[a] Highest concentration from significant impact analysis (see Section 6.0).
Note: NA = Not Applicable

4.0 AMBIENT MONITORING ANALYSIS

4.1 MONITORING REQUIREMENTS

In accordance with requirements of 40 CFR 52.21(m) and Rule 62-212.400(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 3-1). As discussed in Section 3.1, SO_2, SAM, and NO_x require an air quality analysis to meet PSD pre-construction monitoring requirements for the proposed CF modification.

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* (1987).

An exemption from the pre-construction ambient monitoring requirements is also available if certain criteria are met. If the predicted increase in ambient concentrations, due to the proposed modification, is less than specified *de minimis* concentrations, then the modification can be exempted from the pre-construction air monitoring requirements for that pollutant.

The PSD *de minimis* monitoring concentration for SO_2 is 13 $\mu g/m^3$, 24-hour average and for NO_x is 14 $\mu g/m^3$, annual average. The predicted increase in SO_2, NO_x, and SAM concentrations due to the proposed modification only are presented in Section 6.0 and in Table 3-4. Since the predicted increase in SO_2 and NO_x impacts due to the proposed modification are less than *de minimis* monitoring concentration levels, a pre-construction air monitoring analysis is not required for these pollutants. In addition, no air monitoring data is presented for SAM since AAQS have not been established for this pollutant.

5.0 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

5.1 REQUIREMENTS

The 1977 CAA Amendments established requirements for the approval of pre-construction permit applications under the PSD program. As discussed in Section 3.2.2, one of these requirements is that BACT be installed for applicable pollutants. BACT determinations must be made on a case-by-case basis considering technical, economic, energy, and environmental impacts for various BACT alternatives. To bring consistency to the BACT process, the EPA developed the "top-down" approach to BACT determinations.

The first step in a top-down BACT analysis is to determine, for each applicable pollutant, the most stringent control alternative available for a similar source or source category. If it can be shown that this level of control is not feasible on the basis of technical, economic, energy, or environmental impacts for the source in question, then the next most stringent level of control is identified and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any technical, economic, energy, or environmental consideration.

In the case of the proposed project, SO_2, NO_x, and SAM emissions require a BACT analysis. Both the C and D SAPs and the Molten Sulfur Storage and Handling System are being modified as part of this project, and therefore are subject to BACT. The BACT analysis is presented in the following sections.

5.2 SULFURIC ACID PLANTS C AND D

5.2.1 SULFUR DIOXIDE

5.2.1.1 Proposed Control Technology

In the C and D SAPs, sulfur is burned with dried atmospheric oxygen to produce SO_2. The SO_2 is catalytically oxidized to SO_3 over a catalyst bed. The SO_3 is then absorbed in sulfuric acid to produce additional sulfuric acid. The remaining SO_2, not previously oxidized, is passed over a final converter bed of catalyst and the SO_3 produced is then absorbed into sulfuric acid. The process results in emissions of SO_2, SAM, and a small amount of NO_x.

The C and D SAPs at CF are double-absorption plants. The existing double-absorption technology is considered to be state-of-the-art in reducing SO_2 emissions from H_2SO_4 plants and is already in operation at the C and D SAPs. The C and D SAPs will be upgraded by incorporating cesium catalyst into the 4th pass of the converter (beds 4a and 4b). Cesium catalyst is similar to the traditional vanadium catalyst except that cesium salts are added to lower the activation temperature and increase SO_2 conversion efficiency. Higher conversion efficiency allows the plants to increase production rates by increasing burner SO_2 concentrations while at the same time lowering stack SO_2 emissions.

The proposed BACT for SO_2 is the continued use of double-absorption technology with the addition of cesium catalyst into the 4th pass of the converter (beds 4a and 4b). The proposed BACT emission limit for SO_2 is 3.5 lb/ton 100-percent H_2SO_4 as a 24-hour average.

On a 3-hour average, the proposed BACT emission rate is 3.85 lb/ton 100-percent H_2SO_4, which is less than the NSPS. This higher 3-hour average emission rate is necessary to account for plant process fluctuations and variability.

5.2.1.2 <u>BACT Analysis</u>

Previous BACT Determinations

A review was performed of previous SO_2 BACT determinations for sulfuric acid plants listed in the RACT/BACT/LAER Clearinghouse on EPA's web page. A summary of these BACT determinations is presented in Table 5-1. Only determinations issued within the last 10 years are shown.

Previous BACT determinations have ranged from 3.5 lb/ton to 4.0 lb/ton 100-percent H_2SO_4. All of these determinations were for double absorption sulfuric acid plants. The determinations reflective of the lower end of this range were based on a 24-hour averaging time.

Control Technology Feasibility

The technically feasible SO_2 controls for the C and D SAPs are shown in Table 5-2. As shown, there are six types of feasible SO_2 abatement methods. Each available technique is listed with its associated efficiency estimate, identified as feasible or infeasible, and ranked based on control efficiency.

<u>Potential Control Method Descriptions</u>

Sorbent Injection

Sorbent injection has been used on boilers and involves the injection of a dry sorbent into the furnace, economizer, or in the flue gas duct after the preheater where the temperature is about 300 degrees Fahrenheit (°F). In furnace injection, a finely grained sorbent, limestone ($CaCO_3$) or hydrated lime [$Ca(OH)_2$] is distributed quickly and evenly over the entire cross section in the upper part of the furnace in a location where the temperature is in the range of 1,380 to 2,280°F. The sorbent reacts with SO_2 and O_2 to form $CaSO_4$. $CaSO_4$ is then captured in a particulate control device together with unused sorbent and fly ash. Temperatures over 2,280°F result in sintering of the surface on the sorbent, destroying the structure of the pores and reducing the active surface area.

In an economizer sorbent injection system, hydrated lime is injected into the flue gas stream near the economizer zone where the temperature is in the range of 570 to 1,200°F. At this temperature, SO_2 reacts with the sorbent to form $CaSO_3$.

In duct sorbent injection the aim is to distribute the sorbent evenly in the flue gas duct after the air preheater, where the temperature is about 300°F. At the same time, the flue gas is humidified with water. As with the furnace and economizer designs, the end products are collected in a particulate control device.

There are many factors that influence the performance of a duct sorbent injection process. These include sorbent reactivity, quantity of injected sorbent, relative humidity of the flue gas, gas and solids residence time in the duct, and quantity of recycled, unreacted sorbent from the particulate control device. The most efficient way of achieving good conditions is to establish a dedicated reaction chamber.

Although demonstrated on boilers, sorbent injection has never been used at a sulfuric acid plant to control SO_2. Nor is there a suitable injection location that would not interfere with the H_2SO_4 recovery process. Therefore, since this is not a proven technique for SO_2 control from a sulfuric acid plant, this technique was not considered further.

Double Absorption Process Technology

The most common control technique applied to sulfuric acid plants is the double-absorption process. In the double absorption process, SO_2 is formed in the furnace (sulfur burner). The SO_2 is then converted to SO_3 gas in the primary converter stages and is sent to an interpass absorber where most of the SO_3 is removed to form H_2SO_4. The remaining unconverted SO_2 is forwarded to the final stages in the converter to convert much of the remaining SO_2 by oxidation to SO_3, whence it is sent to the final absorber for removal of the remaining SO_3. There are no byproducts or waste scrubbing materials created, only additional sulfuric acid.

SO_2 to SO_3 conversion efficiencies of 99.7 percent and higher are achievable, whereas most single absorption plants have SO_2 conversion efficiencies ranging from only 95 to 98 percent. Furthermore, double absorption permits higher converter inlet SO_2 concentrations than are used in single absorption plants, because the final conversion stages effectively remove any residual sulfur dioxide from the interpass absorber.

Add-on Gas Absorption/Wet Scrubbers

Devices that are based on absorption principles include wet scrubbers such as packed towers, plate columns, venturi scrubbers, and spray chambers. Absorption is a mass transfer operation in which one or more soluble components of a gas mixture are dissolved in a liquid that has low volatility under the process conditions. The pollutant diffuses from the gas into the liquid when the liquid contains less than the equilibrium concentration of the gaseous component. The difference between the actual and the equilibrium concentration provides the driving force for absorption. Specific applications of these technologies to sulfuric acid plants are described below.

In cases where very low SO_2 emissions limits are required (i.e., substantially lower than NSPS limits), tail-gas scrubbing in addition to the double-absorption system have been employed. Hydrogen peroxide scrubbing and SO_2 oxidation with activated carbon have both been employed at sulfuric acid plants. In addition, ammonia scrubbing has been employed at some single-absorption sulfuric acid plants.

In hydrogen peroxide scrubbing, dilute sulfuric acid and hydrogen peroxide are circulated over a packed bed countercurrent to the stream of SO_2 containing tailgas. SO_2 is absorbed in the solution where a rapid, high-yield reaction takes place to produce H_2SO_4. The acid produced in the scrubber becomes part of the plant's total production by blending with high-strength acid in the drying or absorbing towers. Thus there is no by-product or purge stream to dispose of with this process. Although this technique has been applied to sulfuric acid plants, the high cost of hydrogen peroxide makes this technique economically infeasible.

The ammonia scrubbing process uses anhydrous ammonia (NH_3) and water make-up in a 2-stage scrubbing system to remove SO_2 from acid plant tail gas. Excess ammonium sulfite-bisulfite solution is reacted with sulfuric acid in a stripper to evolve SO_2 gas and produce an ammonium sulfate byproduct solution. The SO_2 is returned to the acid plant while the solution is treated for the production of fertilizer grade ammonium sulfate. The process is dependent on a suitable market for ammonium sulfate.

As of 1979, one new plant (two units) and a new unit added to an existing plant, were known to employ an ammonia scrubbing system for tail gas SO_2 emissions control. The existing "A" and "B" SAPs at the CF Plant city complex currently employ ammonia scrubbing. These are single-absorption sulfuric acid plants.

Wet flue gas desulfurization (FGD) systems include technologies such as lime, limestone, forced or inhibited oxidation, and magnesium-enhanced lime FGD. These systems create solid and liquid waste streams, which must be treated before disposal. SO_2 control efficiencies for wet limestone FGD range from 50 to 98 percent, depending on the type of device and design, with an average of 90 percent.

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_2SO_4 manufactured. No sulfuric acid plant is known to have employed FGD as a control technology. In the PSD permits issued to Cargill Riverview and Piney Point Phosphates in recent years, FGD systems were dismissed as not being practical or economically feasible. As a result of these considerations, FGD systems were not considered further as BACT.

Oxidation

SO_2 oxidation with activated carbon is an alternative to double-absorption technology that has been applied to sulfuric acid plants for SO_2 control. In this process, the dry gas leaving the final absorbing tower is humidified then passed through a reactor filled with activated carbon. The activated carbon oxidizes the SO_2 to sulfuric acid, which is retained in the pores of the carbon. Clean, but wet, tail gas is discharged to the stack. Periodically, the carbon bed is regenerated by flushing with water. This produces a weak sulfuric acid stream that can be recycled back to the contact plant as dilution water.

One application of this technology is the Centaur process, which uses low-temperature wet carbon catalysis/adsorption in place of the standard final pass and absorption tower. The Centaur process has been demonstrated on a pilot scale at a sulfur burning plant. Emissions as low as 1 lb SO_2 per ton of acid are theoretically possible. However, the process has not yet been optimized and might result in a separate excess weak H_2SO_4 stream (beyond plant water makeup needs), which might require treatment and disposal. Process optimization and building wastewater treatment facilities would delay expansion of the plant. Furthermore, the C and D SAPs are double-absorption plants, and since this control technique has only been applied to single-absorption plants, this technique was not considered further.

EPA Review of Technologies

EPA's latest review of NSPS for H_2SO_4 plants (MITRE Corp., 1979) presents a comprehensive assessment of alternative control technologies for removing SO_2 from H_2SO_4 plant tailgases. Alternative technologies identified included the double-absorption contact H_2SO_4 plant, sodium sulfite-bisulfite scrubbing, ammonia scrubbing, and molecular sieves. The study concluded that the best demonstrated control technology to reduce SO_2 emissions is the double-absorption H_2SO_4 plant. Nearly all of the sulfuric acid plants built in the United States since 1971 have used the double-absorption process.

5.2.1.3 <u>Economic Analysis</u>

To achieve SO_2 emissions below those proposed for the C and D sulfuric acid double-absorption plants, add-on control equipment such as tailgas scrubbers would be required. This would add considerable capital and operating costs to the present system.

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

None of the alternative SO_2 control technologies are considered to be economically superior to the selected BACT. Add-on control techniques would have very high capital and annual operating costs, resulting in very high cost effectiveness.

An economic analysis of meeting lower emission rates with the cesium catalyst will be submitted in the near future.

5.2.1.4 Environmental Impacts

As shown in Table 6-10, the maximum predicted SO_2 impacts for the proposed project are below the significant impact levels. Additional SO_2 control would result in an insignificant reduction of ambient impacts that are already below significant impact levels.

Some of the technically feasible control techniques have a negative environmental impact due to waste streams created or additional water or energy demands. For instance, SO_2 oxidation can create an excess weak H_2SO_4 stream and requires additional water for flushing of the carbon bed for regeneration. FGD systems create both solid and liquid waste streams that require additional treatment prior to disposal.

Of the feasible control techniques, the control technique with the least environmental impact is the double absorption process since this process does not create any by-products or wasted scrubbing materials.

5.2.1.5 Summary

The proposed BACT for SO_2 for the C and D SAPs is the current double-absorption system with the addition of cesium catalyst in the 4^{th} pass of the converter. The proposed annual and 24-hour SO_2 limit is 3.5 lb/ton of 100 percent H_2SO_4, and the proposed 3-hour SO_2 limit is 3.85 lb/ton 100 percent H_2SO_4. This is consistent with recent BACT on existing plants.

The proposed limit of 3.5 lb/ton on a 24-hour basis, is already much more restrictive than the current limit of 4.0 lb/ton H_2SO_4. CF is required to operate the SAPs with some margin or safety factor to compensate for plant variability and upsets to ensure that the emission limit is not exceeded. Thus, a higher 3-hour limit is needed to account for these fluctuations in emissions.

CF's proposed BACT is reasonable based on previous BACT determinations and the high cost of any add-on control equipment. Each of the alternative SO_2 control techniques would result in significant capital and operating costs for CF without achieving a significant reduction in emissions.

5.2.2 NITROGEN OXIDES

5.2.2.1 Proposed Control Technology

As described previously, the double absorption process results in a small amount of NO_x emissions. The NO_x emissions are a result of the combustion process. The proposed NO_x emissions from the C and D SAPs at CF are 0.14 lb/ton 100 percent H_2SO_4 produced. The proposed BACT for NO_x is the existing combustion system and good combustion practices.

5.2.2.2 <u>BACT ANALYSIS</u>

Previous BACT Determinations

As part of the BACT analysis, a review was performed of previous BACT determinations for sulfuric acid plants listed in the RACT/BACT/LAER Clearinghouse on EPA's web page. There are no BACT emission limits for NO_x listed on the Clearinghouse. BACT from previous PSD construction permits, such as the recent Cargill Riverview Facility Expansion PSD permit (Permit No. 0570008-036-AC;PSD-FL-315) have been good combustion practices.

Control Technology Feasibility

The technically feasible NO_x controls for the C and D SAPs are shown in Table 5-3. As shown in the table, there are six types of NO_x abatement methods with various techniques of each method. Each available technique was listed with its associated efficiency estimate, identified as feasible or infeasible, and ranked based on control efficiency.

Potential Control Method Descriptions

<u>Using a Sorbent</u>

Absorbent in Combustion Chambers or Ducts -- Several methods are used to inject and remove absorbent. For the removal of NO_x, aqueous ammonia can be sprayed into the flue gas. In this system, the ammonia reacts with NO in the gas stream to produce ammonium nitrate. See below for a description of SNCR.

<u>Oxidation of NO_x with Subsequent Absorption</u>

Inject Oxidant -- The oxidation of nitrogen to its higher valence states makes NO_x soluble in water. When this is done a gas absorber can be effective. Oxidants that have been injected into the gas stream are ozone, ionized oxygen, or hydrogen peroxide.

Non-Thermal Plasma Reactor (NTPR) -- This technique generates electron energies in the gas stream that generate gas-phased radicals, such as hydroxyl (OH) and atomic oxygen (O) through collision of electrons with water and oxygen molecules present in the flue gas stream. In the flue gas stream, these radicals oxidize NO_x to form nitric acid (HNO_3), which can then be condensed out through a wet condensing precipitator.

These techniques have not been demonstrated on any sulfuric acid plants. Therefore, these techniques were not considered further.

Chemical Reduction of NO_x

Selective Catalytic Reduction (SCR) -- SCR uses a catalyst to react injected ammonia to chemically reduce NO_x. The catalyst has a finite life in flue gas and some ammonia slips through without being reacted. SCR has historically used precious metal catalysts, but can now also use base metal and zeolite catalyst materials. The optimum temperatures for the SCR process range from 480 to 800°F. The exhaust temperature from the SAPs is approximately 150 to 200°F, which is much lower than the temperatures required for the SCR system. Therefore, this control technique is considered technically infeasible.

Selective Non-Catalytic Reduction (SNCR) -- In SNCR, ammonia or urea is injected within the boiler or in ducts in a region where temperature is between 1,650 and 2,010°F. This technology is based on temperature ionizing the ammonia or urea instead of using a catalyst or non-thermal plasma. The temperature window for SNCR is very important because outside of it either more ammonia slips through the system or more NO_x is generated than is being chemically reduced. SNCR has never been demonstrated on a SAP, and NO_x emissions are relatively low. Therefore, this control technique was considered technically infeasible.

$SCONO_x$ Catalytic Absorption System – The $SCONO_x$ system utilizes a single catalyst for the reduction of CO and NO_x without the use of ammonia, unlike conventional catalytic units which require two separate catalysts. Conventional systems use an oxidation catalyst for the removal of CO and an SCR catalyst for the reduction of NO_x with the use of ammonia. The system can operate effectively over a wide operating temperature range of 450 to 700°F. Although the $SCONO_x$ technology is capable of operating at temperatures as low as 300°F with some additional equipment and changes to the $SCONO_x$ operating process, the exhaust temperature of the SAPs is considerably lower, between 150 to 200°F. Therefore, this control technique is considered technically infeasible.

Reducing Residence Time at Peak Temperature

Air Staging of Combustion -- Combustion air is divided into two streams. The first stream is mixed with fuel in a ratio that produces a reducing flame. The second stream is injected downstream of the flame and creates an oxygen-rich zone.

Fuel Staging of Combustion -- This is staging of combustion using fuel instead of air. Fuel is divided into two streams. The first stream feeds primary combustion that operates in a reducing fuel-to-air ratio. The second stream is injected downstream of primary combustion, causing the net fuel to air ratio to be slightly oxidizing. Excess fuel in the primary combustion zone dilutes heat to reduce temperature. The second stream oxidizes the fuel while reducing the NO_x to N_2.

Inject Steam -- Injection of steam causes the stoichiometry of the mixture to be changed and dilutes calories generated by combustion. These actions cause combustion temperature to be lower, and in-turn reduces the amount of thermal NO_x formed.

<u>Reducing Peak Temperature</u>

Flue Gas Recirculation (FGR) -- Recirculation of cooled flue gas reduces combustion temperature by diluting the oxygen content of the combustion air and by causing heat to be diluted in a greater mass of flue gas. Heat in the flue gas can be recovered by a heat exchanger. This reduction of temperature lowers the thermal NO_x concentration that is generated.

Over-Fire Air (OFA) -- When primary combustion uses a fuel-rich mixture, use of OFA completes the combustion. Because the mixture is always off-stoichiometric when combustion is occurring, the temperature is reduced. After all other stages of combustion, the remainder of the fuel is oxidized in the OFA.

Less Excess Air (LEA) -- Excess airflow combustion has been correlated to the amount of NO_x generated. Limiting the net excess airflow can limit NO_x content of the flue gas.

Combustion Optimization -- Combustion optimization refers to the active control of combustion. The active combustion control measures seek to find optimum combustion efficiency and to control combustion at that efficiency.

Low NO_x Burners (LNB) -- A LNB provides a stable flame that has several different zones. For example, the first zone can be primary combustion. The second zone can be Fuel Reburning (FR) with fuel added to chemically reduce NO_x. The third zone can be the final combustion in low excess air to limit the temperature.

Add-on NO_x control equipment is not known to be applied on any H_2SO_4 plant. The only known NO_x control technique applied to sulfuric acid plants is good combustion practices. Therefore, none of the add-on control techniques were considered further.

5.2.2.3 Economic Analysis

The maximum proposed NO_x emissions from each of the C and D SAPs is very low; 0.14 lb/ton H_2SO_4. There are no known add-on NO_x control techniques that have been applied to sulfuric acid plants. Add-on technology would have a significant economic impact on CF and would not result in significant emission reductions.

5.2.2.4 Environmental Impacts

As shown in Table 6-12, the maximum predicted annual NO_2 impacts for the proposed project are less than 20-percent of the EPA significant impact levels. Additional NO_x controls would result in an insignificant reduction of ambient impacts that are already below EPA significance levels for both Class I and II areas.

5.2.2.5 Summary

The proposed BACT is the continued use of good combustion practices. The proposed NO_x emission limit is 0.14 lb/ton H_2SO_4.

5.2.3 SULFURIC ACID MIST

5.2.3.1 Proposed Control Technology

CF is proposing the continued use of high-efficiency Monsanto candle-type mesh pad mist eliminators to control sulfuric acid mist at the C and D SAPs. The proposed emission limit for each of the C and D SAPs is 0.10 lb/ton of 100 percent H_2SO_4 produced.

5.2.3.2 BACT Analysis

Previous BACT Determinations

As part of the BACT analysis, a review was performed of previous SAM BACT determinations for sulfuric acid plants listed in the RACT/BACT/LAER Clearinghouse on EPA's web page. A summary of the BACT determinations for SAM emissions from sulfuric acid plants is presented in Table 5-4. The SAM emission limits range from 0.10 to 0.15 lb/ton H_2SO_4. All of the previous BACT determinations have been based on mist eliminators.

Control Technology Feasibility

The only known technically feasible add-on SAM controls for sulfuric acid plants are mist eliminators. There are several types of mist eliminators, including conventional packed fiber mist eliminators or demister pads, impaction based mist eliminators, and Brownian-type mist eliminators. These are described in more detail below.

Potential Control Method Descriptions

As previously stated, mist eliminators are the only known add-on SAM controls for sulfuric acid plants. The different types of mist eliminators include the conventional packed fiber mist eliminator or demister pads, impaction based mist eliminators, and Brownian-type mist eliminators.

Acid mist removal from sulfuric acid plant tail gases is accomplished almost exclusively with packed fiber mist eliminators or demister pads. Although a small portion of the SO_3 that leaves the final absorber will be absorbed in fiber mist eliminators and demister pads, SO_3 emission control depends primarily on proper plant operation. A successful packed fiber tubular mist eliminator using treated glass fibers was developed in 1959, known as the Brink mist eliminator. These devices capture particles using a combination of three different mechanisms: interception, impaction, and Brownian motion. Each mechanism operates most efficiently for a particular particle size. Together, they provide overall collection efficiencies that can exceed 99-percent depending on the inlet mist loading.

Demister pads are mesh pads designed to capture larger mist particles by the interception and impaction mechanisms. Sometimes a coalescing pad is used ahead of the demister pad to provide higher collection efficiency. Demister pads, with or without a coalescer section, are not able to collect submicron particles as efficiently as packed fiber demisters. Successful use of demister pads requires careful control of plant operating parameters to minimize internal mist formation.

Alternatives to the conventional mist eliminator are impaction based devices and Brownian-type devices. The Monsanto CS-type eliminator is an impaction-based product which is stated to remove approximately 100 percent of particles above 3 microns in diameter, and 50 to 95 percent of particles between 0.5 and 3 microns. In order to implement this type of control device, the final tower of a sulfuric acid plant would need to be modified (enlarged) at a considerable expense.

The Brownian-type mist eliminator is much more expensive that the impaction type. To implement this type of control device, the tower would also have to be modified to accommodate the larger size requirements, structural support, etc.

Economic Analysis

Alternative SAM controls are not economically feasible since the use of a different type of mist eliminator would result in very high capital costs since the towers would have to be modified considerably. Furthermore, a significant reduction in SAM emissions would not be achieved by employing an alternative type of mist eliminator, since current actual emissions are already low.

5.2.3.3 Summary

The proposed BACT for SAM emissions is the use of high-efficiency mist eliminators. The proposed emission limit is 0.10 lb/ton H_2SO_4. This limit is much lower than the current limit for the plants of 0.15 lb/ton. This proposed emission limit is reasonable based on previous BACT determinations, and is consistent with currently established BACT, based on recent PSD permits.

A summary of the SAM emissions compliance test data for the C and D SAPs from the last 3 years is presented in Table 5-5. The average for the last 3 years for the C and D SAPs, are 0.038 lb/ton and 0.036 lb/ton, respectively, while the maximum compliance test result was 0.047 lb/ton H_2SO_4 produced. This demonstrates that the mist eliminators are achieving low SAM emission rates.

In summary, the use of mist eliminators is consistent with all other previous BACT determinations and is reasonable based on current performance and economics.

5.3 MOLTEN SULFUR STORAGE AND HANDLING SYSTEM

5.3.1 SULFUR DIOXIDE

The Molten Sulfur Storage and Handling System does not currently use control equipment and does not have emissions limits. However, the proposed project is subject to BACT for SO_2, which is emitted from the Molten Sulfur Storage and Handling System. Therefore, this section represents BACT for SO_2 from the Molten Sulfur Storage and Handling System.

The maximum estimated SO_2 emissions from the entire Molten Sulfur Storage and Handling System are only 0.66 lb/hr or 2.87 TPY. These emissions are extremely low. Any add-on SO_2 control techniques (refer to Section 5.2.1.2 for description) would result in significant capital costs to CF to control an insignificant amount of SO_2 emissions. Therefore, add-on SO_2 control devices were not considered further.

Table 5-1. Summary of BACT Determinations for Sulfur Dioxide Emissions from Sulfuric Acid Plants

Company Name	State	Permit No./RBLC ID	Permit Issue Date	Throughput	Emission Limit	Control Equipment
CARGILL FERTILIZER	FL	0570008-036-AC/PSD-FL-315	11/21/2001	3,400 TPD	4 LB/TON (3-hr)	DOUBLE ABSORPTION SYSTEM
					3.5 LB/TON (24-hr)	
US AGRI-CHEMICALS CORP.	FL	PSD-FL-278/FL-0237	2/6/2001	3,000 TPD	3.5 LB/TON (24-hr)	DOUBLE ABSORPTION & MIST ELIMINATORS
CARGILL FERTILIZER	FL	0570008-014-AV	4/28/1999	2,700 TPD	4 LB/TON (3-hr)	DOUBLE ABSORPTION
					3.5 LB/TON (24-hr)	DOUBLE ABSORPTION
FARMLAND HYDRO, L. P. (NOW CARGILL GREEN BAY)	FL	1050053-019-AC/FL-0129	3/8/1999	2,750 TPD	3.5 LB/TON (24-hr)	DOUBLE ABSORPTION SCRUBBER/MIST ELIMINATOR
CARGILL FERTILIZER	FL	FL-0197	10/16/1998	3,200 TPD	3.5 LB/TON (24-hr)	DOUBLE ABSORPTION PROCESS
FARMLAND HYDRO, L. P. (NOW CARGILL GREEN BAY)	FL	1050053-019-AC	7/15/1998	2,750 TPD	3.5 LB/TON (24-hr)	DOUBLE ABSORPTION SCRUBBER/MIST ELIMINATOR
PINEY POINT PHOSPHATES INC.	FL	FL-0194	2/17/1998	2,000 TPD	4 LB/TON (3-hr)	DOUBLE ABSORPTION
					3.5 LB/TON (48-hr)	DOUBLE ABSORPTION
CARGILL FERTILIZER	FL	AC53-271436/PSD-FL-229	3/7/1995	3,200 TPD	4 LB/TON	DOUBLE ABSORPTION CATALYST /MIST ELIMINATORS

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2003.

Table 5-2. SO_2 Control Technolgy Feasibility Analysis for the C and D Sulfuric Acid Plants, CF Industries, Plant City

SO_2 Abatement Method	Technique Now Available	Estimated Efficiency	Technically Feasible and Demonstrated?	Rank Based on Control Efficiency	Employed by the C and D SAPs?
Sorbent Injection	Furnace Sorbent Injection	50%	N	6	N
	Economiser Sorbent Injection	50%	N	6	N
	Duct Sorbent Injection	80%	N	5	N
Double Absorption Process	Double-Absorption System	>99.7%	Y	2	Y
Add-on Gas Absorption/Wet Scrubbers	Sodium Sulfite-Bisulfite Scrubbing	>90%	Y	4	N
	Ammonia Scrubbing	>90%	Y	4	N
	Hydrogen Peroxide Scrubbing	>90%	Y	4	N
	Molecular Sieves	>90%	Y	4	N
	Lime or Calcium Oxide Spray Dryer Scrubbers	90 - 95%	Y	4	N
Oxidation	SO_2 Oxidation with Activated Carbon	>90%	N	4	N

Note: NTF = Not Technically Feasible.

Table 5-3. NO_x Control Technology Feasibility Analysis for the C and D Sulfuric Acid Plants, CF Industries, Plant City

NO_x Abatement Method	Technique Now Available	Estimated Efficiency	Feasible and Demonstrated? (Y/N)	Rank Based on Control Efficiency	Employed by C and D SAPs? (Y/N)
1. Oxidation of NO_x with subsequent absorption.	Inject Oxidant	60 - 80%	N	1	N
	Non-Thermal Plasma Reactor (NTPR)	60 - 80%	N	1	N
2. Chemical reduction of NO_x	Selective Catalytic Reduction (SCR)	35 - 80%	NTF	NTF	N
	Selective Non-Catalytic Reduction (SNCR)	35 - 80%	NTF	NTF	N
	$SCONO_X$™	35 - 80%	NTF	NTF	N
3. Reducing residence time at peak temperature	Air Staging of Combustion	50 - 65%	N	2	N
	Fuel Staging of Combustion	50 - 65%	N	2	N
	Inject Steam	50 - 65%	N	2	N
4. Reducing peak temperature	Flue Gas Recirculation (FGR)	15 -25%	N	3	N
	Over Fire Air (OFA)	15 -25%	N	3	N
	Less Excess Air (LEA)	15 -25%	N	3	N
	Combustion Optimization	15 -25%	Y	3	Y
	Reduce Air Preheat	15 -25%	N	3	N
	Low NO_x Burners (LNB)	15 -25%	NTF	NTF	N

Note: NTF = Not Technically Feasible.

Table 5-4. Summary of BACT Determinations for Sulfuric Acid Mist Emissions from Sulfuric Acid Plants

Company Name	State	Permit No./RBLC ID	Permit Issue Date	Throughput	Emission Limits	Control Equipment
CARGILL FERTILIZER	FL	0570008-036-AC/PSD-FL-315	11/21/01	3,400 TPD	0.10 LB/TON	MIST ELIMINATORS
US AGRI-CHEMICALS CORP.	FL	PSD-FL-278/FL-0237	2/6/01	3,000 TPD	0.12 LB/TON	MIST ELIMINATORS
CARGILL FERTILIZER	FL	0570008-014-AV	4/28/99	2,700 TPD	0.15 LB/TON	MIST ELIMINATORS
FARMLAND HYDRO, L. P. (NOW CARGILL GREEN BAY)	FL	1050053-019-AC/FL-0129	3/8/99	2,750 TPD	0.15 LB/TON	MIST ELIMINATORS
CARGILL FERTILIZER	FL	FL-0197	10/16/98	3,200 TPD	0.12 LB/TON	MIST ELIMINATORS (IMPACTION OR BROWNIAN DIFFUSION)
FARMLAND HYDRO, L. P. (NOW CARGILL GREEN BAY)	FL	1050053-019-AC	7/15/98	2,750 TPD	0.15 LB/TON	MIST ELIMINATORS
PINEY POINT PHOSPHATES INC	FL	FL-0194	2/17/98	2,000 TPD	0.15 LB/TON	MIST ELIMINATORS (BROWNIAN DIFFUSION)
CARGILL FERTILIZER	FL	AC53-271436 / PSD-FL/229	3/7/95	3,200 TPD	0.15 LB/TON	MIST ELIMINATORS

Reference: RACT/BACT/LAER Clearinghouse on EPA's Webpage, 2003.

Table 5-5. Summary of SAM Emissions Test Data for the C and D Sulfuric Acid Plants, CF Industries, Plant City

C SAP

Date	SAM Emissions lb/hr	SAM Emissions lb/ton
1/14/03 - 1/15/03	2.70	0.027
1/7/02 - 1/8/02	4.15	0.040
1/9/2001	4.08	0.047
Average =	**3.64**	**0.038**

D SAP

Date	SAM Emissions lb/hr	SAM Emissions lb/ton
1/29/2003	3.83	0.037
1/21/02 - 1/22/02	3.19	0.033
1/16/2001	3.86	0.037
Average =	**3.63**	**0.036**

6.0 AIR QUALITY IMPACT ANALYSIS

6.1 GENERAL APPROACH

The general modeling approach followed EPA and FDEP modeling guidelines for determining compliance with AAQS and PSD increments. For all criteria pollutants that will be 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 and/or stack configuration changes due to the project alone will result in predicted impacts that are in excess of the EPA significant impact levels at any location beyond the plant's restricted boundaries.

Generally, if the facility undergoing the modification is within 200 kilometers of a PSD Class I area, then a significant impact analysis is also performed to evaluate the impact due to the project alone at the PSD Class I area. Because the Chassahowitzka National Wilderness Area (CNWA) is a PSD Class I area that is located within 200 km of the proposed project, the maximum predicted impacts at the CNWA are compared to EPA's proposed significant impact levels for PSD Class I areas. These recommended levels have never been promulgated as rules, but are the currently accepted criteria for determining whether a proposed project will incur a significant impact on a PSD Class I area.

If the project-only impacts are above the significant impact levels in the vicinity of the facility, then two additional and more detailed air modeling analyses are required. The first analysis demonstrates compliance with federal and Florida ambient air quality standards (AAQS), and the second analysis demonstrates compliance with allowable PSD Class II increments.

If the project-only impacts at the PSD Class I area are above the proposed EPA PSD Class I significant impact levels, then an analysis is performed to demonstrate compliance with allowable PSD Class I impacts at the PSD Class I area. The proposed project's maximum emission increases are also evaluated at the PSD Class I area to support the air quality related values (AQRV) analysis, which includes an evaluation of regional haze degradation.

Generally, when using 5-years of meteorological data for the analysis, the highest annual and the highest, second-highest (HSH) short-term (i.e., 24 hours or less) concentrations are compared to the applicable AAQS and allowable PSD increments. [Note that for determining compliance with the 24-hour AAQS for particulate matter, the sixth highest predicted concentration in 5 years (i.e., H6H), instead of the HSH, is used to compare to the applicable 24-hour AAQS.]

The HSH concentration is calculated for a receptor field by:

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

The HSH approach is consistent with AAQS 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 modeling 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, if 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.

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 concentrations from other years in the screening analysis are within 10 percent of the overall maximum concentration, then those other concentrations are refined as well. Typically, if the highest and HSH concentrations occur in different locations, concentrations in both areas are refined.

A more detailed description of the model, along with the emission inventory, meteorological data, and receptor grids, is presented in the following sections.

6.2 SIGNIFICANT IMPACT ANALYSIS

FDEP policies stipulate that the highest annual average and highest short-term concentrations are to be compared to the applicable significant impact levels both in the vicinity of the project and at the PSD Class I area. Based on the screening modeling analysis results in the vicinity of the project, additional modeling refinements are performed, if necessary, to obtain the maximum concentration with a receptor grid spacing of 100 meters (m) or less.

6.3 AAQS AND PSD CLASS II ANALYSES

For each pollutant for which a significant impact is predicted in the vicinity of the project, AAQS and PSD Class II analyses are required. The AAQS analysis is a cumulative source analysis that evaluates whether the post-project concentrations from all sources will comply with the AAQS. All sources include the post-project source configuration at the project site, the impacts from other nearby facility sources, plus a background concentration to account for sources not included in the modeling analysis.

The PSD Class II analysis is a cumulative source analysis that evaluates whether the post-project PSD increment concentrations for all increment-affecting sources will comply with the allowable PSD Class II increments. This includes the post-project PSD increment-affecting sources at the project site, plus the impacts from all nearby PSD increment-affecting sources at other facilities.

6.4 PSD CLASS I ANALYSIS

For each pollutant for which a significant impact is predicted at the PSD Class I area, a PSD Class I analysis is required. The PSD Class I analysis is a cumulative source analysis that evaluates whether the post-project PSD increment concentrations for all increment-affecting sources within the impact distance of the PSD Class I area will comply with the allowable PSD Class I increments. This includes the post-project PSD increment-affecting sources at the project site, plus the impacts from all PSD increment-affecting sources at other facilities that are within the impact distance of the PSD Class I area.

6.5 MODEL SELECTION

The Industrial Source Complex Short-term (ISCST3, Version 02035) dispersion model (EPA, 2002) was used to evaluate the pollutant impacts due to the proposed project in areas within 50-km of the CF Plant City facility. This model is maintained by the EPA on its Internet website, Support Center for Regulatory Air Models (SCRAM), within the Technical Transfer Network (TTN). A listing of ISCST3 model features is presented in Table 6-1. The ISCST3 model is designed to calculate hourly concentrations based on hourly meteorological data (i.e., wind direction, wind speed, atmospheric stability, ambient temperature, and mixing heights). The ISCST3 model is applicable to sources located in either flat or rolling terrain where terrain heights do not exceed stack heights. These areas are referred to as simple terrain. The model can also be applied in areas where the terrain exceeds the stack heights. These areas are referred to as complex terrain.

In this analysis, the EPA regulatory default options were used to predict all maximum impacts. The ISCST3 model can be executed in the rural or urban land use mode. The land use mode affects stability, dispersion coefficients, wind speed profiles, and mixing heights. Land use can be characterized based on a scheme recommended by EPA (Auer, 1978). If more than 50 percent land use within a 3-km radius around a project site is classified as industrial or commercial, or high-density residential, then the urban option should be selected. Otherwise, the rural option is appropriate. Based on the land-use within a 3-km radius of the CF plant site, the rural dispersion coefficients were used in the modeling analysis. Also, since the terrain around the facility is flat to gently rolling, the simple terrain feature of the model was selected.

The ISCST3 model was used to provide maximum concentrations for the annual, 24-, 8-, 3-, and 1-hour averaging times.

For predicting maximum impacts at the CNWA PSD Class I area, the California Puff (CALPUFF) modeling system was used. CALPUFF, Version 5.5 (EPA, 2002), is a Lagrangian puff model that is recommended by the FDEP, in coordination with the Federal Land Manager (FLM) for the CNWA, for predicting pollutant impacts at PSD Class I areas that are beyond 50 km from a project site. A listing of CALPUFF model features is presented in Table 6-2.

6.6 METEOROLOGICAL DATA

Meteorological data used in the ISCST3 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 the Tampa International Airport in Tampa, Florida, and at Ruskin, Florida, respectively. The 5-year period of meteorological data was from 1991 through 1995. The NWS stations at Tampa and Ruskin are located approximately 45 and 58 km, respectively, west-southwest and south-southwest, respectively, of the CF Plant City site. The surface meteorological data from Tampa are considered to be representative of the project site because both the project site and the weather stations are located in similar climatological areas in west central Florida. They are, therefore, expected to experience similar weather conditions, such as frontal passages and sea-breeze fronts.

During preliminary telephone discussions with the FLM, it was indicated that the use of only 1 year of CALMET meteorological data would no longer be acceptable for a refined CALPUFF modeling analysis, and that multiple years of CALMET data should be used. If the CALMET meteorological data are created using only National Weather Service (NWS) data, then a minimum of 5 years of meteorological data are required. If the NWS data are merged with mesoscale meteorological data (i.e., either MM4 or MM5), the analysis should include a minimum of 3 years of meteorological data. For this project, a refined CALPUFF analysis was performed with mesoscale meteorological data for the following 3 years: 1990 with 80-km MM4 data, 1992 with 80-km MM5 data, and 1996 with 36-km MM5 data. A more detailed discussion of the CALMET wind fields used for the CALPUFF modeling analysis is provided in Appendix D.

6.7 EMISSION INVENTORY

6.7.1 SIGNIFICANT IMPACT ANALYSIS

The SO_2, SAM, and NO_x emission rates and the physical and operational stack parameters for all project-affected sources are summarized in Tables 6-3 and 6-4. The current actual and future potential SO_2, SAM, and NO_x emissions for all CF sources affected by the project are presented in Table 6-3. Emission rates are based on information presented in Section 2.0. The current and future stack and operating parameters for all CF sources are included in Table 6-4. Since the current emissions from the Molten Sulfur Storage and Handling System are equal to the future emissions form this system, these sources were not modeled in the significant impact analysis. All sources were modeled at locations that are relative to the "C" SAP stack location.

6.7.2 CF PLANT CITY PSD BASELINE INVENTORY (1974)

A summary of CF's SO_2 sources for the PSD baseline year (1974) is provided in Table 6-5. These sources were used along with CF's future SO_2 sources from Table 6-6 to determine the PSD increment consumption concentrations at the PSD Class I area after completion of the proposed project.

6.7.3 PSD CLASS I ANALYSIS

A summary of the future potential SO_2 emission rates and stack parameters for all CF Plant City sources that were used in the PSD Class I increment analysis is presented in Tables 6-6 and 6-7, respectively.

The proposed project's SO_2 impacts were predicted to exceed the 3-hour significant impact level at the CNWA PSD Class I area. Therefore, a PSD Class I increment consumption analysis was required for SO_2. The proposed projects NO_x impacts were predicted to not exceed the significant impact level at the CNWA PSD Class I area. Therefore, a PSD Class I increment consumption analysis was not required for NO_x. However, the proposed project's emissions of NO_x were evaluated at the Class I area to support the air quality related values (AQRV) analysis. Also, emissions of PM_{10}, SAM, and NO_x were evaluated at the Class I area in support of the regional haze analysis, and emissions of SO_2, SAM, and NO_x were evaluated at the Class I area in support of the sulfur (S) and nitrogen (N) deposition analysis. Since the current hourly PM/PM_{10} emissions from the Molten Sulfur Storage and Handling System were equal to the future PM/PM_{10} emissions from this system, these sources were not included in the regional haze analysis. The AQRV, regional haze, and deposition analyses are presented in Section 7.0.

Detailed SO_2 background source data that were used for PSD Class I analysis is presented in Appendix C.

6.8 RECEPTOR LOCATIONS

6.8.1 SITE VICINITY

The screening receptor grid used for the site vicinity was comprised of Cartesian receptors, and consisted of the following:

- Property boundary receptors, spaced at 50-m intervals;
- Receptors from the property boundary out to 2.0 km, spaced at 100-m intervals;
- Receptors from 2 to 3 km, spaced at 150-m intervals; and
- Receptors from 3 to 5 km, spaced at 500-m intervals.

The modeling origin of the receptor grid was the C SAP stack location, and all source and receptor locations are relative to this location.

The receptor locations in the vicinity of the plant, as well as the current sources and building locations, are shown in Figures 6-1 and 6-2.

6.8.2 CLASS I AREA

Maximum SO_2, NO_x, and SAM concentrations were predicted at the CNWA with the CALPUFF model using 13 discrete receptors located along the border of the CNWA PSD Class I area. Impacts for the proposed project only were compared to both the proposed EPA PSD Class I significance levels for SO_2 and NO_x, the regional haze degradation criteria of 5 percent, and the sulfur and nitrogen deposition criteria of 0.01 kg/ha/yr and 0.01 kg/ha/yr, respectively. The SAM impacts were used to assess the proposed project's impacts on the CNWA AQRVs. A listing of the Class I receptors is provided in Table 6-8.

6.9 BUILDING DOWNWASH EFFECTS

All significant building structures within CF's existing plant area were determined by a site plot plan. The plot plan of the CF site was presented in Section 2.0 (Figure 2-1). A total of 18 building structures were evaluated. All structures were processed in the EPA Building Input Profile (BPIP, Version 95086) program to determine direction-specific building heights and projected widths for each 10-degree azimuth direction for each source that was included in the modeling analysis. A listing of dimensions for each structure is presented in Table 6-9.

6.10 MODEL RESULTS

6.10.1 SIGNIFICANT IMPACT ANALYSIS

A summary of the predicted maximum SO_2 concentrations due to the proposed project only, from the screening analysis, are presented in Table 6-10. The maximum predicted concentrations are below the significant impact levels for SO_2 and NO_x. As a result, detailed modeling analyses were not performed for SO_2 and NO_x.

6.10.2 SAM IMPACT ANALYSIS

The maximum predicted SAM concentrations due to the proposed project are presented in Table 6-11, for the annual, 24-, 8-, 3-, and 1-hour averaging times. There are no AAQS or PSD increments for SAM concentrations. However, SAM impacts are required for the additional impact analysis and AQRV analysis for the PSD Class I area. At the site vicinity, the maximum predicted annual and 24-, 8-, 3-, and 1-hour SAM concentrations are 0.19, 2.83, 6.4, 11.0, and 17.7 $\mu g/m^3$, respectively.

6.10.3 PSD CLASS I ANALYSIS

The maximum SO_2 and NO_x concentrations, predicted for the proposed project only at the CNWA PSD Class I area, are compared with the EPA's proposed PSD Class I significance levels in Table 6-12. The 3-hour average SO_2 impacts were predicted to be above the significant impact level. All other maximum predicted impacts were below the significant impact levels. Therefore, a full PSD Class I increment analysis was performed for SO_2 the 3-hour averaging time.

The maximum 3-hour SO_2 PSD Class I increment consumption, due to all PSD affecting sources, is summarized in Table 6-13. The 3-hour periods are listed in Table 6-14, where the maximum predicted PSD increment consumption exceeded the allowable PSD Class I increment of 25 $\mu g/m^3$. For each receptor and time period that exceeded the allowable PSD Class I increment, the contribution from the proposed project was determined to be well below the significant impact level. Therefore, it is concluded that the proposed project does not contribute significantly to any of the modeled PSD Class I violations.

The results of the SO_2, NO_x, and SAM modeling analysis in support of the AQRV, regional haze, and N and S deposition analysis are presented in Section 7.0.

Table 6-1. Major Features of the ISCST3 Model

ISCST3 Model Features[a]
• Polar or Cartesian coordinate systems for receptor locations
• Rural or one of three urban options which affect wind speed profile exponent, dispersion rates, and mixing height calculations
• Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions (Briggs, 1969, 1971, 1972, and 1975; Bowers, et al., 1979).
• Procedures suggested by Huber and Snyder (1976); Huber (1977); and Schulman and Scire (1980) for evaluating building wake effects
• Procedures suggested by Briggs (1974) for evaluating stack-tip downwash
• Separation of multiple emission sources
• Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations
• Capability of simulating point, line, volume, area, and open pit sources
• Capability to calculate dry and wet deposition, including both gaseous and particulate precipitation scavenging for wet deposition
• Variation of wind speed with height (wind speed-profile exponent law)
• Concentration estimates for 1 hour to annual average times
• Terrain-adjustment procedures for elevated terrain including a terrain truncation algorithm for ISCST3; a built-in algorithm for predicting concentrations in complex terrain
• Consideration of time-dependent exponential decay of pollutants
• The method of Pasquill (1976) to account for buoyancy-induced dispersion
• A regulatory default option to set various model options and parameters to EPA recommended values (see text for regulatory options used)
• Procedure for calm-wind processing including setting wind speeds less than 1 m/s to 1 m/s.

Note: ISCST3 = Industrial Source Complex Short-Term.

References:

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Huber, A.H. 1977. Incorporating Building/Terrain Wake Effects on Stack Effluents. Preprint Volume for the Joint Conference on Applications of Air Pollution Meteorology, American Meteorological Society, Boston, Massachusetts.

Huber, A.H. and W.H. Snyder. 1976. Building Wake Effects on Short Stack Effluents. Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality, American Meteorological Society, Boston, Massachusetts.

Pasquill, F. 1976. Atmospheric Dispersion Parameters in Gaussian Plume Modeling - Part II. Possible Requirements for Change in the Turner Workbook Values. EPA-600/4-76-030b, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

Schulman, L.L. and J.S. Scire. 1980. Buoyant Line and Point Source (BLP) Dispersion Model User's Guide. Document P-7304B, Environmental Research and Technology, Inc., Concord, MA.

Table 6-2. Major Features of the CALPUFF Model, Version 5.5

CALPUFF Model Features
• Source types: Point, line (including buoyancy effects), volume, area (buoyant, non-buoyant)
• Non-steady-state emissions and meteorological conditions (time-dependent source and emission data; gridded 3-dimensional wind and temperature fields; spatially-variable fields of mixing heights, friction velocity, precipitation, Monin-Obukhov length; vertically and horizontally-varying turbulence and dispersion rates; time-dependent source and emission data for point, area, and volume sources; temporal or wind-dependent scaling factors for emission rates)
• Efficient sampling function (integrated puff formulation; elongated puff (slug) formation)
• Dispersion coefficient options (Pasquill-Gifford (PG) values for rural areas; McElroy-Pooler values (MP) for urban areas; CTDM values for neutral/stable; direct measurements or estimated values)
• Vertical wind shear (puff splitting; differential advection and dispersion)
• Plume rise (buoyant and momentum rise; stack-tip effects; building downwash effects; partial plume penetration above mixing layer)
• Building downwash effects (Huber-Snyder method; Schulman-Scire method)
• Complex terrain effects (steering effects in CALMET wind field; puff height adjustments using ISC model method or plume path coefficient; enhanced vertical dispersion used in CTDMPLUS)
• Subgrid scale complex terrain (CTSG option) (CTDM flow module; dividing streamline as in CTDMPLUS)
• Dry deposition (gases and particles; options for diurnal cycle per pollutant, space and time variations with a resistance model, or none)
• Overwater and coastal interaction effects (overwater boundary layer parameters; abrupt change in meteorological conditions, plume dispersion at coastal boundary; fumigation; option to use Thermal Internal Boundary Layers (TIBL) into coastal grid cells)
• Chemical transformation options (Pseudo-first-order chemical mechanisms for SO_2, SO_4, HNO_3, and NO_3; Pseudo-first-order chemical mechanisms for SO_2, SO_4, NO, NO_2, HNO_3, and NO_3 (RIVAD/ARM3 method); user-specified diurnal cycles of transformation rates; no chemical conversions)
• Wet removal (scavenging coefficient approach; removal rate as a function of precipitation intensity and type)
• Graphical user interface
• Interface utilities (scan ISCST3 and AUSPLUME meteorological data files for problems; translate ISCST3 and AUSPLUME input files to CALPUFF input files

Note: CALPUFF = California Puff Model

Source: EPA, 2001.

Table 6-3. Summary of Emission Rates Used in the Significant Impact Modeling Analysis, CF Industries, Plant City

		SO_2 Emission Rate						SAM Emission Rate					
	EU	3-Hour		24-Hour		Annual		Hourly		Annual		NO_x Emission Rate	
Source	ID	lb/hr	g/s	lb/hr	g/s	TPY	g/s	lb/hr	g/s	TPY	g/s	TPY	g/s
Current Operations													
C SAP	007	392.6 [a]	49.5	381.0 [a]	48.0	1,502.5 [b]	43.2	4.79 [c]	0.604	15.59 [b]	0.448	19.48 [b]	0.56
D SAP	008	381.9 [a]	48.1	378.0 [a]	47.6	1,485.0 [b]	42.7	3.86 [c]	0.486	14.87 [b]	0.428	10.99 [b]	0.32
Molten Sulfur Storage and Handling System: [d]		--	--	--	--	--	--	--	--	--	--	--	--
--Storage Tank (022)	022	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Storage Tank (033)	033	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Truck Pit A	023	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Truck Pit B	024	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Railcar Unloading Pit		0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
Total--Molten Sulfur Storage & Handling System		**0.66**	**0.083**	**0.66**	**0.083**	**2.87**	**0.083**	--	--	--	--	--	--
Future Operations													
C SAP [e]	007	441.15	55.58	401.04	50.53	1,756.56	50.53	11.46	1.44	50.19	1.44	70.26	2.02
D SAP [e]	008	441.15	55.58	401.04	50.53	1,756.56	50.53	11.46	1.44	50.19	1.44	70.26	2.02
Molten Sulfur Storage and Handling System: [f]		--	--	--	--	--	--	--	--	--	--	--	--
--Storage Tank (022)	022	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Storage Tank (033)	033	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Truck Pit A	023	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Truck Pit B	024	0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
--Railcar Unloading Pit		0.13	0.017	0.13	0.017	0.57	0.017	--	--	--	--	--	--
Total--Molten Sulfur Storage & Handling System		**0.66**	**0.083**	**0.66**	**0.083**	**2.87**	**0.083**	--	--	--	--	--	--

[a] Based on the maximum 24-hour average emissions from CEM data.
[b] Refer to Table 2-4 for derivation.
[c] Based on the maximum of test data (2001 - 2003)
[d] Refer to Table 2-4 for derivation.
[e] Refer to Table 2-1 for derivation.
[f] Refer to Table 2-3 for derivation.

Table 6-4. Summary of Stack and Operating Parameters and Locations Used in the Significant Impact Modeling Analysis, CF Industries, Plant City

		Relative Location[a]				Stack and Operating Parameters								
		X		Y		Height		Diameter		Flow Rate	Exit Temperature		Velocity	
Emission Unit	ISCST3 ID	ft	m	ft	m	ft	m	ft	m	(acfm)	°F	K	ft/s	m/s
Current Operations														
"C" SAP[b]	SAPC	0.0	0.0	0.0	0.0	199	60.66	8.0	2.44	123,300	158	343	40.9	12.46
"D" SAP[b]	SAPD	174.3	53.12	58.9	17.94	199	60.66	8.0	2.44	121,200	161	345	40.2	12.25
Molten Sulfur Storage and Handling System:														
--Storage Tank (022)[d]	MSTK22	-67.27	-20.50	95.4	29.09	38	11.58	2.0	0.61	[g]	212	373.2	0.033	0.01
--Storage Tank (033)[e]	MSTK33	-204.8	-62.41	654.2	199.39	41	12.50	-	-	[g]	-	-	-	-
--Truck Pit A[d]	MSTPTA	-171.7	-52.34	35.4	10.78	12	3.66	0.67	0.20	[g]	212	373.2	0.033	0.01
--Truck Pit B[d]	MSTPTB	-125.9	-38.39	-95.5	-29.11	12	3.66	0.67	0.20	[g]	212	373.2	0.033	0.01
--Railcar Unloading Pit[f]	MSRCUP	-332.3	-101.29	696.5	212.29	0	0.00	-	-	[g]	-	-	-	-
Future Operations														
"C" SAP[c]	SAPC	0.0	0.0	0.0	0.0	199	60.66	8.0	2.44	140,700	158	343	46.7	14.22
"D" SAP[c]	SAPD	174.3	53.12	58.9	17.94	199	60.66	8.0	2.44	145,600	161	345	48.3	14.71
Molten Sulfur Storage and Handling System:														
--Storage Tank (022)[d]	MSTK22	-67.27	-20.50	95.4	29.09	38	11.58	2.0	0.61	[g]	212	373.2	0.033	0.01
--Storage Tank (033)[e]	MSTK33	-204.8	-62.41	654.2	199.39	41	12.50	-	-	[g]	-	-	-	-
--Truck Pit A[d]	MSTPTA	-171.7	-52.34	35.4	10.78	12	3.66	0.67	0.20	[g]	212	373.2	0.033	0.01
--Truck Pit B[d]	MSTPTB	-125.9	-38.39	-95.5	-29.11	12	3.66	0.67	0.20	[g]	212	373.2	0.033	0.01
--Railcar Unloading Pit[f]	MSRCUP	-332.3	-101.29	696.5	212.29	0	0.00	-	-	[g]	-	-	-	-

[a] Relative to the C SAP stack, true north.

[b] Current flow rate, temperature, and velocity based on actual stack test data (last 2 years).

[c] Future flow rate, temperature, and velocity based on actual stack test data (last 2 years) and the maximum production rate of 2,750 TPD.

[d] Source has a rain cap. Modeled with a velocity of 0.01 m/s.

[e] Modeled as a 16.4 by 16.4 m square area source.

[f] Modeled as a 3.5 by 19 m area square.

[g] Ventilation rate is 30 dscfm.

Table 6-5. PM/PM_{10} and SO_2 Baseline (1974) Emissions and Stack and Operating Parameters, CF Industries, Plant City

				Stack Parameters				Operating Parameters					Baseline Emissions (lb/hr)	
				Height		Diameter		Temperature		Flow	Velocity			
Emission Unit	Unit ID	Model ID	Reference	ft	m	ft	m	°F	K	(acfm)	ft/s	m/s	PM/PM_{10}	SO_2 (a)
"A" DAP Plant	010	ADAP	1	100	30.48	10.0	3.05	128	326	126,200	26.8	8.16	4.04	18.42
"X" DAP/MAP/GTSP Plant	012	XDMGP	2	125	38.10	7.3	2.23	110	316	175,000	69.7	21.24	5.08	27.43
"Y" GTSP Plant	013	YGTSP	3	125	38.10	7.3	2.23	110	316	112,400	44.8	13.64	5.08	18.34
"Z" DAP/GTSP Plant	011	ZDGP	2	125	38.10	7.3	2.23	110	316	175,000	69.7	21.24	5.08	18.34
"A" and "B" Storage Buildings and Shipping Facilities	014	ABSTO	4	85.5	26.06	9.0	2.74	80	300	175,000	45.8	13.97	2.61	--
"A" Shipping Baghouse	015	ASBAG	5	90	27.43	1.7	0.52	110	316	8,500	62.4	19.02	0.42	--
"B" Shipping Baghouse	016	BSBAG	5	35	10.67	2.0	0.61	120	322	10,000	53.1	16.17	0.42	--
"B" Truck Loading	018	BTLOD	6										0.32	--
"B" Railcar Loading	019	BRLOD	6										0.32	--
"A" Sulfuric Acid Plant with Ammonia Scrubber	002	SAPA	7	80	24.38	5.0	1.52	98	310	73,300	62.2	18.96	--	416.7
"B" Sulfuric Acid Plant with Ammonia Scrubber	003	SAPB	7	80	24.38	5.0	1.52	96	309	80,600	68.4	20.85	--	416.7
"C" Sulfuric Acid Plant Double Absorption	007	SAPC	8	199	60.66	8.0	2.44	150	339	103,900	34.5	10.50	--	250.0
"D" Sulfuric Acid Plant Double Absorption	008	SAPD	9	199	60.66	8.0	2.44	150	339	83,600	27.7	8.45	--	250.0
Sulfur Storage and Handling (b)	--	PITSTANK	10	--	--	--	--	--	--	--	--	--	0.08	0.33
-A Sulfur Truck Pit	023	PITSTANK	10	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	--	--
-B Sulfur Truck Pit	024	PITSTANK	10	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	--	--
-Storage Tank (022)	022	PITSTANK	10	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	(f)	--	--
Rock Unloading and Storage Bag Collector	025	RUSBC1	11	20	6.10	3.5	1.07	100	311	36,000	62.4	19.01	1.54	--
Product Reclaim Bag Collector	(c)	RUSBC2	12	3	1	1.1	1.07	120	322	10,100	(c)	(e)	0.36	--
"X,Y,Z" Rock Hopper Bag Collectors (d)	028	RBBC	13	119	36.27	1.0	0.30	120	322	2,120	45.0	13.71	0.23	--
ROP/MGTSP Manufacturing	--	RMMAN	14	135	41.15	6.5	1.98	87	304	67,500	33.9	10.33	0.08	14.11

References:

1. Stack parameters and emissions are from a construction permit application for "A" DAP dated May 30, 1974 and emissions test data (12/3/75)..
2. Stack parameters and emissions are from a construction permit application for the "X", "Y", and "Z" facilities dated May 30, 1974 and emissions test data (12/19/76).
3. Based on permit application (1/20/76) and emissions test report (1/2/76).
4. Based on application for renewal of operating permit for "A" and "B" Storage Buildings and associated shipping facilities dated April 6, 1979.
5. Based on construction permit application for Granular Storage and Shipping dated May 30, 1974. Application is for "A" Shipping Baghouse. Since the baghouses in the "A" and "B" Shipping unit are the same, "B" Shipping Baghouse is assumed to have the same emissions as "A" Shipping Baghouse. Stack parameters for "B" Shipping assumed the same as current.
6. Based on an emission factor of 0.0024 lb/ton product and 3,150 TPD product (DAP and GTSP) from operation permit application for "B" Storage and Shipping dated 1/21/76. Assumed to be fugitive emissions from transferring of product therefore no height, diameter or flow rate is associated with these sources.
7. Stack parameters and PM emissions based on emissions test data for "A" SAP (12/14/75) and "B" SAP (12/13/75). SO_2 emissions based on 1973 air construction permit to reduce SO_2 from 10 lb/ton. Compliance required by 7/1/75. No actual test data prior to modifications available, therefore 10 lb/ton limit assumed at 1,000 TPD for each plant.
8. Stack parameters and PM emissions based on operation permit application (11/6/75) and stack test data (10/1/75) for the "C" Sulfuric Acid Plant. SO_2 emissions based on 5/30/74 application and 11/11/75 operating permit application. Startup of plants was after 1/6/75. Based on each the plant operating at 1,500 TPD H_2SO_4 at 4 lb SO_2/ton.
9. Stack parameters and PM emissions based on operation permit application (11/6/75) and stack test data (10/2/75) for the "D" Sulfuric Acid Plant. SO_2 emissions based on 5/30/74 application and 11/11/75 operating permit application. Startup of plants as after 1/6/75. Based on each plant operating at 1,500 TPD H_2SO_4 and 4 lb SO_2/ton.
10. Based on construction permit application (6/28/89) and Title V application June 14, 1996. All 3 sources were modeled as one large area source. PM emissions were based on hourly emission rate from construction permit application. SO_2 emissions were based on the hourly input from the construction permit application and the emission factor used in the Title V application.
11. Based on construction permit application (12/10/90). This was the first permit application that was completed for this emission unit.
12. Based on construction permit application for the Product Reclaim Bag Collector application dated December 10, 1990. Stack parameters assumed the same as current.
13. Based on construction permit application for the X, Y, and Z Rock Hopper Bag Collector dated (December 12, 1990).
14. Based on operating permit application for ROP/MGTSP manufacturing dated January 20, 1976.

Footnotes:

(a) SO_2 emissions for "A" DAP/MAP Plant, "X" DAP/MAP/GTSP, "Y" DAP/MAP/GTSP Plant, "Z" DAP/MAP Plant and ROP/GTSP Manufacturing are based on AP-42 emission factors and total fuel purchased in 1974. See Table F-1.
(b) Emission Units 022, 023, 024 and 033 were combined into one equivalent source.
(c) The bag collector in the 72% Rock Unloading and Storage Bag Collector was moved in 1982 to the Product Reclaim Handling System and is now considered part of Emission Unit 026.
(d) The three bag collectors (Emission Units 027, 028, and 029) were combined into one equivalent source.
(e) Horizontal discharge, modeled with velocity of 0.1 m/s.
(f) The sulfur storage and handling system was modeled as one area source with dimensions of 85 m x 50 m.

Table 6-6. Summary of SO_2 Emission Rates from all Future CF Plant City Sources Used in the Modeling Analyses

Source	EU ID	SO_2 Emission Rate 3-Hour lb/hr	3-Hour g/s	24-Hour lb/hr	24-Hour g/s	Annual TPY	Annual g/s
Johnston Scotch Marine Type Boiler [c]	001	46.86	5.90	46.86	5.90	9.37	0.27
A SAP [d]	002	303.3	38.22	303.3	38.22	1,003.00	28.85
B SAP [d]	003	303.3	38.22	303.3	38.22	1,003.00	28.85
C SAP [a]	007	441.15	55.58	401.04	50.53	1,756.56	50.53
D SAP [a]	008	441.15	55.58	401.04	50.53	1,756.56	50.53
A DAP/MAP Plant Dryer [e]	010	13.86	1.75	13.86	1.75	60.71	1.75
Z DAP/MAP Plant Dryer [f]	011	20.79	2.62	20.79	2.62	91.05	2.62
X DAP/MAP/GTSP Plant Dryer [g]	012	24.17	3.05	24.17	3.05	105.86	3.05
Y DAP/MAP/GTSP Plant Dryer [h]	013	24.07	3.03	24.07	3.03	105.44	3.03
Molten Sulfur Storage and Handling System: [b]		--	--	--	--	--	--
--Storage Tank (022)	022	0.13	0.017	0.13	0.017	0.57	0.017
--Storage Tank (033)	033	0.13	0.017	0.13	0.017	0.57	0.017
--Truck Pit A	023	0.13	0.017	0.13	0.017	0.57	0.017
--Truck Pit B	024	0.13	0.017	0.13	0.017	0.57	0.017
--Railcar Unloading Pit		0.13	0.017	0.13	0.017	0.57	0.017
Total--Molten Sulfur Storage & Handling System		**0.66**	**0.083**	**0.66**	**0.083**	**2.87**	**0.083**

[a] Refer to Table 2-1 for derivation.
[b] Refer to Table 2-3 for derivation.
[c] Refer to Appendix E, Table E-1.
[d] Based on Title V Permit No. 0570005-007-AV.
[e] Refer to Appendix E, Table E-2.
[f] Refer to Appendix E, Table E-3.
[g] Refer to Appendix E, Table E-4.
[h] Refer to Appendix E, Table E-5.

Table 6-7. Summary of Stack and Operating Parameters and Locations for All Future Sources Used in the SO_2 Modeling Analyses, CF Industries, Plant City

		Relative Location [a]				Stack and Operating Parameters								
		X		Y		Height		Diameter		Flow Rate	Exit Temperature		Velocity	
Emission Unit	ISCST3 ID	ft	m	ft	m	ft	m	ft	m	(acfm)	°F	K	ft/s	m/s
Johnson Scotch Boiler	JSMTB	-405.4	-123.56	85.9	26.17	25	7.62	3.5	1.07	35,566	550	561	61.6	18.78
"A" SAP	SAPA	-245.5	-74.82	58.5	17.82	110	33.53	5.0	1.52	85,500	85	303	72.6	22.12
"B" SAP	SAPB	-171.6	-52.3	-157.1	-47.87	110	33.53	5.0	1.52	94,400	84	302	80.1	24.42
"C" SAP	SAPC	0.0	0.00	0.0	0.00	199	60.66	8.0	2.44	140,700	158	343	46.7	14.22
"D" SAP	SAPD	174.3	53.12	58.9	17.94	199	60.66	8.0	2.44	145,600	161	345	48.3	14.71
"A" DAP/MAP Plant	ADMP	-991.6	-302.23	-368.2	-112.22	80	24.38	10.0	3.05	173,300	137	331	36.8	11.21
"Z" DAP/MAP Plant	ZDMP	-1042.8	-317.86	150.6	45.9	136	41.45	9.0	2.74	169,800	140	333	44.5	13.56
"X" DAP/MAP/GTSP Plant	XDMGP	-1118.7	-340.99	310.3	94.57	136	41.45	9.0	2.74	193,700	134	330	50.7	15.47
"Y" DAP/MAP/GTSP Plant	YDMGP	-1074.8	-327.59	245.1	74.71	136	41.45	9.0	2.74	203,400	135	330	53.3	16.24
Molten Sulfur Storage and Handling System:														
--Storage Tank (022)[b]	MSTK22	-67.27	-20.50	95.4	29.09	38	11.58	2.0	0.61	[e]	212	373.2	-	0.01
--Storage Tank (033)[c]	MSTK33	-204.76	-62.41	654.2	199.39	41	12.50	-	-	[e]	-	-	-	-
--Truck Pit A[b]	MSTPTA	-171.72	-52.34	35.4	10.78	12	3.66	0.67	0.20	[e]	212	373.2	-	0.01
--Truck Pit B[b]	MSTPTB	-125.94	-38.39	-95.5	-29.11	12	3.66	0.67	0.20	[e]	212	373.2	-	0.01
--Railcar Unloading Pit[d]	MSRCUP	-332.32	-101.29	696.5	212.29	0	0.00	-	-	[e]	-	-	-	-

[a] Relative to the C SAP stack, true north.

[b] Source has a rain cap. Modeled with a velocity of 0.01 m/s.

[c] Modeled as a 16.4 x 16.4 m square area source.

[d] Modeled as a 3.5 x 19 m area square.

[e] Ventilation rate is 30 dscfm.

Table 6-8. Chassahowitzka NWA Receptors Used in the Modeling Analysis

UTM Coordinates, Zone 17	
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

Table 6-9. Building/Structure Dimensions Used in the Air Dispersion Modeling Analysis, CF Industries, Plant City

	Building Dimensions					
	Height		Length		Width	
Building / Structure	ft	m	ft	m	ft	m
Uranium Control Room	22.0	6.7	135.0	41.1	42.6	13.0
Uranium Clarifier No. 1	22.6	6.9	80.0 [a]	24.4	-	-
Uranium Clarifier No. 2	22.6	6.9	80.0 [a]	24.4	-	-
Uranium Storage Tank 1	66.0	20.1	49.0 [a]	14.9	-	-
Uranium Storage Tank 2	66.0	20.1	49.0 [a]	14.9	-	-
Uranium Belt Filter	75.0	22.9	90.0	27.4	48.0	14.6
ROP Maintenance Warehouse	60.0	18.3	99.0	30.2	400.0	121.9
Cogeneration Building	66.0	20.1	142.0	43.3	79.0	24.1
A DAP Granulation	93.0	28.3	121.0	36.9	51.0	15.5
XYZ DAP Granulation	127.0	38.7	140.0	42.7	277.0	84.4
A Shipping Warehouse	67.0	20.4	130.0	39.6	440.0	134.1
B Shipping Warehouse	87.0	26.5	159.0	48.5	337.0	102.7
93' Screening Building	93.0	28.3	41.0	12.5	67.0	20.4
A PAP Belt Filter	65.0	19.8	92.0	28.0	33.0	10.1
B PAP Belt Filter	96.0	29.3	32.0	9.8	123.0	37.5
A PAP Byrd Filter	71.0	21.6	75.0	22.9	75.0	22.9
B PAP Byrd Filter	86.5	26.4	80.0	24.4	80.0	24.4
Molten Sulfur Storage Tank 022	30.0	9.1	49.0 [a]	14.9	-	-

[a] Indicates a tank diameter.

Source: CF Industries, 2003.

Table 6-10. Maximum Predicted Pollutant Impacts for the Proposed Project, CF Industries, Plant City, Compared To EPA PSD Class II Significant Impact Levels

Pollutant/ Averaging Time	Concentration [a] (ug/m^3)	Receptor Location [b] X (m)	Receptor Location [b] Y (m)	Time Period (YYMMDDHH) [c]	EPA Significant Impact Level (ug/m^3)
SO_2					
Annual	0.36	1,609.3	573.0	91123124	1
	0.43	1,609.3	573.0	92123124	
	0.44	1,609.3	573.0	93123124	
	0.39	1,609.3	715.2	94123124	
	0.47	1,609.3	573.0	95123124	
Highest 24-Hour	1.76	-3,500.0	0.0	91080124	5
	1.07	2,428.6	-500.0	92061024	
	1.39	400.0	1,400.0	93032424	
	1.10	-1,700.0	700.0	94092824	
	1.33	2,428.6	1,264.7	95071924	
Highest 3-Hour	21.4	-2,714.3	58.8	91080118	25
	17.5	-700.0	900.0	92041815	
	19.2	-800.0	800.0	93060912	
	22.3	-2,571.4	-382.4	94060109	
	20.7	2,142.9	1,117.7	95071909	
NO_2					
Annual	0.15	-1,438.1	-641.6	91123124	1
	0.14	1,609.3	573.0	92123124	
	0.15	1,609.3	573.0	93123124	
	0.13	1,609.3	715.2	94123124	
	0.15	1,609.3	573.0	95123124	

[a] Based on 5-year surface and upper air meteorological data for 1991 to 1995 from the National Weather Service Stations in Tampa and Ruskin, respectively.

[b] Relative to C Sulfuric Acid Plant stack.

[c] YYMMDDHH = Year, Month, Day, Hour Ending

Table 6-11. Maximum Predicted Sulfuric Acid Mist Impacts for the Proposed Project
CF Industries, Plant City

Pollutant/ Averaging Time	Concentration [a] (ug/m^3)	Receptor Location [b] X (m)	Y (m)	Time Period (YYMMDDHH) [c]
Annual	0.18	-1,438.1	-641.6	91123124
	0.18	1,609.3	573.0	92123124
	0.18	1,609.3	573.0	93123124
	0.16	1,609.3	715.2	94123124
	0.19	1,609.3	573.0	95123124
Highest 24-Hour	2.34	366.3	999.7	91051524
	2.20	-914.4	573.0	92072124
	2.83	-231.7	573.0	93080624
	2.39	-700.0	1,000.0	94070824
	2.35	-1,488.0	-350.1	95061524
Highest 8-Hour	6.0	-200.0	800.0	91051716
	5.7	416.0	999.7	92070116
	6.4	-231.7	573.0	93080616
	5.7	-700.0	1,000.0	94070816
	5.8	-1,479.7	-398.7	95061516
Highest 3-Hour	9.3	-200.0	900.0	91051715
	9.6	-426.7	573.0	92041815
	11.0	-300.0	600.0	93061012
	9.2	863.5	999.7	94062618
	9.0	-800.0	600.0	95080412
Highest 1-Hour	17.7	-1,100.0	600.0	91080116
	15.7	-800.0	1,800.0	92081510
	16.1	0.0	600.0	93072511
	15.9	-182.9	573.0	94061511
	16.3	-182.9	573.0	95071414

[a] Based on 5-year surface and upper air meteorological data for 1991 to 1995 from the National Weather Service Stations in Tampa and Ruskin, respectively.

[b] Relative to C Sulfuric Acid Plant stack.

[c] YYMMDDHH = Year, Month, Day, Hour Ending

Table 6-12. Summary of Maximum Pollutant Concentrations Predicted for the Project Only Compared to the EPA Class I Significant Impact Levels

Pollutant/ Averaging Time	Year	Maximum Concentration[a] ($\mu g/m^3$)	EPA Class I Significant Impact Levels ($\mu g/m^3$)
SO_2			
Annual	1990	0.011	0.1
	1992	0.011	
	1996	0.014	
24-Hour	1990	0.165	0.2
	1992	0.176	
	1996	0.082	
3-Hour	1990	1.45	1.0
	1992	1.02	
	1996	0.69	
NO_2			
Annual	1990	0.0014	0.1
	1992	0.0015	
	1996	0.0017	

[a] Highest Predicted with CALPUFF model and Central Florida CALMET Domain, 1990, 1992, and 1996.

Table 6-13. Maximum Predicted 3-Hour SO_2 PSD Increment Consumption at the Chassahowitka National Wilderness Area as Compared to the 3-Hour Allowable PSD Class I Increment

Year	Rank	Concentration[a] (ug/m^3)	CALPUFF Receptor Number	Receptor Location UTM-E (km)	Receptor Location UTM-N (km)	Julian Day	Hour Ending	Allowable PSD Class I Increment (ug/m^3)
1990	Highest	39.69	10	339.0	3183.4	347	17	
	2nd-Highest	28.26	9	341.1	3183.4	205	11	25
1992	Highest	29.01	1	340.3	3165.7	153	11	
	2nd-Highest	13.33	2	340.3	2167.7	206	8	25
1996	Highest	37.55	8	342.4	3180.6	175	9	
	2nd-Highest	14.78	2	340.3	3167.7	114	3	25

[a] Concentrations are predicted using the CALPUFF model and Central Florida CALMET Domain, 1990, 1992, and 1996.

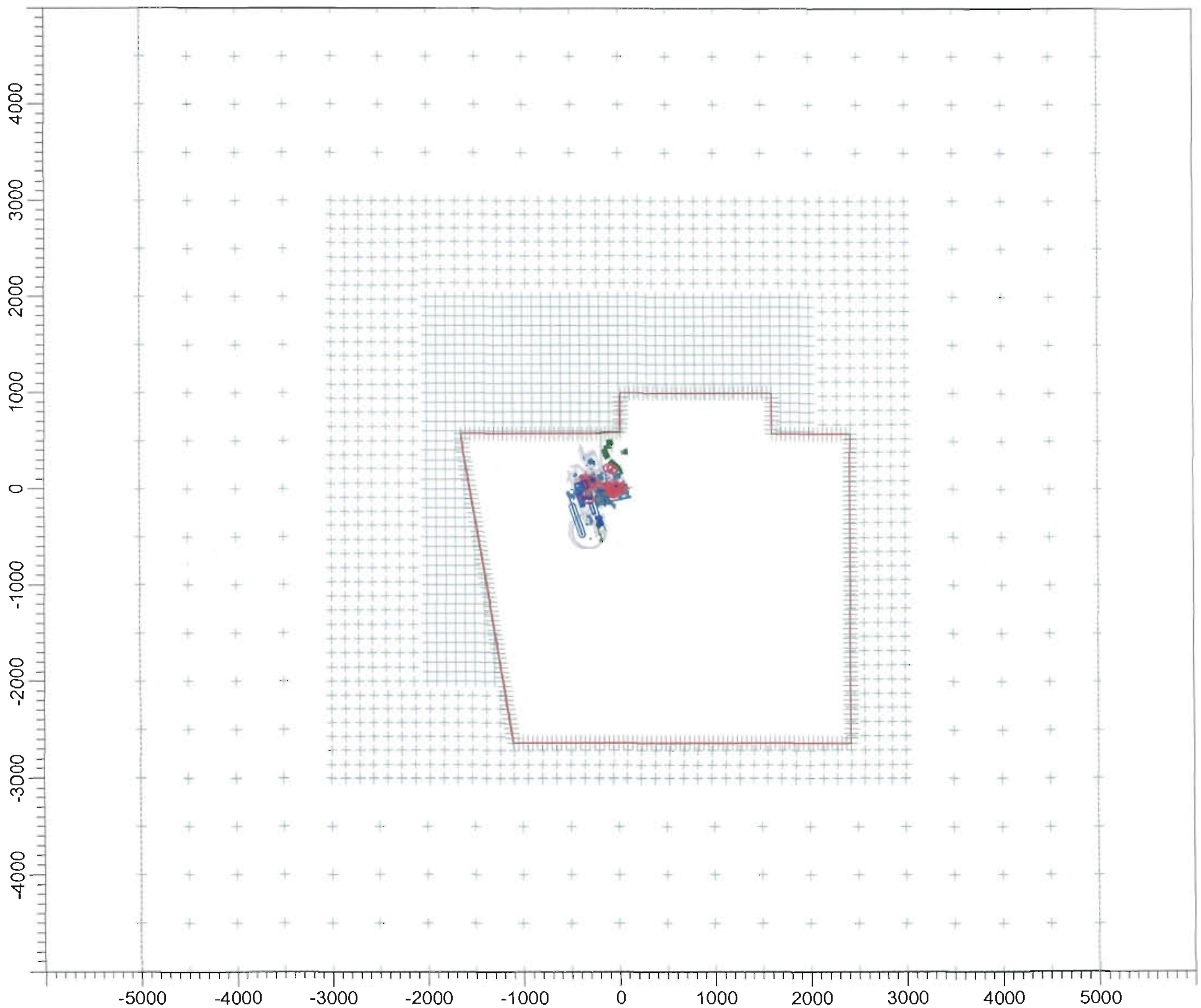
Table 6-14. CF Industries' Project Contribution to Predicted 3-Hour SO_2 PSD Class I Increment Exceedances

Year	Julian Day	Hour Ending	CALPUFF Receptor Number	Receptor Location UTM-E (km)	Receptor Location UTM-N (km)	Total Concentration[a] (ug/m^3)	CF Project Contribution (ug/m^3)	PSD Class I Significant Impact Level (ug/m^3)
1990	347	17	9	341.1	3183.4	29.36	0.001	1.0
1990	205	11	9	341.1	3183.4	28.26	0.0	
1990	347	17	10	339.0	3183.4	39.69	0.001	

[a] Concentrations are predicted using the CALPUFF model and Central Florida CALMET Domain, 1990, 1992, and 1996.

PROJECT TITLE:

Figure 6-1. Off-site and Fenceline Receptor Locations, CF Industries, Plant City Phosphate Complex
CF Industries, Plant City



COMMENTS:

SOURCES :
17

RECEPTORS :
2140

COMPANY NAME:

MODELER:

DATE:
1/15/2004

0 ——— 2 km

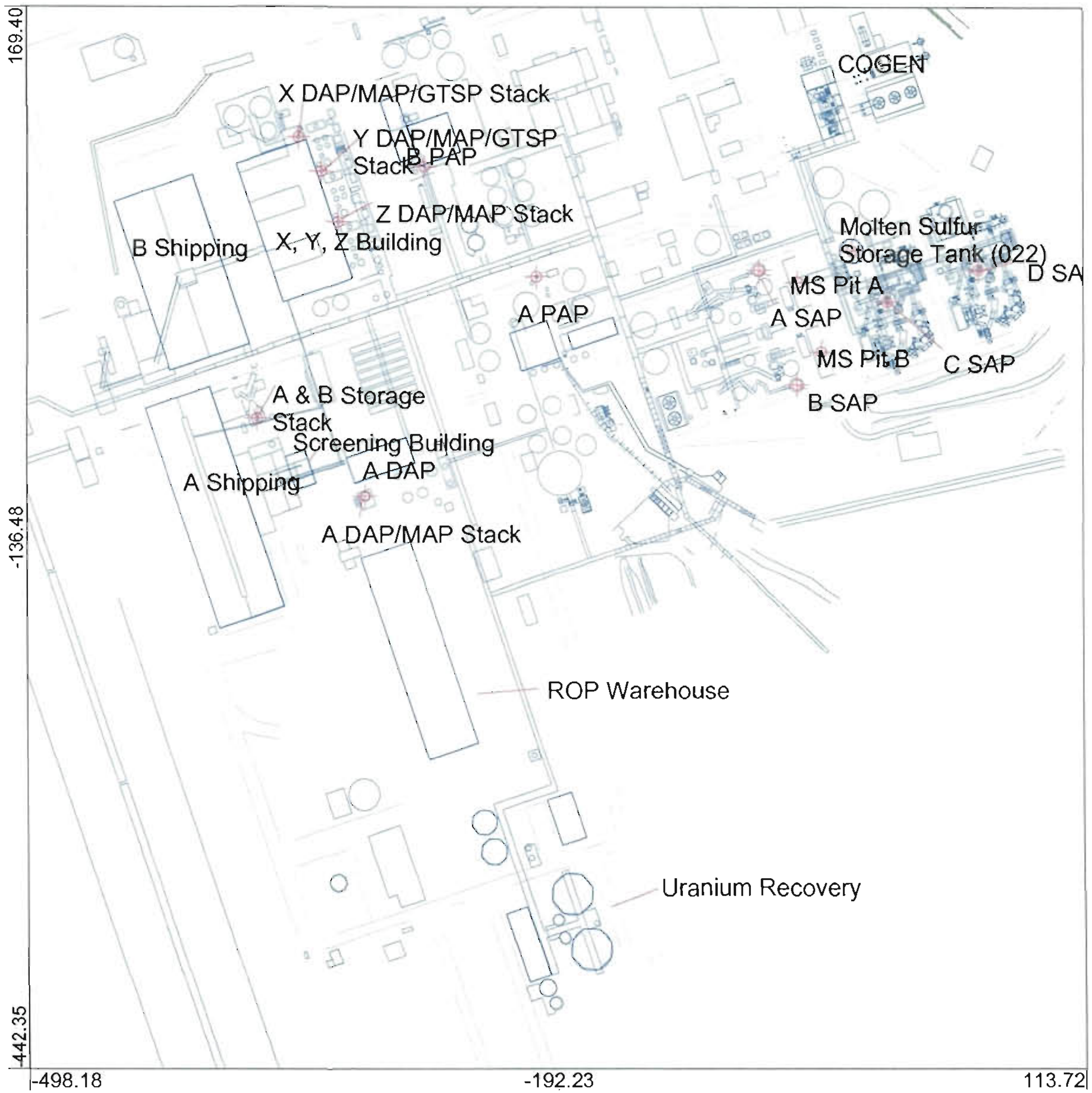
PROJECT NO.:
033-7620

ISC-AERMOD View - Lakes Environmental Software

D:\PROJECTS\CF-IND\bpip\cf1.isc

PROJECT TITLE

Figure 6-2. Building and Stack Locations, CF Industries, Plant City Phosphate Complex



COMMENTS

BUILDINGS:

17

SOURCES:

14

Wind Direction:

COMPANY NAME: Golder Associates Inc.l

MODELER:

DATE:

1/16/2004

0 — 0.1 km

PROJECT NO.:

033-7620

BPIP View - Lakes Environmental Software

D:\PROJECTS\CF-IND\bpip\CF2.bpv

7.0 ADDITIONAL IMPACT ANALYSIS

7.1 INTRODUCTION

CF is proposing to modify its existing facility in Plant City, Florida. The facility is subject to the PSD new source review requirements for SO_2, NO_x, and SAM. The additional impact analysis and the Class I area analysis addresses these pollutants.

The analysis addresses the potential impacts on vegetation, soils, and wildlife of the surrounding area and the nearest Class I area due to CF's proposed modification. The nearest Class I area is the CNWA, located approximately 69 km north-northwest of the CF plant. In addition, potential impacts upon visibility resulting from the proposal modification are assessed.

The analysis will demonstrate that the increase in impacts due to the proposed increase in emissions is extremely low. Regardless of the existing conditions in the vicinity of the site or in the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon these areas.

7.2 SOIL, VEGETATION, AND AQRV ANALYSIS METHODOLOGY

In the foregoing analysis, the maximum air quality impacts predicted to occur in the vicinity of the CF plant and in the Class I area due to the increase in emissions are used. These impacts are summarized in Section 6.0 and Table 7-1, based on the modeling described in Section 6.0.

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the vicinity of the plant and in the Class I areas and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, i.e., vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations of air pollutants of concern with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the vicinity of the plant and the Class I area. It was recognized that effects threshold information is not available for all species found in the CNWA, although studies have been performed on a few of the common species and on other similar species which can be used as models.

7.3 IMPACTS TO SOILS AND VEGETATION IN THE VICINITY OF THE CF PLANT

According to the modeling results presented in Section 6.0, the maximum air quality impacts due to the CF facility emitting at maximum rates are predicted to be below the significant impact levels for NO_x and SO_2. Therefore, the project's impacts on soils, vegetation, and wildlife in the project's vicinity are also not expected to be significant. In addition, no visibility impairment in the vicinity of CF is expected since no new emission sources are proposed for this project.

7.3.1 IMPACTS TO SOILS

According to the USDA Soil Survey of Hillsborough County (1989), the CF Plant City site and vicinity are dominated by four soil series (Appendix X, Soil Survey): Basinger, Holopaw and Samsula soils, depressional (5), Arents, nearly level (4), Gypsum land (20), and Myakka fine sand (29). These soils are generally described in the Soil Survey as follows:

> *Basinger, Holopaw and Samsula soils, depressional (5): This soil series is characteristic of swamps and depressions within flatwoods. In most areas, these soils have been left in natural vegetation, consisting of cypress, wetland hardwoods, and hydrophytic grasses, such as maidencane and cutgrass. In the highly organic surface layers, the soil pH ranges from 3.6 to 7.3, classified as extremely acidic to neutral.*
>
> *Arents, nearly level (4): Arents consist of nearly level, heterogeneous soil material that has been excavated, reworked, and reshaped by earthmoving equipment. This soil series is found near urban centers, phosphate mining operations, major highways, and landfills. In most areas, the soil in these areas has been left idle or is used for homesites, recreation, and urban development. Due to the heterogeneous nature of the soil material, the soil reaction pH is highly variable.*
>
> *Gypsum land (20): This soil series is used to describe moderately to very steep mounds of gypsum, a product of acid manufacturing plants that are associated with phosphate-mining operations. The soil surface is generally very unstable, erodes easily, and does not support vegetation due to limiting factors of acidity and compaction. The soil*

reaction pH is not presented within the Hillsborough County Soil Survey, although the series is described as acidic.

Myakka fine sand (29): This soil series is nearly level and poorly drained, typically found on broad plains in flatwoods. In most areas, this soil is used for native pasture or cultivated crops, though it is also used for improved pasture, citrus crops, or urban development. Water control systems and frequent applications of fertilizer and lime are generally needed to improve soil quality for cultivated crops. The natural vegetation consists of longleaf pine and slash pine with an understory of gallberry, running oak, saw palmetto, and wax myrtle. The soil pH ranges from 3.6 to 6.5, classified as extremely to slightly acidic.

Depressional soil series in the vicinity of the project area are poorly drained and have high organic matter content, which provides high cation exchange capacity and bulk density. These factors increase the buffering capacity of the soil, which ameliorates the effects of acidic atmospheric inputs.

The relatively low sensitivity of the soils to atmospheric inputs coupled with the extremely low ground-level concentrations of SO_2, NO_x, and SAM projected from the Project's emissions precludes any significant impact on soils.

7.3.2 IMPACTS TO VEGETATION

Vegetative communities in the vicinity of the Project area include wet pine flatwoods and former pasture lands interspersed with cypress and mixed forested wetlands. CF Industries is restoring native Florida vegetation on 1900 acres of former pasture land immediately east and south of the Plant City Phosphate Complex. The forested floodplain of the Blackwater Creek is located approximately one mile south of the Project Site.

Air pollutants occurring at elevated levels have long been known to potentially cause injury to plants. For SO_2, 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^3. Phytotoxic symptoms demonstrated by plants can occur as low as 88 μg/m^3 (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_2 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_2 concentrations ranging from 790 to 1,570 μg/m^3. 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_2 concentrations ranging from 1,570 to 2,100 μg/m^3. Resistant species (potentially injured at concentrations above 2,100 μg/m^3 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^3 SO_2 for 8 hours were not visibly damaged. This supports the levels cited by other researchers on the effects of SO_2 on vegetation. It is important to note that because plants possess metabolisms that can convert SO_2 into cellular constituents, they are capable of recovery when exposed to elevated levels of SO_2 for short periods of time. Refer to Tables 7-2 and 7-3 for SO_2 effect levels for various plant species and sensitivity groupings of vegetation.

The maximum annual and 3-hour SO_2 concentrations predicted in the vicinity of the CF facility due to the proposed project (0.47 and 22.3 μg/m^3, respectively) represent levels that are lower than those known to cause damage to the majority of test species.

The maximum predicted 24-hour SO_2 concentration of 1.76 μg/m^3 due to the project only, is below the significant impact level, and should therefore not damage sensitive species. 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_2 monitors in the area, the maximum measured HSH 24-hour concentration for 2002 and 2001 is 31 μg/m^3, or about 4 percent of the maximum modeled 24-hour concentration. This demonstrates the conservatism of the modeling.

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Radish and barley are considered good indicators of SO_2 pollution because of their inherent sensitivities to this gas. When these two plants were exposed to 370 and 310 $\mu g/m^3$ SO_2 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_2 concentration is less than concentrations that could potentially damage SO_2-sensitive plants. Again, it is important to realize that this modeled concentration represents a worst-case scenario. These actual levels pose minimal threats to area vegetation.

The increase in SO_2 concentrations due to the modification only, presented in Table 6-10, are low (0.47 $\mu g/m^3$, annual average and 1.76 $\mu g/m^3$, 24-hr average) and well below any threshold affect level.

7.4 IMPACTS UPON VISIBILITY IN THE VICINITY OF CF

No new emission sources will be created by the proposed CF modification. The proposed project at the C and D SAPs will not change any stack characteristics, nor add any new stacks. All of these sources are in compliance with opacity regulations and should remain in compliance after the modification. As a result, no adverse impacts upon visibility are expected.

7.5 IMPACTS DUE TO ASSOCIATED DIRECT GROWTH

7.5.1 INTRODUCTION

Rule 62-212.400(3)(h)(5), F.A.C., states that an application must include information relating to the air quality impacts of, and the nature and extent of all general, residential, commercial, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. This growth analysis considers air quality impacts due to emissions resulting from the industrial, commercial, and residential growth associated with the proposed modifications to the CF Industries Plant City Phosphate Complex. This information is consistent with the EPA Guidance related to this requirement in the *Draft New Source Review Workshop Manual* (EPA, 1990).

In general, there has been minimal growth in the Plant City Phosphate Complex area since 1977. The site is located in northeast Hillsborough County, near the Pasco County border. Hillsborough County is surrounded by Manatee County to the south, Polk County to the east, Pasco County to the north, and Pinellas County to the west. Hillsborough County has the fourth largest population in Florida, just under one million. The county consists of 1,051 square miles of land area.

The modification will increase potential sulfuric acid production rates at the facility. The majority of construction activities associated with the proposed modification will occur over an 18-month period, requiring an average of approximately 15 workers during that time. Recent workforce reductions at the plant have more than compensated for this temporary increase, reducing the workforce from over 470 to about 430 employees. Replacement of tower packing at the C and D SAPs will occur periodically over a 3 to 5 year period.

It is anticipated that many of the construction personnel will commute to the site. The increase in workers will only be temporary, since CF will not employ any additional operational workers after the completion of the proposed modification to the C and D SAPs. Therefore, while there would be a small temporary increase in vehicular traffic in the area, the effect on air quality levels would be minimal and not above levels that existed prior to the workforce reductions.

There are also expected to be no air quality impacts due to associated commercial and industrial growth given the location of the existing Plant City Phosphate Complex. The existing commercial and industrial infrastructure should be adequate to provide any support services that the proposed modification might require and would not increase with the operation of the modified C and D SAPs.

The following discussion presents general trends in residential, commercial, industrial, and other growth that has occurred since August 7, 1977, in Hillsborough County. As such, the discussion presents information available from a variety of sources (i.e., Florida Statistical Abstract, FDEP, etc.) that characterize Hillsborough County as a whole.

7.5.2 RESIDENTIAL GROWTH

7.5.2.1 Population and Household Trends

As an indicator of residential growth, the trend in the population and number of household units in Hillsborough County since 1970 are shown in Figure 7-1. The county experienced a 65 percent increase in population for the years 1977 through 2000. During this period, there was an increase in population of about 393,000. Similarly, the number of households in the county increased by about 176,000, or 82 percent, since 1977.

7.5.2.2 Growth Associated with the Operation of the Project

Since no additional operational workers will be needed at the modified C and D SAPs, no residential growth due to the proposed modification is expected.

7.5.3 COMMERCIAL GROWTH

7.5.3.1 Retail Trade and Wholesale Trade

As an indicator of commercial growth in Hillsborough County, the trends in the number of commercial facilities and employees involved in retail and wholesale trade are presented in Figure 7-2. The retail trade sector comprises establishments engaged in retailing merchandise. The retailing process is the final step in the distribution of merchandise. Retailers are, therefore, organized to sell merchandise in small quantities to the general public. The wholesale trade sector comprises establishments engaged in wholesaling merchandise. This sector includes merchant wholesalers who buy and own the goods they sell; manufacturers' sales branches and offices that sell products manufactured domestically by their own company; and agents and brokers who collect a commission or fee for arranging the sale of merchandise owned by others.

Since 1977, retail trade has increased by about 1,800 establishments and 46,000 employees or 65 and 103 percent, respectively. For the same period, wholesale trade has increased by 1,400 establishments and 16,000 employees, or 109 and 80 percent, respectively.

7.5.3.2 Labor Force

The trend in the labor force in Hillsborough County since 1977 is shown in Figure 7-3. Between 1977 and 2000, approximately 276,000 persons were added to the available work force, for an increase of 113 percent.

7.5.3.3 Tourism

Another indicator of commercial growth in Hillsborough County is the tourism industry. As an indicator of tourism growth in the county, the trend in the number of hotels and motels and the number of units at the hotels and motels are presented in Figure 7-4.

This industry comprises establishments primarily engaged in marketing and promoting communities and facilities to businesses and leisure travelers through a range of activities, such as assisting organizations in locating meeting and convention sites; providing travel information on area attractions, lodging accommodations, restaurants; providing maps; and organizing group tours of local historical, recreational, and cultural attractions.

Between 1978 and 2000, there was a decrease of 3 percent in the number of hotels and motels. However, the number of units at those establishments increased by 90 percent during that same time period.

7.5.3.4 Transportation

As an indicator of transportation growth, the trend in the number of vehicle miles traveled (VMT) by motor vehicles on major roadways in Hillsborough County is presented in Figure 7-5. Between 1977 and 2002, there was an increase of about 14,200,000 VMT, or 77 percent, on major roadways in the county.

7.5.3.5 Growth Associated with the Operation of the Project

The existing commercial and transportation infrastructure should be adequate to provide any support services that might be required during construction and operation of the modified C and D SAPs. The workforce needed to operate the modified C and D SAPs represents a small fraction of the labor force present in the immediate and surrounding areas.

7.5.4 INDUSTRIAL GROWTH

7.5.4.1 Manufacturing and Agricultural Industries

As an indicator of industrial growth, the trend in the number of employees in the manufacturing industry in Hillsborough County since 1977 is shown in Figure 7-6. As shown, the manufacturing industry experienced an increase of 6,200 employees or 19 percent from 1977 through 2000.

As another indicator of industrial growth, the trend in the number of employees in the agricultural industry in Hillsborough County since 1977 is also shown in Figure 7-6. As shown, the agricultural industry experienced an increase of 6,200 employees or 656 percent from 1977 through 2000.

7.5.4.2 Electrical Power Generation

Existing electrical generating plants in Hillsborough County include the following:

- Tampa Electric Company's (TECO) Plants:

  - TECO Big Bend,
  - TECO Hookers Point, and
  - TECO Gannon.
- Hillsborough County Resource Recovery Facility.
- Mackay Bay Facility.

Together, these power plants have an electrical nameplate generating capacity of over 30,000 MW.

As an indicator of electrical utility growth, the electrical nameplate generating capacity in Hillsborough County since 1977 is shown in Figure 7-7. As shown, there has been minimal change in electrical utility growth since 1977.

7.5.4.3 Growth Associated with the Operation of the Project

Since the PSD baseline date of August 7, 1977, there have not been any major facilities built within a 20-km radius of the Plant City Phosphate Complex. Based on the locations of nearby air emission sources (see Table 6-7), there has not been a concentration of industrial and commercial growth in the vicinity of the Plant City Phosphate Complex.

7.5.5 AIR QUALITY DISCUSSION

7.5.5.1 Air Emissions and Spatial Distribution of Major Facilities

The locations of facilities with SO_2 emissions sources in the vicinity of Plant City Phosphate Complex are presented in Table 6-7. Based on actual emissions reported for 1999 (latest year of available data) by EPA on its AIRSdata website, total emissions from these stationary sources in Hillsborough County are as follows:

- SO_2: 161,868 TPY
- PM_{10} 6,651 TPY
- NO_x: 63,804 TPY
- CO: 2,710 TPY
- VOC: 2,344 TPY

7.5.5.2 Air Emissions from Mobile Sources

The trends in the air emissions of CO, VOC, and NO_x from mobile sources in Hillsborough County are presented in Figure 7-8. Between 1977 and 2002, there were significant decreases in these emissions. The decrease in CO, VOC, NO_x emissions were about 1,022; 112; and 35 tons per day, respectively, which represent decreases from 1977 emissions of 60, 64, and 28 percent, respectively.

7.5.5.3 Air Monitoring Data

Hillsborough County is classified as attainment or maintenance for all criteria pollutants. Air quality monitoring data have been collected in Hillsborough County, primarily in the western portion of the county. For this evaluation, the air quality monitoring data collected at the monitoring stations nearest to the Plant City Phosphate Complex were used to assess air quality trends since 1977. Air quality monitoring data were based on the following monitoring stations:

- SO_2 concentrations – Tampa, Plant City, and Mulberry (Polk County); and
- NO_2 concentrations – Tampa.

Data collected from these stations are considered to be generally representative of air quality in Hillsborough County. Because these monitoring stations are generally located in more industrialized areas than the Plant City Phosphate Complex, the reported concentrations are likely to be somewhat higher than that experienced at the site.

These data indicate that the maximum air quality concentrations currently measured in the region comply with and are well below the applicable AAQS. These monitoring stations are located in areas where the highest concentrations of a measured pollutant are expected due to the combined effect of emissions from stationary and mobile sources, as well as the effects of meteorology. Therefore, the ambient concentrations in areas not monitored should have pollutant concentrations less than the monitored concentrations from these sites.

7.5.5.4 SO_2 Concentrations

The trends in the annual, 24-hour, and 3-hour average SO_2 concentrations measured in Hillsborough County since 1977 are presented in Figures 7-9 through 7-11, respectively. As shown in these figures, measured SO_2 concentrations have been and continue to be well below the AAQS.

7.5.5.5 NO_2 Concentrations

The trends in the annual average NO_2 concentrations measured at the nearest monitors to the Plant City facility are presented in Figure 7-12. As shown in this figure, measured NO_2 concentrations have been well below the AAQS.

7.5.5.6 Air Quality Associated with the Operation of the Project

The air quality data measured in the region of the Plant City facility indicate that the maximum air quality concentrations are well below and comply with the AAQS. Also, based on the trends presented of these maximum concentrations, the air quality has generally improved in the region since the baseline date of August 7, 1977. Because the maximum concentrations for the proposed modification to the Plant City Complex are predicted to be below the significant impact level for NO_x and below the AAQS for SO_2, air quality concentrations in the region are expected to remain below and comply with the AAQS after completion of the proposed modification.

7.6 IMPACTS UPON PSD CLASS I AREAS

7.6.1 IDENTIFICATION OF AQRVS AND METHODOLOGY

The CF facility is located about 69 km from the PSD Class I area of the CNWA. Other PSD Class I areas are located more than 200 km from the Site. An AQRV analysis was conducted to assess the potential risk to AQRVs of the CNWA due to the proposed emissions from the CF project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the CNWA, this AQRV analysis evaluates the effects of air quality on general vegetation types and wildlife found in the CNWA.

Vegetation type AQRVs and their representative species types have been defined by the U.S. Fish and Wildlife as:

- Marshlands - black needlerush, saw grass, salt grass, and salt marsh cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto
- Mangrove Swamp - red, white, and black mangrove

Wildlife AQRVs have been identified as endangered species, waterfowl, marsh and waterbirds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations due to the CF project's emissions predicted at the PSD Class I area of the CNWA are presented in Table 7-1. These results are based on using the CALPUFF model (see Appendix D).

Similar to the evaluation performed in Section 7.2, a screening approach was used that compared the maximum ambient concentration of air pollutants of concern due to the project's emissions at the PSD Class I area of the CNWA with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted that specifically addressed the effects of air contaminants on plant species reported to occur in the CNWA. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. It is recognized that effect threshold information is not available for all species found in the CNWA, although studies have been performed on a few of the common species and on other similar species that can be used as indicators of effects.

7.6.2 IMPACTS TO SOILS

For soils, the potential and hypothesized effects of atmospheric deposition include:

- Increased soil acidification,
- Alteration in cation exchange,
- Loss of base cations, and
- Mobilization of trace metals.

The potential sensitivity of specific soils to atmospheric inputs is related to two factors. First, the physical ability of a soil to conduct water vertically through the soil profile is important in influencing the interaction with deposition. Second, the ability of the soil to resist chemical changes, as measured in terms of pH and soil cation exchange capacity (CEC), is important in determining how a soil responds to atmospheric inputs.

According to the U.S. Department of Agriculture (USDA) Soil Surveys of Citrus and Hernando Counties, nine soil complexes are found in the CNWA. These include Aripeka fine sand, Aripeka-Okeelanta-Lauderhill, Hallendale-Rock outcrop, Homosassa mucky fine sandy loam, Lacooche, Okeelanta mucks, Okeelanta-Lauderdale-Terra Ceia mucks, Rock outcrop-Homosassa-Lacoochee, and Weekiwachee-Durbin mucks (Porter, 1996). The majority of the soil complexes found in the CNWA are inundated by tidal waters, contain a relatively high organic matter content, and have high buffering capacities based on their CEC, base saturation, and bulk density. The regular flooding of these soils by the Gulf of Mexico regulates the pH and any change in acidity in the soil would be buffered by this activity. Therefore, they would be relatively insensitive to atmospheric inputs. However, Terra Ceia, Okeelanta, and Lauderdale freshwater mucks are present along the eastern border of the CNWA, and may be more sensitive to atmospheric sulfur deposition (Porter, 1996). Although not tidally influenced, these freshwater mucks are highly organic and therefore have a relatively high intrinsic buffering capacity.

The relatively low sensitivity of the soils to atmospheric inputs coupled with the extremely low ground-level concentrations of contaminants projected for the CNWA from the proposed project's emissions precludes any significant impact on soils.

7.6.3 IMPACTS TO VEGETATION

In general, the effects of air pollutants on vegetation occur primarily from SO_2, nitrogen dioxide (NO_2), ozone, and PM. Effects from minor air contaminants, such as F, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides, have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The concentrations of the pollutants, duration of exposure and frequency of exposures influence the response of vegetation and wildlife to atmospheric pollutants. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants and animals they will be from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

7.6.3.1 SO_2

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When sulfur dioxide in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at sufficiently elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercostal necrotic areas that 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 SO_2 in the CNWA average 1.3 $\mu g/m^3$, with a maximum 24-hour average concentration of 14.5 $\mu g/m^3$ (IMPROVE, 2002). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 7-2 and 7-3, respectively.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2 concentrations of 790 to 1,570 $\mu g/m^3$. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 $\mu g/m^3$. Resistant species (injured at concentrations above 2,100 $\mu g/m^3$ for 3 hours) include white oak and dogwood (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 $\mu g/m^3$ SO_2 for 8 hours were not visibly damaged. This finding support the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 $\mu g/m^3$.

Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 $\mu g/m^3$ for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 $\mu g/m^3$ SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979).

Two lichen species indigenous to Florida exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 $\mu g/m^3$ for 6 hours/week for 10 weeks (Hart et al., 1988).

The maximum 24-hour average SO_2 concentration increase that is predicted for the CF project at the Class I area is 0.18 $\mu g/m^3$. When added to the average background concentration of 1.3 $\mu g/m^3$, the total SO_2 impact is 1.48 $\mu g/m^3$. When added to the maximum 24-hour average background concentration of 14.5 μg/m^3 at the CNWA, the maximum worst-case total SO_2 concentration is 14.7 μg/m^3, which is much lower than those known to cause damage to test species. The maximum 24-hour average SO_2 concentrations predicted for the project at the Class I area are only 7 to 4 percent of those that caused damage to the most sensitive lichens. The modeled annual incremental increase in SO_2 adds slightly to background levels of this gas and poses only a minimal threat to area vegetation.

7.6.3.2 NO_2

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1, 4, 8 hours) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 μg/m^3 (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 μg/m^3 for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The 8-hour average NO_2 concentration for the CF project in the Class I area is predicted to be 0.12 μg/m^3. This concentration is less than 0.005 percent of the levels that cause foliar injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Class I areas can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the project in the Class I area is 0.002 μg/m^3. This value is less than 0.0001 percent of the levels that caused minimal yield loss and chlorosis in plant tissue. Average and maximum background 24-hour average concentrations of NO_2 reported in the CNWA are 0.006 and 0.104 μg/m^3, respectively.

Although it has been shown that simultaneous exposure to SO_2 and NO_2 results in synergistic plant injury (Ashenden and Williams, 1980), the magnitude of this response is generally only 3 to

4 times greater than either gas alone and usually occurs at unnaturally high levels of each gas. Therefore, the concentrations within the wilderness areas are still far below the levels that potentially cause plant injury for either acute or chronic exposure.

7.6.3.3 Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming sulfuric acid mist which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, sulfuric acid mist has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of sulfuric acid mist concentrations, are predicted to be well below levels which have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

7.6.3.4 Summary

In summary, the phytotoxic effects from the CF project's emissions are minimal. It is important to note that the emissions were conservatively modeled with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

7.6.4 IMPACTS TO WILDLIFE

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the NAAQS. This occurs in non-attainment areas, e.g., Los Angeles Basin. Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed (Newman, 1981).

A wide range of physiological and ecological effects to fauna has been reported for gaseous and particulate pollutants (Newman, 1981; Newman and Schreiber, 1988). The most severe of these effects have been observed at concentrations above the secondary ambient air quality standards. Physiological and behavioral effects have been observed in experimental animals at or below these standards.

For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates which are reported to cause physiological changes are shown in Table 7-4. These values are orders of magnitude larger than maximum concentrations predicted for the CF Project for the Class I area. No effects on wildlife AQRVs from SO_2, NO_2, and particulates are expected. The proposed project's contribution to cumulative impacts is negligible.

7.7 IMPACTS UPON VISIBILITY

7.7.1 INTRODUCTION

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I areas. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Chassahowitzka NWA. Visibility can take the form of plume blight for nearby areas or regional haze for long distances (e.g., distances beyond 50 km). Because the Chassahowitzka NWA is more than 50 km from the CF Plant City facility, the potential change in visibility is analyzed as regional haze.

Currently, there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and FLM of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report; and
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report,* USFS, NPS, USFWS (December, 2000), referred to as the FLAG document.

The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

Analysis Methodology

Based on the FLAG document, current regional haze guidelines characterize a change in visibility by the change in the light-extinction coefficient (b_{ext}). The b_{ext} is the attenuation of light per unit distance due to the scattering and absorption by gases and particles in the atmosphere. A change in the extinction coefficient produces a perceived visual change. An index that simply quantifies the percent change in visibility due to the operation of a source is calculated as:

$$\Delta\% = (b_{exts} / b_{extb}) \times 100$$

where: b_{exts} is the extinction coefficient calculated for the source, and
b_{extb} is the background extinction coefficient.

The purpose of the visibility analysis is to calculate the extinction at each receptor for each day (24-hour period) of the year due to the proposed project. The criteria to determine if the project's impacts are potentially significant are based on a change in extinction of 5 percent or greater for any day of the year.

Processing of visibility impairment for this study was performed with the CALPUFF model (see Appendix D) and the CALPUFF post-processing programs POSTUTIL and CALPOST. The analysis was conducted in accordance with the most recent guidance from the FLAG report (December 2000). The CALPUFF postprocessor model CALPOST is used to calculate the combined visibility effects from the different pollutants that are emitted from the Project. Daily background extinction coefficients are calculated on an hour-by-hour basis using hourly relative humidity data from CALMET and hygroscopic and non-hygroscopic extinction components specified in the FLAG document. For the Class I area evaluated, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse mega meter (Mm^{-1}). CALPOST then predicts the percent extinction change for each day of the year.

Emission Inventory

Based on recommendations of the FLAG Phase I Summary Report (12/00), the regional haze analysis considered only the maximum 24-hour increase in emissions due to the proposed CF modification. The emission rates and source parameters for the affected sources are presented in Chapter 6.0.

Building Wake Effects

The air modeling analysis included the same building structure dimensions to account for the effects of building-induced downwash as was used in the ISCST3 modeling analysis. Dimensions for all significant building structures were processed with the Building Profile Input Program (BPIP), Version 95086, and were included in the CALPUFF model.

Receptor Locations

Receptors for the refined analysis included 13 discrete receptors located at the Chassahowitzka PSD Class I area. Because the area's terrain is flat, all receptors were assumed to be at zero elevation.

Background Extinction Coefficients and Relative Humidity

The regional haze analysis was performed using the latest regulatory guidance as provided in the Federal Land Manager's Air Quality Related Values Workgroup (FLAG) Phase I report. Using the hourly meteorological and relative humidity data used with the CALPUFF model, the daily change is background extinction is computed. The hygroscopic and dry non-hygroscopic components used for calculating the daily background extinction coefficients for the CNWA were obtained from the FLAG report. For this analysis, the hygroscopic and dry non-hygroscopic values were 0.9 and 8.5 inverse millimeters (Mm^{-1}), respectively.

Meteorological Data

Three years of CALMET wind field data was used for a domain that covers all of central Florida. The years of data are 1990, 1992, and 1996. A detailed description of the data used to develop the wind domains is presented in Appendix D.

Chemical Transformation

The air modeling analysis included all chemical transformation processes that occur for the emitted species.

Results

The visibility modeling results are presented in Table 7-5. The maximum predicted 24-hour change in background extinction coefficient is 4.3 percent. As this percentage is well below the criteria value of 5 percent, it is concluded that the proposed project will not adversely impact the background visibility levels at the CNWA PSD Class I area.

7.7.2 NITROGEN AND SULFUR DEPOSITION

As part of the AQRV analyses, total nitrogen (N) and total sulfur (S) deposition rates were predicted at the Chassahowitzka NWA Class I area. The deposition analysis threshold is based on the annual averaging period. The total nitrogen and sulfur deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x, dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- SO_2, wet and dry deposition; and
- SO_4, wet and dry deposition.

The CALPUFF model produces results in units of $\mu g/m^2/s$. The modeled deposition rates are then converted to N and S deposition in kg/ha respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (IWAQM Phase II report Section 3.3).

The deposition analysis threshold (DAT) for nitrogen of 0.01 kg/ha/yr was provided by the U.S. Fish and Wildlife Service (January 2002). A DAT is the additional amount of N or S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant. The maximum N and S deposition predicted for the proposed CF project is, therefore, compared to these DAT or significant impact levels.

The maximum predicted N and S deposition predicted for the Project in the PSD Class I area of the Chassahowitzka NWA is summarized in Table 7-6. The maximum N deposition rate for the project is predicted to be 0.0021 kg/ha/yr, which is below the DAT of 0.01 kg/ha/yr. The maximum S deposition rate for the project is predicted to be 0.011 kg/ha/yr, which is slightly above the DAT of 0.01 kg/ha/yr. Although the S deposition rates are slightly above the DAT, the project's emissions are not expected to have a significant adverse effect on N or S deposition at the Class I area.

Table 7-1. Summary of Maximum Pollutant Concentrations Predicted for the Project Only at the PSD Class I Area of the Chassahowitzka NWA

Pollutant/ Averaging Time	Maximum Concentration[a] (µg/m^3) 1990	1992	1996	Overall Maximum Concentrations (µg/m^3)
SO_2				
Annual	0.011	0.011	0.014	0.014
24-Hour	0.165	0.176	0.082	0.176
8-Hour	0.48	0.53	0.23	0.53
3-Hour	1.45	1.02	0.69	1.45
1-Hour	2.53	1.51	0.91	2.53
NO_2				
Annual	0.0014	0.0015	0.0017	0.002
24-Hour	0.039	0.041	0.040	0.041
8-Hour	0.11	0.12	0.11	0.12
3-Hour	0.16	0.13	0.13	0.16
1-Hour	0.17	0.21	0.16	0.21
SAM				
Annual	0.0026	0.0024	0.0032	0.0032
24-Hour	0.036	0.034	0.041	0.041
8-Hour	0.081	0.077	0.075	0.081
3-Hour	0.22	0.10	0.15	0.22
1-Hour	0.33	0.14	0.16	0.33

[a] Highest Predicted with CALPUFF model and Central Florida CALMET Domain, 1990, 1992, and 1996.

Table 7-2. SO_2 Effect Levels for Various Plant Species

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sensitive to tolerant	920 (20 percent displayed visible injury)	3 hours	McLaughlin and Lee, 1974
Lichens	200-400	6 hr/wk for 10 weeks	Hart *et al.*, 1988
Cypress, slash pine, live oak, mangrove	1,300	8 hours	Woltz and Howe, 1981
Jack pine seedlings	470-520	24 hours	Malhotra and Kahn, 1978
Black oak	1,310	Continuously for 1 week	Carlson, 1979

Table 7-3. Sensitivity Groupings of Vegetation Based on Visible Injury at Different SO_2 Exposures[a]

Sensitivity Grouping	SO_2 Concentration 1-Hour	SO_2 Concentration 3-Hour	Plants
Sensitive	1,310 - 2,620 µG/m³ (0.5 - 1.0 ppm)	790 - 1,570 µG/m³ (0.3 - 0.6 ppm)	Ragweeds Legumes Blackberry Southern pines Red and black oaks White ash Sumacs
Intermediate	2,620 - 5,240 µG/m³ (1.0 - 2.0 ppm)	1,570 - 2,100 µG/m³ (0.6 - 0.8 ppm)	Maples Locust Sweetgum Cherry Elms Tuliptree Many crop and garden species
Resistant	>5,240 µG/m³ (>2.0 ppm)	>2,100 µG/m³ (>0.8 ppm)	White oaks Potato Upland cotton Corn Dogwood Peach

[a] Based on observations over a 20-year period of visible injury occurring on over 120 species growing in the vicinities of coal-fired power plants in the southeastern United States.

Source: EPA, 1982a.

Table 7-4. Examples of Reported Wildlife Effects of Air Pollutants at Concentrations Below National Secondary Ambient Air Quality Standards

Pollutant	Reported Effect	Concentration ($\mu g/m^3$)	Exposure
Sulfur Dioxide[a]	Respiratory stress in guinea pigs	427 to 854	1 hour
	Respiratory stress in rats	267	7 hours/day; 5 days/ week for 10 weeks
	Decreased abundance in deer mice	13 to 157	Continually for 5 months
Nitrogen Dioxide[b,c]	Respiratory stress in mice	1,917	3 hours
	Respiratory stress in guinea pigs	96 to 958	8 hours/day for 122 days
Particulates[a]	Respiratory stress, reduced respiratory disease defenses	120 PbO_3	Continually for 2 months
	Decreased respiratory disease defenses in rats, same with hamsters	100 $NiCl_2$	2 hours

Source: [a]Newman and Schreiber, 1988.
[b]Gardner and Graham, 1976.
[c]Trzeciak et al., 1977.

Table 7-5. Maximum 24-hour Visibility Impairment Predicted for Project Project, CF Industries, Plant City, at the PSD Class I Area of the Chassahowitzka NWA

Ranking	Visibility Impairment (%) [a]			Project Only Visibility Impairment Criteria (%)
	1990	1992	1996	
Highest	4.30	3.09	4.17	5.0

[a] Concentrations are highest predicted using the CALPUFF model and Central Florida CALMET Domain, 1990, 1992, and 1996.

Table 7-6. Maximum Total Sulfur and Nitrogen Annual Deposition Predicted for CF Industries Proposed Project, At the PSD Class I of the Chassahowitzka NWA

Species	Total Deposition (Wet & Dry)						Deposition Analysis Threshold [b]
	1990		1992		1996		
	($g/m^2/s$)	(kg/ha/yr)[a]	($g/m^2/s$)	(kg/ha/yr)[a]	($g/m^2/s$)	(kg/ha/yr)[a]	(kg/ha/yr)
Sulfur (S) Deposition	3.22E-11	0.010	3.23E-11	0.010	3.54E-11	0.011	0.01
Nitrogen (N) Deposition	6.45E-12	0.0020	6.54E-12	0.0021	5.56E-12	0.0018	0.01

[a] Conversion factor is used to convert $g/m^2/s$ to kg/hectare (ha)/yr with the following units:

$g/m^2/s$ x 0.001 kg/g
x 10,000 m^2/hectare
x 3,600 sec/hr
x 8,760 hr/yr = kg/ha/yr
or
$g/m^2/s$ x 3.154E+08 = kg/ha/yr

[b] Deposition analysis thresholds (DAT) for nitrogen and sulfur deposition provided by the U.S. Fish and Wildlife Service, January 2002. A DAT is the additional amount of N or S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant.

Figure 7-1. Population and Household Unit Trends in Hillsborough County

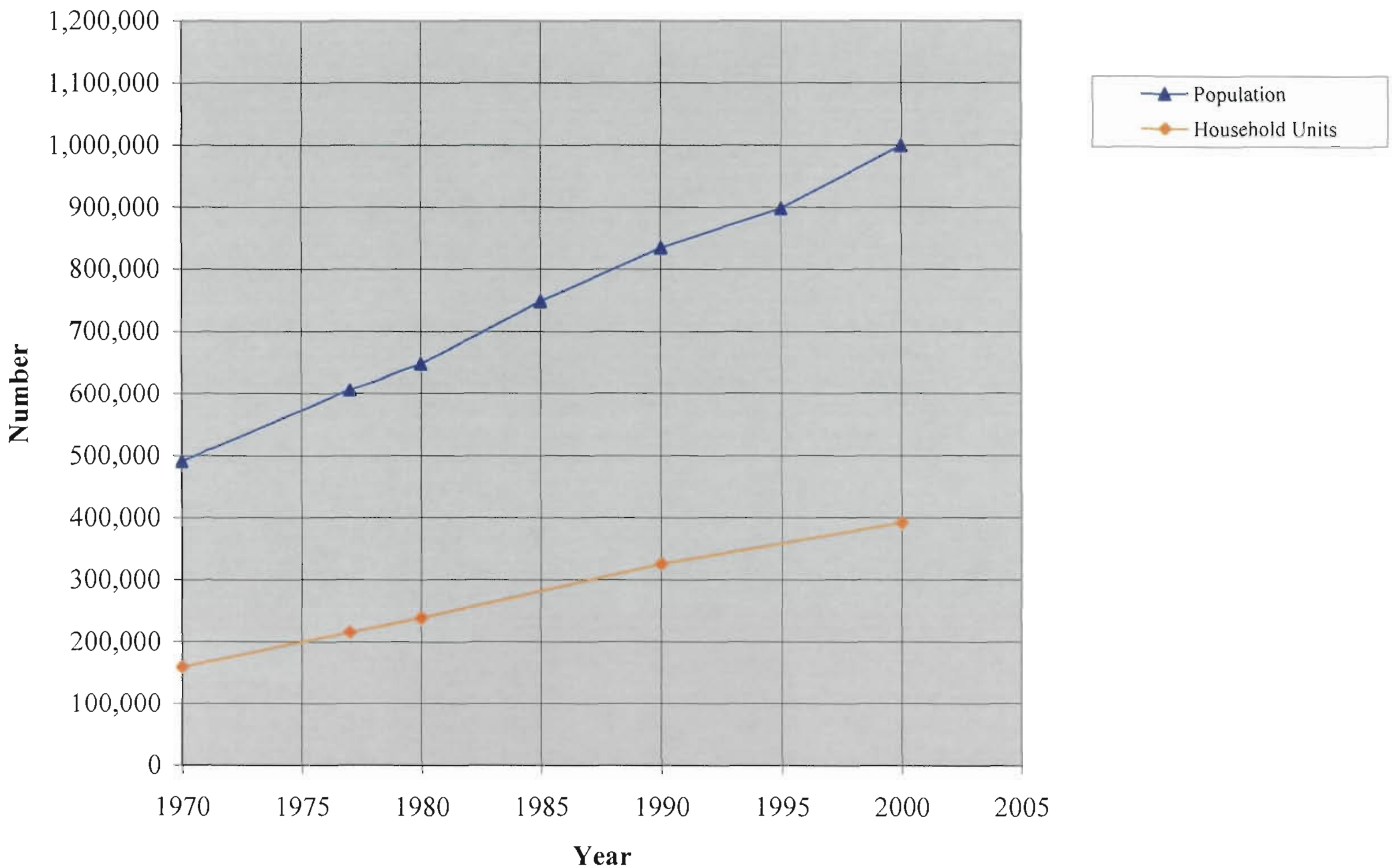


Figure 7-2. Retail and Wholesale Trade Trends in Hillsborough County

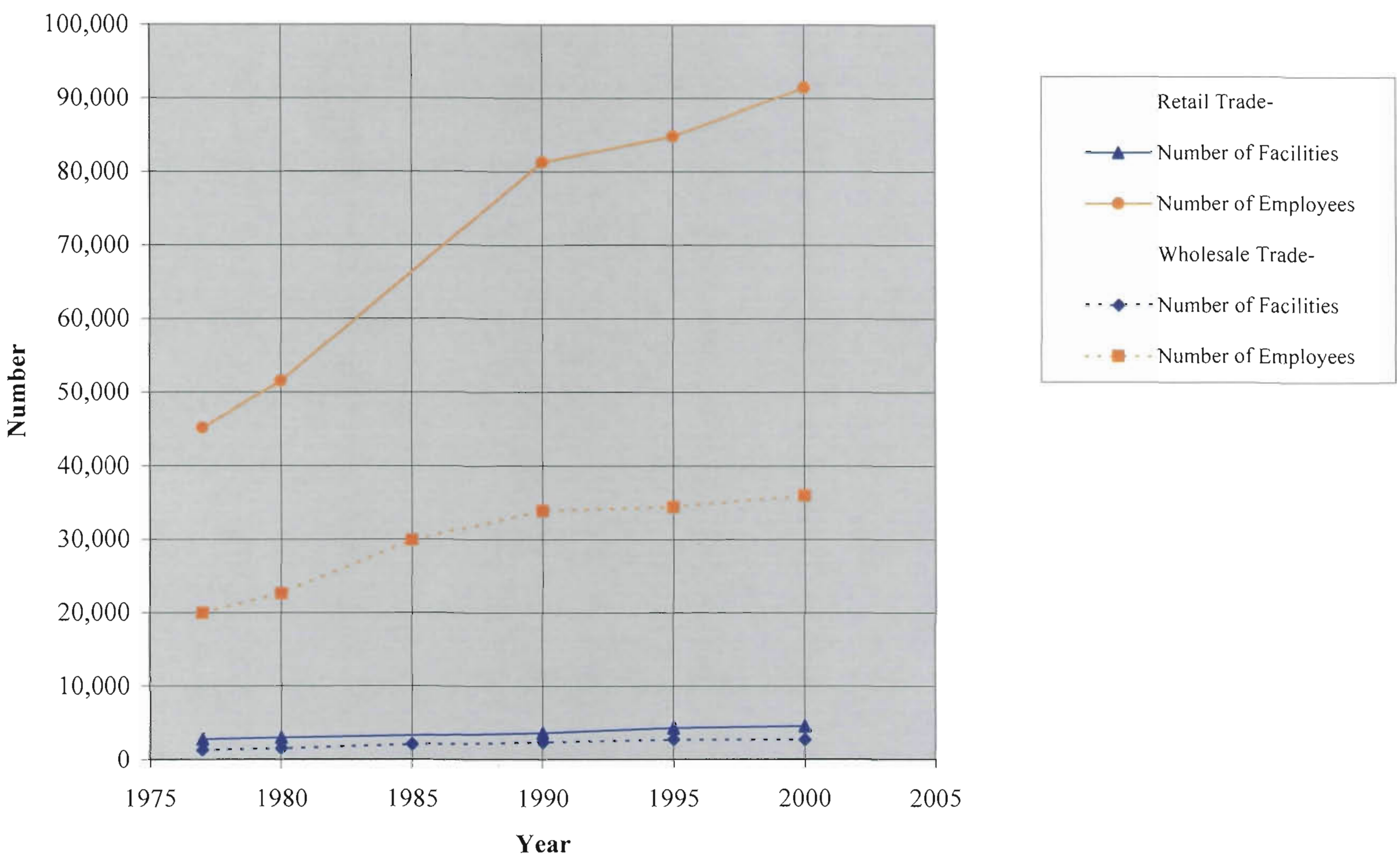


Figure 7-3. Labor Force Trend in Hillsborough County

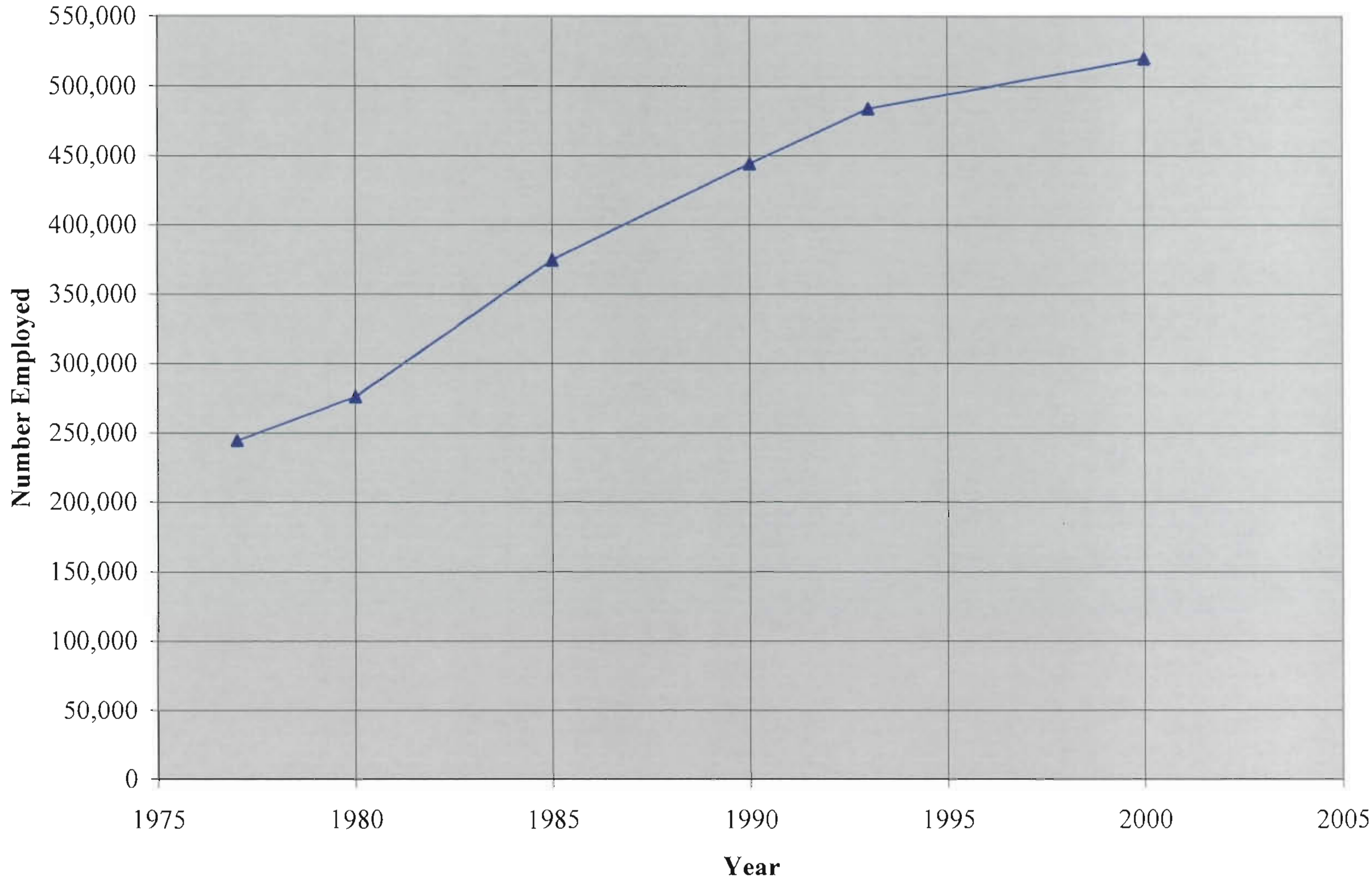


Figure 7-4. Hotel and Motel Trend in Hillsborough County

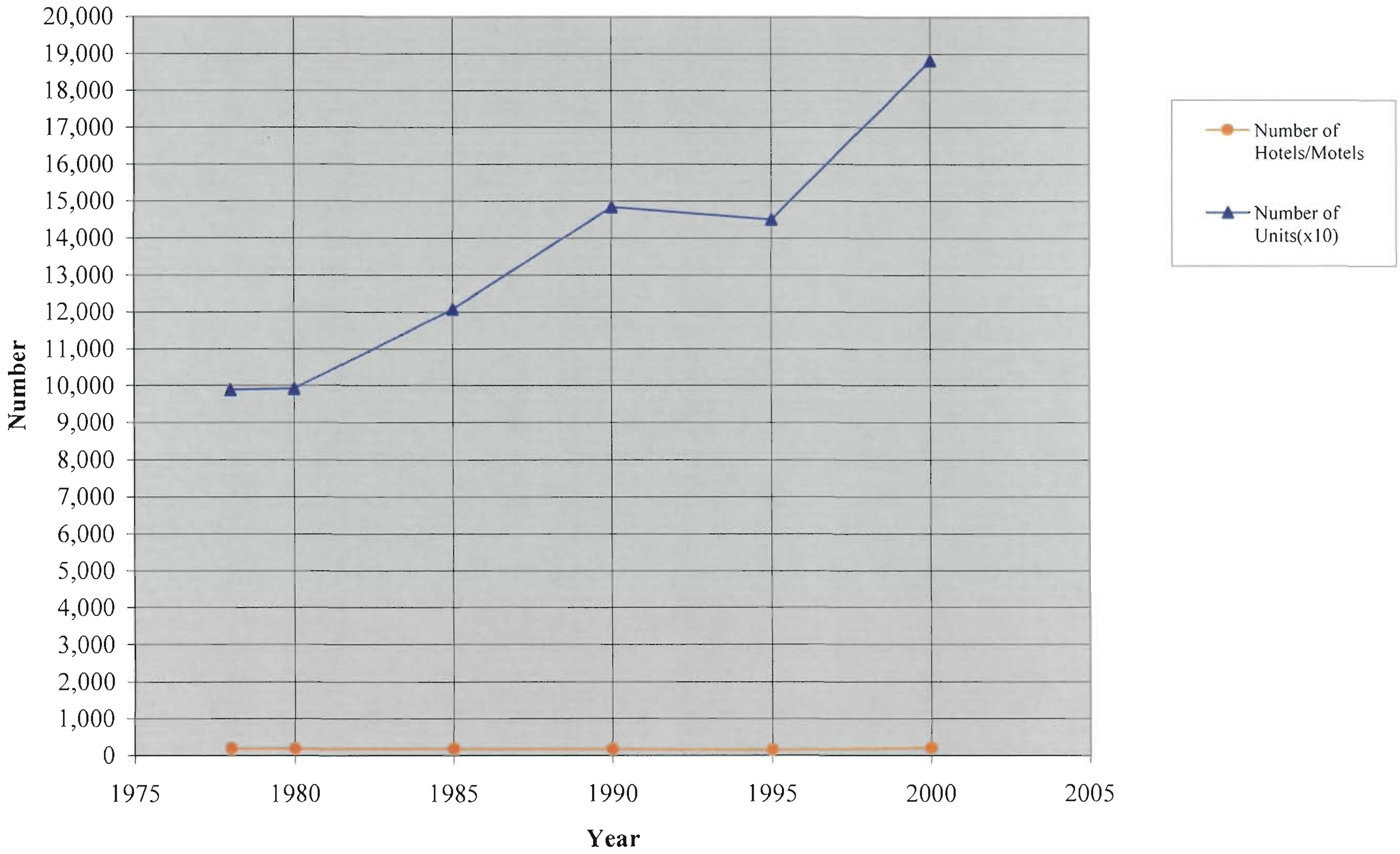


Figure 7-5. Vehicle Miles Traveled (VMT) Estimates for Motor Vehicles in Hillsborough County

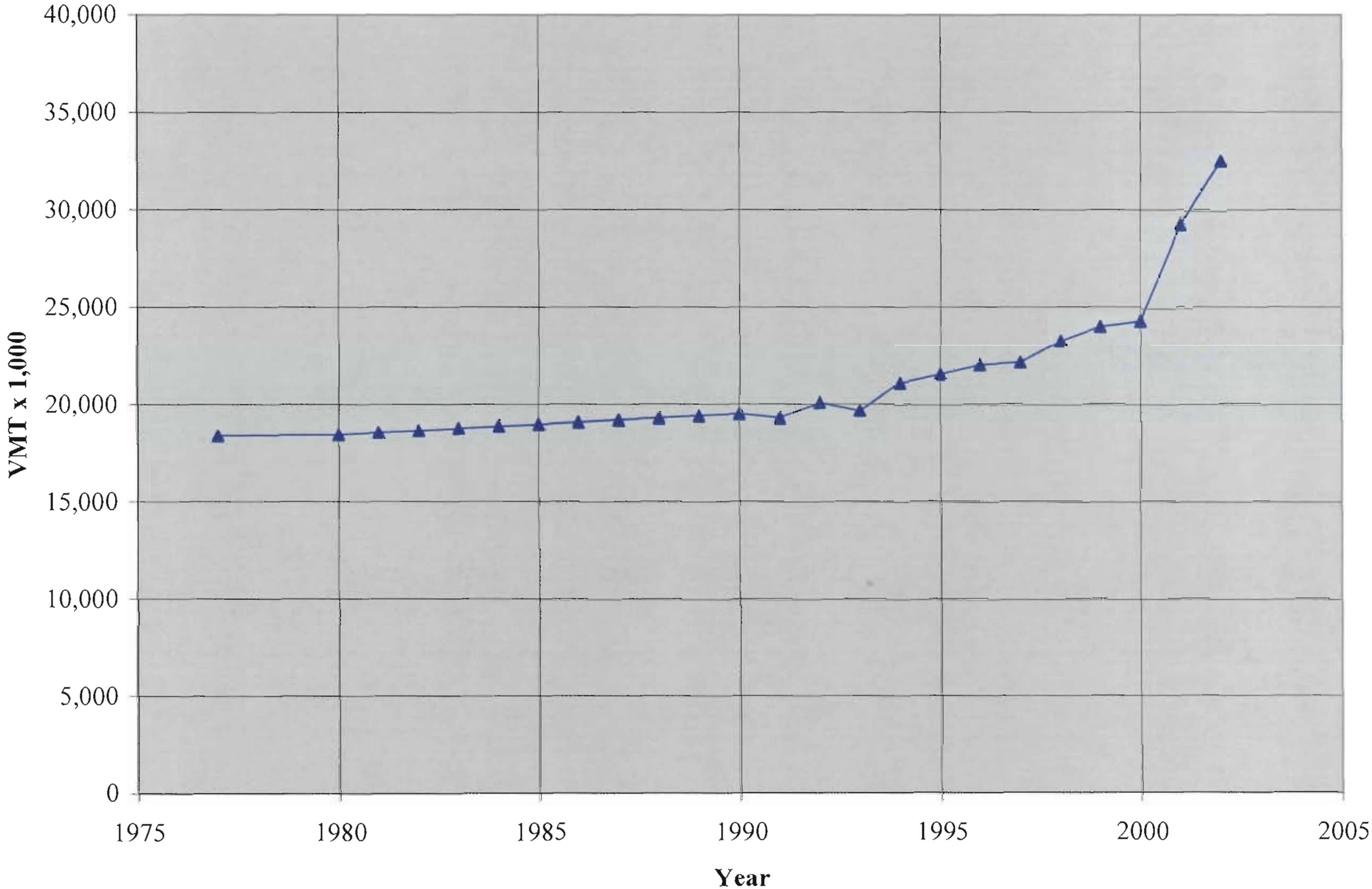


Figure 7-6. Manufacturing and Agriculture Trends in Hillsborough County

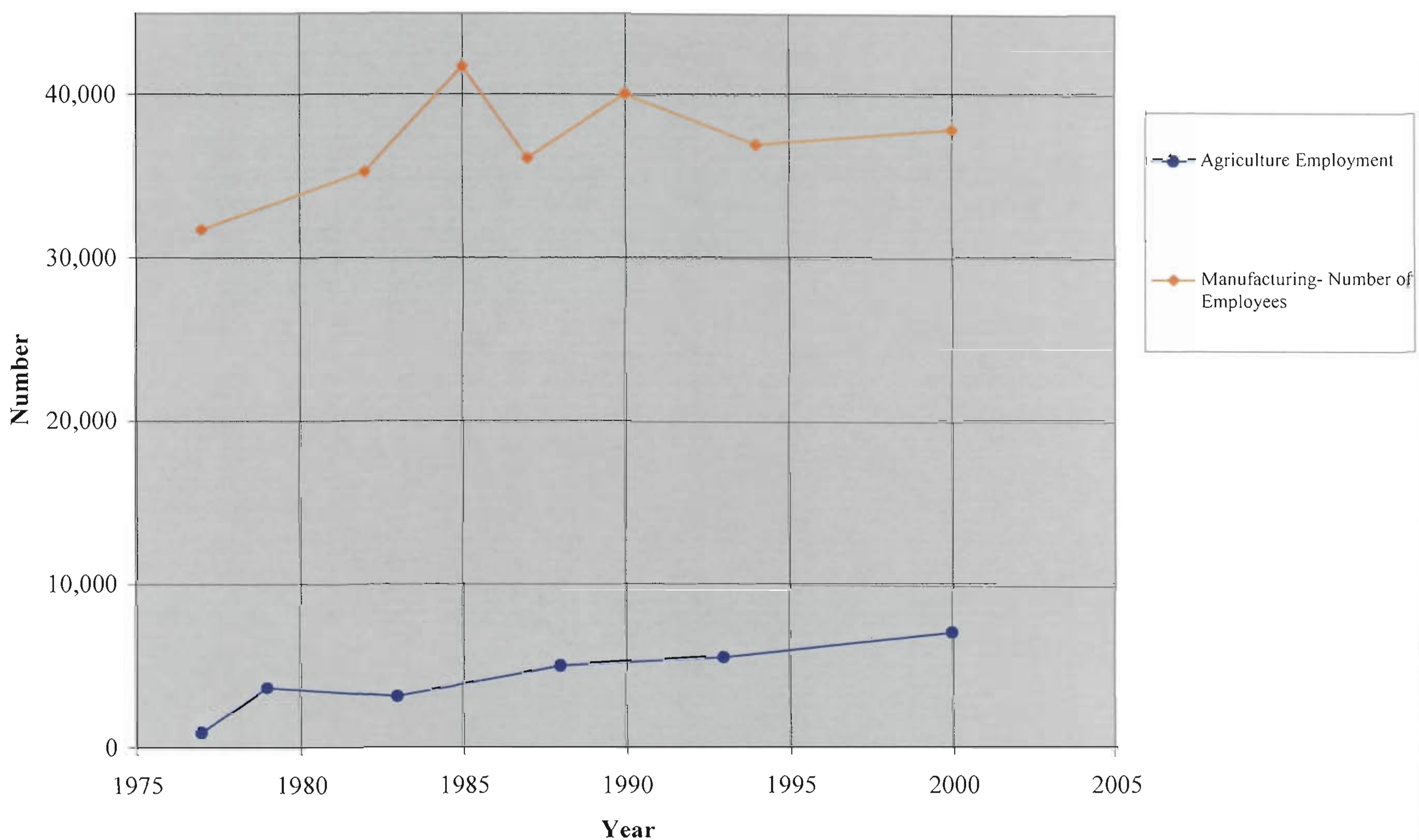


Figure 7-7. Electrical Utility Power Generation Capacity in Hillsborough County

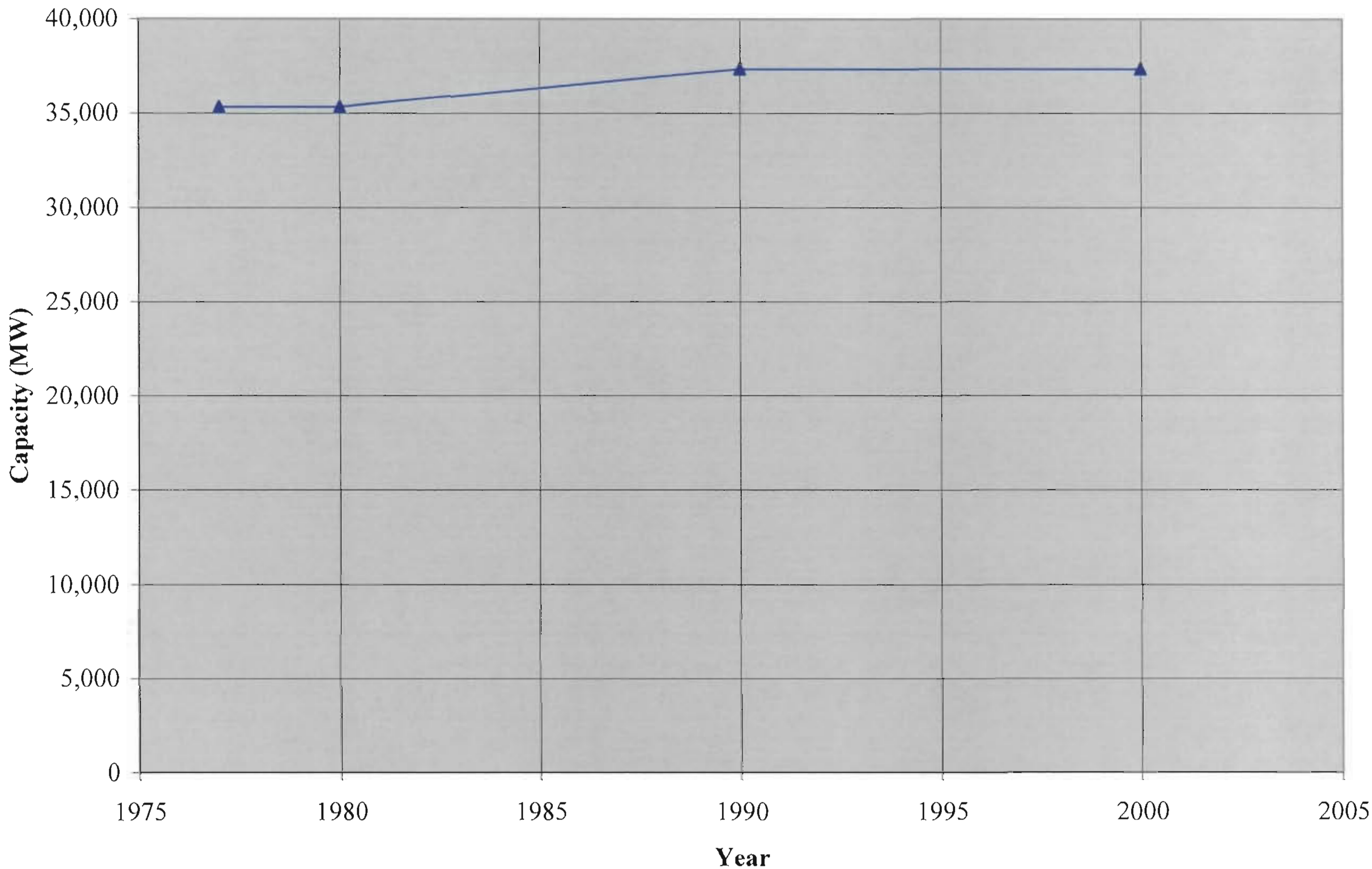


Figure 7-8. Mobile Source Emissions (Tons per Day) of CO, VOC, and NO_x in Hillsborough County

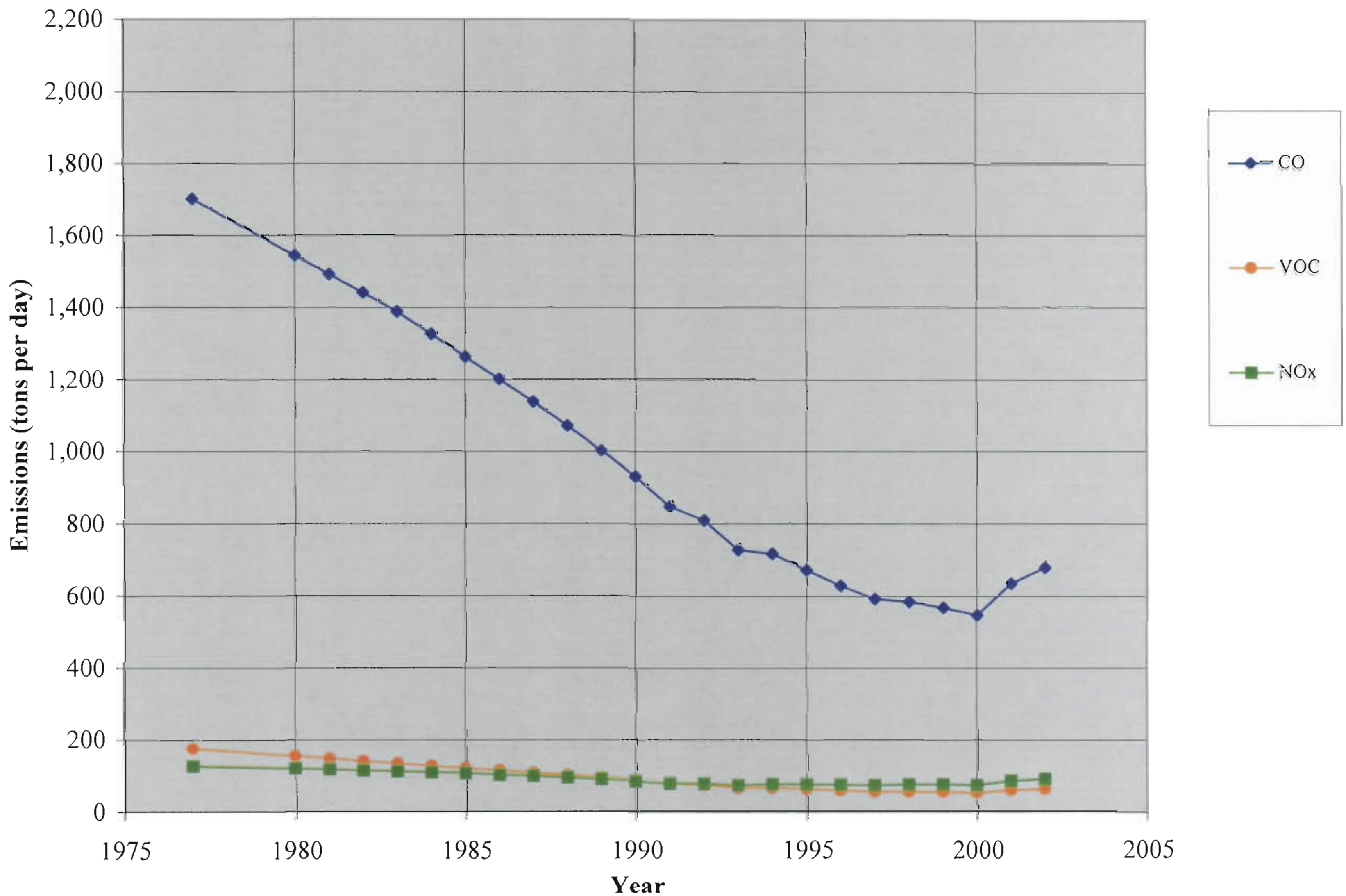


Figure 7-9. Measured Annual Average Sulfur Dioxide Concentrations from 1982 to 2002- Hillsborough County

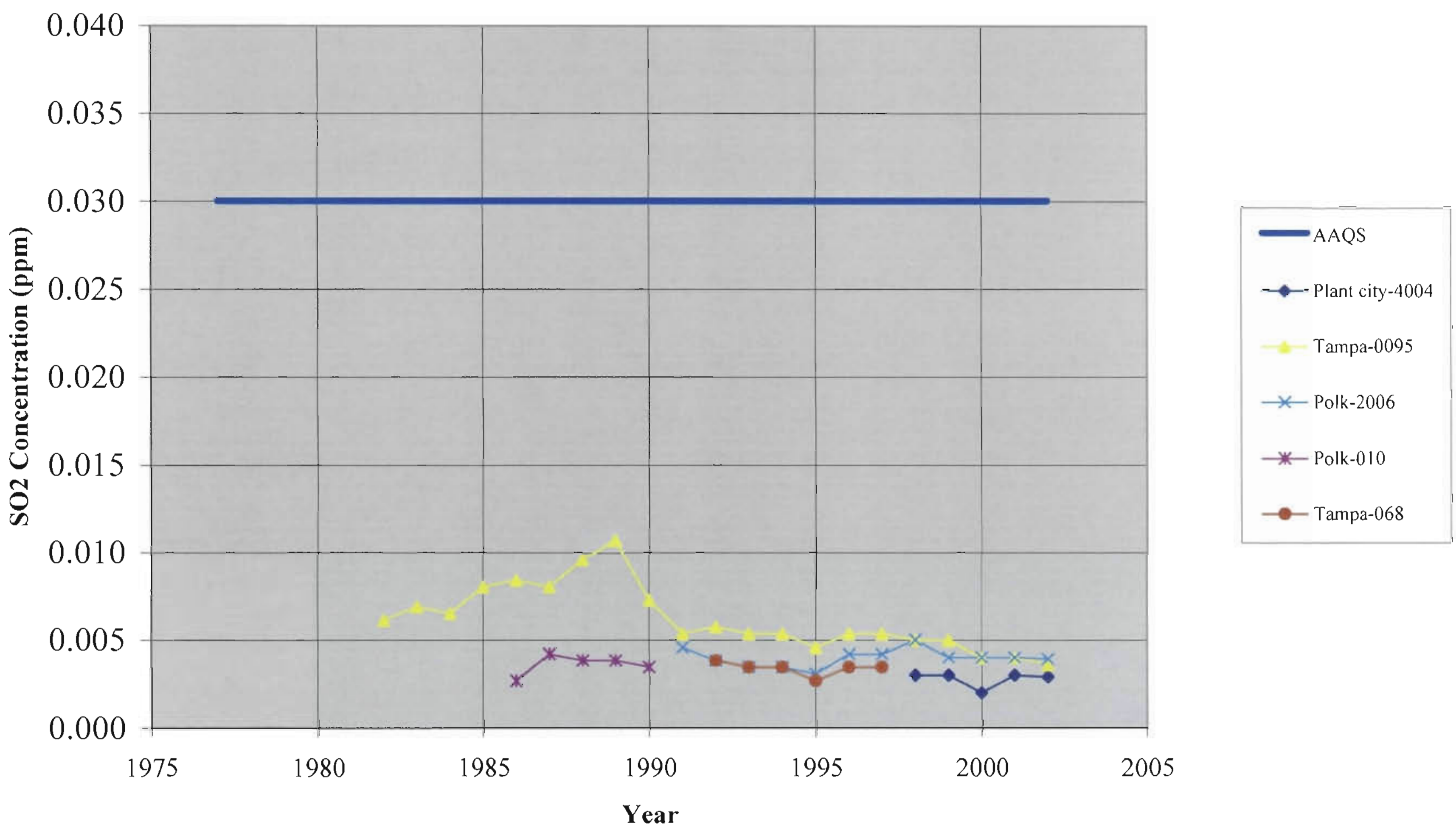


Figure 7-10. Measured 24-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1982 to 2002- Hillsborough County

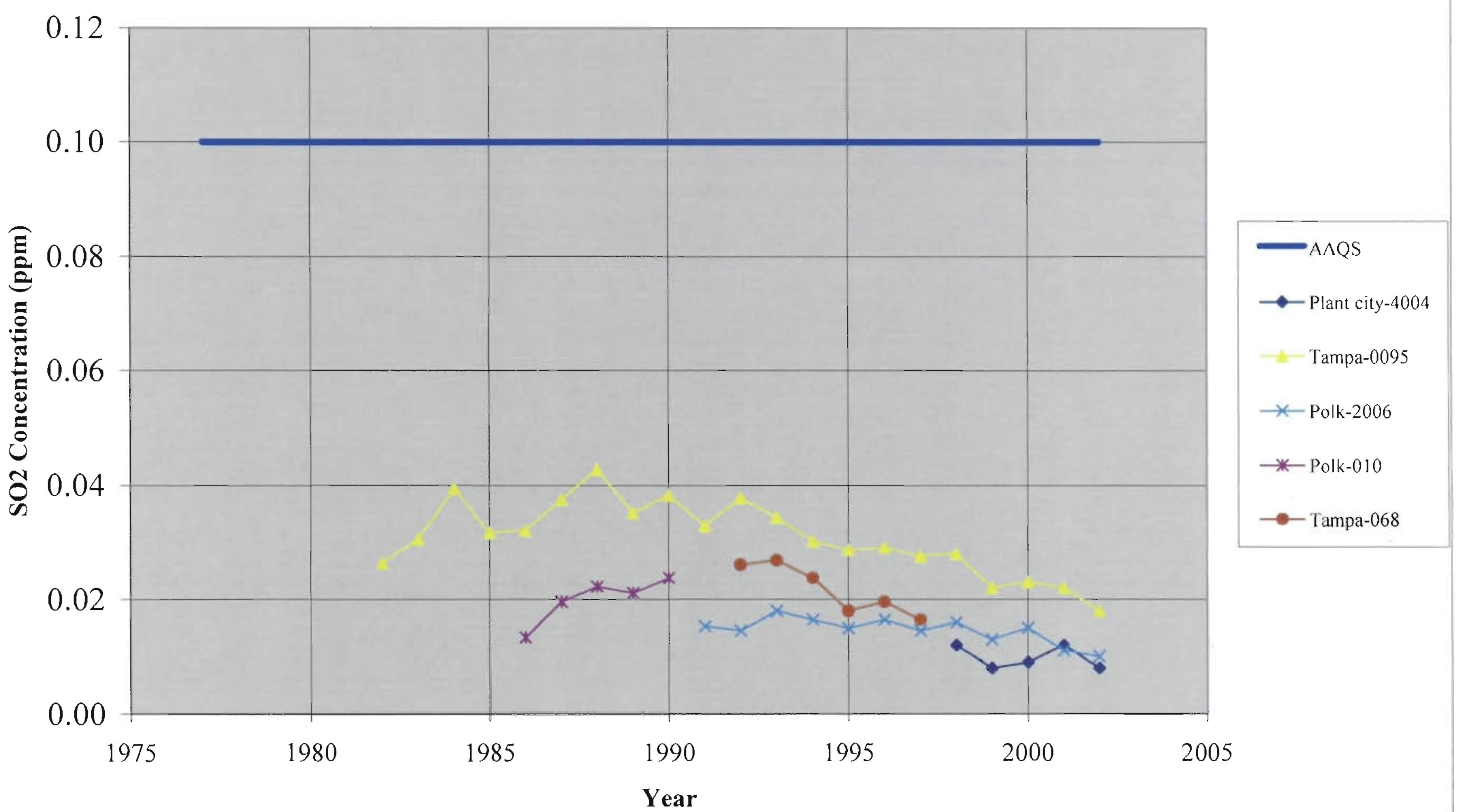


Figure 7-11. Measured 3-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1982 to 2002- Hillsborough County

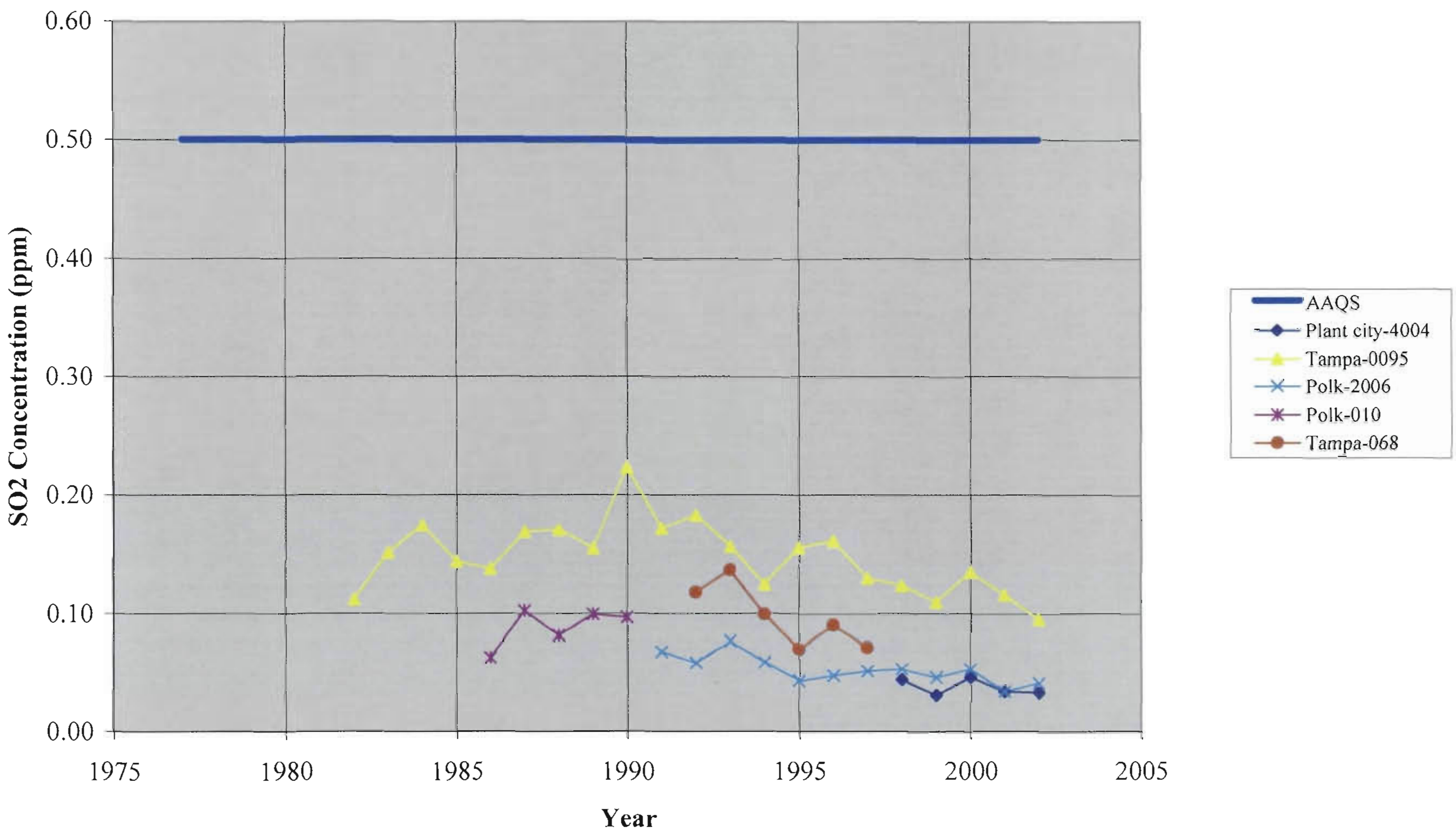
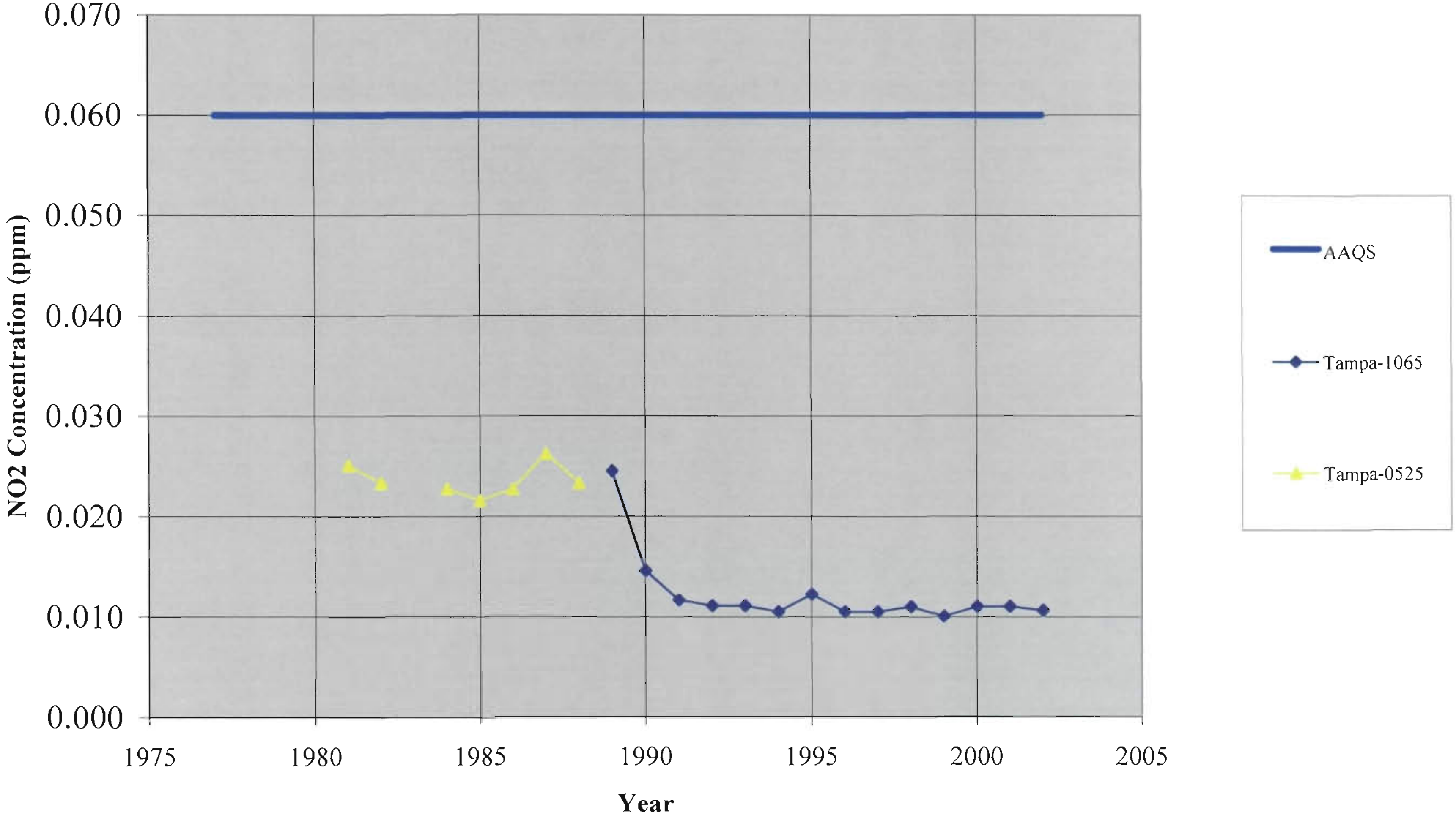


Figure 7-12. Measured Annual Average Nitrogen Dioxide Concentrations from 1981 to 2002- Hillsborough County



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APPENDIX A

BASIS OF ACTUAL EMISSIONS

Table A-1. Derivation of Actual 3-Month Emission Calculations for 2001, CF Industries, Plant City

Emission Unit	Total Production Rate [a] (tons 100% H_2SO_4)	SO_2 lb/ton [b]	SO_2 tons [a]	SAM lb/ton [c]	SAM tons [a]	NO_x lb/ton [d]	NO_x tons [a]
C SAP	213,515	3.57	380.82	0.05	5.34	0.05	5.02
D SAP	210,259	3.56	374.23	0.04	4.21	0.03	2.84

[a] Production rates and emissions represent 3-month total from October 1, 2001 through December 31, 2001.

[b] Emission factor from CEM data.

[c] Emission factor from stack test data.

[d] Emission factor based on 1992 stack test data from AOR.

Table A-2. 2002 Actual Annual Emissions [a], CF Industries, Plant City

Emission Unit	EU ID	Total Emissions (tons)		
		SO_2	SAM	NO_x
C SAP	007	1,510.48	16.69	19.61
D SAP	008	1,482.11	13.33	10.90

[a] Emissions from the 2002 AOR.

Table A-3. Derivation of Actual 9-Month Emission Calculations for 2003, CF Industries, Plant City

Emission Unit	Total Production Rate [a] (tons 100% H_2SO_4)	SO_2 lb/ton [b]	SO_2 tons [a]	SAM lb/ton [c]	SAM tons [a]	NO_x lb/ton [d]	NO_x tons [a]
C SAP	609,887	3.65	1,113.64	0.03	9.15	0.05	14.33
D SAP	609,887	3.65	1,113.64	0.04	12.20	0.03	8.23

[a] Production rates and emissions represent 9-month total from January 1, 2003 through September 30, 2003.

[b] Emission factor from CEM data.

[c] Emission factor from stack test data.

[d] Emission factor based on 1992 stack test data from AOR.

Table A-4. Calculation of Average Annual Emissions for C and D SAP

Time Period	Total Emissions (tons)		
	SO_2	SAM	NO_x
C SAP			
October 1, 2001 to December 31, 2001	380.82	5.34	5.02
January 1, 2002 to December 31, 2002	1,510.48	16.69	19.61
January 1, 2003 to September 30, 2003	1,113.64	9.15	14.33
Two-Year Total	3,004.94	31.18	38.96
Annual Average[a]	1,502.47	15.59	19.48
D SAP			
October 1, 2001 to December 31, 2001	374.23	4.21	2.84
January 1, 2002 to December 31, 2002	1,482.11	13.33	10.90
January 1, 2003 to September 30, 2003	1,113.64	12.20	8.23
Two-Year Total	2,969.98	29.73	21.98
Annual Average[a]	1,484.99	14.87	10.99

[a] Annual average is two-year total divided by two.

APPENDIX B

BASIS OF EMISSION FACTORS

FOR MOLTEN SULFUR HANDLING

EMISSION FACTORS FOR SULFUR PARTICLES, TRS, SO_2 AND VOC IN MOLTEN SULFUR STORAGE AND HANDLING SYSTEMS

Sulfur particle emissions have been measured by Koogler & Associates (November 1988) from molten sulfur storage tanks in the phosphate chemical fertilizer industry. The measured sulfur particle concentrations in the gases vented from the storage tanks have ranged from 0.3-0.5 grains/ft^3. The higher concentrations were measured when the tanks were being filled with molten sulfur, and the lower concentrations when the tanks were idle. The average natural ventilation rates on multi-vent tanks were measured at about 18 cfm/vent.

Measurements of sulfur particle emissions at the Pennzoil terminals in Tampa, Florida, in October 1986 by Enviroplan were measured at 0.46 grains/ft^3 (NOTE: Data was corrected by Koogler and comments were transmitted to FDER, December 30, 1986). However, later tests conducted by Enviroplan (1987) at Sulfur Storage Company, Inc. in Tampa, Florida, measured sulfur particle concentrations at 0.12 grain/ft^3. It is believed that the Pennzoil tests and the Koogler tests during tank filling could contain condensed organics. Enviroplan (1987) indicated the total particulate concentrations including condensible hydrocarbons could be 2.5 times the sulfur particulate concentration.

Therefore, a reasonable estimate of sulfur particle concentration under all conditions is:

$$(0.3 + 0.12)/2 = 0.2 \text{ grains/ft}^3$$

Air vented from molten sulfur storage tanks and pits is also expected to contain small quantities of total reduced sulfur compounds, including H_2S (TRS), sulfur dioxide and volatile organic compounds (VOCs). The volatile organic compounds result from small quantities of petroleum products contained in Frasch sulfur (approximately 0.25%) and the vaporization of these compounds at the storage temperature of molten sulfur. The reduced sulfur compounds result from the reduction of elemental sulfur in the presence of carbon supplied by the petroleum products and the SO_2 results from the oxidation of elemental sulfur.

A limited number of measurements have been made on molten sulfur storage tanks at Frasch sulfur terminals in the Tampa area to determine TRS, SO_2, and VOC concentrations in the headspace of the tanks over molten sulfur. These measurements have been made on molten sulfur storage tanks with capacities in the range of 10,000 tons which are air purged at rates between 10 and 63 cfm to prevent the accumulation of H_2S. Because of the size of the tanks, the fact that they are air purged and the fact that sulfur delivered to the Port of Tampa most probably has a higher fraction of VOCs (due to the fact that there has been less time for the volatile fraction of the petroleum products to vaporize), measurements made in Tampa will overestimate TRS, SO_2 and VOC emissions from phosphate chemical fertilizer facilities which later receive the sulfur. However, as no other data is available, the Tampa data will be used to estimate TRS (including H_2S), SO_2 and VOC emissions factors for molten sulfur storage tanks and molten sulfur pits. It should be recognized that the application of these emission factors will overstate the actual emissions by some unknown amount.

Measurements of TRS made in November 1983 by TRC and reported in the FDER "Sulfur Report" (February 1984) show the following:

Tank Purge Rate (CFM)	TRS (as H2S) in Headspace Over Molten Sulfur (ppm, vol)
43	280
63	403

Measurements made by Enviroplan, Inc. in 1987 in the headspace over molten sulfur in a tank purged at the rate of 10 cfm showed an average TRS concentration of 638 ppm (vol).

A "typical" concentration of TRS (as H_2S) in the headspace over molten sulfur can be estimated from these data:

$$[280 + 403 + 2(638)]/4 = 490 \text{ ppm (vol)}$$

$$= 3.5 \times 10^{-5} \text{ lb/ft}^3 \text{ at } 200^oF$$

Measurements of SO_2 made by TRC (1983) in the tank headspace over molten sulfur at purge rates of 43 and 63 cfm averaged 553 ppm (vol). This converts to an SO_2 concentration of 7.3×10^{-5} lb/ft^3 at 200^{o}F.

Measurements made by Enviroplan, Inc. (1987) in the tank headspace over molten sulfur at STI in Tampa showed VOC concentrations that averaged 5.2×10^{-5} lb/ft^3.

Table 1 summarizes the above emission factors for molten sulfur storage and handling systems.

TABLE 1
SUMMARY OF EMISSION FACTORS FOR
MOLTEN SULFUR STORAGE AND
HANDLING SYSTEMS

Air Pollutant	Emission Factor
Sulfur Particle	0.2 grains/ft^3
TRS (as H_2S)	3.5×10^{-5} lb/ft^3
SO_2	7.3×10^{-5} lb/ft^3
VOC	5.2×10^{-5} lb/ft^3

REFERENCES

1. "Preliminary Report on Emissions From Tank No. 4 at Sulfur Terminal Co.,Inc., Tampa, Florida." TRC Environmental Consultants, Inc., East Hartford, Connecticut, December 30, 1983.

2. "Sulfur Report." Bureau of Air Quality Management, Florida Department of Environmental Regulation, Tallahassee, Florida, February 1984.

3. "Sulfur Particulate Emission Measurement Project at the Pennzoil Terminals in Tampa, Florida." Enviroplan, Inc., West Orange, New Jersey, October 1986.

4. Comments in a letter dated December 30, 1986, by Dr. John Koogler, Koogler & Associates to Mr. Steve Smallwood, FDER, on Enviroplan's Pennzoil Sulfur Company emission measurement report.

5. "Technical Report Supporting Application to the Florida DER For An Alternate Sulfur Particulate Emissions Sampling Procedure." Enviroplan, Inc., West Orange, New Jersey, October 30, 1987.

6. "Particulate Matter Emission Measurements From Molten Sulfur Storage Tanks at Gardinier, Inc., Tampa, Florida." Koogler & Associates, Gainesville, Florida, November 7-8, 1988.

7. Discussions with Enviroplan, Inc. at a meeting in New Orleans, Louisiana, on July 6, 1989. Enviroplan supplied measurement data on TRS and VOC concentrations in the headspace over molten sulfur storage tanks at the Sulfur Terminals Company, Inc. in Tampa, Florida, for testing which was conducted during September 1987.

SECTION V: SUPPLEMENTAL INFORMATION

1. Process input/production rates

Input Rate

Molten sulfur input rate to tank

= 1300 tonne/hr x 2200 lb/ton
= 2,860,000 lb/hr

Annual throughput @ 1.34 MM tonnes for the entire facility.

Assume annual throughput will be equally distributed between the three tanks.

= 1,340,000/3
= 446,667 tonne/yr

Time required to transfer sulfur to tank

= 446,667 tonne/yr x 1/1300 tonne/hr
= 344 hr/yr

Sulfur Withdrawl

Maximum sulfur withdrawl rate is approximately 300 tonne/hr. The sulfur is pumped to one of three covered sumps that serve the sulfuric acid plants or will go to the truck loading station as proposed in this permit application.

2/3. Controlled and Uncontrolled Emissions

Tank No. 1 has a 10,000 tonne capacity. Drawing sk-1 shows the configuration of the present tank. The roof vents, except for the single center vent, are sealed. Seal details are shown in drawing sk-4. Emissions from the tank will be essentially the same regardless of capacity.

Emission measurements made on a single vent molten sulfur storage tank (Penzoil) demonstrated that the ventilation rate of the tank (wind induced), while the tank is sitting idle (or while sulfur is being withdrawn) is approximately 30 dscfm. These measurements also indicated the sulfur particle concentration in the air vented from the tank is in the range of .46 grains/dscf.

Measurments made on the Cargill Fertilizer molten sulfur storage tanks in November 1988 (multiple vents on the tanks) showed a sulfur particle concentration in the vented gas of .51 grains/dscf when molten sulfur was being pumped into the tanks at a rate of 1000 tonnes per hour and .29 grains/dscf when the tanks were sitting idle.

For calculating emissions from the tank, the following conditions have been established:

<u>Tank Filling</u>

Ventilation Rate	=	429 dscfm (ventilation due to inflow of 1300 tonnes/hr molten sulfur plus wind induced ventilation)
Sulfur Particle Concentration	=	0.66 grains/dscf
Time	=	344 hr/yr

<u>Tank Idle</u>

Ventilation Rate	=	30 dscfm (from Penzoil report)
Sulfur Particle Concentration	=	0.29 grains/dscf
Time	=	8760 - 344
	=	8416 hr/yr

Emissions were estimated for the single vent only as rim vents are sealed as shown in drawing sk-4.

<u>Tank Filling</u>

Emissions	=	429 cfm x 60 min/hr x .66 gr/cf
		x 1/7000 gr/lb
	=	2.43 lb/hr
		x 344 hr/yr x 1/2000
	=	0.42 tpy

<u>Tank Idle</u>

Emissions	=	30 dscfm x 60 min/hr x 0.29 gr/cf
		x 1/7000 gr/lb
	=	0.075 lb/hr
		x 8416 hr/yr x 1/2000
	=	0.32 tpy

<u>Total Emissions</u>

Hourly	=	0.075 to 2.43 lb/hr
Annual	=	0.74 tpy

SECTION V: SUPPLEMENTAL INFORMATION

1. Process input/production rates

Input Rate

Molten sulfur input rate to tank

= 1300 tonne/hr x 2200 lb/ton
= 2,860,000 lb/hr

Annual throughput @ 1.34 MM tonnes for the entire facility.

Assume annual throughput will be equally distributed between the three tanks.

= 1,340,000/3
= 446,667 tonne/yr

Time required to transfer sulfur to tank

= 446,667 tonne/yr x 1/1300 tonne/hr
= 344 hr/yr

Sulfur Withdrawl

Maximum sulfur withdrawl rate is approximately 300 tonne/hr. The sulfur is pumped to one of three covered sumps that serve the sulfuric acid plants or will go to the truck loading station as proposed in this permit application.

2/3. Controlled and Uncontrolled Emissions

Tank No. 2 has a 18,000 tonne capacity. Drawing SK-3 shows the configuration of the present tank. The roof vents, except for the single center vent, are sealed. Seal details are shown in drawing sk-4. The tank will be vented by a single 10-inch diameter gooseneck vent in the center of the tank roof (See drawing SK-3. Emissions from the tank will be essentially the same regardless of capacity.

Emission measurements made on a single vent molten sulfur storage tank (Penzoil) demonstrated that the ventilation rate of the tank (wind induced), while the tank is sitting idle (or while sulfur is being withdrawn) is approximately 30 dscfm. These measurements also indicated the sulfur particle concentration in the air vented from the tank is in the range of .46 grains/dscf.

Measurments made on the Cargill Fertilizer molten sulfur storage tanks in November 1988 (multiple vents on the tanks) showed a sulfur particle concentration in the vented gas of .51 grains/dscf when molten sulfur was being pumped into the tanks at a rate of 1000 tonnes per hour and .29 grains/dscf when the tanks were sitting idle.

For calculating emissions from the tank, the following conditions have been established:

Tank Filling

Ventilation Rate	=	429 dscfm (ventilation due to inflow of 1300 tonnes/hr molten sulfur plus wind induced ventilation)
Sulfur Particle Concentration	=	0.66 grains/dscf
Time	=	344 hr/yr

Tank Idle

Ventilation Rate	=	30 dscfm (from Penzoil report)
Sulfur Particle Concentration	=	0.29 grains/dscf
Time	=	8760 - 344
	=	8416 hr/yr

Emissions were estimated for the single vent only as rim vents are sealed as shown in drawing sk-4.

Tank Filling

Emissions	=	429 cfm x 60 min/hr x .66 gr/cf x 1/7000 gr/lb
	=	2.43 lb/hr x 344 hr/yr x 1/2000
	=	0.42 tpy

Tank Idle

Emissions	=	30 dscfm x 60 min/hr x 0.29 gr/cf x 1/7000 gr/lb
	=	0.075 lb/hr x 8416 hr/yr x 1/2000
	=	0.32 tpy

Total Emissions

Hourly	=	0.075 to 2.43 lb/hr
Annual	=	0.74 tpy

SECTION V: SUPPLEMENTAL INFORMATION

1. Process input/production rates

Input Rate

Molten sulfur input rate to tank

= 1300 tonne/hr x 2200 lb/ton
= 2,860,000 lb/hr

Annual throughput @ 1.34 MM tonnes for the entire facility.

Assume annual throughput will be equally distributed between the three tanks.

= 1,340,000/3
= 446,667 tonne/yr

Time required to transfer sulfur to tank

= 446,667 tonne/yr x 1/1300 tonne/hr
= 344 hr/yr

Sulfur Withdrawl

Maximum sulfur withdrawl rate is approximately 300 tonne/hr. The sulfur is pumped to one of three covered sumps that serve the sulfuric acid plants or will go to the truck loading station as proposed in this permit application.

2/3. Controlled and Uncontrolled Emissions

Tank No. 3 has a 18,000 tonne capacity. Drawing SK-3 shows the configuration of the present tank. The roof vents, except for the single center vent, are sealed. Seal details are shown in drawing sk-4. The tank will be vented by a single 10-inch diameter gooseneck vent in the center of the tank roof (See drawing SK-3. Emissions from the tank will be essentially the same regardless of capacity.

Emission measurements made on a single vent molten sulfur storage tank (Penzoil) demonstrated that the ventilation rate of the tank (wind induced), while the tank is sitting idle (or while sulfur is being withdrawn) is approximately 30 dscfm. These measurements also indicated the sulfur particle concentration in the air vented from the tank is in the range of .46 grains/dscf.

Measurments made on the Cargill Fertilizer molten sulfur storage tanks in November 1988 (multiple vents on the tanks) showed a sulfur particle concentration in the vented gas of .51 grains/dscf when molten sulfur was being pumped into the tanks at a rate of 1000 tonnes per hour and .29 grains/dscf when the tanks were sitting idle.

For calculating emissions from the tank, the following conditions have been established:

<u>Tank Filling</u>

Ventilation Rate	=	429 dscfm (ventilation due to inflow of 1300 tonnes/hr molten sulfur plus wind induced ventilation)
Sulfur Particle Concentration	=	0.66 grains/dscf
Time	=	344 hr/yr

<u>Tank Idle</u>

Ventilation Rate	=	30 dscfm (from Penzoil report)
Sulfur Particle Concentration	=	0.29 grains/dscf
Time	=	8760 - 344
	=	8416 hr/yr

Emissions were estimated for the single vent only as rim vents are sealed as shown in drawing sk-4.

<u>Tank Filling</u>

Emissions	=	429 cfm x 60 min/hr x .66 gr/cf x 1/7000 gr/lb
	=	2.43 lb/hr x 344 hr/yr x 1/2000
	=	0.42 tpy

<u>Tank Idle</u>

Emissions	=	30 dscfm x 60 min/hr x 0.29 gr/cf x 1/7000 gr/lb
	=	0.075 lb/hr x 8416 hr/yr x 1/2000
	=	0.32 tpy

<u>Total Emissions</u>

Hourly	=	0.075 to 2.43 lb/hr
Annual	=	0.74 tpy

SECTION V: SUPPLEMENTAL INFORMATION

1. Process Input/Production Rates

The sulfur pits receive molten sulfur from one of the three molten sulfur storage tanks and provide surge capacity between the storage tanks and the sulfuric acid plants. The maximum sulfur transfer rate to the pits is approximately 300 tonnes per hour depending upon the operating rates of the three sulfuric acid plants.

2/3. Controlled and Uncontrolled Emissions

Sulfur particle emissions from the three pits result from sulfur vapors that are displaced from the pits as sulfur is transferred to the pits and as a result of wind induced ventilation through the pit vents. Each pit is partitioned into two sections (attachment A) and each section has a single vent. As a result, each pit section is similar to a single vent molten sulfur storage tank. The ventilation rates of the pits have therefore been estimated on the same basis as molten sulfur storage tanks; with adjustments for sulfur transfer rates and vent diameters and heights.

The transfer of 300 tonnes per hour of sulfur into a pit will result in the displacement of approximately 100 dscfm of air (including wind induced ventilation). The wind induced ventilation rates of the pits have been estimated to be one-sixth the wind induced ventilation rates of the tanks (one-sixth of 30 dscfm or 5 dscfm). The factor of one-sixth was estimated considering differences in vent diameters (cross-sectional areas) - 3.5 to 6 inches vs. 10 inches for the tanks - and differences in vent heights - 6 to 8 feet vs. 25 to 30 feet for the tanks. Sulfur particle concentrations in the vented gas streams from the pits were assumed to be the same as from the tanks - 0.51 grains/dscf during sulfur transfer and 0.29 grains/dscf during wind induced ventilation.

<u>Pit Filling</u>

Controlled and Uncontrolled emissions are identical

Time = 446,667 tonnes per year at a transfer rate of 300 tonnes per hour

= 446,667 tpy/300 tph

= 1489 hr/yr

Emissions	=	100 cfm x 60 min/hr x 0.51 gr/dscf
		x 1/7000 gr/lb
	=	0.44 lb/hr
		x 1489 hr/yr x 1/2000 lb/ton
	=	0.33 tpy

<u>Wind Induced</u>

Time	=	8760 - 1489
	=	7271 hr/yr
Emissions	=	5 cfm x 60 min/hr x 0.29 gr/dscf
		x 1/7000 gr/lb
	=	0.012 lb/hr
		x 7271 hr/yr x 1/2000
	=	0.04 tpy

<u>Total Emissions</u>

Hourly	=	0.012 to 0.44 lb/hr
Annual	=	0.37 tpy

APPENDIX C

SO_2 PSD CLASS I INVENTORY

Appendix C-1 Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name / EU ID	Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Parameters Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	24-Hour (g/s)	3-Hour (lb/hr)	3-Hour (g/s)	PSD[a] Consuming (C) or Expanding (E)	Modeled in Class I
0570008	CARGILL FERTILIZER, INC.--RIVERVIEW																		
		MOLTEN SULFUR PITS 7, 8, AND 9	CRPITS	363	3083	b	b	b	b	b	b	b	b	0.13	0.016	0.13	0.02	C	Yes
		MOLTEN SULFUR TANKS 1, 2, AND 3/TRUCK LOADING	CRTKTL	363	3083	33	10.1	0.8	0.25	110	316	20.5	6.24	3.34	0.42	3.34	0.42	C	Yes
	4	NO. 7 SULFURIC ACID PLANT	CR7SAP	363	3083	150	45.7	7.5	2.29	152	340	41.5	12.64	466.70	58.8	533.30	67.20	C	Yes
	5	NO. 8 SULFURIC ACID PLANT	CR8SAP	363	3083	150	45.7	8.0	2.44	165	347	42.9	13.08	393.75	49.6	450.00	56.70	C	Yes
	6	NO. 9 SULFURIC ACID PLANT	CR9SAP	363	3083	150	45.7	9.0	2.74	155	341	44.8	13.66	495.83	62.5	566.67	71.40	C	Yes
	100	NO. 5 ROCK MILL	CR5RKML	363	3083	91	27.7	2.5	0.76	166	348	122.6	37.36	6.59	0.83	6.59	0.83	C	Yes
	106	NO. 7 ROCK MILL	CR7RKML	363	3083	91	27.7	3.0	0.91	165	347	47.2	14.37	6.59	0.83	6.59	0.83	C	Yes
	101	NO. 9 ROCK MILL	CR9RKML	363	3083	91	27.7	2.5	0.76	162	345	106.5	32.46	6.59	0.83	6.59	0.83	C	Yes
	7	NO. 6 GRANULATION PLANT DRYER STACK	CR6GRAN	363	3083	162	49.4	8.5	2.59	164	346	58.7	17.89	40.57	5.1	40.57	5.11	C	Yes
		AFI PLANT NO. 1	CRAFI1	363	3083	136	41.5	6.0	1.83	150	339	64.5	19.66	25.36	3.2	25.36	3.20	C	Yes
		AFI PLANT NO. 2	CRAFI2	363	3083	155	47.2	6.0	1.83	150	339	64.5	19.66	38.04	4.8	38.04	4.79	C	Yes
	55	NO. 5 GRANULATION PLANT-DRYER/COOLER STACK	CR5GRAN	363	3083	133	40.5	7.0	2.13	110	316	67.6	20.59	12.58	1.585	12.58	1.59	C	Yes
	22,23,2‹	NOS. 3 AND 4 MAP PLANTS, SOUTH COOLER	CR34MAP	363	3083	133	40.5	7.0	2.13	142	334	71.5	21.78	0.0030	0.00038	0.0030	0.00038	C	Yes
		Ammonia Plant (Expanding Source)	AMMPLTB	363	3083	60	18.3	8.3	2.5	600	589	22.7	6.93	-32.80	-4.13	-32.80	-4.13	E	Yes
		Sodium Silicofluoride/Sodium Fluoride Plant (Expanding Source)	SSFSFPB	363	3083	28	8.5	2.5	0.76	95	308	11.6	3.55	-0.20	-0.03	-0.20	-0.03	E	Yes
		No. 10 KVS Mill (Expanding Source)	10KVSMB	363	3083	87	26.5	1.7	0.52	118	321	59.8	18.24	-0.020	-0.0025	-0.020	-0.0025	E	Yes
		No. 12 KVS Mill (Expanding Source)	12KVSMB	363	3083	71	21.6	1.6	0.49	135	330	68.5	20.87	-0.040	-0.0050	-0.040	-0.0050	E	Yes
		No. 7 Oil-Fired Concentrator (Expanding Source)	7OFCONB	363	3083	78	23.8	6.0	1.83	165	347	17.2	5.24	-41.40	-5.22	-41.40	-5.22	E	Yes
		No. 8 Oil-Fired Concentrator (Expanding Source)	8OFCONB	363	3083	78	23.8	6.0	1.83	159	344	16.7	5.10	-39.70	-5.00	-39.70	-5.00	E	Yes
		GTSP Plant (Expanding Source)	GTSPAPB	363	3083	126	38.4	8.0	2.44	129	327	34.9	10.65	-71.40	-9.00	-71.40	-9.00	E	Yes
		No. 5 and No. 9 Mills Bag Filter (Expanding Source)	RKML59B	363	3083	66	20.1	2.0	0.61	115	319	58.3	17.75	-0.010	-0.0013	-0.010	-0.0013	E	Yes
		No. 3 Continuous Triple Dryer (Expanding Source)	3CONTDB	363	3083	68	20.7	3.5	1.07	115	319	45.8	13.96	-22.80	-2.87	-22.80	-2.87	E	Yes
		No. 4 Continuous Triple Dryer (Expanding Source)	4CONTDB	363	3083	68	20.7	3.5	1.07	134	330	61.8	18.85	-23.20	-2.92	-23.20	-2.92	E	Yes
		Molten Sulfur Handling- Pits 7 & 8 (Expanding Source)	MSPTSB	363	3083	c	c	c	c	c	c	c	c	-0.080	-0.010	-0.080	-0.010	E	Yes
		Molten Sulfur Handling- Pits 4,5, & 6 (Expanding Source)	PTS456B	363	3083	d	d	d	d	d	d	d	d	-0.13	-0.02	-0.13	-0.02	E	Yes
		Molten Sulfur Handling- Tanks (Expanding Source)	MSTKTLB	363	3083	e	e	e	e	e	e	e	e	-2.12	-0.27	-2.12	-0.27	E	Yes
		No. 4 Sulfuric Acid Plant (Expanding Source)	NO4SAPB	363	3083	80	24.4	4.7	1.43	194	363	20.4	6.23	-282.00	-35.53	-282.00	-35.53	E	Yes
		No. 5 Sulfuric Acid Plant (Expanding Source)	NO5SAPB	363	3083	74	22.6	5.3	1.62	189	360	25.3	7.72	-480.00	-60.48	-480.00	-60.48	E	Yes
		No. 6 Sulfuric Acid Plant (Expanding Source)	NO6SAPB	363	3083	72	21.9	5.9	1.80	189	360	31.3	9.53	-688.00	-86.69	-688.00	-86.69	E	Yes
		No. 7 Sulfuric Acid Plant (Expanding Source)	NO7SAPB	363	3083	92	28.0	9.4	2.87	183	357	22.3	6.80	-1,503.00	-189.38	-1,503.00	-189.38	E	Yes
		No. 8 Sulfuric Acid Plant (Expanding Source)	NO8SAPB	363	3083	96	29.3	10.7	3.26	174	352	24.2	7.37	-1,679.00	-211.55	-1,679.00	-211.55	E	Yes
0571242	NATIONAL GYPSUM - APOLLO BEACH																		
	1	Imp Mill #1	NATGYP1	363.3	3075.6	98	29.9	3.8	1.14	350	450	28.2	8.6	5.28	0.67	5.28	0.67	C	Yes
		Imp Mill #2	NATGYP2	363.3	3075.6	98	29.9	3.8	1.14	350	450	28.2	8.6	5.28	0.67	5.28	0.67	C	Yes
		Imp Mill #3	NATGYP3	363.3	3075.6	98	29.9	3.8	1.14	350	450	28.2	8.6	5.28	0.67	5.28	0.67	C	Yes
		Imp Mill #4	NATGYP4	363.3	3075.6	98	29.9	3.8	1.14	350	450	28.2	8.6	5.28	0.67	5.28	0.67	C	Yes
		Kiln	NATGYP5	363.3	3075.6	54	16.5	13.4	4.08	384	469	58.2	17.7	33.22	4.19	33.22	4.19	C	Yes
	BIG BEND TRANSFER CO. L.L.C.																		
		Melter/ Molten Scrubber stack	BBTCCMBO	361.1	3076.2	95	29.0	2.2	0.66	97	309	57.0	17.4	0.014	0.002	0.01	0.00	C	Yes
		Package Boiler	BBTCPKBL	361.1	3076.2	106	32.3	4.0	1.22	350	450	29.7	9.1	3.56	0.45	3.56	0.45	C	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	EU ID	Facility Name / Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	Emission Rate 24-Hour (g/s)	Emission Rate 3-Hour (lb/hr)	Emission Rate 3-Hour (g/s)	PSD [a] Consuming (C) or Expanding (E)	Modeled in Class I
0570039		TECO - BIG BEND																	
	4	UNIT #4 BOILER W/ESP	TECOBB4	361.9	3075.0	490	149.4	24.0	7.32	127	326	78.3	23.9	3,576	451	3576.00	450.58	C	Yes
	1,2	Steam Generators 1 & 2 Baseline	TCBB12B	361.9	3075.0	490	149.4	24.0	7.32	300	422	94.0	28.7	-19333	-2436	-19333	-2436	E	Yes
	3	Steam Generator 3 Baseline	TCBB3B	361.9	3075.0	490	149.4	24.0	7.32	293	418	47.0	14.3	-9667	-1218	-9667	-1218	E	Yes
0570286		TAMPA BAY SHIPBUILDING & REPAIR CO.																	
	5	DIESEL COMPRESSORS	TBSHIP5	358.0	3089.0	10	3.0	0.5	0.15	350	450	148.5	45.3	2.74	0.35	2.74	0.35	C	Yes
0570127		MCKAY BAY REFUSE-TO-ENERGY FACILITY																	
	103	MWC & Aux Burner No 1	MCKY103	360.2	3092.2	201	61.3	4.2	1.28	289	416	73.3	22.3	40.87	5.15	40.87	5.15	C	Yes
	104	MWC & Aux Burner No. 2	MCKY104	360.2	3092.2	201	61.3	4.2	1.28	289	416	73.3	22.3	40.87	5.15	40.87	5.15	C	Yes
	105	MWC & Aux Burner No. 3	MCKY105	360.2	3092.2	201	61.3	4.2	1.28	289	416	73.3	22.3	40.87	5.15	40.87	5.15	C	Yes
	106	MWC & Aux Burner No. 4	MCKY106	360.2	3092.2	201	61.3	4.2	1.28	289	416	73.3	22.3	40.87	5.15	40.87	5.15	C	Yes
0570261		HILLSBOROUGH CTY. RESOURCE RECOVERY FAC.																	
	1	MWC & Aux Burner #1	HILLSRC1	368.2	3092.7	220	67.1	5.1	1.55	290	416	72.5	22.1	58.67	7.39	58.67	7.39	C	Yes
	2	MWC & Aux Burner #2	HILLSRC2	368.2	3092.7	220	67.1	5.1	1.55	290	416	72.5	22.1	58.67	7.39	58.67	7.39	C	Yes
	3	MWC & Aux Burner #3	HILLSRC3	368.2	3092.7	220	67.1	5.1	1.55	290	416	72.5	22.1	58.67	7.39	58.67	7.39	C	Yes
0570006		YUENGLING BREWING CO.																	
	1	2 Natural gas boilers	YNGBREW1	362.0	3103.2	90	27.4	6.5	1.98	275	408	7.0	2.1	9.00	1.13	9.00	1.13	C	Yes
1030117		PINELLAS CO. RESOURCE RECOVERY FACILITY																	
	1	Waste Combustor & Aux burners-Unit #1	PINRCY1	335.2	3084.1	161	49.1	7.8	2.38	449	505	88.0	26.8	170.00	21.4	170.00	21.42	C	Yes
	3	Waste Combustor & Aux burners-Unit #2	PINRCY3	335.2	3084.1	165	50.3	9.0	2.74	450	505	90.0	27.4	525.00	66.2	525.00	66.15	C	Yes
1050059		IMC PHOSPHATES COMPANY - NEW WALES																	
	2	SAP No. 1	IMCWAL2	396.7	3079.4	200	61.0	8.5	2.59	170	350	50.0	15.2	483.30	60.90	483.30	60.90	C	Yes
	3	SAP No. 2	IMCWAL3	396.7	3079.4	200	61.0	8.5	2.59	170	350	50.0	15.2	483.30	60.90	483.30	60.90	C	Yes
	4	SAP No. 3	IMCWAL4	396.7	3079.4	200	61.0	8.5	2.59	170	350	50.0	15.2	483.30	60.90	483.30	60.90	C	Yes
	9	DAP Plant No. 1	IMCWAL9	396.7	3079.4	133	40.5	7.0	2.13	105	314	49.0	14.9	74.60	9.40	74.60	9.40	C	Yes
	13	Auxiliary Boiler	IMCWAL13	396.7	3079.4	85	25.9	3.0	0.91	555	564	193.3	58.9	569.00	71.69	569.00	71.69	C	Yes
	27	AFI Plant	IMCWAL27	396.7	3079.4	172	52.4	8.0	2.44	130	328	66.3	20.2	18.30	2.31	18.30	2.31	C	Yes
	36	Kilns, Dryer, Blending Op.	IMCWAL36	396.7	3079.4	172	52.4	4.5	1.37	105	314	52.0	15.8	192.00	24.19	192.00	24.19	C	Yes
	42	SAP No. 4	IMCWAL42	396.7	3079.4	199	60.7	8.5	2.59	170	350	50.0	15.2	483.30	60.90	483.30	60.90	C	Yes
	44	SAP No. 5	IMCWAL44	396.7	3079.4	199	60.7	8.5	2.59	170	350	50.0	15.2	483.30	60.90	483.30	60.90	C	Yes
	45	DAP Plant No 2 - East Train	IMCWAL45	396.7	3079.4	171	52.1	6.0	1.83	110	316	58.0	17.7	22.00	2.77	22.00	2.77	C	Yes
	46	DAP Plant No 2 - West Train	IMCWAL46	396.7	3079.4	171	52.1	6.0	1.83	110	316	58.0	17.7	22.00	2.77	22.00	2.77	C	Yes
	60	Molten Storage Tank	IMCWAL60	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.50	0.06	0.50	0.06	C	Yes
	62	Molten Storage Tank	IMCWAL62	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.50	0.06	0.50	0.06	C	Yes
	63	Unloading Sulfur Pit	IMCWAL63	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.30	0.04	0.30	0.04	C	Yes
	64	Unloading Sulfur Pit	IMCWAL64	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.10	0.01	0.10	0.01	C	Yes
	65	Unloading Sulfur Pit	IMCWAL65	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.30	0.04	0.30	0.04	C	Yes
	66	Sulfur Transfer Pit	IMCWAL66	396.7	3079.4	40	12.2	2.0	0.61	240	389	0.4	0.1	0.10	0.01	0.10	0.01	C	Yes
	68	Unloading Sulfur Pit	IMCWAL68	396.7	3079.4	25	7.6	0.1	0.03	90	305	0.1	0.03 [a]	0.30	0.04	0.30	0.04	C	Yes
	69	Unloading Sulfur Pit	IMCWAL69	396.7	3079.4	25	7.6	0.1	0.03	90	305	0.1	0.03 [a]	0.10	0.01	0.10	0.01	C	Yes
	74	Multifos C Kiln	IMCWAL74	396.7	3079.4	172	52.4	4.5	1.37	105	314	70.2	21.4	8.70	1.10	8.70	1.10	C	Yes
	78	GRANULAR MAP PLANT	IMCWAL78	396.7	3079.4	133	40.5	6.0	1.83	145	336	109.6	33.4	13.72	1.73	13.72	1.73	C	Yes
		Expanding Source	IMCWAL0	396.7	3079.4	69	21.0	7.0	2.13	165	347	61.0	18.6	-272.0	-34.27	-271.98	-34.27	E	Yes
		Expanding Source	IMCWAL1	396.7	3079.4	200	61.0	8.5	2.59	170	350	42.9	13.1	-1158.7	-146.00	-1158.73	-146.00	E	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name / EU ID Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Parameters Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	24-Hour (g/s)	3-Hour (lb/hr)	3-Hour (g/s)	PSD[a] Consuming (C) or Expanding (E)	Modeled in Class I
1050047	AGRIFOS, L.L.C. - NICHOLS	(formerly Mobil Mining & Minerals Nichols)																
	Expanding Source	AGRINK3	398.7	3085.3	93	28.4	3.6	1.10	152	340	63.1	19.2	-110.32	-13.90	-110.32	-13.90	E	Yes
	Expanding Source	AGRINK4	398.7	3085.3	13	4.0	2.6	0.79	480	522	5.9	1.8	-6.90	-0.87	-6.90	-0.87	E	Yes
1050057	IMC PHOSPHATES COMPANY - NICHOLS	(formerly IMC Agrico/Conserve)																
	5 SAP NO. 1 PSD	AGRNK5	398.4	3084.2	150	45.7	7.5	2.29	170	350	33.0	10.1	416.80	52.52	416.80	52.52	C	Yes
	Expanding Source	AGRNK1	398.4	3084.2	100	30.5	5.9	1.80	95	308	62.0	18.9	-120.5	-15.2	-120.50	-15.18	E	Yes
	Expanding Source	AGRNK2	398.4	3084.2	80	24.4	5.0	1.52	151	339	42.3	12.9	-30.8	-3.88	-30.80	-3.88	E	Yes
1050233	TECO - POLK POWER STATION																	
	1 Combined cycle CT	TECOPK1	402.5	3067.4	150	45.7	19.0	5.79	340	444	75.8	23.1	518.00	65.27	518.00	65.27	C	Yes
	3 120 MMBtu/HR AuxBlr	TECOPK3	402.5	3067.4	75	22.9	3.7	1.13	375	464	50.0	15.2	96.00	12.10	96.00	12.10	C	Yes
	4 Sulfuric Acid Plant	TECOPK4	402.5	3067.4	199	60.7	2.5	0.76	180	355	60.0	18.3	35.60	4.49	35.60	4.49	C	Yes
	9 Simple Cycle CT	TECOPK9	402.5	3067.4	114	34.7	29.0	8.84	1117	876	60.2	18.3	9.20	1.16	9.20	1.16	C	Yes
	10 Simple Cycle CT	TECOPK10	402.5	3067.4	114	34.7	29.0	8.84	1117	876	60.2	18.3	9.20	1.16	9.20	1.16	C	Yes
1050048	CARGILL MULBERRY (FORMERLY MULBERRY PHOSPHATES, INC.)																	
	2 SAP 2	MULPHS2	406.8	3085.1	200	61.0	7.0	2.13	200	366	32.0	9.8	283.33	35.70	283.33	35.70	C	Yes
	1 Expanding Source	MULPHSX	406.8	3085.1	168	51.2	7.0	2.13	181	356	37.5	11.4	-2,044.40	-258	-2044.40	-257.59	E	Yes
1050052	CF INDUSTRIES, INC. - BARTOW	(Bonnie Mine Road)																
	6 SAP NO.6	CFIBAR6	408.3	3082.5	206	62.8	7.0	2.13	140	333	21.0	6.4	400.00	50.40	400.00	50.40	C	Yes
	21 BOILER NO. 1	CFIBAR21	408.3	3082.5	36	11.0	2.5	0.76	600	589	44.0	13.4	16.80	2.12	16.80	2.12	C	Yes
	1 Expanding Source	CFIBARX1	408.3	3082.5	100	30.5	4.5	1.37	170	350	40.0	12.2	-483	-61	-483	-61	E	Yes
	2 Expanding Source	CFIBARX2	408.3	3082.5	100	30.5	5.5	1.68	170	350	34.0	10.4	-875	-110	-875	-110	E	Yes
	3 Expanding Source	CFIBARX3	408.3	3082.5	100	30.5	9.0	2.74	196	364	14.0	4.3	-850	-107	-850	-107	E	Yes
	4 Expanding Source	CFIBARX4	408.3	3082.5	100	30.5	7.0	2.13	185	358	26.0	7.9	-1,388	-175	-1388	-175	E	Yes
	5 Expanding Source	CFIBARX5	408.3	3082.5	206	62.8	7.0	2.13	185	358	35.0	10.7	-1,800	-227	-1800	-227	E	Yes
	6 Expanding Source	CFIBARX6	408.3	3082.5	206	62.8	7.0	2.13	187	359	34.0	10.4	-1,350	-170	-1350	-170	E	Yes
1050055	IMC PHOSPHATES COMPANY - SOUTH PIERCE																	
	4 SAP No. 10	IMCSPR4	407.5	3071.4	144	43.9	9.0	2.74	170	350	41.1	12.5	450.0	56.70	450.00	56.70	C	Yes
	5 SAP No. 11	IMCSPR5	407.5	3071.4	144	43.9	9.0	2.74	170	350	41.1	12.5	450.0	56.70	450.00	56.70	C	Yes
	Combined Expanding Sources	IMCPIER6	407.5	3071.4	144	43.9	5.2	1.58	170	350	86.6	26.4	-600.0	-75.6	-600.00	-75.60	E	Yes
1050053	CARGILL GREEN BAY (FOMERLY FARMLAND HYDRO, L.P. - GREEN BAY)																	
	3 SAP #3	FARM3	409.5	3080.1	100	30.5	7.5	2.29	170	350	28.0	8.5	350.00	44.10	350.00	44.10	C	Yes
	4 SAP #4	FARM4	409.5	3080.1	100	30.5	7.5	2.29	180	355	39.6	12.1	350.00	44.10	350.00	44.10	C	Yes
	5 SAP #5	FARM5	409.5	3080.1	150	45.7	8.0	2.44	180	355	44.1	13.4	466.70	58.80	466.70	58.80	C	Yes
	7 South AP Plant--Stack A	FARM7	409.5	3080.1	130	39.5	8.0	2.44	97	309	49.7	15.2	3.16	0.40	3.16	0.40	C	Yes
	38 NORTH MAP/DAP PLANT--MAIN STACK	FARM29	409.5	3080.1	128	39.0	8.0	2.44	113	318	50.7	15.5	2.63	0.33	2.63	0.33	C	Yes
	29 MAP/DAP PLANT	FARM29	409.5	3080.1	129	39.3	7.5	2.29	108	315	43.0	13.1	0.03	0.004	0.03	0.00	C	Yes
	34 MOLTEN SULFUR PIT	FARM34	409.5	3080.1	10	3.0	0.8	0.24	200	366	54.0	16.5	0.70	0.09	0.70	0.09	C	Yes
	38 No. 6 SAP	FARM38	409.5	3080.1	150	45.7	9.0	2.74	180	355	34.8	10.6	401.00	50.53	401.00	50.53	C	Yes
	SAP # 1 (Expanding Source)	FRMSAP1	409.5	3080.1	100	30.5	7.0	2.13	169	349	18.9	5.8	-493	-62.10	-493	-62.10	E	Yes
	SAP # 2 (Expanding Source)	FRMSAP2	409.5	3080.1	100	30.5	7.0	2.13	171	350	18.8	5.7	-533	-67.13	-533	-67.13	E	Yes
	SAP # 3 (Expanding Source)	FRMSAP3	409.5	3080.1	100	30.5	7.5	2.29	162	345	30.3	9.2	-653	-82.23	-653	-82.23	E	Yes
	SAP # 4 (Expanding Source)	FRMSAP4	409.5	3080.1	100	30.5	7.5	2.29	124	324	22.7	6.9	-542	-68.34	-542	-68.34	E	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	EU ID	Facility Name / Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Height (ft)	Stack Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	Emission Rate 24-Hour (g/s)	Emission Rate 3-Hour (lb/hr)	Emission Rate 3-Hour (g/s)	PSD [a] Consuming (C) or Expanding (E)	Modeled in Class I
1050046		CARGILL FERTILIZER - BARTOW																	
	1	NO.3 FERTILIZER PLANT	CARBAR1	409.8	3086.6	141	43.0	7.5	2.29	160	344	79.0	24.1	76.90	9.69	76.90	9.69	C	Yes
	12	No. 4 SAP	CARBAR12	409.8	3086.6	200	61.0	6.8	2.07	180	355	61.0	18.6	433.30	54.60	433.30	54.60	C	Yes
	32	No. 6 SAP	CARBAR32	409.8	3086.6	200	61.0	6.8	2.07	180	355	61.0	18.6	433.30	54.60	433.30	54.60	C	Yes
	33	No. 5 SAP	CARBAR33	409.8	3086.6	200	61.0	6.8	2.07	180	355	61.0	18.6	433.30	54.60	433.30	54.60	C	Yes
	51	Boiler	CARBAR51	409.8	3086.6	31	9.4	3.5	1.07	410	483	20.0	6.1	165.17	20.81	165.17	20.81	C	Yes
0490015		HARDEE POWER STATION																	
	1	CT 1A W\HRSG	HARDE1	404.8	3057.4	90	27.4	14.5	4.42	236	386	77.5	23.6	734.40	92.53	734.40	92.53	C	Yes
	2	CT 2A W\HRSG	HARDE2	404.8	3057.4	90	27.4	14.5	4.42	245	391	75.8	23.1	734.40	92.53	734.40	92.53	C	Yes
	3	Simple cycle CT 2A	HARDE3	404.8	3057.4	75	22.9	17.9	5.46	986	803	94.3	28.7	734.40	92.53	734.40	92.53	C	Yes
	5	Unit 2B - 75 MW gas turbine	HARDE5	404.8	3057.4	85	25.9	14.8	4.51	999	810	142.0	43.3	5.30	0.67	5.30	0.67	C	Yes
1050003		LAKELAND ELECTRIC, LARSEN POWER PLANT																	
	8	Combined Cycle CT	LARS8	408.9	3102.5	155	47.2	16.0	4.88	481	523	85.7	26.1	211.40	26.64	211.40	26.64	C	Yes
1050004		LAKELAND ELECTRIC, MCINTOSH POWER PLANT																	
	6	McIntosh Unit 3	MCINT6	409.0	3106.2	250	76.2	18.0	5.49	167	348	82.6	25.2	4,368.00	550.37	4368.00	550.37	C	Yes
	28	CT UNIT 5	MCINT28	409.0	3106.2	85	25.9	28.0	8.53	1095	864	82.7	25.2	126.70	15.96	126.70	15.96	C	Yes
1050051		U.S. AGRI-CHEMICALS - FT. MEADE																	
	16	SAP #1	USAGFM16	416.0	3069.0	175	53.3	8.5	2.59	180	355	32	9.8	500.00	63.00	500.00	63.00	C	Yes
	17	SAP #2	USAGFM17	416.0	3069.0	175	53.3	8.5	2.59	180	355	32	9.8	500.00	63.00	500.00	63.00	C	Yes
	28	MOLTEN SULFUR TANK	USAGFM28	416.0	3069.0	6	1.8	0.3	0.09	270	405	344	104.9	0.49	0.06	0.49	0.06	C	Yes
	29	MOLTEN SULFUR TANK	USAGFM29	416.0	3069.0	6	1.8	0.3	0.09	260	400	157	47.9	0.23	0.03	0.23	0.03	C	Yes
		Expanding Source	USAGFM0	416.0	3069.0	95	29	9.9	3.02	106	314	23	6.9	-625.4	-78.80	-625.40	-78.80	E	Yes
		Expanding Source	USAGFM1	416.0	3069.0	93	28	5.0	1.52	134	330	58	17.6	-145.0	-18.27	-145.00	-18.27	E	Yes
1050023		CUTRALE CITRUS JUICES USA,INC																	
	3	PEEL DRYER	CUTR3	421.6	3103.7	100	30.5	3.2	0.98	161	345	49.0	14.9	186.00	23.44	186.00	23.44	C	Yes
	8	COGEN #1	CUTR8	421.6	3103.7	40	12.2	4.0	1.22	323	435	60.0	18.3	170.80	21.52	170.80	21.52	C	Yes
	9	COGEN #2	CUTR9	421.6	3103.7	40	12.2	4.0	1.22	330	439	66.0	20.1	26.00	3.28	26.00	3.28	C	Yes

Appendix C-1 . Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name	EU ID	Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Parameters Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	24-Hour (g/s)	3-Hour (lb/hr)	3-Hour (g/s)	PSD [a] Consuming (C) or Expanding (E)	Modeled in Class I
1050221	Auburndale Power Partners, LP																			
			Proposed CT	LD7595A	420.8	3103.3	50	15	22.0	6.71	1,040	833	68	20.8	53.6	6.75	53.60	6.75	C	Yes
		1	Existing CT	CALEXT1	420.8	3103.3	160	49	18.0	5.49	280	411	58	17.7	70.0	8.82	70.00	8.82	C	Yes
			Proposed CT, Osprey	CALOSP1	420.8	3103.3	135	41	19.0	5.79	200	366	60	18.3	6.5	0.82	6.50	0.82	C	Yes
			Proposed CT, Osprey	CALOSP2	420.8	3103.3	135	41	19.0	5.79	200	366	60	18.3	6.5	0.82	6.50	0.82	C	Yes
1050096	Florida Distillers - Auburndale																			
		3	Boiler	FDIST31	421.4	3102.9	45	14	4.0	1 22	350	450	5	1.5	0.1	0.008	0.060	0.008	C	Yes
0970014	FPC - Intercession City Plant																			
		1-6	Combined CT Units 1-6	INTCP16	446.3	3126.0	20	6	14.6	4.46	760	678	175	53.3	2,185.2	275.3	2185.20	275.34	C	Yes
		7-10	Combined CTs 7-10	INTCP710	446.3	3126.0	75	23	19.0	5.79	1034	830	139	42.5	1,295.0	163.2	1295.00	163.17	C	Yes
		11	CT 11	INTCP11	446.3	3126.0	75	23	19.0	5.79	1034	830	139	42.5	407.0	51 3	407.00	51 28	C	Yes
	IPS - Shady Hills																			
			CT No. 1-3	IPSPASCO	347.2	3138.8	60	18.3	22	6.71	1076	853	122.4	37.3	304.5	38.367	304.50	38.37	C	Yes
	Estech/Swift Polk																			
				ESTDRY1	411.5	3,074.2	60.0	18.3	9.7	2.95	151	339	27.8	8.47	-190.0	-23.94	-190.00	-23.94	E	Yes
				ESTDRY2	411.5	3,074.2	61.5	18.8	9.7	2.95	152	340	16.6	5.06	-181.0	-22.8	-180.95	-22.80	E	Yes
				ESTSAP	411.5	3,074.2	101	30.8	7 0	2.13	185	358	12.8	3.90	-737.1	-92.87	-737.06	-92.87	E	Yes
40TPA270021	FL Crushed Stone Kiln 1																			
				FCS1	360.0	3,162.5	320	97.5	21.3	6.48	323	435	54.6	16.6	806.3	101.6	806.35	101.60	C	Yes
	FPC Polk County Site																			
							113	34.4	13.5	4.115	260	400	133.0	40.5	98.0	12.35	98.02	12.35	C	Yes
							113	34.4	13.5	4.1	260	400	133.0	40.5	98.0	12.35	98.02	12.35	C	Yes
				FPCPKC2	414.3	3,073.9	113	34.4	13.5	4.1	260	400	133.0	40.5	196.0	24.7	196.03	24.70	C	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name / EU ID Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Parameters Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	24-Hour (g/s)	3-Hour (lb/hr)	3-Hour (g/s)	PSD[a] Consuming (C) or Expanding (E)	Modeled in Class I
NA	General Portland Cement #4																	
		GPCEM4B	358.0	3,090.6	118	36.0	9.0	2.74	450	505	57.8	17.6	-499.9	-62.99	-499.92	-62.99	E	Yes
NA	General Portland Cement #5																	
		GPCEM5B	358.0	3,090.6	149	45.4	12.5	3.81	430	494	19.0	5.80	-550.0	-69.3	-550.00	-69.30	E	Yes
NA	IMC-Agrico Pierce																	
		IAPRC12	404.1	3,079.0	80.0	24.4	5.0	1.52	151	339	42.5	12.9	-193.0	-24.3	-193.02	-24.32	E	Yes
		IAPRC34	404.1	3,079.0	80.0	24.4	8.0	2.43	151	339	61.7	18.8	-182.5	-23.0	-182.54	-23.00	E	Yes
40TPA530080	Imperial Phosphates (Brewer)																	
		IMPRLX	404.8	3,069.5	90	27.4	7.5	2.29	151	339	50.0	15.3	-152.9	-19.3	-152.86	-19.26	E	Yes
40TPA530060	Mobil Electrophos Division																	
		MOBELE1	405.6	3,079.4	24.0	7.3	3.0	0.91	376	464	10.6	3.2	-51.8	-6.53	-51.83	-6.53	E	Yes
		MOBELE2	405.6	3,079.4	20.0	6.1	3.0	0.91	376	464	25.3	7.7	-79.8	-10.05	-79.76	-10.05	E	Yes
		MOBELE3	405.6	3,079.4	60.0	18.3	6.0	1.83	170	350	22.3	6.8	-173.1	-21.81	-173.10	-21.81	E	Yes
		MOBELE4	405.6	3,079.4	84.0	25.6	7.0	2.13	91	306	22.9	7.0	-56.4	-7.11	-56.43	-7.11	E	Yes
		MOBELE5	405.6	3,079.4	60.0	18.3	2.3	0.7	120	322	75.0	22.9	-25.2	-3.17	-25.16	-3.17	E	Yes
		MOBELE6	405.6	3,079.4	96.0	29.3	7.0	2.13	106	314	28.0	8.5	-375.0	-47.25	-375.00	-47.25	E	Yes
40PNL520042	Stauffer (Shutdown)																	
		STAUFR1	325.6	3,116.7	24.0	7.3	3.0	0.91	376	464	10.6	3.2	-38.6	-4.86	-38.57	-4.86	E	Yes
		STAUFR2	325.6	3,116.7	60.0	18.3	2.3	0.7	120	322	75.0	22.9	-11.9	-1.50	-11.90	-1.50	E	Yes
		STAUFR3	325.6	3,116.7	161	49.0	3.9	1.2	143	335	11.8	3.6	-404.2	-50.93	-404.21	-50.93	E	Yes
		STAUFR4	325.6	3,116.7	84.0	25.6	7.0	2.13	91	306	22.9	7.0	-58.4	-7.36	-58.41	-7.36	E	Yes
		STAUFR5	325.6	3,116.7	84.0	25.6	3.0	0.91	120	322	22.9	7.0	-3.6	-0.45	-3.57	-0.45	E	Yes
40TPA530050	US Agri-Chem Bartow																	
		UAGBAR1	413.2	3,086.3	51.8	15.8	6.0	1.83	138	332	32.8	10.0	-27.1	-3.41	-27.06	-3.41	E	Yes
		UAGBAR2	413.2	3,086.3	95.0	29.0	7.0	2.12	89	305	24.6	7.5	-333.3	-42.0	-333.33	-42.00	E	Yes
40TPA270024	Asphalt Pavers 3																	
		ASPHALT3	359.9	3,162.4	40.0	12.2	4.5	1.37	219	377	34.7	10.6	17.9	2.25	17.86	2.25	C	Yes
40TPA270015	Asphalt Pavers 4																	
		ASPHALT4	361.4	3,168.4	28.0	8.5	3.5	1.08	184	357	35.9	11.0	17.9	2.25	17.86	2.25	C	Yes
NA	Borden Hillsborough																	
		BORDHIL	394.6	3,069.6	100	30.5	6.0	1.82	160	344	48.5	14.8	-51.4	-6.48	-51.43	-6.48	E	Yes
NA	Borden Polk																	
		BORDPLK	414.5	3,109.0	56.0	17.1	7.7	2.34	140	333	27.1	8.3	-42.0	-5.29	-41.98	-5.29	E	Yes
40TPA510066	Couch Const-Zephyrhills (Asphalt)																	
		COUCHZEP	390.3	3,129.4	20.0	6.1	4.5	1.38	300	422	68.9	21.0	28.1	3.54	28.10	3.54	C	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name / EU ID Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Height (ft)	Stack Height (m)	Stack Diameter (ft)	Stack Diameter (m)	Stack Temperature (F)	Stack Temperature (K)	Stack Velocity (ft/s)	Stack Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	Emission Rate 24-Hour (g/s)	Emission Rate 3-Hour (lb/hr)	Emission Rate 3-Hour (g/s)	PSD[a] Consuming (C) or Expanding (E)	Modeled in Class I
40TPA510041	Couch Const-Odessa (Asphalt)																	
		COUCHODE	340.7	3,119.5	30.0	9.1	4.6	1.4	325	436	73.2	22.3	57.5	7.25	57.54	7.25	C	Yes
	Dris Paving (Asphalt)																	
		DRIS	340.6	3,119.2	40.0	12.2	10.0	3.05	151	339	21.2	6.5	1.83	0.23	1.83	0.23	C	Yes
NA	Dolime																	
	Dryers	DOLIMEDR	404.8	3,069.5	90.0	27.4	5.0	1.52	140	333	67.8	20.7	-45.1	-5.68	-45.08	-5.68	E	Yes
	Boilers	DOLIMEBL	404.8	3,069.5	90.0	27.4	2.0	0.61	430	494	23.8	7.3	-35.9	-4.52	-35.87	-4.52	E	Yes
NA	Evans Packing																	
		EVANS	383.3	3,135.8	40.4	12.3	1.3	0.4	379	466	30.2	9.2	1.59	0.20	1.59	0.20	C	Yes
40TPA270017	E R Jahna (Lime Dryer)																	
		ERJAHNA	386.7	3,155.8	35.0	10.7	6.0	1.83	129	327	29.5	9.0	6.51	0.82	6.51	0.82	C	Yes
NA	FDOC Boiler #3																	
		FDOC	382.2	3,166.1	30.0	9.1	2.0	0.61	401	478	15.0	4.6	23.7	2.99	23.73	2.99	C	Yes
40TPA270010	FL Mining and Materials Kiln																	
		FMM	356.2	3,169.9	105	32.0	14.0	4.27	250	394	32.5	9.9	11.5	1.45	11.51	1.45	C	Yes
40TPA090004	FPC - Crystal River																	
	Crystal River 1	CRYRIV1B	334.2	3,204.5	499	152.0	15.0	4.57	300	422	138.1	42.1	-2492	-314.00	-2492.06	-314.00	E	Yes
	Crystal River 2	CRYRIV2B	334.2	3,204.5	502	153.0	16.0	4.88	300	422	138.1	42.1	-14754	-1859.00	-14753.97	-1859.00	E	Yes
	Crystal River 4				585	178.2	25.5	7.77	253	396	68.9	21.0	8006	1008.80	8006.35	1008.80	C	Yes
	Crystal River 5				585	178.2	25.5	7.77	253	396	68.9	21.0	8006	1008.80	8006.35	1008.80	C	Yes
		CRYRIV45	334.2	3,204.5	585	178.2	25.5	7.77	253	396	68.9	21.0	16013	2017.60	16012.70	2017.60	C	Yes
30ORL640028	FPC Debary																	
		DEBARY	467.5	3,197.2	50.0	15.2	13.8	4.21	1016	820	184.4	56.2	3702	466.40	3701.59	466.40	C	Yes
NA	Hospital Corp of America																	
	Boiler #1				36.0	11.0	1.0	0.31	500	533	13.1	4.0	0.63	0.08	0.63	0.08	C	Yes
	Boiler #2				36.0	11.0	1.0	0.31	500	533	13.1	4.0	0.63	0.08	0.63	0.08	C	Yes
		HCOA12	333.4	3,141.0	36.0	11.0	1.0	0.31	500	533	13.1	4.0	1.27	0.16	1.27	0.16	C	Yes
NA	Kissimmee Utilities																	
		KISSUT	447.7	3,127.9	40.0	12.2	10.0	3.05	718	654	95.5	29.1	233	29.40	233.33	29.40	C	Yes
30ORL490001	Kissimmee Utilites Exist																	
		KISSEX	460.1	3,129.3	60.0	18.3	12.0	3.66	300	422	124.7	38.0	255	32.10	254.76	32.10	C	Yes
NA	Lake Cogen																	
		LAKECOGN	434.0	3,198.8	100	30.5	11.0	3.35	232	384	56.2	17.1	40.0	5.04	40.00	5.04	C	Yes
NA	Mulberry Cogeneration																	
	CT	MULCNAA	413.6	3,080.6	125	38.1	15.0	4.57	219	377	61.9	18.9	100.8	12.70	100.79	12.70	C	Yes
	Duct Burner	MULCNAB	413.6	3,080.6	125	38.1	6.5	1.98	300	422	30.5	9.3	5.16	0.65	5.16	0.65	C	Yes

Appendix C-1. Summary of SO_2 Class I Sources Included in the Air Modeling Analysis

Facility ID	Facility Name / EU ID Emission Unit Description	ISCST3 ID Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Stack Parameters Height (ft)	Height (m)	Diameter (ft)	Diameter (m)	Temperature (F)	Temperature (K)	Velocity (ft/s)	Velocity (m/s)	Emission Rate 24-Hour (lb/hr)	24-Hour (g/s)	3-Hour (lb/hr)	3-Hour (g/s)	PSD[a] Consuming (C) or Expanding (E)	Modeled in Class I
NA	New Pt Richey Hospital																	
	Boiler #1				36.0	11.0	1.0	0.31	520	544	12.7	3.9	0.48	0.06	0.48	0.06	C	Yes
	Boiler #2				36.0	11.0	1.0	0.31	520	544	12.7	3.9	0.24	0.03	0.24	0.03	C	Yes
		NEWPTR12	331.2	3,124.5	36.0	11.0	1.0	0.31	520	544	12.7	3.9	0.71	0.09	0.71	0.09	C	Yes
NA	Oman Construction																	
		OMAN	359.8	3,164.9	25.0	7.6	6.0	1.83	165	347	20.6	6.3	16.6	2.09	16.59	2.09	C	Yes
30ORL480137	Orlando Utilities Commission - Stanton																	
	Unit 1	OUC1	483.5	3,150.6	550	167.6	19.0	5.8	127	326	70.9	21.6	4770	601.00	4769.84	601.00	C	Yes
	Unit 2 (24-hour)	OUC2	483.5	3,150.6	550	167.6	19.0	5.8	124	324	77.1	23.5	729	91.80	728.57	91.80	C	Yes
40TPA510028	Overstreet Paving																	
		OVERST	355.9	3,143.7	30	9.1	4.3	1.3	275	408	52.5	16.0	29.1	3.67	29.13	3.67	C	Yes
40TPA510056	Pasco Cty RRF																	
		PASCORRF	347.1	3,139.2	275	83.8	10.0	3.05	250	394	51.0	15.5	111.9	14.10	111.90	14.10	C	Yes
NA	Pasco Cogen																	
		PASCOGN	385.6	3,139.0	100	30.5	11.0	3.35	232	384	56.2	17.1	40.0	5.04	40.00	5.04	C	Yes
30ORL48109	Reedy Creek Energy Services- EPCOT																	
	Generator 1				17.0	5.2	1.8	0.55	650	617	144.8	44.1	14.5	1.83	14.52	1.83	C	Yes
	Generator 2				17.0	5.2	1.8	0.55	650	617	144.8	44.1	14.5	1.83	14.52	1.83	C	Yes
		EPCOT12	442.0	3,139.0	17.0	5.2	1.8	0.55	650	617	144.8	44.1	29.0	3.66	29.05	3.66	C	Yes
30ORL480110	Reedy Creek Energy Services																	
		REEDY	443.1	3,144.3	65.0	19.8	11.2	3.41	285	414	51.0	15.6	1.19	0.15	1.19	0.15	C	Yes
NA	Ridge Cogeneration																	
		RIDGE	416.7	3,100.4	325	99.1	10.0	3.05	170	350	47.6	14.5	109.5	13.80	109.52	13.80	C	Yes

[a] Comsuming (C) sources are sources that were constructed or modified after the PSD baseline date. Expanding (E) sources are sources that have shutdown or have been modified since the baseline date.

[b, c, d, e] Modeled as volume sources. Dimensions are based on methods presented in accordance with ISCST3 User's Manual, and are as follows:

	Physical Dimensions (ft) Height (H)	Width (W)	Model Dimensions (ft) Height (H or H/2)	Sigma Y (W/4.3	Sigma Z (H/2.15)
b	8.0	210.0	8.0	48.8	3.72
c	8.0	210.0	8.0	48.8	3.72
d	8.0	210.0	8.0	48.8	3.72
e	36.0	125.0	36.0	29	16.7

APPENDIX D

CALPUFF MODELING METHODOLOGY

CALPUFF MODEL DESCRIPTION AND METHODOLOGY

D.1 INTRODUCTION

As part of the new source review requirements under Prevention of Significant Deterioration (PSD) regulations, new sources are required to address air quality impacts at PSD Class I areas. As part of the PSD analysis report submitted to the Florida Department of Environmental Protection (DEP), the air quality impacts due to the potential emissions of the proposed C and D SAPs modification project are required to be addressed at the PSD Class I area of the Chassahowitzka National Wildlife Area (NWA). The Chassahowitzka NWA is located approximately 69 km northwest of the facility site and is the only PSD Class I area located within 200 km of the project site.

The evaluation of air quality impacts are not only concerned with determining compliance with PSD Class I increments but also assessing a source's impact on Air Quality Related Values (AQRVs), such as regional haze. Further, compliance with PSD Class I increments can be evaluated by determining if the source's impacts are less than the proposed U.S. Environmental Protection Agency (EPA) Class I significant impact levels. The significant impact levels are threshold levels that are used to determine the type of air impact analyses needed for the facility. If the new source's impacts are predicted to be less than significant, then the source's impacts are assumed not to have a significant adverse affect on air quality and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance with Class I increments.

Currently there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and Federal Land Managers (FLM) of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report.
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report,* USFS, NPS, USFWS (12/00), referred to as the FLAG document.

For the proposed project, air quality analyses were performed that assess the facility's impacts in the PSD Class I area of the Chassahowitzka NWA using the refined modeling approach from the IWAQM Phase 2 report for:

- Significant impact analysis,
- Regional haze analysis, and
- Total sulfur and nitrogen deposition.

The refined analysis approach was used instead of the screening analysis approach since the air quality impacts are based on generally more realistic assumptions, including more detailed meteorological data, and are estimated at locations at the Class I area.

D.2 GENERAL AIR MODELING APPROACH

The general modeling approach was based on using the long-range transport model, California Puff model (CALPUFF, Version 5.7). At distances beyond 50 km, the ISCST3 model is considered to overpredict air quality impacts, because it is a steady-state model. At those distances, the CALPUFF model is recommended for use. The FLM have requested that air quality impacts, such as for regional haze, for a source located more than 50 km from a Class I area be predicted using the CALPUFF model. The Florida DEP has also recommended that the CALPUFF model be used to assess if the source has a significant impact at a Class I area located beyond 50 km from the source. As a result, a significant impact and regional haze analyses were performed using the CALPUFF model to assess the facility's impacts at the Chassahowitzka NWA.

The methods and assumptions used in the CALPUFF model were based on the latest recommendations for a refined analysis as presented in the IWAQM Phase 2 Summary Report and the FLAG documents.

A regional haze analysis was performed to determine the affect that the facility's emissions will have on background regional haze levels at the Chassahowitzka NWA. In the regional haze analysis, the change in visual range, as calculated by a deciview change, was estimated for the facility in accordance with the IWAQM recommendations. Based on those recommendations, the CALPUFF model is used to predict the maximum 24-hour average sulfate (SO_4), nitrate (NO_3), and fine particulate (PM_{10}) concentrations as well as ammonium sulfate [$(NH_4)_2SO_4$] and ammonium nitrate (NH_4NO_3) concentrations. The change in visibility due to a source, estimated as a percentage, is then calculated based on the change from background data.

The following sections present the methods and assumptions used to assess the refined significant impact and regional haze analyses performed for the proposed project. The results of these analyses are presented in Sections 6.0 and 7.0 of the report.

D.3 MODEL SELECTION AND SETTINGS

The CALPUFF air modeling system was used to assess the proposed project's impacts at the PSD Class I area for comparison to the PSD Class I significant impact levels and to the regional haze visibility criteria. CALPUFF is a non-steady state Lagrangian Gaussian puff long-range transport model that includes algorithms for building downwash effects as well as chemical transformations (important for visibility controlling pollutants), and wet/dry deposition. The CALPUFF meteorological and geophysical data preprocessor (CALMET, Version 5.5), a preprocessor to CALPUFF, is a diagnostic meteorological model that produces a three-dimensional field of wind and temperature and a two-dimensional field of other meteorological parameters. CALMET was designed to process raw meteorological, terrain and land-use databases to be used in the air modeling analysis. The CALPUFF modeling system uses a number of FORTRAN preprocessor programs that extract data from large databases and converts the data into formats suitable for input to CALMET. The processed data produced from CALMET was input to CALPUFF to assess the pollutant specific impact. Both CALMET and CALPUFF were used in a manner that is recommended by the IWAQM Phase 2 and FLAG reports.

D.3.1 CALPUFF MODEL APPROACHES AND SETTINGS

The IWAQM has recommended approaches for performing a Phase 2 refined modeling analyses that are presented in Table D-1. These approaches involve use of meteorological data, selection of receptors and dispersion conditions, and processing of model output.

The specific settings used in the CALPUFF model are presented in Table D-2.

D.3.2 EMISSION INVENTORY AND BUILDING WAKE EFFECTS

The CALPUFF model included the facility's emissions, stack, and operating data as well as building dimensions to account for the effects of building-induced downwash on the emission sources. Dimensions for all significant building structures were processed with the Building Profile Input Program (BPIP), Version 95086, and were included in the CALPUFF model input. Section 6.0 of the PSD report presents a listing of the facility's emissions and structures included in the analysis.

D.4 RECEPTOR LOCATIONS

For the refined analyses, pollutant concentrations were predicted in an array of 13 discrete receptors located at the Chassahowitzka NWA area. These receptors are the same as those used in the PSD Class I analysis performed for the PSD report (refer to Section 6.0).

D.5 METEOROLOGICAL DATA

D.5.1 REFINED ANALYSIS

CALMET was used to develop the gridded parameter fields required for the refined modeling analyses. The follow sections discuss the specific data used and processed in the CALMET model.

D.5.2 CALMET SETTINGS

The CALMET settings contained in Table D-3 were used for the refined modeling analysis.

D.5.3 MODELING DOMAIN

A rectangular modeling domain extending 435 km in the east-west (x) direction and 465 km in the north-south (y) direction was used for the refined modeling analysis. The southwest corner of the domain is the origin and is located at 27 degrees north latitude and 83.5 degrees west longitude. This location is in the Gulf of Mexico approximately 110 km west of Venice, Florida. For the processing of meteorological and geophysical data, the domain contains 88 grid cells in the x-direction and 94 grid cells in the y-direction. The domain grid resolution is 4 km. The air modeling analysis was performed in the UTM coordinate system.

D.5.4 MESOSCALE MODEL – GENERATION 4 (MM4/5) DATA

Pennsylvania State University in conjunction with the NCAR Assessment Laboratory developed the MM4 data set, a prognostic wind field or "guess" field, for the United States. The hourly meteorological variables used to create these datasets (wind, temperature, dew point depression, and geopotential height for eight standard levels and up to 15 significant levels) are extensive and have been developed for the MM4 data for 1990 and the MM5 data for 1992 and 1996. The analysis used the MM4 and MM5 data to initialize the CALMET wind field. The 1990 MM4 and 1992 MM5 data have horizontal spacing of 80 km while the 1996 MM6 data has a spacing of 36 km. These data are used to simulate atmospheric variables within the modeling domain.

The MM4/5 subset domain consisted of a 9 by 9- cell rectangle, with 80 or 36 km grid resolution, extending from the MM4/5 grid points (49,9) to (57, 17). These data were processed to create a MM4.DAT or MM5.DAT file, for input to the CALMET model. The MM5 data for 1992 and 1996 were provided by the National Park Service and was processed in a similar manner as the MM4 data.

The MM4 and MM5 data sets used in the CALMET, although advanced, lacks the fine detail of specific temporal and spatial meteorological variables and geophysical data. These variables were processed into the appropriate format and introduced into the CALMET model through the additional data files obtained from the following sources.

D.5.5 SURFACE DATA STATIONS AND PROCESSING

The surface station data processed for the CALPUFF analyses consisted of data from five NWS stations or Federal Aviation Administration (FAA) Flight Service stations for Gainesville, Tampa, Daytona Beach, Vero Beach, Fort Myers and Orlando. A summary of the surface station information and locations are presented in Table D-4. The surface station parameters include wind speed, wind direction, cloud ceiling height, opaque cloud cover, dry bulb temperature, relative humidity, station pressure, and a precipitation code that is based on current weather conditions. The surface station data were processed into a SURF.DAT file format for CALMET input.

Because the modeling domain extends largely over water, C-Man station data from Venice was obtained. These data were processed into an over-water surface station format (i.e., SEA*.DAT) for input to CALMET. The over-water station data include wind direction, wind speed and air temperature.

D.5.6 UPPER AIR DATA STATIONS AND PROCESSING

The analysis included three upper air NWS stations located in Ruskin, Apalachicola, and West Palm Beach. Data for each station were obtained from the Florida DEP in a format for CALMET input.

The data and locations for the upper air stations are presented in Table D-4.

D.5.7 PRECIPITATION DATA STATIONS AND PROCESSING

Precipitation data were processed from a network of hourly precipitation data files collected from primary and secondary NWS precipitation-recording stations located within the latitude and longitudinal limits of the modeling domain. Data for 27 stations were obtained in NCDC TD-3240 variable format and converted into a fixed-length format. The utility programs PXTRACT and PMERGE were then used to process the data into the format for the PRECIP.DAT file that is used by CALMET. A listing of the precipitation stations used for the modeling analysis is presented in Table D-5.

D.5.8 GEOPHYSICAL DATA PROCESSING

The land-use and terrain information data were developed for the modeling domain and were converted into a GEO.DAT file format for input to CALMET. Terrain elevations for each grid cell of the modeling domain were obtained from Digital Elevation Model (DEM) files obtained from US Geographical Survey (USGS). The DEM data was extracted for the modeling domain grid using the utility extraction program TERREL. Land-use data were obtained from the USGS LULC grid-cell data, and were extracted using the utility programs CTGCOMP and CTGPROC. The scale for both the DEM and LULC files was 1:250,000.

Table D-1. Refined Modeling Analyses Recommendations[a]

Model Input/Output	Description
Meteorology	Use CALMET (minimum 6 to 10 layers in the vertical; top layer must extend above the maximum mixing depth expected); horizontal domain extends 50 to 80 km beyond outer receptors and sources being modeled; terrain elevation and land-use data is resolved for the situation.
Receptors	Within Class I area(s) of concern; obtain regulatory concurrence on coverage.
Dispersion	1. CALPUFF with default dispersion settings. 2. Use MESOPUFF II chemistry with wet and dry deposition. 3. Define background values for ozone and ammonia for area.
Processing	1. For PSD increments: use highest, second-highest 3-hour and 24-hour average SO_2 concentrations; highest, second-highest 24-hour average PM_{10} concentrations; and highest annual average SO_2, PM_{10}, or NO_x concentrations. 2. For haze: process, on a 24-hour basis, compute the source extinction from the maximum increase in emissions of SO_2, NO_x, and PM_{10}; compute the daily relative humidity factor [f(RH)], provided from an external disk file; and compute the maximum percent change in extinction using the FLM supplied background extinction data in the FLAG document. 3. For deposition: compute dry and wet fluxes of nitrogen and sulfur emissions on an annual average basis and adjust concentrations using the molecular weight ratios provided in the FLAG document. Compute total sulfur and nitrogen deposition. 4. For significant impact analysis: use highest annual and highest short-term averaging time concentrations for SO_2, NO_x, or PM_{10}.

[a] IWAQM Phase II report (12/98) and FLAG document (12/00)

Table D-2. CALPUFF Model Settings

Parameter	Setting
Pollutant Species	SO_2, SO_4, NO_x, HNO_3 and NO_3, PM_{10}, and F
Chemical Transformation	MESOPUFF II scheme
Deposition	Include both dry and wet deposition, plume depletion.
Meteorological/Land Use Input	CALMET
Plume Rise	Transitional, Stack-tip downwash, Partial plume penetration
Dispersion	Puff plume element, PG /MP coefficients, rural mode, ISC building downwash scheme
Terrain Effects	Partial plume path adjustment
Output	Create binary concentration file including output species for SO_4, NO_3, PM_{10}, SO_2, and NO_x
Model Processing	For haze: highest predicted 24-hour extinction change (%) for the year. For deposition, predicted total annual average sulfur and nitrogen deposition and compare to FLM deposition analysis thresholds (DAT). For eastern PSD Class I areas, the DAT are 0.01 kg/ha/yr for both total sulfur and total nitrogen. For significant impact analysis: highest predicted annual and highest short-term averaging time concentrations for SO_2, NO_x, and PM_{10}.
Background Values [a]	Ozone: 50 ppb; Ammonia: 1 ppb

[a] Recommended by the National Park Service.

Table D-3. General CALMET Settings, 1990, 1992, and 1996 Domains

Parameter	Setting
Horizontal Grid Dimensions	350 by 280 km, 4 km grid resolution
Vertical Grid	10 layers
Weather Station Data Inputs	6 surface, 3 upper air, 27 precipitation stations
Wind model options	Diagnostic wind model, no kinematic effects
Prognostic wind field model	1990: MM4 data, 80-km resolution, 8 x 6 grid, used for wind field initialization 1992: MM5 data, 80-km resolution, 8 x 6 grid, used for wind field initialization 1996: MM5 data, 36-km resolution, 8 x 6 grid, used for wind field initialization
Output	Binary hourly gridded meteorological data file for CALPUFF input

Table D-4. Surface and Upper Air Stations Used in the CALPUFF Analysis

Station Name	Station Symbol	WBAN Number	UTM Coordinates Easting (km)	UTM Coordinates Northing (km)	UTM Coordinates Zone	Anemometer Height (m)
Surface Stations						
Tampa	TPA	12842	349.20	3094.25	17	6.7
Daytona Beach	DAB	12834	495.14	3228.05	17	9.1
Orlando	ORL	12815	468.96	3146.88	17	10.1
Gainesville	GNV	12816	377.40	3284.12	17	6.7
Vero Beach	VER	12843	557.52	3058.36	17	6.7
Fort Myers	FMY	12835	413.65	2940.38	17	6.1
Upper Air Stations						
Ruskin	TBW	12842	349.20	3094.28	17	NA
West Palm Beach	PBI	12844	587.87	2951.42	17	NA
Apalachicola	AQQ	12832	110.00[a]	3296.00	16	NA

[a] Equivalent coordinate for Zone 17; Zone 16 coordinate is 690.22 km.

Table D-5. Hourly Precipitation Stations Used in the CALPUFF Analysis

		UTM Coordinate		
Station Name	**Station Number**	**Easting (km)**	**Northing (km)**	**Zone**
Belle Glade Hrcn Gt 4	80616	528.190	2953.034	17
Branford	80975	315.606	3315.955	17
Brooksville 7 SSW	81048	358.029	3149.545	17
Canal Point Gate 5	81271	536.428	2971.514	17
Daytona Beach WSO AP	82158	494.165	3227.413	17
Deland 1 SSE	82229	470.780	3209.660	17
Fort Myers FAA/AP	83186	413.992	2940.710	17
Gainesville 11 WNW	83322	355.411	3284.205	17
Inglis 3 E	84273	342.631	3211.652	17
Lakeland	84797	409.871	3099.178	17
Lisbon	85076	423.594	3193.256	17
Lynne	85237	409.255	3230.295	17
Marineland	85391	479.193	3282.030	17
Melbourne WSO	85612	534.381	3109.967	17
Moore Haven Lock 1	85895	491.608	2967.803	17
Orlando Wso Mccoy	86628	468.169	3145.102	17
Ortona Lock 2	86657	470.174	2962.267	17
Parrish	86880	366.986	3054.394	17
Port Mayaca S L Canal	87293	538.044	2984.440	17
Saint Leo	87851	376.483	3135.086	17
St Lucie New Lock 1	87859	571.042	2999.353	17
St Petersburg	87886	339.608	3071.991	17
Tampa Wscmo AP	88788	348.478	3093.670	17
Venice	89176	357.593	2998.178	17
Venus	89184	467.266	3001.224	17
Vero Beach 4 W	89219	554.268	3056.498	17
West Palm Beach Int AP	89525	589.611	2951.627	17

APPENDIX E

BASIS OF FUTURE POTENTIAL EMISSION CALCULATIONS

FOR SO_2 FROM FUEL COMBUSTION SOURCES

Table E-1. Maximum SO_2 Emission Rates Due to Fuel Combustion for the Johnston Scotch Marine Type Boiler

Parameter	Units	No. 2 Fuel Oil	Natural Gas
Operating Data			
Annual Operating Hours	hr/yr	400	8,760
Maximum Heat Input Rate	10^6Btu/hr	83.3	83.3
Hourly Fuel Oil Usage[a]	10^3gal/hr	0.66	N/A
Annual Fuel Oil Usage	10^3gal/yr	264.0	N/A
Maximum Sulfur Content	Weight %	0.5	N/A
Hourly Natural Gas Usage[b]	scf/hr	N/A	89,800
Annual Natural Gas Usage	10^6scf/yr	N/A	787

		No. 2 Fuel Oil		Natural gas		Maximum Total Emission Rate	
Pollutant	AP-42 Emission Factor[c]	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)
Sulfur Dioxide							
Fuel oil	142 *(S)lb/10^3gal[d]	46.86	9.37	--	--	--	--
Natural gas	0.6 lb/10^6ft^3	--	--	0.054	0.24	--	--
Worse-Case Combination of Fuels		--	--	--	--	46.86	9.37

Footnotes:

[a] Based on the heat content of fuel oil of 140,000 Btu/gallon.

[b] Based on the heat content of natural gas of 1,000 Btu/scf.

[c] Emission factors for fuel oil are based on AP-42, Section 1.3, September 1998. Emission factors for natural gas are based on AP-42, Section 1.4, July 1998.

[d] S denotes the weight-percent of Sulfur in fuel oil; Maximum sulfur content = 0.5%.

Table E-2. Maximum Emission Rates Due to Fuel Combustion for the Dryer at the A DAP/MAP Plant

Parameter	Units	No. 5 Fuel Oil	Natural Gas
Operating Data			
Annual Operating Hours	hr/yr	8760	8,760
Maximum Heat Input Rate	10^6Btu/hr	28.5	28.5
Hourly Fuel Oil Usage[a]	10^3gal/hr	0.195	N/A
Annual Fuel Oil Usage	10^3gal/yr	1,710	N/A
Maximum Sulfur Content	Weight %	0.5	N/A
Hourly Natural Gas Usage[b]	scf/hr	N/A	28,500
Annual Natural Gas Usage	10^6scf/yr	N/A	249.66

		No. 5 Fuel Oil		Natural gas		Maximum Total Emission Rate	
Pollutant	AP-42 Emission Factor[c]	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)	Hourly Emisson Rate (lb/hr)	Annual Emission Rate (TPY)
Sulfur Dioxide							
Fuel oil	142 *(S)lb/10^3gal[d]	13.86	60.71	--	--	--	--
Natural gas	0.6 lb/10^6ft^3	--	--	0.017	0.075	--	--
Worse-Case Combination of Fuels		--	--	--	--	13.86	60.71

Footnotes:

[a] Based on the heat content of fuel oil of 146,000 Btu/gallon.

[b] Based on the heat content of natural gas of 1,000 Btu/scf.

[c] Emission factors for fuel oil are based on AP-42, Section 1.3, September 1998. Emission factors for natural gas are based on AP-42, Section 1.4, July 1998.

[d] S denotes the weight-percent of Sulfur in fuel oil; Maximum sulfur content = 0.50%.

Table E-3. Maximum Emission Rates Due to Fuel Combustion for the Dryer at the Z DAP/MAP Plant

Parameter	Units	No. 5 Fuel Oil	Natural Gas
Operating Data			
Annual Operating Hours	hr/yr	8,760	8,760
Maximum Heat Input Rate	10^6Btu/hr	42.75	42.75
Hourly Fuel Oil Usage[a]	10^3gal/hr	0.293	N/A
Annual Fuel Oil Usage	10^3gal/yr	2,565	N/A
Maximum Sulfur Content	Weight %	0.5	N/A
Hourly Natural Gas Usage[b]	scf/hr	N/A	42,750
Annual Natural Gas Usage	10^6scf/yr	N/A	374.49

Pollutant	AP-42 Emission Factor[c]	No. 5 Fuel Oil Hourly Emisson Rate (lb/hr)	No. 5 Fuel Oil Annual Emission Rate (TPY)	Natural gas Hourly Emisson Rate (lb/hr)	Natural gas Annual Emission Rate (TPY)	Maximum Total Emission Rate Hourly Emisson Rate (lb/hr)	Maximum Total Emission Rate Annual Emission Rate (TPY)
Sulfur Dioxide							
Fuel oil	142 *(S)lb/10^3gal[d]	20.79	91.05	--	--	--	--
Natural gas	0.6 lb/10^6ft^3	--	--	0.026	0.11	--	--
Worse-Case Combination of Fuels		--	--	--	--	20.79	91.05

Footnotes:

[a] Based on the heat content of fuel oil of 146,000 Btu/gallon.

[b] Based on the heat content of natural gas of 1,000 Btu/scf.

[c] Emission factors for fuel oil are based on AP-42, Section 1.3, September 1998. Emission factors for natural gas are based on AP-42, Section 1.4, July 1998.

[d] S denotes the weight-percent of Sulfur in fuel oil; Maximum sulfur content = 0.5%.

Table E-4. Maximum Emission Rates Due to Fuel Combustion for the Dryer at the X DAP/MAP/GTSP Plant

Parameter	Units	No. 5 Fuel Oil	Natural Gas
Operating Data			
Annual Operating Hours	hr/yr	8,760	8,760
Maximum Heat Input Rate	10^6Btu/hr	49.7	49.7
Hourly Fuel Oil Usage[a]	10^3gal/hr	0.340	N/A
Annual Fuel Oil Usage	10^3gal/yr	2,982	N/A
Maximum Sulfur Content	Weight %	0.5	N/A
Hourly Natural Gas Usage[b]	scf/hr	N/A	49,700
Annual Natural Gas Usage	10^6scf/yr	N/A	435.372

Pollutant	AP-42 Emission Factor[c]	No. 5 Fuel Oil Hourly Emisson Rate (lb/hr)	No. 5 Fuel Oil Annual Emission Rate (TPY)	Natural gas Hourly Emisson Rate (lb/hr)	Natural gas Annual Emission Rate (TPY)	Maximum Total Emission Rate Hourly Emisson Rate (lb/hr)	Maximum Total Emission Rate Annual Emission Rate (TPY)
Sulfur Dioxide							
Fuel oil	142 *(S)lb/10^3gal[d]	24.17	105.86	--	--	--	--
Natural gas	0.6 lb/10^6ft^3	--	--	0.030	0.13	--	--
Worse-Case Combination of Fuels		--	--	--	--	24.17	105.86

Footnotes:

[a] Based on the heat content of fuel oil of 146,000 Btu/gallon.

[b] Based on the heat content of natural gas of 1,000 Btu/scf.

[c] Emission factors for fuel oil are based on AP-42, Section 1.3, September 1998. Emission factors for natural gas are based on AP-42, Section 1.4, July 1998.

[d] S denotes the weight-percent of Sulfur in fuel oil; Maximum sulfur content = 0.5%.

Table E-5. Maximum Emission Rates Due to Fuel Combustion for the Dryer at the Y DAP/MAP/GTSP Plant

Parameter	Units	No. 5 Fuel Oil	Natural Gas
Operating Data			
Annual Operating Hours	hr/yr	8,760	8,760
Maximum Heat Input Rate	10^6Btu/hr	49.5	49.5
Hourly Fuel Oil Usage[a]	10^3gal/hr	0.339	N/A
Annual Fuel Oil Usage	10^3gal/yr	2,970	N/A
Maximum Sulfur Content	Weight %	0.5	N/A
Hourly Natural Gas Usage[b]	scf/hr	N/A	49,500
Annual Natural Gas Usage	10^6scf/yr	N/A	433.62

Pollutant	AP-42 Emission Factor[c]	No. 5 Fuel Oil Hourly Emisson Rate (lb/hr)	No. 5 Fuel Oil Annual Emission Rate (TPY)	Natural gas Hourly Emisson Rate (lb/hr)	Natural gas Annual Emission Rate (TPY)	Maximum Total Emission Rate Hourly Emisson Rate (lb/hr)	Maximum Total Emission Rate Annual Emission Rate (TPY)
Sulfur Dioxide							
Fuel oil	142 *(S)lb/10^3gal[d]	24.07	105.44	--	--	--	--
Natural gas	0.6 lb/10^6ft^3	--	--	0.030	0.13	--	--
Worse-Case Combination of Fuels		--	--	--	--	24.07	105.44

Footnotes:

[a] Based on the heat content of fuel oil of 146,000 Btu/gallon.

[b] Based on the heat content of natural gas of 1,000 Btu/scf.

[c] Emission factors for fuel oil are based on AP-42, Section 1.3, September 1998. Emission factors for natural gas are based on AP-42, Section 1.4, July 1998.

[d] S denotes the weight-percent of Sulfur in fuel oil; Maximum sulfur content = 0.5%.

APPENDIX F

BASIS OF 1974 BASELINE (SO_2) EMISSION CALCULATIONS

Table F-1. Sulfur Dioxide PSD Baseline Emissions, CF Industries

Emission Unit	Emission Factor [a] (lb/10^3 gal)	Activity Factor [b] (10^3 gal/yr)	Annual Emissions (TPY)	Hourly Emissions [c] (lb/hr)
"A" DAP/MAP Plant	392.5	411.11	80.68	18.42
"X" DAP/MAP/GTSP Plant	392.5	612.30	120.16	27.43
"Y" DAP/MAP/GTSP Plant	392.5	409.37	80.34	18.34
"Z" DAP/MAP Plant	392.5	409.37	80.34	18.34
ROP/MGTSP Manufacturing	392.5	314.90	61.80	14.11

Footnotes:

[a] SO_2 emission factor for No. 5 fuel oil combustion, AP-42, Table 1.3-1 (9/98). Assumes that sulfur content of the No. 5 fuel oil is 2.5%.

[b] Based on estimated fuel usage for 1974. See Table G-2.

[c] Based on 8,760 hours per year.

Table F-2. Estimated Fuel Usage for 1974, CF Industries

Emission Unit	Fuel Usage as Given in Applications	Fuel Usage (a) (gal/hr)	% of Total	Estimated Fuel Usage (b) (gal/yr)
ADAP	4700 gal/day	195.83	14.53	411,107
X-Train	7000 gal/day	291.67	21.65	612,304
Y-Train	1560 lb/hr	195	14.47	409,365
Z-Train	1560 lb/hr	195	14.47	409,365
Riley Stoker	320 gal/hr	320	23.75	671,778
ROP/MGTSP	3600 gal/day	150	11.13	314,896
	TOTAL	1,347.5	100	2,828,814

Notes:

(a) Converted from number given in applications. Used a density of 8 lb/gal.

(b) Based on total fuel purchases for calendar year 1974 for the entire facility (2,828,814 gal).

	For instructions for color plot setup see i:\design\scheds\desi_org.or2
REFERENCE NUMBER	REFERENCE DESCRIPTION

REV. BY	REV. DATE	REV. NO.	REVISION DESCRIPTION
RTN	6/20/96	0	Was dwg no. 0.0-A-011, Changed no., border, & created color plot
			Added AREAS I, II, III, & IV
RTN	10/18/96	1	Corrected offsite images south of Area I & @ Guard House #2
RTN	9/17/97	2	Added RO as built - modified Area I Battery Limits
MWJ	3/04/02	3	General Revisions

JOB NO. N/A	FILE NAME D00ZA001
DWG. STATUS AS BUILT	DWG. BY CFI
PLOT SCALE 1200	DWG. DATE 6/19/96
PLOT DATE 4/04/02	DWG. SCALE 1" = 100'

CF Industries, Inc.
PLANT CITY PHOSPHATE COMPLEX

AREA LOCATION
FIGURE 2-1 – FACILITY PLOT PLAN

DRAWING NO. D-00-ZA-001 REV. NO. 3