Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor | Carol M. Browner, Secretary

July 20, 1992

Ms. Linda Novak
Polk County Board County Commissioners
Environmental Services Department
P. O. Box 60
330 West Church Street
Bartow, FL 33830

Dear Ms. Novak:

RE: Seminole Fertilizer, Polk County
Sulfuric Acid Production Rate Increase
AC 53-216288, PSD-FL-191

Enclosed for your review is the above referenced permit application. Please forward your comments to the Bureau of Air Regulation by August 14, 1992. The Bureau's FAX number is (904)922-6979.

If you have any questions, please call Willard Hanks or Cleve Holladay at (904)488-1344 or write to me at the above address.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/pa

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

July 20, 1992

Mrs. Chris Shaver, Chief
Permit Review and Technical Support Branch
National Park Service-Air Quality Division
Post Office Box 25287
Denver, Colorado 80225

Dear Mrs. Shaver:

RE: Seminole Fertilizer, Polk County
Sulfuric Acid Production Rate Increase
AC 53-216288, PSD-FL-191

Enclosed for your review is the above referenced permit application. Please forward your comments to the Bureau of Air Regulation by August 14, 1992. The Bureau's FAX number is (904)922-6979.

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Enclosures

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Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

July 20, 1992

Ms. Jewell A. Harper, Chief
Air Enforcement Branch
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Dear Ms. Harper:

RE: Seminole Fertilizer Corp., Polk County
Sulfuric Acid Production Rate Increase
AC 53-216288, PSD-FL-191

Enclosed for your review is the above referenced permit application. Please forward your comments to the Department's Bureau of Air Regulation by August 14, 1992. The Bureau's FAX number is (904)922-6979.

If you have any questions, please contact Willard Hanks or Cleve Holladay at (904)488-1344 or write to me at the above address.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/pa

Enclosures

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
904/377-5822 ▪ FAX 377-7158

KA 203-92-01

July 15, 1992

RECEIVED

JUL 16 1992

Division of Air
Resources Management

Mr. Clair Fancy
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: Application for a PSD Construction Permit
Seminole Fertilizer Corporation
Polk County, Florida

Dear Mr. Fancy:

Enclosed is the modeling output associated with the construction permit application for an increase in the sulfuric acid production rates of the existing plants No. 4, 5 and 6 at the Seminole Fertilizer Corporation facility in Polk County, Florida.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

Raval

Pradeep A. Raval

PAR:wa
Enc.

c: Mr. M. Martinasek, Seminole

VENDOR: 000274

SEMINOLE FERTILIZER CORPORATION

CHECK NO. 064629

VOUCHER NO.	INVOICE NO.	INVOICE DATE	INVOICE AMOUNT	AMOUNT PAID	DISCOUNT TAKEN	NET CHECK AMOUNT
016447	7-1-92	07/10/92	7,500.00	7,500.00	.00	7,500.00
					CHECK TOTAL	7,500.00

CHECK NO.	CHECK DATE	VENDOR NO.
64629	07/14/92	000274

Casco Northern Bank
an affiliate of
BANK OF BOSTON

SEMINOLE

Seminole Fertilizer Corporation
Hwy 60 West, P.O. Box 471
Bartow, Florida 33830

CHECK NO. 064629

52-2
112

NOT VALID FOR PAYMENT AFTER 90 DAYS FROM DATE HEREON.

SEVEN THOUSAND FIVE HUNDRED AND 00/100 DOLLARS

CHECK AMOUNT
$****7,500.00

PAY TO THE ORDER OF
DEPARTMENT OF ENVIRONMENTAL
REGULATION
TAMPA FL 33610

BY

BY

MUST BE COUNTERSIGNED IF $10,000 OR MORE.

⑈064629⑈ ⑆011200022⑆ 80⑈005⑈281⑈

Sent original check to F&A

Barbara

$2,500 pd.
7-10-92
Rcpt.# 180777

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

DER Form #
Form Title
Effective Date
DER Application No.
Filled in by DER

AC 53-216288
PSD-FL-191

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Sulfuric Acid Plant [ ] New[1] [x] Existing[1]

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

COMPANY NAME: Seminole Fertilizer Corporation COUNTY: Polk

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Sulfuric Acid Plant Nos. 4, 5, and 6.

SOURCE LOCATION: Street Highway 60 West City Bartow

UTM: East (17) 409.8 km North 3087.0 km

Latitude 27 ° 54 ' 22 "N Longitude 81 ° 54 ' 59 "W

APPLICANT NAME AND TITLE: Kenneth V. Ford, Manager Environmental Affairs

APPLICANT ADDRESS: P.O. Box 471, Bartow, Florida 33830

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Seminole Fertilizer Corp.

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

*Attach letter of authorization

Signed: Kenneth V. Ford

Kenneth V. Ford, Manager Environmental Affairs
Name and Title (Please Type)

Date: 7/10/92 Telephone No. (813) 533-2171

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project ha been ~~designed~~/examined by me and found to be in conformity with modern engineeri principles applicable to the treatment and disposal of pollutants characterized in t permit application. There is reasonable assurance, in my professional judgment, th

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

<u>AFFIDAVIT OF AUTHORIZATION</u>

I, Hudson C. Smith, Executive Vice President and General Manager, hereby authorize Kenneth V. Ford, as Manager Environmental Affairs, to sign permit applications on behalf of Seminole Fertilizer Corporation for the Hookers Prairie Mine and the Bartow chemical complex.

SEMINOLE FERTILIZER CORPORATION

By: ______________________

STATE OF FLORIDA
COUNTY OF POLK

SWORN to and subscribed before me this 26th day of November, 1991.

____
Notary Public

My Commission Expires:
Notary Public, State of Florida at Large
My Commission Expires Sept. 20, 1993

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

Signed ____________________

John B. Koogler, Ph.D., P.E.
Name (Please Type)

Koogler & Associates, Environmental Services
Company Name (Please Type)

4014 N.W. 13th Street, Gainesville, FL 32609
Mailing Address (Please Type)

Florida Registration No. 12925 Date: 7/13/92 Telephone No. (904) 377-5822

SECTION II: GENERAL PROJECT INFORMATION

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

For the increase in sulfuric acid production rates from 80 to 95 tons per hour for plant Nos. 4, 5, and 6. The three plants will operate in full compliance with the applicable air regulations. See attached report.

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

Start of Construction October 1992 Completion of Construction October 1993

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Existing equipment.

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

See attached report.

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

if power plant, hrs/yr ____; if seasonal, describe: 8760 hours/year

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

1. Is this source in a non-attainment area for a particular pollutant? NO

   a. If yes, has "offset" been applied? NA

   b. If yes, has "Lowest Achievable Emission Rate" been applied? NA

   c. If yes, list non-attainment pollutants. NA

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. YES[1]

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. YES[1]

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? YES[1]

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

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

   a. If yes, for what pollutants? NA

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

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

[1] See attached report.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Each Plant

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Sulfur	Ash	0.005	63,000	

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

1. Total Process Input Rate (lbs/hr): 63,000

2. Product Weight (lbs/hr): 190,000 (95 tph)

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

Each Plant

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/~~yr~~ hr	T/yr	
SO_2	380.0	1664.4	17-2.600(2)	380.0	380.0	1664.4	
Acid Mist	14.3	62.4	17-2.600(2)	14.3	14.3	62.4	
NOx	11.4	49.9	--	--	11.4	49.9	

[1]See Section V, Item 2.

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

[3]Calculated from operating rate and applicable standard.

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

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Dual Absorption Tower	SO_2	99.4%	--	Design
HV & HE Mist Eliminator	Acid Mist	90.0%	> 1	Design

E. Fuels NA

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

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

Fuel Analysis:

Percent Sulfur: ______________________ Percent Ash: ______________________

Density: ______________________ lbs/gal Typical Percent Nitrogen: ______________________

Heat Capacity: ______________________ BTU/lb ______________________ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ______________________

____

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

Annual Average ______________________ Maximum ______________________

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

____

____

____

____

Each Plant

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

Stack Height: 200 ft. Stack Diameter: 6.75 ft.

Gas Flow Rate: 133,000 ACFM 110,000 DSCFM Gas Exit Temperature: 180 °F.

Water Vapor Content: -- % Velocity: 62 FPS

SECTION IV: INCINERATOR INFORMATION

NA

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (lbs/hr)							

Description of Waste ______

Total Weight Incinerated (lbs/hr) ______ Design Capacity (lbs/hr) ______

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

Manufacturer ______

Date Constructed ______ Model No. ______

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

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

Gas Flow Rate: ______ ACFM ______ DSCFM* Velocity: ______ FPS

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) ______

Brief description of operating characteristics of control devices: ______

______

______

______

______

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

______

______

______

______

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

See attached report.

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation. $7500

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

See attached report.

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

See attached report.

A. Company Monitored Data

1. ______ no. sites ______ TSP ______ ( ) SO^2* ______ Wind spd/dir

Period of Monitoring ___/___/___ to ___/___/___
month day year month day year

Other data recorded ______________________

Attach all data or statistical summaries to this application.

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

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)______________________________

3. Upper air (mixing height) data obtained from (location)______________________

4. Stability wind rose (STAR) data obtained from (location)______________________

. Computer Models Used

1. ______________________________ Modified? If yes, attach description.

2. ______________________________ Modified? If yes, attach description.

3. ______________________________ Modified? If yes, attach description.

4. ______________________________ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	______________ grams/sec
SO^2	______________ grams/sec

Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

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

REPORT IN SUPPORT OF
AN APPLICATION FOR A PSD
CONSTRUCTION PERMIT REVIEW

PREPARED FOR:

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

JULY 1992

PREPARED BY:

KOOGLER & ASSOCIATES
4014 N.W. 13TH STREET
GAINESVILLE, FLORIDA 32609
(904) 377-5822

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1.0 SYNOPSIS OF APPLICATION

1.1 APPLICANT

Seminole Fertilizer Corporation
Highway 60 West
P.O. Box 471
Bartow, Florida 33830

1.2 FACILITY LOCATION

Seminole Fertilizer Corporation (Seminole) consists of a phosphate chemical fertilizer manufacturing facility approximately four miles west of Bartow on Highway 60 in Polk County, Florida (See Figure 1-1). The UTM coordinates of the Seminole facility are Zone 17, 409.8 km east and 3087.0 km north.

1.3 PROJECT DESCRIPTION

Seminole proposes to increase the sulfuric acid production rate of three existing double absorption sulfuric acid plants from 1920 to 2280 tons per day (TPD) of 100% H_2SO_4 each. This will result in an overall increase in the sulfuric acid production rate of Plants No. 4, 5 and 6 of 1080 TPD 100% H_2SO_4. This increase is less than the 1100 TPD potential production rate of Plant No. 3 which is currently inactive.

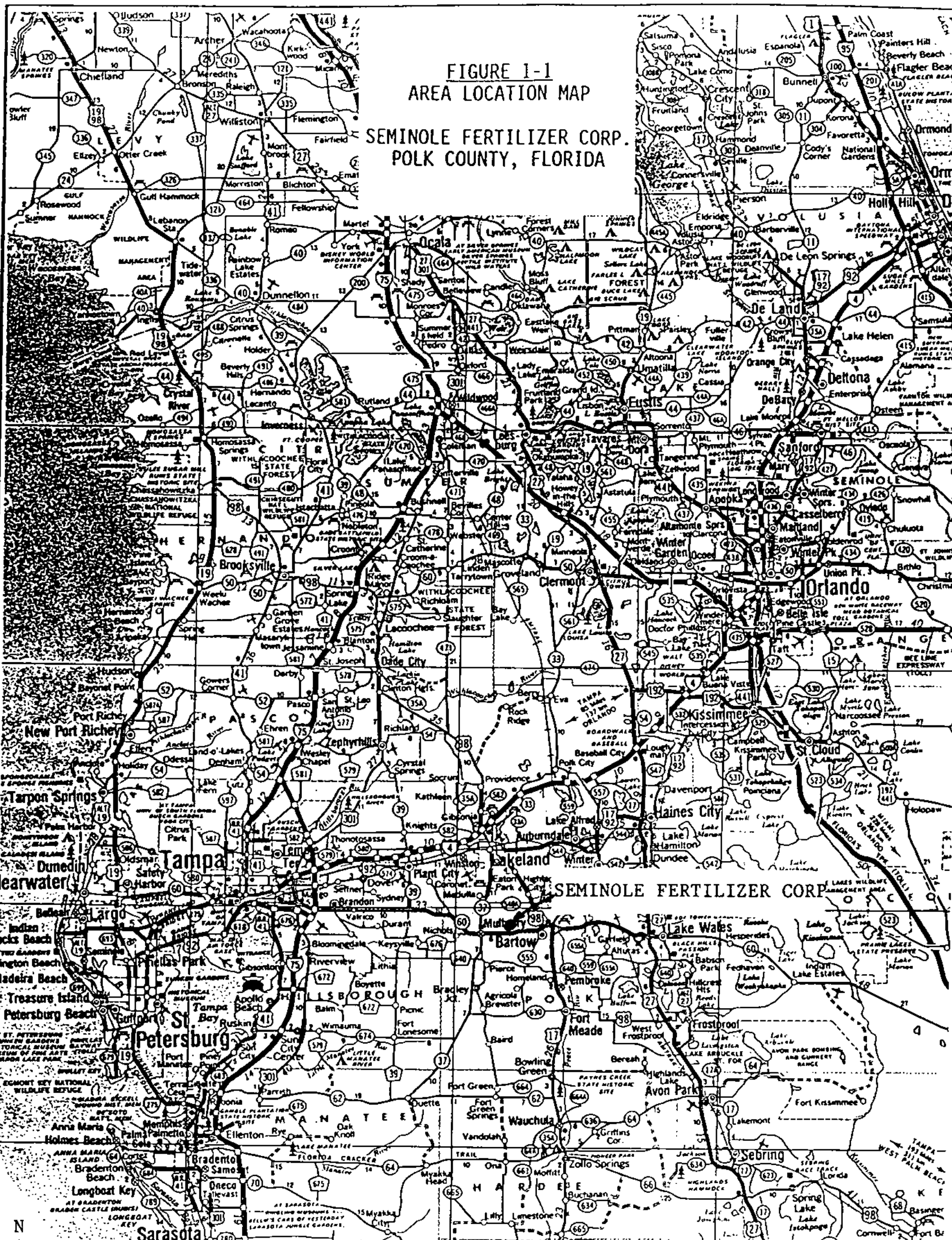
The additional sulfuric acid produced will be sold to sulfuric acid consumers and will not affect the operation of any other plant in the chemical complex.

The proposed project will result in a significant net increase (in accordance with Table 500-2 of Chapter 17-2, Florida Administrative Code, FAC) in the emission rates of sulfur dioxide and sulfuric acid mist, and a less than significant increase in the emission rate of nitrogen oxides.

Seminole is submitting this report in support of the application to the Florida Department of Environmental Regulation for increasing the sulfuric acid production rates of the three existing sulfuric acid plants. The report includes a description of the existing chemical complex and the sulfuric acid plants, a review of Best Available Control Technology, an ambient air quality analysis and an evaluation of the impact of the proposed project on soils, vegetation and visibility.

FIGURE 1-1
AREA LOCATION MAP

SEMINOLE FERTILIZER CORP.
POLK COUNTY, FLORIDA



2.0 FACILITY DESCRIPTION

Seminole Fertilizer Corporation consists of a phosphate chemical fertilizer manufacturing facility located on Highway 60 in Polk County, Florida (See Figure 2-1). The UTM coordinates of the facility are Zone 17, 409.8 km east and 3087.0 km north.

2.1 EXISTING FACILITY

The existing fertilizer complex processes phosphate rock into several different fertilizer products. This is accomplished by reacting the phosphate rock with sulfuric acid to produce phosphoric acid and then converting the phosphoric acid to fertilizer products. Figure 2-3, Plot Plan, shows the location of the existing plants.

The additional sulfuric acid produced will be sold to sulfuric acid consumers and will not affect the operation of the other plants in the chemical complex.

2.2 SULFURIC ACID PLANTS

There are four existing sulfuric acid plants at Seminole. Plant No. 3 permitted at 1100 tons per day (TPD) of 100 percent H_2SO_4 is currently inactive. Identical double absorption Plants No. 4, 5, and 6 are subject to Federal New Source Performance Standards as set forth in 40CFR60, Subpart H. The emission limiting standards for these plants are:

Sulfur Dioxide	-	4 pounds per ton of 100 percent acid
Acid Mist	-	0.15 pound per ton of 100 percent acid
Visible Emissions	-	10 percent opacity.

The state of Florida has identical emission limiting standards for new sulfuric acid plants as set forth in Rule 17-2.600(2)(b), FAC. The current FDER air permit numbers for the four sulfuric acid plants at

Seminole are as follows:

Plant Number	Air Permit No.	Expiration Date
3	A053-176431	4-11-93
4	A053-167885	10-13-94
5	A053-185774	10-13-94
6	A053-166950	10-13-94

The actual emission rates of sulfur dioxide and acid mist from the sulfuric acid plants (presented in Table 2-1) are based on past compliance tests results. These results have been submitted to FDER's Southwest District Office. In 1990-1991, the maximum measured sulfur dioxide emission rate during a compliance test was 3.58 pounds per ton of 100 percent H_2SO_4 produced and the maximum measured acid mist emission rate was 0.12 pounds per ton of 100 percent H_2SO_4 produced. Higher emission rates do occur and are documented in the Appendix.

Nitrogen oxide emissions from the sulfuric acid plants were estimated by using an emission factor of 0.12 pound per ton of 100 percent H_2SO_4 produced, an emission rate used by FDER in recent permitting of similar plants.

TABLE 2-1

ACTUAL EMISSIONS SUMMARY(1)
SULFURIC ACID PLANTS NO. 4, 5 AND 6

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Plant No.	Date	Sulfur Dioxide lbs/hr	Sulfur Dioxide lbs/ton	Sulfuric Acid Mist lb/hr	Sulfuric Acid Mist lb/ton
4	6-15-90	292	3.58	4.20	0.052
	2-11-91	272	3.19	4.40	0.051
	Avg.	282	3.39	4.30	0.052
5	6-06-90	301	3.45	6.43	0.074
	5-01-91	273	3.24	5.41	0.064
	Avg.	287	3.35	5.92	0.069
6	6-02-90	299	3.37	10.5	0.119
	10-26-91	276	3.27	8.0	0.095
	Avg.	288	3.32	9.3	0.107
Permit Limits		320	4.0	12.0	0.15

(1) Emissions summary from the 1990 and 1991 compliance tests submitted to FDER.

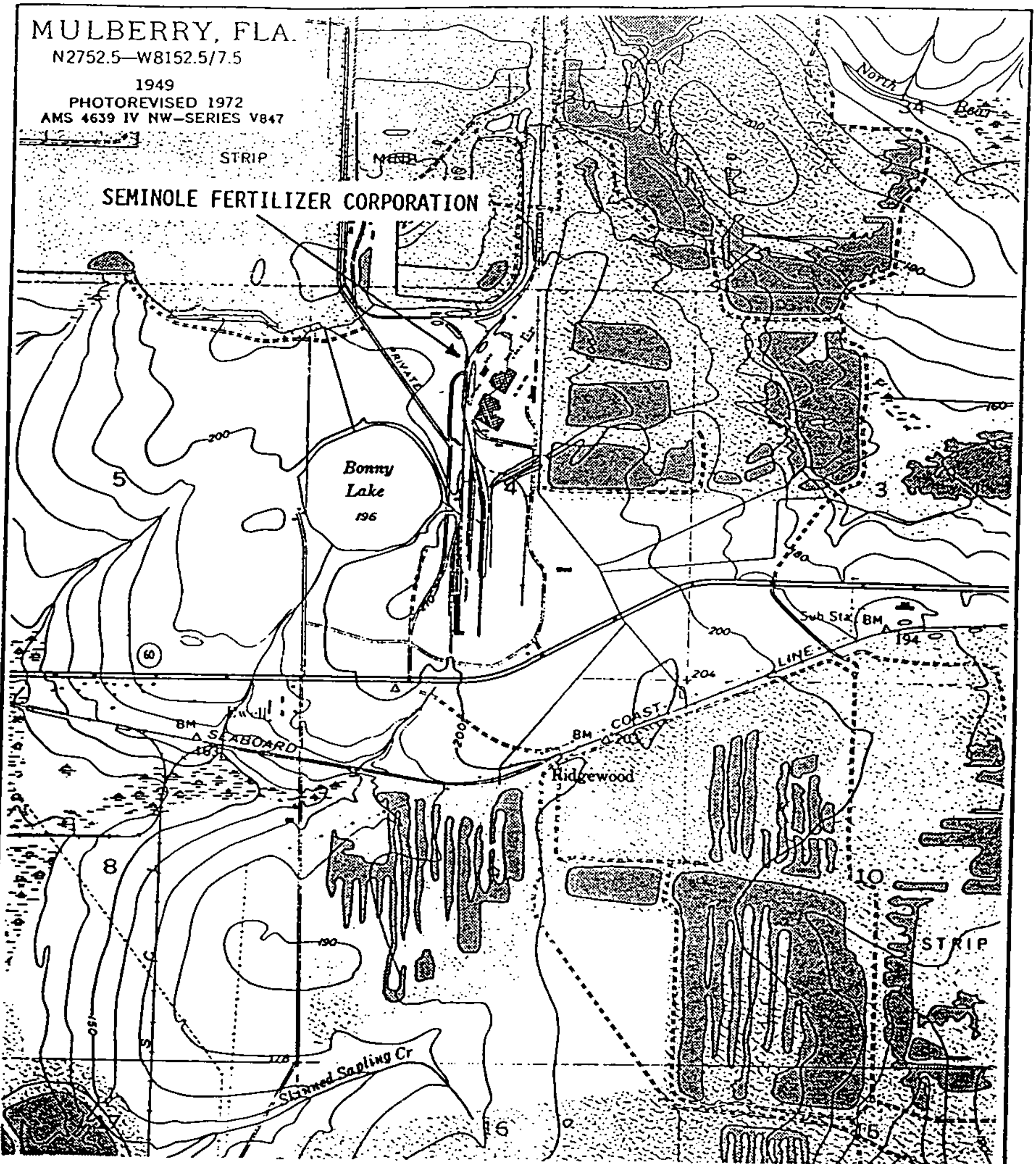


FIGURE 2-1
SITE LOCATION MAP

SEMINOLE FERTILIZER CORPORATION

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

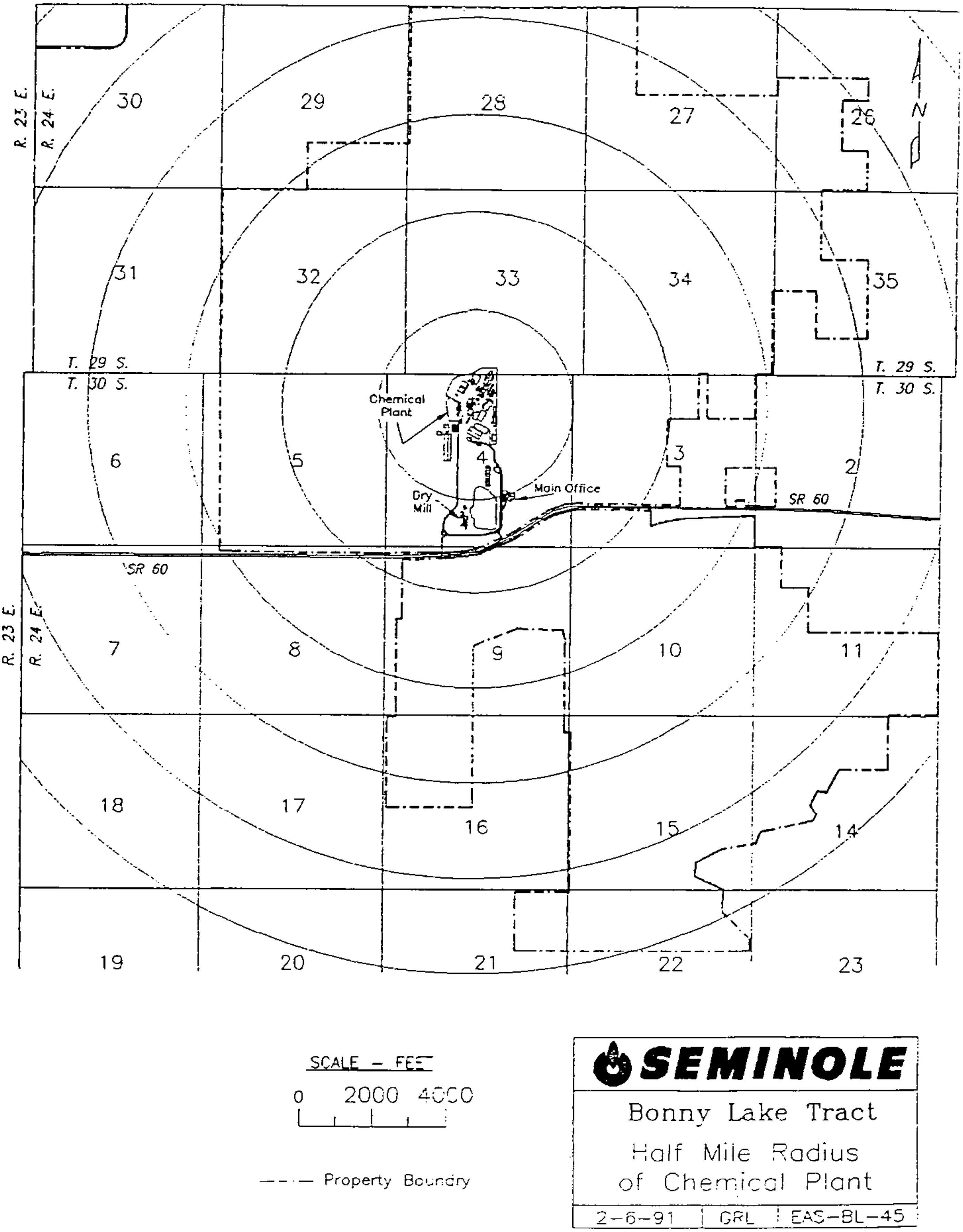
MN GN 0°26' 8 MILS

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

KOOGLER & ASSOCIATES

FIGURE 2-2
PROPERTY BOUNDARY MAP

SEMINOLE FERTILIZER CORPORATION



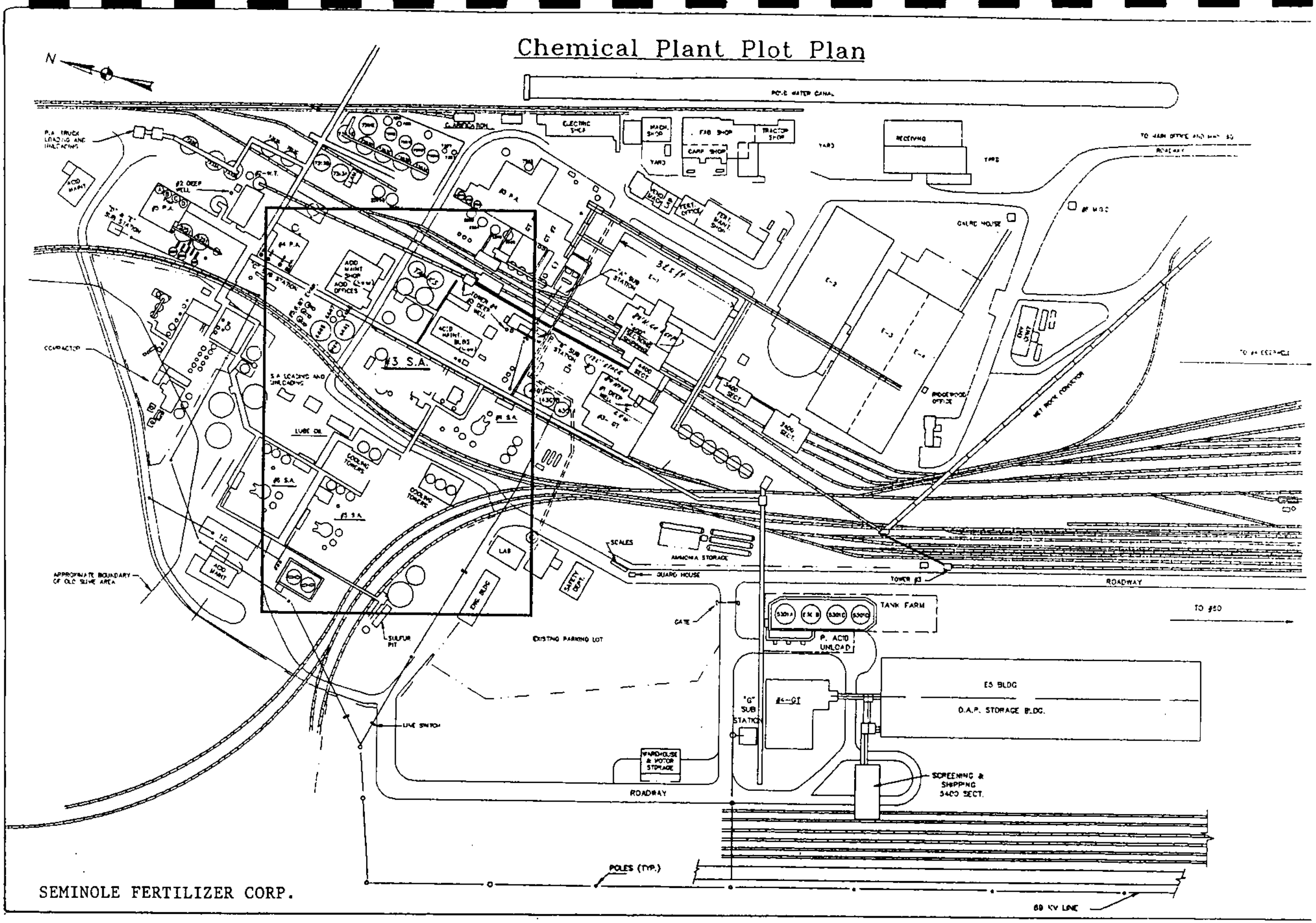


FIGURE 2-3
PLOT PLAN

SEMINOLE FERTILIZER CORPORATION

3.0 PROPOSED PROJECT

3.1 PROJECT DESCRIPTION

Seminole proposes to increase the sulfuric acid production rate of the existing No. 4, 5 and 6 plants from 80 TPH (1920 TPD) to 95 TPH (2280 TPD) 100% acid.

The sulfuric acid production increase proposed by Seminole will also result in an increase in the waste heat recovered and electrical power generated.

No changes to the existing equipment are proposed to accomplish the increase in production. Plant operation has indicated that the existing equipment is capable of producing more sulfuric acid. A process flow diagram for the three identical plants is presented in Figure 3-1.

The emission limits for the sulfuric acid plants will be in accordance with the Federal New Source Performance Standards and Rule 17-2.600(2)(b), FAC; i.e., the sulfur dioxide and acid mist emission limits will be 4.0 pounds per ton and 0.15 pounds per ton of 100 percent sulfuric acid, respectively.

Table 3-1 summarizes the permitted, actual and proposed operating characteristics of the three sulfuric acid plants. The net emission changes as a result of the proposed project are summarized in Table 3-2.

The information presented in Table 3-2 shows there will be a significant net increase in the annual emissions of sulfur dioxide and sulfuric acid mist and a less than significant increase in the annual emissions of nitrogen oxides (as defined by Table 500-2, Chapter 17-2, FAC).

The only other air pollution source affected by the requested change at Seminole is the molten sulfur system. An after-the-fact permit was issued in 1990 by FDER for the existing molten sulfur system. This system has a total estimated SO_2 emission rate of about 2.1 lbs/hr and 7.6 tpy. No increase in the permitted molten sulfur handing rates or emission rates are requested as the currently permitted levels satisfy the proposed molten sulfur requirement.

As the increased acid production of Plants No. 4, 5, and 6 is a little less than the production capability of the inactive No. 3 plant, there will be a negligible overall decrease in the estimated actual SO_2 emissions from the molten sulfur system.

A PSD permit was issued by FDER for a gas turbine in 1991. The PSD review requirements for that project were triggered for NOx only. The sulfur dioxide emissions increase from that project was 8.3 lbs/hr and 36.4 tpy. However, the inclusion of these contemporaneous emissions increases to the net sulfur dioxide emissions increase from the sulfuric plants will not affect the PSD applicability for the sulfuric acid plants.

3.2 RULE REVIEW

The following are the state and federal air regulatory requirements that apply to new or modified sources subject to a Prevention of Significant Deterioration (PSD) review.

In accordance with EPA and state of Florida PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) are subject to preconstruction review. Florida's State Implementation Plan (SIP), approved by the EPA, authorizes the Florida Department of Environmental Regulation (FDER) to manage the air pollution program in Florida.

The PSD review determines whether or not significant air quality deterioration will result from a new or modified facility. Federal PSD regulations are contained in 40CFR52.21, Prevention of Significant Deterioration of Air Quality. The state of Florida has adopted PSD regulations which are essentially identical to the federal regulations and are contained in Chapter 17-2 of the Florida Administration Code (FAC). All new major facilities and major modifications to existing facilities are subject to control technology review, source impact analysis, air quality analysis and additional impact analyses for each pollutant subject to a PSD review. A facility must also comply with the Good Engineering Practice (GEP) stack height rule.

A major facility is defined in the PSD rules as any one of the 28 specific source categories (see Table 3-3) which has the potential to emit 100 tons per year (tpy) or more, or any other stationary facility which has the potential to emit 250 tpy or more, of any pollutant regulated under the CAA. A major modification is defined in the PSD rules as a change at an existing major facility which increases the actual emissions by greater than significant amounts (see Table 3-4).

3.2.1 Ambient Air Quality Standards

The EPA and the state of Florida have developed/adopted ambient air quality standards, AAQS (see Table 3-5). Primary AAQS protect the public health while the secondary AAQS protect the public welfare from adverse effects of air pollution. Areas of the country have been designated as attainment or nonattainment for specific pollutants. Areas not meeting the AAQS for a given pollutant are designated as nonattainment areas for that pollutant. Any new source or expansion of existing sources in or near these nonattainment areas are usually subject to more stringent air permitting requirements. Projects proposed in attainment areas are subject to air permit requirements which would ensure continued attainment status.

3.2.2 PSD Increments

In promulgating the 1977 CAA Amendments, Congress quantified concentration increases above an air quality baseline concentration levels for sulfur dioxide (SO_2) and particulate matter (PM/TSP) which would constitute significant deterioration. The size of the allowable increment depends on the classification of the area in which the source would be located or have an impact. Class I areas include specific national parks, wilderness areas and memorial parks. Class II areas are all areas not designated as Class I areas and Class III areas are industrial areas in which greater deterioration than Class II areas would be allowed. There are no designated Class III areas in Florida.

In 1988, EPA promulgated PSD regulations for nitrogen oxides (NOx) and PSD increments for nitrogen dioxide (NO_2) concentrations. FDER adopted the NO_2 increments in July 1990 (see Table 3-6 for PSD increments).

In the PSD regulations, as amended August 7, 1980, baseline concentration is defined as the ambient concentration level for a given pollutant which exists in the baseline area at the time of the applicable baseline date and includes the actual emissions representative of facilities in existence on the applicable baseline date, and the allowable emissions of major stationary facilities which commenced construction before January 6, 1975, but were not in operation by the applicable baseline date.

The emissions not included in the baseline concentration and, therefore, affecting PSD increment consumption are the actual emissions from any major stationary facility on which construction commenced after January 6, 1975, for SO_2 and PM (TSP) and February 8, 1988, for NO_2, and the actual emission increases and decreases at any stationary facility occurring after the baseline date.

3.2.3 Control Technology Evaluation

The PSD control technology review requires that all applicable federal and state emission limiting standards be met and that Best Available Control Technology (BACT) be applied to the source. The BACT requirements are applicable to all regulated pollutants subject to a PSD review.

BACT is defined in Chapter 17-2, FAC as an emission limitation, including a visible emission standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of such pollutant. If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead, to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation. Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.

The reason for evaluating the BACT is to minimize as much as possible the consumption of PSD increments and to allow future growth without significantly degrading air quality. The BACT review also analyzes if the most current control systems are incorporated in the design of a proposed facility. The BACT, as a minimum, has to comply with the applicable New Source Performance Standard for the source. The BACT analysis requires the evaluation of the available air pollution control methods including a cost-benefit analysis of the alternatives. The cost-benefit analysis includes consideration of materials, energy, and economic penalties associated with the control systems, as well as environmental benefits derived from the alternatives.

EPA recently determined that the bottom-up approach (starting at NSPS and working up to BACT) was not providing the level of BACT originally intended. As a result, in December 1987, EPA strongly suggested changes in the implementation of the PSD program including the "top-down" approach to BACT. The top-down approach requires an application to start with the most stringent control alternative, often Lowest Achievable Emission Rate (LAER), and justify its rejection or acceptance as BACT. Rejection of control alternatives may be based on technical or economical infeasibility, physical differences, locational differences, and environmental or energy impact differences when comparing a proposed project with a project previously subject to that BACT.

3.2.4 Air Quality Monitoring

An application for a PSD permit requires an analysis of ambient air quality in the area affected by the proposed facility or major modification. For a new major facility, the affected pollutants are those that the facility would potentially emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate.

Ambient air monitoring for a period of up to one year, but no less than four months, is required. Existing ambient air data for a location in the vicinity of the proposed project is acceptable if the data meet FDER quality assurance requirements. If not, additional data would need to be gathered. There are guidelines available for designing a PSD air monitoring network in EPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration."

FDER may exempt a proposed major stationary facility or major modification from the monitoring requirements with respect to a particular pollutant if the emissions increase of the pollutant from the facility or modification would cause air quality impacts less than the de minimis levels (see Table 3-4).

3.2.5 Ambient Impact Analysis

A source impact analysis is required for a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate. Specific atmospheric dispersion models are required in performing the impact analysis. The analysis should demonstrate the project's compliance with AAQS and allowable PSD increments. The impact analysis for criteria pollutants may be limited to only the new or modified source if the net increase in impacts due to the new or modified source is below significant impact levels.

Typically, a five-year period is used for the evaluation of the highest, second-highest short-term concentrations for comparison to AAQS or PSD increments. The term "highest, second-highest" refers to the highest of the second-highest concentrations at all receptors. The second-highest concentration is considered because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than five years of meteorological data are used in the modeling analysis, the highest concentration at each receptor is normally used.

3.2.6 Additional Impact Analysis

The PSD rules also require analyses of the impairment to visibility and the impact on soils and vegetation that would occur as a result of the project. A visibility impairment analysis must be conducted for PSD Class I areas. Impacts due to commercial, residential, industrial, and other growth associated with the source must be addressed.

3.2.7 Good Engineering Practice Stack Height

In accordance with Chapter 17-2, FAC, the degree of emission limitation required for control of any pollutant should not be affected by a stack height that exceeds GEP, or any other dispersion technique. GEP stack height is defined as the highest of:

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

   $$Hg = H + 1.5\ L$$

   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)
3. A height demonstrated by a model or field study.

The 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 higher or lower.

3.3 RULE APPLICABILITY

The sulfuric acid production increase at Seminole is classified as a major modification to a major facility subject to both state and federal regulations as set forth in Chapter 17-2, FAC. The facility is located in an area classified as attainment for each of the regulated air pollutants. The proposed modification to the Nos. 4, 5 and 6 sulfuric acid plants will result in significant increases in sulfur dioxide and acid mist emissions as defined by Rule 17-2.500(2)(e)2, FAC, and will therefore be subject to PSD preconstruction review requirements in accordance with FAC Rule 17-2.500. This will include a determination of Best Available Control Technology, an air quality review, Good Engineering Practice stack height analysis and an evaluation of impacts on soils, vegetation and visibility.

As the estimated increase in the emissions of nitrogen oxides as a result of the proposed project will be less than significant, no PSD preconstruction review is required.

TABLE 3-1
CHANGES IN EMISSION RATES

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

	Sulfuric Acid Plant		
	4	5	6
Permit Allowable Conditions			
SO2 (lb/ton)	4.0	4.0	4.0
(lb/hr)	320.0	320.0	320.0
(TPY)	1401.6	1401.6	1401.6
Mist (lb/ton)	0.15	0.15	0.15
(lb/hr)	12.0	12.0	12.0
(TPY)	52.6	52.6	52.6
Average Operating Hours	8760	8760	8760
Actual Conditions			
SO2 (lb/ton)	3.39	3.35	3.32
(lb/hr)	282	287	288
(TPY)	1142.1	1240.6	1208.2
Mist (lb/ton)	0.052	0.069	0.107
(lb/hr)	4.30	5.92	9.3
(TPY)	17.4	25.6	39.0
Average Operating Hours	8100	8645	8390
Proposed Conditions			
SO2 (lb/ton)	4.0	4.0	4.0
(lb/hr)	380.0	380.0	380.0
(TPY)	1164.4	1164.4	1164.4
Mist (lb/ton)	0.15	0.15	0.15
(lb/hr)	14.25	14.25	14.25
(TPY)	62.4	62.4	62.4
Annual Operating Hours	8760	8760	8760

* Existing permits allow operation above 80 tph as long as the emission limits are not exceeded.

NOTE:

See Appendix for calculations of emission rates.

TABLE 3-2

SULFURIC ACID PLANTS
NET EMISSION INCREASES(1)

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Pollutant	Emissions (tons/yr) Sulfuric Acid Plant		
	4	5	6
SO2			
Present (actual)	1142.1	1240.6	1208.2
Proposed	1664.4	1664.4	1664.4
Change	522.3	423.8	456.2
Total Increase		1402.3	
Significant Increase (3)		40	
ACID MIST			
Present (actual)	17.4	25.6	39.0
Proposed	62.4	62.4	62.4
Change	45.0	36.8	23.4
Total Increase		105.2	
Significant Increase (3)		7	
NOx			
Present (actual) (2)	38.9	42.5	41.6
Proposed (2)	49.9	49.9	49.9
Change	11.0	7.4	8.3
Total Increase		26.7	
Significant Increase (3)		40	

(1) See Appendix for emission calculations.
(2) NOx emissions based on recent permits issued by FDER for similar sources.
(3) Presented in Table 500.2, Chapter 17-2, FAC.

TABLE 3-3
MAJOR FACILITY CATEGORIES

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Fossil fuel fired steam electric plants of more than 250 MMBTU/hr heat input
Coal cleaning plants (with thermal dryers)
Kraft pulp mills
Portland cement plants
Primary zinc smelters
Iron and steel mill plants
Primary aluminum ore reduction plants
Primary copper smelters
Municipal incinerators capable of charging more than 250 tons of refuse per day
Hydrofluoric acid plants
Sulfuric acid plants
Nitric acid plants
Petroleum refineries
Lime plants
Phosphate rock processing plants
Coke oven batteries
Sulfur recovery plants
Carbon black plants (furnace process)
Primary lead smelters
Fuel conversion plants
Sintering plants
Secondary metal production plants
Chemical process plants
Fossil fuel boilers (or combinations thereof) totaling more than 250 million BTU/hr heat input
Petroleum storage and transfer units with total storage capacity exceeding 300,000 barrels
Taconite ore processing plants
Glass fiber processing plants
Charcoal production plants

TABLE 3-4
REGULATED AIR POLLUTANTS - SIGNIFICANT EMISSION RATES

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Pollutant	Significant Emission Rate tons/yr	De Minimis Ambient Impacts $\mu g/m^3$
CO	100	575 (8-hour)
NOx	40	14 (NO_2, Annual)
SO_2	40	13 (24-hour)
Ozone	40 (VOC)	-
PM	25	10 (24-hour)
PM10	15	10 (24-hour)
TRS (including H2S)	10	0.2 (1-hour)
H_2SO_4 mist	7	-
Fluorides	3	0.25 (24-hour)
Vinyl Chloride	1	15 (24-hour)
	pounds/yr	
Lead	1200	0.1 (Quarterly avg)
Mercury	200	0.25 (24-hour)
Asbestos	14	-
Beryllium	0.8	0.001 (24-hour)

TABLE 3-5
AMBIENT AIR QUALITY STANDARDS

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

			USEPA (National)			
	FDER (State)		Primary		Secondary	
Pollutant	$\mu g/m^3$	PPM	$\mu g/m^3$	PPM	$\mu g/m^3$	PPM
SO_2, 3-hour	1,300	0.5	-	-	1300	0.5
24-hour	260	0.1	365	0.14	-	-
Annual	60	0.02	80	0.03	-	-
PM10, 24-hour	150	-	150	-	150	-
Annual	50	-	50	-	50	-
CO, 1-hour	40,000	35	40,000	35	-	-
8-hour	10,000	9	10,000	9	-	-
Ozone, 1-hour	235	0.12	235	0.12	235	0.12
NO_2, Annual	100	0.053	100	-	100	-
Lead, Quarterly	1.5	-	1.5	-	1.5	-

TABLE 3-6
PSD INCREMENTS

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Pollutant	Allowable PSD Increments (State/National) Class I $\mu g/m^3$	Class II $\mu g/m^3$	Class III $\mu g/m^3$
TSP, Annual	5	19	37
24-hour	10	37	75
SO_2, Annual	2	20	40
24-hour	5	91	182
3-hour	25	512	700
NO_2, Annual	2.5	25	50

Sulfuric Acid Manufacturing

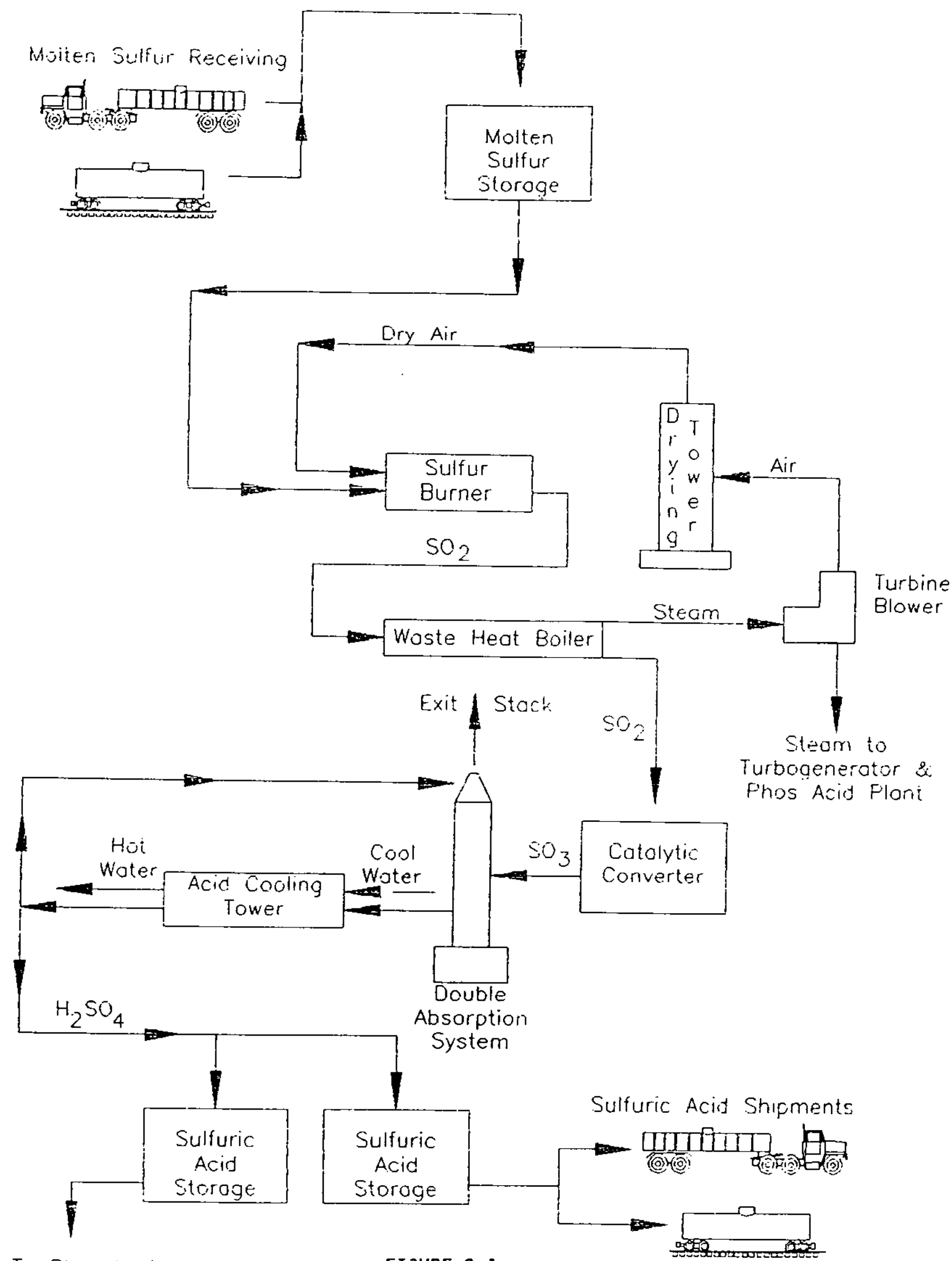


FIGURE 3-1
SULFURIC ACID MANUFACTURING PROCESS FLOW

M-S 6-22-89 GRL

SEMINOLE FERTILIZER CORPORATION

SEMINOLE

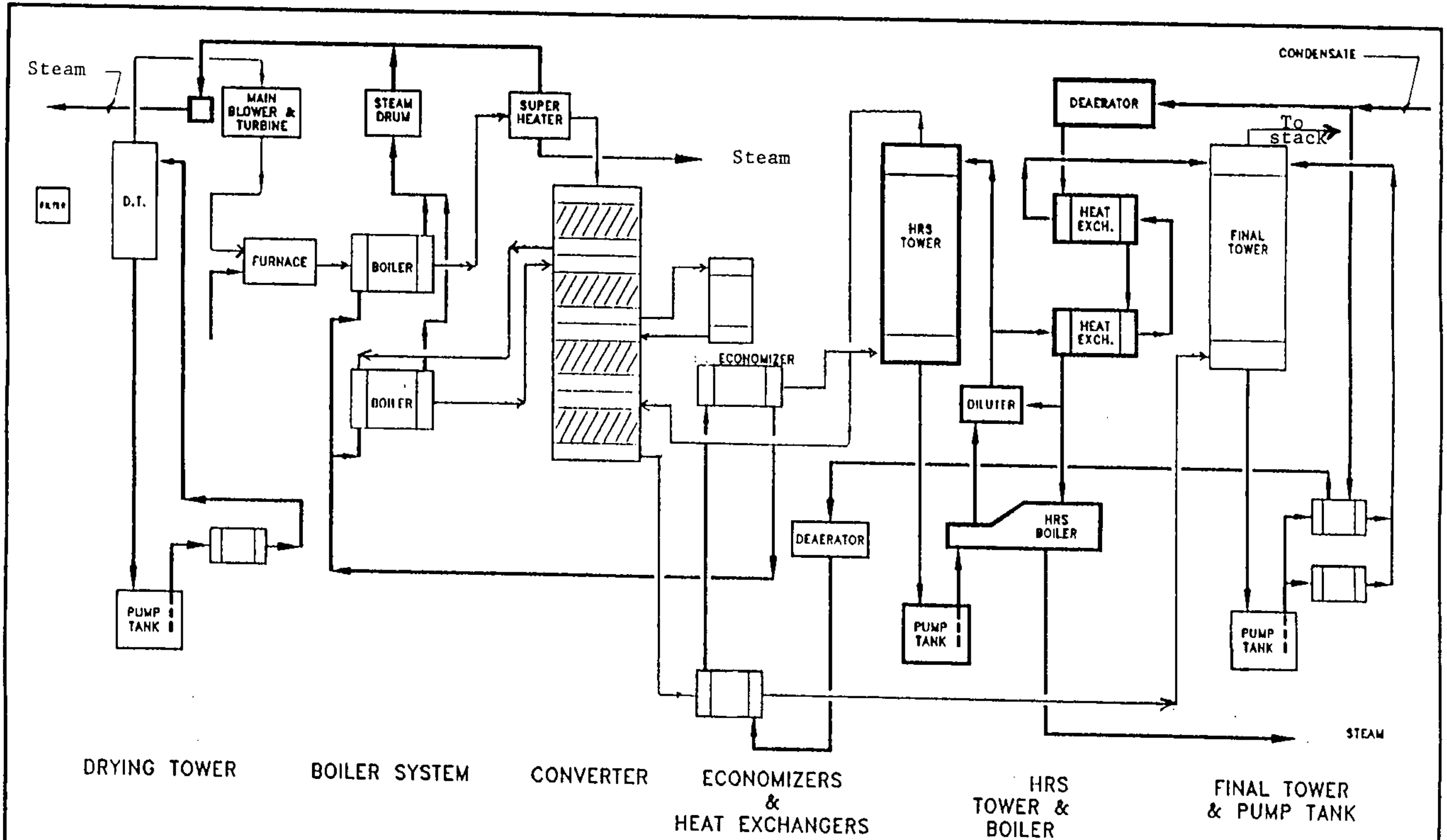


FIGURE 3-2
SULFURIC ACID PLANT PROCESS FLOW DIAGRAM

SEMINOLE FERTILIZER CORPORATION

SEMINOLE FERTILIZER CORPORATION
BARTOW, FLORIDA

PROCESS FLOW DIAGRAM

4.0 BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology (BACT) is required to control air pollutants emitted from newly constructed major sources or from modification to the major emitting facilities if the modification results in significant increase in the emission rate of regulated pollutants (see Table 3-4 for significant emission levels).

The emission rate increases proposed by Seminole have been summarized in Table 3-2. The sulfur dioxide and sulfuric acid mist emissions increase from the proposed project will represent a significant increase while nitrogen oxides emissions will be less than significant.

4.1 EMISSION STANDARDS FOR SULFURIC ACID PLANTS

Federal New Source Performance Standards (NSPS) for sulfuric acid plants became effective on August 17, 1971. These standards are codified in 40CFR60, Subpart H and require sulfur dioxide emissions to be limited to no more than 4.0 pounds per ton of 100 percent acid produced and require that sulfuric acid mist emissions be limited to no more than 0.15 pounds per ton of 100 percent acid produced. Additionally, the standards limit the opacity of the emissions from new sulfuric acid plants to less than 10 percent. There are no emission standards for nitrogen oxides from sulfuric acid plants.

EPA reviewed the New Source Performance Standards for sulfuric acid plants in 1985 (EPA-450/3-85-012). At that time, it was concluded that because of the expected variations in sulfur dioxide emissions "... the level of SO_2 emissions as specified in the current NSPS (should) not be changed at this time." Regarding the NSPS for sulfuric acid mist, EPA concluded, "Making the acid mist standard more stringent is not believed to be practical at this time because of the need to provide a margin of safety due to in-plant operating fluctuations, which introduce variable quantities of moisture into the sulfuric acid production line." It is our understanding that there has been no change in EPA philosophy related to sulfuric acid plants since the 1985 review.

A review of BACT/LAER determinations published in the EPA Clearinghouse indicates that no new control alternatives have been applied to sulfuric acid plants that would result in a consistent reduction in sulfur dioxide emission below 4.0 pounds per ton of acid nor would result in a consistent reduction of sulfuric acid mist emissions below 0.15 pounds per ton of acid. No control technologies for nitrogen oxides are discussed in either the NSPS review or in BACT/LAER determinations.

4.2 CONTROL TECHNOLOGIES

The control of sulfur dioxide and sulfuric acid mist emissions from sulfuric acid plants can be achieved by various processes. The process of choice for sulfur dioxide control has been dual absorption and the process of choice for controlling sulfuric acid mist emission has been one of the various types of fiber mist eliminators. These processes have been selected based on cost, product recovery, the formation of no undesirable by-products and the fact that neither introduces operating processes that are foreign to plant personnel.

EPA published a review of NSPS for sulfuric acid plants in March 1985 (EPA-450/3-85-012). In that report, EPA reviewed 46 sulfuric acid plants built between 1971 and 1985. Of these 46 plants, 40 used the dual absorption process for sulfur dioxide control with the remaining six using some type of acid gas scrubbing. All 46 plants used the high efficiency mist eliminators for acid mist control. The control of nitrogen oxides in sulfuric acid plants has not been addressed to date because of the low concentration of nitrogen oxides in the tail gases of sulfuric acid plants. The nitrogen oxide concentration in the tail gas stream of a sulfuric acid plant has been measured in the range of 10 - 20 parts per million.

In the March 1985 review (EPA-450/3-85-012), EPA reviewed the control technologies that had been used to control sulfur dioxide and sulfuric acid mist emissions from sulfuric acid plants. The alternatives included the dual absorption process, ammonia scrubbing, sodium sulfite-bisulfite scrubbing, and molecular sieves for sulfur dioxide control and filter type mist eliminators and electrostatic precipitators for sulfuric acid mist control. A review of the EPA BACT/LAER Clearinghouse information indicated that no other control alternatives have been considered for sulfuric acid plants. No control alternatives were addressed for nitrogen oxides control in either the 1985 EPA NSPS review or in the BACT/LAER Clearinghouse.

4.2.1 Sulfur Dioxide Control - Dual Absorption Process

The dual absorption process has become the SO_2 control system of choice within the sulfuric acid industry since the promulgation of NSPS in 1971. Of the 46 new sulfuric acid plants constructed between 1971 and 1985, 40 employed this process for sulfur dioxide control. The process offers the following advantages over other SO_2 control technologies:

1. 99.4 percent of the sulfur is converted to sulfuric acid compared with 97.7 percent conversion with a single absorption plant followed by scrubbing;

2. there are no by-products produced;

3. there are no new operating processes that plant personnel must become familiar with;

4. the process permits higher inlet sulfur dioxide concentrations resulting in a reduction in equipment size;

5. there is no reduction in overall plant operating time efficiency; and

6. there is no increase in manpower requirements.

The dual absorption process is capable of reducing sulfur dioxide emission rates to within 4.0 pounds per ton of acid as required by New Source Performance Standards. Recent BACT determinations (in 1992) also reflect a sulfur dioxide emission limit of 4.0 pounds per ton using the double absorption process.

4.2.2 Sulfuric Acid Mist Control - Fiber Mist Eliminators

The 46 new sulfuric acid plants constructed between 1971 and 1985, all used the fiber type mist eliminators for sulfuric acid mist control. Operations demonstrated that these types of mist eliminators can control sulfuric acid mist emissions to less than 0.15 pounds per ton of sulfuric acid.

The mist eliminators are the control of choice for sulfuric acid mist within the sulfuric acid industry because they require very little operation and maintenance attention and because of the small space requirement associated with these devices. The disadvantage of this type of mist eliminator is that the pressure drop across the elements varies from five to 15 inches of water; resulting in an increase in operating utility costs.

Recent BACT determinations (in 1992) also reflect a sulfuric acid mist emission rate of 0.15 lb/ton using fabric mist eliminators.

4.3 CONCLUSION

Based upon the discussion presented in the previous section, the dual absorption process is selected by Seminole as the control alternative limiting sulfur dioxide emissions to 4.0 pounds per ton of acid and the fiber type high efficiency mist eliminator for limiting sulfuric acid mist emissions to 0.15 pounds per ton of acid. There is no effective and demonstrated technology for controlling nitrogen oxides emissions from sulfuric acid plants.

Lower emission limits are not proposed in order to maintain an operation margin that will allow for the fluctuation in the emission rates (see attached graph of the continuous emissions monitoring data for sulfur dioxide).

5.0 AIR QUALITY REVIEW

The air quality review required of a PSD construction permit application potentially requires both air quality modeling and air quality monitoring. The air quality monitoring is required when the impact of air pollutant emission increases and decreases associated with a proposed project exceed the de minimis impact levels defined by Rule 17-2.500(3)(e)1, FAC or in cases where an applicant wishes to define existing ambient air quality by monitoring rather than by air quality modeling. The air quality modeling is required to provide assurance that the increases and decreases in air pollutant emissions associated with the project, combined with all other applicable air pollutant emission rate increases and decreases associated with new sources affecting the project area, will not cause or contribute to an exceedance of the applicable PSD increments (defined by Rule 17-2.310, FAC). Additionally, the air quality modeling is required to provide assurance that the emissions from the proposed project, together with the emissions of all other air pollutants in the project area, will not cause or contribute to a violation of any ambient air quality standard.

The de minimis impact levels (see Table 3-4) for the air pollutants associated with the proposed project are:

Sulfur Dioxide	-	13.0 micrograms per cubic meter, 24-hour average
Sulfuric Acid Mist	-	NA

The air quality review for the proposed project included emission increases associated with the three sulfuric acid plants.

The modeling that has been conducted demonstrates that the net impact of the sulfur dioxide emissions increases addressed in this application are less than the de minimis impact levels defined by Rule 17-2.500, FAC and presented in Table 3-4. Therefore, air quality monitoring is not required.

The air quality modeling also demonstrates that the impact of the sulfur dioxide emission increases from the three sulfuric acid plants is less than significant for the 3-hour, 24-hour and annual periods. The modeling further shows the impact of sulfuric acid mist emissions associated with the proposed project is not expected to be of concern because of the low concentrations.

In the following sections, the air quality modeling for sulfur dioxide and sulfuric acid mist is described. Air quality modeling for nitrogen oxides is not required as the increase in nitrogen oxides emissions associated with the increased production in the sulfuric acid plants is less than 40 tons per year (less than significant emission rate increase).

5.1 AIR QUALITY MODELING FOR SULFUR DIOXIDE

As previously described, the emissions rate of sulfur dioxide used for air quality modeling purposes is the proposed increase in the emission rate associated with the increased sulfuric acid production rates of plant Nos. 4, 5 and 6. Table 5-1 contains modeling input parameters used in the ambient air quality impacts analysis.

5.1.1 Area of Significant Impact

The impact analysis of the net increase in sulfur dioxide emissions was conducted using the Industrial Source Complex-Short Term 2 (ISC-ST2) air quality model, Version 92062. The Area of Significant Impact (ASI) modeling was conducted in accordance with guidelines established by EPA and published in the document, Guideline for Air Quality Modeling, (Revised), July 1986. The meteorological data used with the model were for Tampa, Florida and represented the period 1982-1986.

The sulfur dioxide emissions modeled to determine the ASI were the net increase in emissions associated with the increases in the production rate of the three existing sulfuric acid plants. The currently permitted sulfur dioxide emissions were represented as negative inputs while the proposed sulfur dioxide emissions from the proposed project were represented as positive inputs to the model. It should be noted that the actual sulfur dioxide emissions are very close to the allowable emission limits as reflected by CEM data (attached) and therefore the allowable emissions were used in the modeling.

The ASI modeling included receptors established by the polar grid system extending to 3000 meters from the plant. Six sets of receptor rings were placed at distances ranging from 1360 to 3000 meters from the plant with receptors placed at 10 degree intervals from 10° to 360° on each receptor ring. The receptor ring at 1360 meters approximately corresponds to the nearest property boundary (see Figure 2-2).

The results of the ASI modeling, summarized in Table 5-2, demonstrate that the impacts of emission increases associated with the proposed project are less than significant for the three-hour, 24-hour and annual time periods. The ASI modeling also demonstrated that the impacts from the proposed project generally decrease beyond 2500 meters (see Table 5-2).

Also, since the predicted 24-hour sulfur dioxide impacts are less than the de minimis impact level of 13 μg/m3, ambient air monitoring is not required for the proposed project.

Since the predicted sulfur dioxide impacts from the proposed project are less than significant levels, no additional modeling was required for the Class II area analysis. However, a Class I area PSD increment analysis was performed to satisfy the National Park Service (NPS) concerns regarding the 24-hour period sulfur dioxide increment consumption.

5.1.2. Class I Area PSD Increment Analysis

The Class I area PSD increment analysis was performed for the 24-hour period to address the NPS concerns on increment violations. To evaluate the Class I area PSD increment consumption, the emission rates of all significant sources identified by FDER as being permitted after the applicable baseline date are input to the model along with emission rate reductions after the baseline date. The impacts of these emission rate increases and decreases are then compared with the allowable PSD increment for the applicable period of time. An extensive sulfur dioxide source inventory (previously submitted to FDER) was used for the modeling. The MESOPUFF II long range transport model (recommended by the NPS) was used to predict the PSD increment consumption at Chassahowitzka National Wildlife Refuge for sources beyond 50 kilometers from Chassahowitzka. The ISC-ST2 model was used to predict the PSD increment consumption for sources within 50 kilometers from Chassahowitzka.

The receptors chosen for the PSD increment modeling were suggested by FDER. The results of the PSD increment modeling are presented in Table 5-3. It is anticipated that the proposed project will not cause or significantly contribute to any violation of the allowable 24-hour PSD increment.

A detailed discussion of the modeling protocol is presented in the Appendix.

5.2 AIR QUALITY MODELING FOR SULFURIC ACID MIST

No ambient air quality standards, PSD increments or significant impact levels have been established for sulfuric acid mist. The FDER Air Toxics Policy (January 1991) does not include a No Threat Level (NTL) for sulfuric acid mist.

Ambient air quality impacts of acid mist for the proposed project corresponding to the increase in acid mist emissions for No. 4, 5, and 6 sulfuric acid plants can be estimated based on a ratio of the sulfur dioxide impacts. The predicted sulfuric acid mist impacts are summarized in Table 5-4. Considering the expected small magnitude of the sulfuric acid mist emissions from other sources and the distances of these sources from Seminole, it was assumed that, individually or collectively, the sources would not result in a significant contribution to ambient acid mist levels in the project area.

The maximum sulfuric acid mist impacts from the proposed project are predicted to occur at locations which are both remote and far from the population centers. Also, the sulfuric acid mist will be controlled by the Best Available Control Technology. As a result, the sulfuric acid mist emissions are not expected to be of concern.

TABLE 5-1

AIR QUALITY MODELING PARAMETERS

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

No. 4, 5 and 6 H_2SO_4 Plants	Combined Emission Rates SO_2 (g/s)	Combined Emission Rates Acid Mist (g/s)	Ht (m)	Dia (m)	Vel (mps)	Temp (°K)
10 Existing	-121.07	-4.54	60.98	2.06	14.19	347
11 Proposed	143.77	5.39	60.98	2.06	19.02	355

TABLE 5-2

SUMMARY OF SULFUR DIOXIDE SIGNIFICANT IMPACT ANALYSIS

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	SULFUR DIOXIDE IMPACT ($\mu g/m^3$)* ANNUAL	3-HOUR	24-HOUR
1982	0.19 (2500m,70°)	16.20 (2000m, 110°)	3.79 (2000m, 360°)
1983	0.12 (3000m,80°)	17.29 (1500m, 70°)	3.60 (3000m, 250°)
1984	0.16 (3000m,90°)	18.89 (1750m, 90°)	4.56 (2000m, 90°)
1985	0.25 (2500m,70°)	21.22 (1500m, 80°)	3.35 (1750m, 80°)
1986	0.30 (2500m,90°)	19.30 (1360m, 80°)	4.62 (1750m, 90°)
Significant Impact (17-2.100(171)(a),FAC	1.0	25.0	5.0
De minimis Impact 17-2.500(3)(e)1,FAC	NA	NA	13.0

* Based on the increase in sulfur dioxide emissions from the proposed project of 180 lbs/hr, 22.7 g/s.

TABLE 5-3

CLASS I AREA SO2 PSD INCREMENT ANALYSIS

SUMMARY OF MESOPUFF/ISC-ST AIR QUALITY MODELING ANALYSES

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

Option(1)	Impact of All Increment Consuming Sources(2)	Impact of Emissions from Proposed Seminole Project	
	Max 24-hour Impact > 5 μg/m3 When Seminole Impact >0.07 μg/m3 (Julian Day 1986) (μg/m3)	Max 24-hour Period (Julian Day 1986)	Max 24-hour Impact at any Class I Receptor (Julian Day 1986) (μg/m3)
Gaussian Vertical Dispersion Algorithm			
0	5.13	329	0.079

(1) Gaussian Dispersion Algorithm used for Vertical Dispersion

Option	Technical Model Options Employed
0	Gaussian Dispersion Only

(2) 24-Hour SO_2 Impact of all PSD increment consuming sources on Chassahowitzka Class I Area.

NOTE: The maximum 24-hour impact of all PSD increment consuming sources on Class I area is 6.20 micrograms per cubic meter (Day 135). The maximum 24-hour of the proposed project on the Class I area is 0.30 micrograms per cubic meter (Day 196).

TABLE 5-4

SUMMARY OF ACID MIST IMPACT ANALYSIS

SEMINOLE FERTILIZER CORPORATION
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	24-HR ACID MIST IMPACT ($\mu g/m^3$)
1982	0.14
1983	0.13
1984	0.10
1985	0.12
1986	0.17

NOTE: Predicted impacts are based on a ratio of acid mist to sulfur dioxide emissions and the magnitude of the maximum predicted sulfur dioxide impacts.

6.0 GOOD ENGINEERING PRACTICE STACK HEIGHT

The criteria for good engineering practice stack height in Rule 17-2.270 states that the height of a stack should not exceed the greater of 65 meters (213) feet or the height of nearby structures plus the lesser of 1.5 times the height or cross-wind width of the nearby structure. This stack height policy is designed to prevent achieving ambient air quality goals solely through the use of excessive stack heights and air dispersion.

Based on this policy, the limiting height for the two sulfuric acid plant stacks is 213 feet. Seminole's stacks are less than 213 feet in height above-grade. This will satisfy the good engineering practice (GEP) stack height criteria. It should be noted that the building wake effects were included in the modeling in accordance with the ISC-ST2 modeling guidelines.

7.0 IMPACTS ON SOILS, VEGETATION AND VISIBILITY

7.1 IMPACT ON SOILS AND VEGETATION

The U. S. Environmental Protection Agency was directed by Congress to develop primary and secondary ambient air quality standards. The primary standards were to protect human health and the secondary standards were to:

> "... protect the public welfare from any known or anticipated adverse effects of a pollutant."

The public welfare was to include soils, vegetation and visibility.

As a basis for promulgating the air quality standards, EPA undertook studies related to the effects of all major air pollutants and published criteria documents summarizing the results of the studies. The studies included in the criteria documents were related to both acute and chronic effects of air pollutants. Based on the results of these studies, the criteria documents recommended air pollutant concentration limits for various periods of time that would protect against both chronic and acute effects of air pollutants with a reasonable margin of safety.

The air quality modeling that has been conducted as a requirement for the PSD application demonstrates that the levels of sulfur dioxide expected from the proposed project is expected to have a less than significant impact at the project site. As a result, it is reasonable to conclude that there will be no adverse effect to the soils, vegetation or visibility of the area.

The Seminole property and the surrounding areas are comprised of mining lands (phosphate), flatwoods, marshes, and sloughs. The soils of the area are primarily sandy and are typically low in both clay and silt content. These characteristics and the semi-tropic climatic factors of high temperature and rainfall are the natural factors which determine the terrestrial communities of the region.

The land in the vicinity of Seminole supports various plant communities. Much of the natural vegetation on the site and the surrounding areas has been altered due to mining and industrial use; primarily the phosphate fertilizer industry. As a result of mining and industrial activity, there is very little undisturbed land in existence in the vicinity of the Seminole facility. As a result, no adverse impacts from the proposed project are expected on the soils and vegetation in the vicinity of the facility.

7.2 GROWTH RELATED IMPACTS

The proposed modification will require no increase in personnel to operate the sulfuric acid plants. Also, the increase in sulfuric acid production may cause a slight increase in delivery truck tanker traffic but will have a negligible impact on traffic in the area as compared with traffic levels that presently exist. Therefore, no additional growth impacts are expected as a result of the proposed project.

7.3 VISIBILITY IMPACTS

The proposed project will result in an increase in the sulfur dioxide emissions which has the potential for adverse impacts on visibility. However, EPA has noted in discussions on visibility models that the sulfates formation resulting from sulfur dioxide emissions becomes a factor beyond 200 kilometers. Since the air modeling predicts less than significant sulfur dioxide impacts in the vicinity of the facility, it can be concluded that the proposed project is not expected to have an adverse impact on visibility in the area.

7.4 IMPACTS ON AIR QUALITY RELATED VALUES FOR CLASS I AREA

In the previous sections, the impact of the sulfur dioxide emission increases on air quality related values within an area of significant impact of the emissions was addressed. The analysis addressed in this section extends the review of the impact of increased emissions on air quality related values to the Chassahowitzka Class I PSD area; an area in excess of 100 kilometers northwest of the Seminole facility.

Air quality modeling with the MESOPUFF 2.0 air quality model indicates that the Class I area impact of sulfur dioxide emission increases expected at the Seminole facility will, at a maximum, be in the range of 0.3 micrograms per cubic meter, 24-hour average, depending upon the technical options incorporated in the MESOPUFF model.

7.4.1 Impact on Vegetation

The response of vegetation to air pollutants is influenced by the concentration of the pollutant, the duration of the exposure and the frequency of the exposure. The pattern of exposure expected from a single facility is that of a few episodes of relatively high concentrations interdispersed with long periods of no exposure or extremely low concentrations. This is the pattern of exposure that would be expected from sulfur dioxide and acid mist emissions from the proposed project at Chassahowitzka; with the estimated highest sulfur dioxide impact as estimated in the preceding paragraph.

Vegetation responds to a dose of an air pollutant with a dose being defined as the product of the concentration of the pollutant and the duration of the exposure. The impact of the sulfur dioxide emissions on Chassahowitzka regional vegetation was assessed by comparing pollutant doses that have been projected with air quality modeling to threshold doses reported in the literature.

Sulfur dioxide damage to vegetation can be grouped into two general categories: acute and chronic. Acute damage is caused by short-term exposure to relatively high concentrations of sulfur dioxide. This damage is usually characterized by a yellowing of leaf tips with a sharp, well defined separation between the damaged and healthy areas of a leaf. In pine trees, injury usually first occurs at the base of the youngest needles (the newest tissue on the plant).

Damaged plants typically show decreased growth and yield. These effects vary widely between species but studies have shown a rough correlation between the loss and yield and the exposure dose. These studies showed approximately a 10 percent yield loss for each 10-fold increase in sulfur dioxide dose beyond 260 micrograms per cubic meter-hour.

Susceptibility to acute damage varies widely with plant species and also with the time of exposure. For example, alfalfa can tolerate 3250 micrograms per cubic meter for one hour (3250 micrograms per cubic meter-hour dose), but only 1850 micrograms per cubic meter for two hours (3700 micrograms per cubic meter-hour dose). Table 7-1 shows the sulfur dioxide concentration/time thresholds for several plant species common to Florida.

The vegetation in the Chassahowitzka area is characterized by flatwoods, brackish-water, marine and halothytic terrestrial species. Predominant tree species are slash pine, laurel oak, sweet gum and palm. Other plants in the area include needlegrass rush, seashore saltgrass, marsh hay and red mangrove.

A study of the tolerance of native Florida species to sulfur dioxide (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak and mangrove exposed to 1300 micrograms per cubic meter of sulfur dioxide for 8-hours were not visibly damaged. This is consistent with the results reported in Table 7-1. Another study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a broad range of plants ranging from sensitive to tolerant were visibly injured when exposed to a sulfur dioxide concentration of 920 micrograms per cubic meter for a 3-hour period.

Acute injury results from a plants inability to quickly convert absorbed sulfur dioxide into the sulfate ion; an essential nutrient to plants. Chronic injury, on the other hand, results from a build-up of sulfate in tissue to the point where it becomes toxic. This sulfate build-up occurs over a relatively long period of time. Symptoms include a reduction in chlorophyll production resulting in decreased photosynthesis and yellow or reddish areas on leaves in a mottled pattern. In pines, sulfate injury is typically shown first at tips of older needles (the oldest tissue in the needle).

Chronic injury can result from sulfur dioxide exposures that are much lower than is required for acute injury. Unfortunately, there is a lack of quantitative experimental data for long term effects of sulfur dioxide exposure. The lowest average concentration for which chronic injury has been shown is 80 micrograms per cubic meter. The Environmental Protection Agency has therefore established an ambient air quality standard of 80 micrograms per cubic meter, annual average. The Florida Department of Environmental Regulation adopted a more conservative standard of 60 micrograms per cubic meter, annual average.

The maximum expected concentrations of acid mist in the Chassahowitzka area resulting from the increased emissions from Seminole will be less than four percent of the expected less than significant sulfur dioxide impacts. Furthermore, it would be expected that by the time acid mist droplets have traveled over 100 kilometers from Seminole to the Chassahowitzka area, the droplets would have reacted with particles in the atmosphere to produce a sulfate salt.

Salt deposition concentrations in coastal areas are in the range of 25-300 pounds per acre per year and may be as high as 4000 pounds per acre per year on exposed shorelines. Sulfates can account for 5 - 6 percent of the total salt; resulting in a deposition rate in the range of 1-200 pounds per acre per year.

One study (Mulchi Armbruster, 1975) demonstrated leaf damage in reduced yields in corn and soybeans with a salt deposition of 169 - 339 pounds per acre per year. Another study (Curtis, 1975) reported that broad leaf plants absorbed greater amounts of salt than do pines, probably due to leaf shape. It has been found that deciduous trees begin to exhibit adverse effects to salt exposure concentrations in the range of 100 micrograms per cubic meter (DeVine, 1975). The same study reported no observed injury to plants with long-term exposures to salt spray of 40 micrograms per cubic meter.

The sulfate concentrations resulting from acid mist emissions from Seminole are well below concentrations which have been reported to produce vegetation damage.

7.4.2 Impact on Soils

The major soil classification in the Chassahowitzka area is Weeki Wachee-Durbin muck. This is an euic, hyderthermic typic sufihemist that is characterized by high levels of sulfur and organic matter. This soil is flooded daily with the advent of high tide and the pH ranges between 6.1 and 7.8. The upper level of this soil may contain as much as four percent sulfur (USDA, 1991).

Based upon the maximum expected sulfur dioxide and sulfate concentrations in the Chassahowitzka area resulting from the increased emissions from Seminole, it is not expected that there will be a significant increase in the sulfur content of the native soils.

7.4.3 Impacts on Wildlife

As the predicted sulfur dioxide levels are below those known to cause affects to vegetation, the increased sulfur dioxide and acid mist emissions increases from Seminole are not expected to have any impact on the wildlife in the Chassahowitzka area.

7.4.4. Visibility Impairment Analysis

Visibility impairment analysis could be performed to determine potential visibility effects of the proposed Seminole project in the Chassahowitzka area. A screening approach suggested by EPA (Workbook for Plume Visual Impact Screening and Analysis, 1988) and computerized in a model referred to as VISCREEN could be used for the analysis.

In reviewing the applicability of the VISCREEN model, it was found that the sulfur dioxide and acid mist emission increases from Seminole are not required as model inputs because the distance from the proposed project to the Chassahowitzka area is less than 200 kilometers (Chapter 3 of the VISCREEN users manual). Also, the Class I visibility impairment analysis required by FDER and federal rules are limited to Class I areas within 100 kilometers of a source.

In view of the limitations of the VISCREEN model and the state and federal PSD regulations, no visibility impact analysis was deemed necessary for this project for the following reasons:

1. The distance from Seminole to the Chassahowitzka area is greater than 100 kilometers but less than 200 kilometers,

2. The VISCREEN model is not sensitive to sulfur dioxide emission for source-receptor distances less than 200 kilometers, and

3. The maximum sulfur dioxide impact of the proposed project in the Chassahowitzka area is expected to be in the 0.3 micrograms per cubic meter range, 24-hour average.

TABLE 7-1

SENSITIVITY OF VEGETATION TO SULFUR DIOXIDE

CONCENTRATION - TIME EXPOSURES TO
SULFUR DIOXIDE RESULTING IN DAMAGE TO
SEVERAL SPECIES COMMON TO FLORIDA

<u>Sensitive Plants</u>

Popular	Radish	Cabbage
Lombardy Popular	Cucumber	Broccoli
Black Willow	Squash	Spinach
Elm	Bean	Wheat
American Elm	Pea	Begonia
Southern pines	Soybean	Zinnia
Red Oak	Cotton	Rubber plant
Black Oak	Eggplant	Bluegrass
Sumac	Celery	Ryegrass

<u>Intermediate Plants</u>

Basswood	Yellow Popular	Virginia creeper
Red Oxier Dogwood	Sweetgum	Rose
Maples	Locust	Hibiscus
Red Maple	Eastern Cottonwood	Gladiolus
Elm	Saltgrass	Honeysuckle
Pine	Cucumber	Wisteria
White Oak	Tobacco	Chrysanthemum
Pin Oak	Potato	

<u>Tolerant Plants</u>

Juniper	Pine	Gardenia
Ginkgo	Sumac	Citrus
Dogwood	Cantaloupe	Celery
Oak	Corn	
Live Oak	Lily	

(Continued)

TABLE 7-1 (CONTINUED)

Exposure Time, Hours	Concentration Needed to Produce Injury ($\mu g/m^3$)		
	Sensitive	Intermediate	Tolerant
0.5	2,620 - 10,480	9,170 - 31,440	>26,200
1.0	1,310 - 7,860	6,550 - 26,200	>20,960
2.0	655 - 5,240	3,930 - 19,650	>15,720
4.0	262 - 2,620	1,310 - 13,100	>10,480
8.0	131 - 1,310	524 - 6,550	> 5,240

8.0 CONCLUSION

It can be concluded from the information in this report that the proposed increase in production rates of Seminole's sulfuric acid plants No. 4, 5 and 6 as described in this report will not cause or contribute to a violation of any air quality standard, PSD increment, or any other provision of Chapter 17-2, FAC.

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APPENDIX

EMISSION RATE CALCULATIONS

PERMITTED EMISSION RATE CALCULATIONS (Each Plant)

SULFURIC ACID PLANTS NO. 4, 5, AND 6

SO_2:	=	4.0 lbs/ton x 80 tons/hr
	=	320.0 lbs/hr
		x 8760 hrs/yr x ton/2000 lbs
	=	1401.6 TPY

MIST:	=	0.15 lb/ton x 80 tons/hr
	=	12.0 lbs/hr
		x 8760 hrs/yr x ton/2000 lbs
	=	52.6 TPY

ACTUAL EMISSION RATE CALCULATIONS

(Emissions based on 1990-1991 compliance test results)

SULFURIC ACID PLANT NO. 4

SO_2:	=	282 lbs/hr (average measured)
		x 8100 hrs/yr x ton/2000 lbs
	=	1142.1 TPY

MIST:	=	4.30 lbs/hr (average measured)
		x 8100 hrs/yr x ton/2000 lbs
	=	17.4 TPY

NOx emissions based on the permitted production rate and a NOx emission factor used previously by FDER of 0.12 lb/ton:

NOx:	=	80 tons/hr x 0.12 lb/ton
		x 8100 hrs/yr x ton/2000 lbs
	=	38.9 TPY

SULFURIC ACID PLANT NO. 5

SO_2:	=	287 lbs/hr (average measured)
		x 8645 hrs/yr x ton/2000 lbs
	=	1240.6 TPY

MIST: = 5.92 lbs/hr (average measured)
x 8645 hrs/yr x ton/2000 lbs
= 25.6 TPY

NOx: = 80 tons/hr x 0.12 lb/ton
= 9.6 lbs/hr
x 8645 hrs/yr x ton/2000 lbs
= 41.5 TPY

<u>SULFURIC ACID PLANT NO. 6</u>

SO_2: = 288 lbs/hr (average measured)
x 8390 hrs/yr x ton/2000 lbs
= 1208.2 TPY

MIST: = 9.3 lbs/hr (average measured)
x 8390 hrs/yr x ton/2000 lbs
= 39.0 TPY

NOx: = 80 tons/hr x 0.12 lb/ton
= 9.6 lbs/hr
x 8390 hrs/yr x ton/2000 lbs
= 40.3 TPY

PROPOSED EMISSION RATE CALCULATIONS: (Each Plant)

SULFURIC ACID PLANTS NO. 4, 5 and 6

SO_2: = 95 tons/hr x 4.0 lbs/ton
= 380 lbs/hr
x 8760 hrs/yr x ton/2000 lbs
= 1664.4 TPY

MIST: = 95 tons/hr x 0.15 lb/ton
= 14.3 lbs/hr
x 8760 hrs/yr x ton/2000 lbs
= 62.4 TPY

NOx: = 95 tons/hr x 0.12 lb/ton
= 11.4 lbs/hr
x 8760 hrs/yr x ton/2000 lbs
= 49.9 TPY

NET ANNUAL EMISSION CHANGES

Total Actual SO_2 = (1142.1 + 1240.6 + 1208.2) TPY = 3590.9 TPY

Total Proposed SO_2 = 3 x 1664.4 TPY = 4993.2 TPY

Net Change SO_2 = (4993.2 - 3590.9) TPY = 1402.3 TPY

Total Actual Mist = (17.4 + 25.6 + 39.0) TPY = 82.0 TPY

Total Proposed Mist = 3 x 62.4 TPY = 187.2 TPY

Net Change Mist = (187.2 - 82.0) TPY = 105.2 TPY

Total Actual NOx = (38.9 + 41.5 + 40.3) TPY = 120.7 TPY

Total Proposed NOx = 3 x 49.9 TPY = 149.7 TPY

Net Change NOx = (149.7 - 120.7) TPY = 29.0 TPY

CONTEMPORANEOUS EMISSION CHANGES

Includes SO_2 emissions from gas turbine project permitted by FDER in 1991 (PSD for NOx).

SO_2 = (1402.3 + 36.4) TPY = 1438.7 TPY

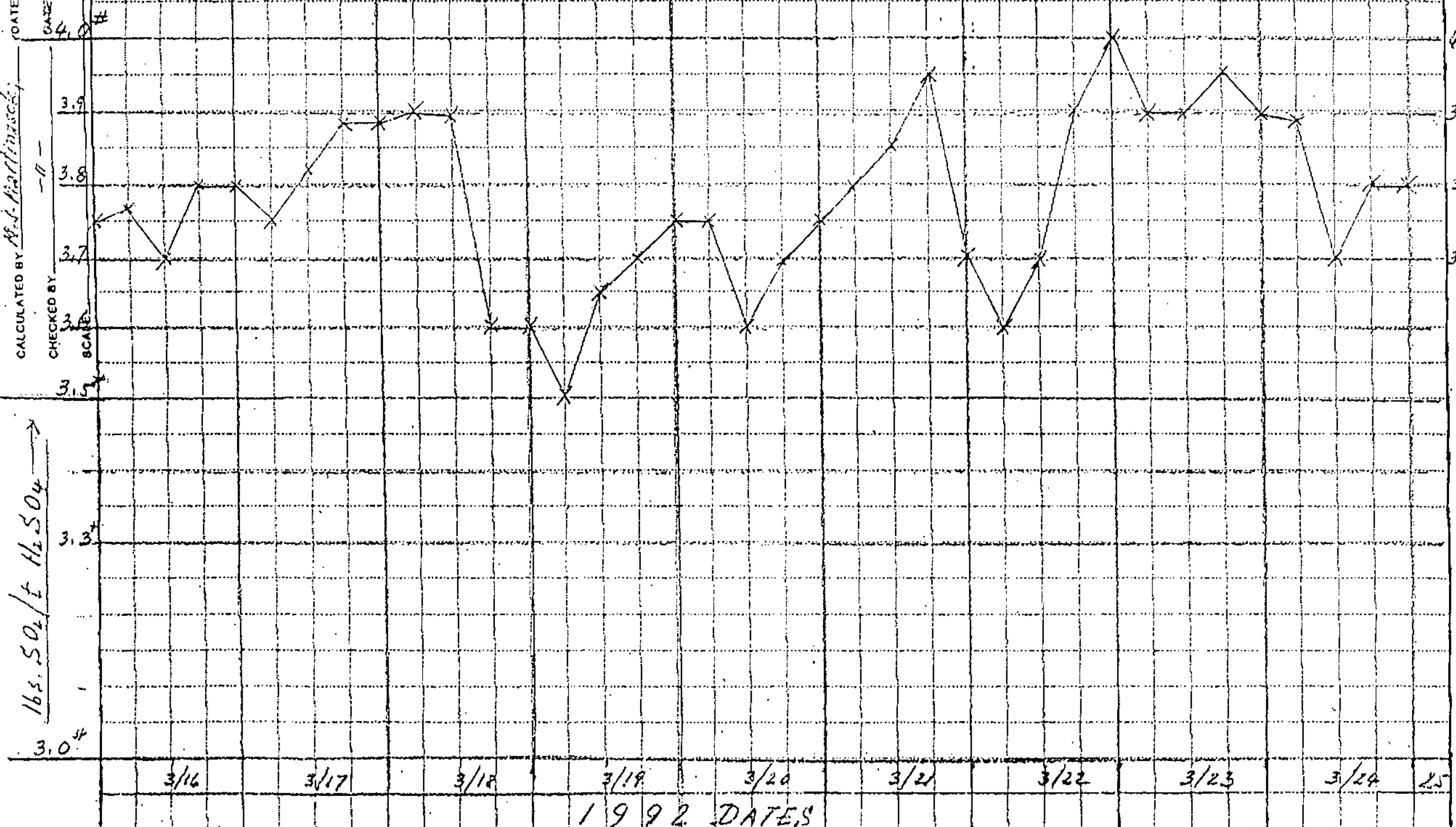
Mist = (105.2 + 0) TPY = 105.2 TPY

NOx = (29.0 + 0) TPY = 29.0 TPY

JOB SO2 EMISSIONS: No. 4 S.A. Plant
SHEET NO. CEM DATA — OF 4#/t ≈ 0.400 PPM
CALCULATED BY M.J. Martinsick — DATE 6-23-92
CHECKED BY -"- — DATE RCM 7-9-92
SCALE T.O. 10/24/90

No. 4 Sulfuric Acid Plant

lbs. SO_2/ton of H_2SO_4



PRODUCTION:										
TPD:	1877	1890	1831	1843	1925	1962	1937	1935	1925	1900
÷TPH:	78.2	78.75	76.3	76.8	80.2	81.75	80.7	80.6	80.2	79.2

MODELING PROTOCOL
MESOPUFF-II MODEL

INTRODUCTION

As a greater number of air pollution sources are permitted under the PSD review process, an increasing concern has developed regarding the cumulative impacts of these sources on distance receptors. These concerns have been related to the consumption of Class I or Class II PSD increments and to the impacts of these sources on non-attainment areas. The conventional air quality models such as the ISC2 are not appropriate for assessing source impacts beyond approximately 50 kilometers because the models do not account for temporal or spacial variations in plume transport direction nor do they limit the downwind transport of a pollutant as a function of wind speed and travel time. To overcome these deficiencies in conventional air quality models, long range transport models such as the MESOPUFF-II have been developed.

The MESOPUFF-II is described in Appendix B (an "Appendix B" model) of the U.S. Environmental Protection Agency (EPA) *Guideline on Air Quality Models* (Revised), 1990. The "Appendix B" models can be used on a case-by-case basis only if they perform functions not available in "Appendix A" models. As previously discussed, the MESOPUFF-II is capable of accounting for several long-range transport and dispersion phenomena that are not addressed in "Appendix A" air quality models.

The version of MESOPUFF-II utilized by Koogler & Associates was obtained from the National Park Service (NPS) in early 1992. The model is currently recommended by EPA and NPS for estimating the impacts of sources that are 50 kilometers or more from a receptor. "Appendix A" models, such as the ISC2, are recommended for source-receptor distances less than 50 kilometers (EPA, 1990).

The MESOPUFF-II is a short-term plume transport model that mathematically simulates the transport and dispersion of pollutants from individual sources. A continuous plume from each source is modeled as a series of discrete puffs that are transported and dispersed independently until they leave the user-defined modeling grid. Pollutant concentrations are calculated at discrete receptors according to the proximity of a puff to a receptor and the concentration of a pollutant within a puff. The transport distance and direction are determined from hourly, gridded wind fields derived from one or more sets of meteorological data. Hourly pollutant concentrations are calculated at each receptor representing the cumulative impact of all sources input to the model. Longer term averages (3-hour, 24-hour and/or annual) are determined by block averaging hourly concentrations.

The MESOPUFF-II model consists of four individual programs; the READ62 and MESOPAC-II programs that pre-process meteorological data, the MESOPUFF-II dispersion model and the MESOFILE-II post-processing program. The READ62 program (an update of READ56) reads and processes the twice-daily upper wind and temperature sounding data. If data are missing, READ62 notes the incomplete sounding and the user must complete the data set. The MESOPAC-II program is the meteorological pre-processor program that computes the time and space interpolated fields of meteorological variables. The MESOPAC-II reads the upper air data files created by READ62 and hourly surface meteorological data and precipitation data. These data are read for all meteorological stations in the MESOPUFF-II grid and a single output file, containing the derived meteorological fields, is produced as an input file to MESOPUFF-II.

Both MESOPAC-II and MESOPUFF-II employ a Cartesian coordinate reference grid consisting of three nested grids; a meteorological grid, a computational grid and a sampling grid. The meteorological grid defines the meteorological stations and the meteorological field which controls the transport and dispersion of pollutants, the computational grid defines that portion of the meteorological grid in which puffs are tracked and the sampling grid defines the receptor points at which pollutant concentrations are calculated.

The MESOPUFF-II utilizes the meteorological data file created by MESOPAC-II and source information to calculate hourly pollutant concentrations. In addition to accounting for plume meander, the model can also account for dry deposition, chemical transformation and wet removal of a pollutant.

The data generated by MESOPUFF-II is post-processed with MESOFILE-II. The format of this program was modified by Koogler & Associates to produce concentration values for each receptor for each Julian day (24-hour period) of meteorological data utilized. Koogler & Associates also developed the program HIGH50 to produce tables of the highest and second-highest concentrations for each receptor and to produce maximum-50 or maximum-100 concentration tables for each model run.

The input to the MESOPUFF-II program included the data file generated by MESOPAC-II and an inventory of PSD increment consuming and expanding sulfur dioxide sources in west central Florida. The final inventory, included as Table 1, included 136 sources obtained from FDER permit files and from emission inventories in permit PSD applications on file with the FDER, Division of Air Resources Management, Tallahassee, Florida. The source data include source locations, sulfur dioxide emission rates (or emission reductions), stack heights and diameters, and stack gas temperatures and velocities. Source information associated with plume downwash was not included as MESOPUFF-II does not account for plume downwash.

As published, MESOPUFF-II limits the number of puffs in the computational grid to 500. Because a full year of meteorological data were utilized for each model run and because of the large number of sources (136), the model was expanded by Koogler & Associates to allow 2,000 puffs to be active at any one time. Even with this expansion of the model, only 20 sources could be run at a time.

SPATIAL SCALE

The meteorological grid used with MESOPUFF-II consisted of a 15 x 15 point grid with 20 kilometer spacing between grid points. This results in a grid that is 280 kilometers in both the east-west and a north-south dimensions. The southwest corner of the grid was located at UTM Zone 17, 270 km east and 2940 km north (latitude 26°33'49"N and longitude 83°18'32"W); or approximately 175 kilometers southwest of Tampa (Figure 1).

The computational grid is 10 grid points in the east-west dimension by 12 grid points in the north-south dimension. The southwest corner of the computational grid is located at point (3, 4) of the meteorological grid.

The sampling grid is defined by 13 discrete receptors defining the boundary of the Chassahowitzka National Wilderness Area. These receptors were selected by the Florida Department of Environmental Regulation, Division of Air Resources Management, Bureau of Air Regulation.

The computational grid was situated such that there was at least a two grid point buffer between sources and receptors and the boundary of the grid.

METEOROLOGICAL DATA BASE

The meteorological data for the full 1986 calendar year were selected for modeling. The use of these data was based upon ISC model runs which indicated that these data would likely result in impacts that were more critical than impacts generated with any other meteorological data in the 1982 to 1986 data set.

Upper air rawinsonde data for Ruskin, Florida, West Palm Beach, Florida, and Waycross, Georgia, for calendar year 1986 were processed with the READ62 program. In the initial processing, it was observed that data from Waycross would require extensive editing to account for missing data. Also, initial modeling demonstrated that the upper air data from Waycross had no affect on the model because of the distance of the station from the edge of the meteorological grid and the closer proximity of other upper air stations. As a result, only upper air data from Ruskin and West Palm Beach, Florida, were processed through READ62 and incorporated into the input to MESOPAC-II.

Upper air measurements were processed by the program READ62. The top pressure level (model variable PSTOP) was set at 500 millibars. If READ62 indicated a reading for this pressure level or another required reading was missing, the value was estimated by interpolating between measurements from adjacent levels or by persisting the previous valid reading. Program options for READ62 are summarized in Table 2.

Surface observations for calendar year 1986 were obtained from the EPA SCRAM Bulletin Board for the three surface stations. These data were supplemental with data from the National Climatic Center to provide station pressure, relative humidity, a weather code designating precipitation type and precipitation data. The precipitation data are no longer available in the required TD9657 format; thus data were obtained in the TD3280 format and converted to TD9657 format for use in MESOPAC-II. Missing surface data were estimated by assuming data persistence from the previous valid observation.

Land use information, required by MESOPAC-II to calculate surface roughness lengths, was obtained from the *Water Resource Atlas of Florida* (Florida State University, ISBN 0-9606708-1-5, 1984). The land use specified for each 20 by 20 kilometers cell of the meteorological grid was based upon the land use category representing the greatest fraction of the total area within each grid.

The program options selected for MESOPAC-II are summarized in Table 3.

APPLICATION OF MESOPUFF-II

The MESOPUFF-II was utilized to calculate 3-hour, 24-hour and annual sulfur dioxide concentrations at the 13 receptors used to define the Chassahowitzka National Wilderness Area. These averages were calculated by block averaging (as opposed to running averages) the hourly average concentrations generated by MESOPUFF-II. The sources of sulfur dioxide included in the MESOPUFF-II model were all significant PSD increment consuming and expanding sources beyond 50 kilometers of the Area. The sources included in the model are defined in Table 1. Sources within 50 kilometers of the Area were modeled with the ISC2 (Version 92062). Sulfur dioxide impacts predicted by the two models were added, period by period.

The MESOPUFF-II is designed to simulate the meandering transport, dispersion, transformation and removal of pollutants. The transformation and removal mechanisms include dry deposition, chemical transformation and wet removal. The use of these options, if exercised, is defined in the presentation of model results.

The MESOPUFF-II simulates a continuously released pollutant plume with a series of discrete puffs. The greater the puff release rate, the more nearly the model simulates the continuous release of the pollutant. The disadvantage of increasing the puff release rate is the computational burden. Another factor influencing the selection of puff release rate is the source-receptor distance. The smaller this distance, the greater the puff release rate must be for the model to reasonably simulate plume behavior. Because all of the sources included in the MESOPUFF-II emission inventory were at distances of 50 kilometers or greater from the Chassahowitzka National Wilderness Area, and because of the large number of sources within the inventory, a puff release rate of one per hour (NPUF = 1) was selected. The puff sampling rate utilized by the model was a minimum of two per hour (NSAMAD = 2) and the reference wind speed used with the variable puff sampling option was two meters per second (WSAMP = 2).

To eliminate erratic results from sources close to the receptors, the minimum puff sampling age (AGEMIN) was set to 900 seconds. As only sources beyond 50 kilometers were modeled with MESOPUFF-II, a wind speed in excess of 55 meters per second (124 mph) would be required for AGEMIN to have an affect on the model.

The MESOPUFF-II option, utilizing a vertical Gaussian plume distribution in the mixed layer, was selected. The alternative was to assume an instantly dispersed plume throughout the mixed layer. The utilization of the Gaussian distribution more reasonably represents plume behavior for sources near the receptors but will not be of any great significance once plume travel time exceeds a few hours. Another model variable (TMDEP) was used to define the basis for establishing dispersion parameters. This variable was selected so that for distances up to 50 kilometers, the dispersion parameters would be distant dependent and for longer traveler distances, the parameters would be time dependent. All program options used with MESOPUFF-II are summarized in Table 4.

APPLICATION OF ISC2

In accordance with *Guideline on Air Quality Models* (Revised), EPA, 1990, all sources within 50 kilometers of the Chassahowitzka National Wilderness Area were modeled with the ISC2 (Version 92062) model. These sources are noted in Table 1. The modeling guidelines established by EPA were followed without exception. The meteorological data used with ISC2 were for Tampa, Florida, 1986; as used with MESOPUFF-II. The same 13 receptors used with MESOPUFF-II were used to define the Chassahowitzka boundary. The model was run assuming flat terrain and plume downwash was not accounted for as all sources are 10 kilometers or more from the nearest receptor. The 24-hour average sulfur dioxide concentrations produced by ISC2 were added directly to the corresponding 24-hour average sulfur dioxide concentrations produced by MESOPUFF-II to obtain resulting 24-hour sulfur dioxide impacts for each of the 13 receptors.

TABLE 1

SO2 INVENTORIES

SD NO.	SO2	UTM-E	UTM-N	HT	TEMP	VEL	DIAM	SOURCE DESCRIPTION
100	-24.32	404.100	3078.950	24.38	339.0	12.94	1.52	AGRICO PIERCE DRYERS 1,2
110	-23.00	404.100	3078.950	24.38	339.0	18.82	2.43	AGRICO PIERCE DRYERS 3,4
130	-75.60	407.500	3071.300	45.73	350.0	26.40	1.60	AGRICO SO. PIERCE H2SO4 (2 @ 1800 TPD)
170	-6.48	394.800	3069.600	30.48	344.0	14.79	1.82	BORDEN DRYER
180	-5.29	414.500	3109.000	17.07	333.0	8.26	2.34	BORDEN DRYER
190	-19.60	404.800	3069.500	27.44	339.0	15.25	2.29	BREWSTER/IMPERIAL DRYER
210	-60.90	408.500	3082.500	30.49	350.0	12.20	1.37	CF BARTOW H2SO4 1 (400 TPD)
220	-110.25	408.500	3082.500	30.49	350.0	10.37	1.68	CF BARTOW H2SO4 2 (500 TPD)
230	-107.10	408.500	3082.500	30.49	364.0	4.27	2.74	CF BARTOW H2SO4 3 (600 TPD)
240	-174.83	408.500	3082.500	30.49	358.0	7.93	2.13	CF BARTOW H2SO4 4 (900 TPD)
260	-226.80	408.500	3082.500	63.41	358.0	10.67	2.13	CF BARTOW H2SO4 5 (900 TPD)
280	-170.10	408.500	3082.500	63.41	359.0	10.37	2.13	CF BARTOW H2SO4 6 (900 TPD)
300	-50.40	388.000	3116.000	60.35	353.0	16.40	2.44	CF PLANT CITY BASELINE C
310	-50.40	388.000	3116.000	60.35	353.0	16.40	2.44	CF PLANT CITY BASELINE D
330	-105.00	388.000	3116.000	18.80	316.0	18.80	1.52	CF PLANT CITY H2SO4 A&B
370	-3.88	398.400	3084.200	24.40	339.0	12.90	1.52	CONSERVE NICHOLS ROCK DRYER
380	-54.60	398.400	3084.200	30.50	308.0	18.90	1.80	CONSERVE NICHOLS (2 @ 1300 TPD & 4 LB/TON)
420	-5.68	404.813	3069.548	27.43	333.0	20.67	1.52	DOLIME DRYER
430	-4.52	404.813	3069.548	27.43	494.1	7.25	0.61	DOLINE BOILER
450	-6.53	405.600	3079.400	7.32	464.0	3.23	0.91	ELECTROPHOS 400 HP BOILER
460	-10.00	405.600	3079.400	6.10	464.0	7.71	0.91	ELECTROPHOS 600 HP BOILER
470	-7.11	405.600	3079.400	25.61	306.0	6.97	2.13	ELECTROPHOS CALCINER
480	-2.97	405.600	3079.400	18.29	322.0	22.87	0.70	ELECTROPHOS COKE DRYER
490	-47.25	405.600	3079.400	29.27	314.0	8.52	2.13	ELECTROPHOS FURNACE (31.25 TPH ROCK @ 3% S)
500	-20.90	405.600	3079.400	18.29	350.0	6.79	1.83	ELECTROPHOS ROCK DRYER
520	-23.94	411.500	3074.200	18.29	339.0	8.47	2.95	ESTECH/SWIFT DRYER
530	-22.80	411.500	3074.200	18.75	340.0	5.06	2.95	ESTECH/SWIFT DRYER
540	-92.87	411.500	3074.200	30.79	358.0	3.90	2.13	ESTECH/SWIFT SAP (610 TPD & 29 LB/TON)
560	-83.98	409.500	3079.500	30.48	311.0	20.18	1.37	FARMLAND 1,2 H2SO4
620	-314.00	334.200	3204.500	152.00	422.0	42.10	4.57	FPC CRYSTAL RIVER 1
630	-1859.00	334.200	3204.500	153.00	422.0	42.10	4.88	FPC CRYSTAL RIVER 2
690	-28.89	363.400	3082.400	20.73	310.0	13.12	1.07	GARDINIER/CARGILL DRYER
700	-196.30	363.400	3082.400	22.60	322.0	19.51	1.52	GARDINIER/CARGILL SAP 4,5,6
720	-50.71	363.400	3082.400	45.72	355.0	9.20	2.29	GARDINIER/CARGILL SAP 7
750	-62.99	358.000	3090.600	35.97	505.2	17.61	2.74	GEN. PORT. CEMENT KILN 4
760	-69.30	358.000	3090.600	45.42	494.1	5.80	3.81	GEN. PORT. CEMENT KILN 5
840	-34.27	396.600	3078.900	21.00	347.0	18.60	2.13	IMC NEW WALES ROCK DRYER
850	-146.00	396.600	3078.900	61.00	350.0	14.28	2.60	IMC NEW WALES SAP #1,2,3 BASELINE
940	-13.89	398.300	3084.300	28.40	340.0	19.24	1.09	MOBIL NICHOLS CALCINER
1050	-152.71	406.700	3085.200	51.00	356.0	9.90	2.13	ROYSTER MULBERRY (1003 TPD @ 29 LB/TON)
1080	-4.86	325.600	3116.700	7.32	464.0	3.23	0.91	STAUFFER BOILER
1090	-1.50	325.600	3116.700	18.29	322.0	22.87	0.70	STAUFFER DRYER
1100	-50.93	325.600	3116.700	49.00	335.0	3.60	1.20	STAUFFER FURNACE
1110	-7.36	325.600	3116.700	25.61	306.0	6.97	2.13	STAUFFER KILN
1120	-0.45	325.600	3116.700	25.61	322.0	6.97	0.91	STAUFFER ROASTER
1130	-1218.00	361.900	3075.000	149.40	418.0	14.33	7.32	TECO BIG BEND UNIT 3 (24-HR)
1150	-2436.00	361.900	3075.000	149.40	422.0	28.65	7.32	TECO BIG BEND UNITS 1&2 (24-HR)
1160	-4.99	413.200	3086.300	15.80	332.0	10.01	1.83	USS AGRI-CHEM BARTOW DRYER
1170	-41.90	413.200	3086.300	28.96	305.0	7.50	2.12	USS AGRI-CHEM BARTOW SAP (800 TPD & 10 LB/TON)
1180	-18.27	416.120	3068.620	28.35	330.0	17.60	1.52	USSAC FT MEADE GTSP
1210	-78.80	416.120	3068.620	29.00	314.0	6.77	3.02	USSAC FT MEADE H2SO4 (1500 TPD @ 10 LB/TON)
1220	-15.79	416.120	3068.620	25.60	332.0	16.26	1.52	USSAC FT MEADE ROCK DRYER
1230	-39.41	409.770	3086.990	15.24	327.0	17.32	2.04	W.R. GRACE/SEMINOLE DRYER
1240	-108.00	409.770	3086.990	45.72	352.0	16.50	1.37	W.R. GRACE/SEMINOLE SAP #1
1250	-108.00	409.770	3086.990	45.72	352.0	16.50	1.37	W.R. GRACE/SEMINOLE SAP #2
1270	-52.50	409.770	3086.990	45.72	311.0	16.70	1.52	W.R. GRACE/SEMINOLE SAP #3

120	4.41	407.500	3071.330	38.10	328.0	14.60	3.10	AGRICO SO. PIERCE DAP PLANT
140	113.50	407.500	3071.200	45.73	350.0	39.06	1.60	AGRICO SO. PIERCE H2SO4 (2 @ 2700 TPD)
150	2.25	359.900	3162.400	12.20	377.0	10.58	1.37	ASPHALT PAVERS 3 (0700-1800)
160	2.25	361.400	3168.400	8.50	357.4	10.95	1.08	ASPHALT PAVERS 4 (0700-1800)
200	3.97	408.500	3082.500	36.40	339.0	16.11	2.13	CF BARTOW DAP 1-3
250	50.40	408.500	3082.500	63.41	361.0	10.88	2.13	CF BARTOW H2SO4 5 (2400 TPD)
270	50.40	408.500	3082.500	63.41	370.0	7.28	2.13	CF BARTOW H2SO4 6 (2400 TPD)
290	42.00	408.500	3082.500	67.10	351.0	9.80	2.40	CF BARTOW H2SO4 7 (2000 TPD)
320	88.20	388.000	3116.000	33.50	316.0	19.50	1.50	CF PLANT CITY H2SO4 A&B
340	54.60	388.000	3116.000	60.35	353.0	17.77	2.44	CF PLANT CITY PROPOSED C
350	54.60	388.000	3116.000	60.35	353.0	17.77	2.44	CF PLANT CITY PROPOSED D
360	13.00	361.800	3088.300	30.00	375.0	20.10	0.61	CLM CHLORIDE METALS
390	42.00	398.400	3084.200	45.70	352.0	10.30	2.30	CONSERVE NICHOLS (2000 TPD @ 4 LB/TON)
400	7.25	340.700	3119.500	9.14	436.0	22.30	1.40	COUCH CONST-ODESSA (ASPHALT)
410	3.54	390.300	3129.400	6.10	422.0	21.00	1.38	COUCH CONST-ZEPHYRHILLS (ASPHALT)
440	0.23	340.600	3119.200	12.20	339.0	6.47	3.05	DRIS PAVING (ASPHALT)
510	0.82	386.700	3155.800	10.67	327.0	8.99	1.83	ER JAHNA (LIME DRYER)
550	0.20	383.300	3135.800	12.30	466.2	9.20	0.40	EVANS PACKING
570	67.16	409.500	3079.500	30.48	355.0	9.27	2.29	FARMLAND 3,4 H2SO4
580	41.96	409.500	3079.500	45.72	355.0	9.65	2.44	FARMLAND 5 H2SO4
590	2.99	382.200	3166.100	9.14	478.0	4.57	0.61	FDOC BOILER 3
600	1.45	356.200	3169.300	32.01	394.0	9.90	4.27	FLA MINING & MATERIALS KILN 2
610	98.40	360.008	3162.398	97.60	442.0	23.23	4.88	FLORIDA CRUSHED STONE KILN 1
640	1008.80	334.200	3204.500	182.90	398.0	21.00	6.90	FPC CRYSTAL RIVER 4
650	1008.00	334.200	3204.500	182.90	398.0	21.00	6.90	FPC CRYSTAL RIVER 5
660	466.40	467.500	3197.200	15.24	819.8	56.21	4.21	FPC DEBARY PROP TURBINES AT 20 DEG F
670	310.90	446.300	3126.000	15.24	819.8	56.21	4.21	FPC INT. CITY PROP TURBINES/7EA AT 20 DEG F
680	279.10	446.300	3126.000	15.24	880.8	32.07	7.04	FPC INT. CITY PROP TURBINES/7FA AT 20 DEG F
710	46.20	363.400	3082.400	45.72	355.0	9.20	2.29	GARDINIER/CARGILL SAP 7
730	52.50	363.400	3082.400	45.72	355.0	8.63	2.44	GARDINIER/CARGILL SAP 8
740	54.60	363.400	3082.400	45.72	344.0	12.50	2.74	GARDINIER/CARGILL SAP 9
770	277.60	404.800	3057.400	22.90	389.0	23.90	4.88	HARDEE
780	21.40	368.200	3092.700	50.00	491.0	18.30	1.80	HILLS CO RESOURCE RECOVERY
790	0.08	333.400	3141.000	10.98	533.0	4.00	0.31	HOSP CORP OF AM BLR 1
800	0.08	333.400	3141.000	10.98	533.0	4.00	0.31	HOSP CORP OF AM BLR 2
810	0.20	396.600	3078.900	52.40	322.0	13.10	2.40	IMC NEW WALES AFI PLANT
820	5.54	396.600	3078.900	36.60	319.1	20.15	1.83	IMC NEW WALES DAP
830	4.80	396.600	3078.900	52.40	314.0	15.80	1.40	IMC NEW WALES MULTIPHOS
860	189.00	396.600	3078.900	61.00	350.0	15.31	2.60	IMC NEW WALES SAP #1,2,3 (3 @ 3000 TPD)
870	126.00	396.600	3078.900	60.70	350.0	15.31	2.60	IMC NEW WALES SAP #4,5 (2 @ 3000 TPD)
880	32.10	460.100	3129.300	18.30	422.0	38.00	3.66	KISSIMMEE UTIL EXIST
890	5.04	434.000	3195.800	30.48	384.3	17.13	3.35	LAKE CO. COGEN. FACILITY PROPOSED
900	500.10	408.500	3105.800	76.20	350.0	19.70	4.88	LAKELAND MCINTOSH #3
910	29.11	409.185	3102.754	30.48	783.2	28.22	5.79	LAKELAND UTILITIES CT
920	0.60	394.800	3067.720	8.20	505.0	7.57	0.41	MOBIL BIG-4 BOILER
930	1.90	394.850	3069.770	30.50	334.0	7.26	1.82	MOBIL BIG-4 DRYER
950	2.44	398.300	3084.300	25.90	328.0	10.07	1.83	MOBIL NICHOLS DRYER 4
960	0.06	331.200	3124.500	10.98	544.0	3.88	0.31	NEW PORT RICHEY HOSP BLR 1
970	0.03	331.200	3124.500	10.98	544.0	3.88	0.31	NEW PORT RICHEY HOSP BLR 2
980	2.09	359.800	3164.900	7.62	347.0	6.29	1.83	OMAN CONST (ASPHALT)
990	105.40	483.500	3150.600	167.60	325.7	21.60	5.80	ORLANDO UTIL STANTON 1
1000	242.40	483.500	3150.600	167.60	324.2	23.50	5.80	ORLANDO UTIL STANTON 2 (24-HR)
1010	3.67	355.900	3143.700	9.14	408.0	16.00	1.30	OVERSTREET (PAVING)
1020	14.10	347.100	3139.200	83.82	394.3	15.70	3.05	PASCO COUNTY RRF
1030	5.04	385.600	3139.000	30.48	384.3	17.13	3.35	PASCO CO. COGEN. FACILITY PROPOSED
1040	62.24	335.300	3084.400	49.10	522.0	27.72	2.74	PINELLAS RRF
1060	35.70	406.700	3085.200	61.00	360.0	12.20	2.13	ROYSTER MULBERRY (1700 TPD @ 4 LB/TON)
1070	111.20	464.300	3035.400	45.70	446.0	24.10	1.80	SEBRING UTIL 1 & 2
1140	654.70	361.900	3075.000	149.40	342.2	19.81	7.32	TECO BIG BEND UNIT 4
1190	63.00	416.120	3068.620	53.40	355.0	15.91	2.59	USSAC FT MEADE H2SO4 1

TABLE 1...CONTINUED

1200	63.00	416.120	3068.620	53.40	355.6	15.91	2.59	USSAC FT MEADE H2SO4 2
1260	42.87	409.770	3085.990	45.72	311.0	16.70	1.52	W.R. GRACE/SEMINOLE SAP #3
1280	143.77	409.770	3086.990	61.00	347.0	14.20	2.06	W.R. GRACE/SEMINOLE SAP #4
1290	13.80	416.700	3100.400	93.10	350.0	14.54	3.05	RIDGE COGENERATION
1300	6.35	420.800	3103.300	48.80	411.6	14.30	5.49	AUBURNDALE 65% LOAD

TABLE 2

OPTIONS SELECTED FOR READ62

Variable	Description	Selected Value
1. CARD 1 - STARTING AND ENDING HOURS, UPPER PRESSURE LEVEL		
IBYR, IBDAY, IBHR, IEYR, IEDAY, IEHR	Starting and ending year, day, hour	As needed
PSTOP	Top pressure level for which data are extracted	500 mb
2. CARD 2 - MISSING DATA CONTROL VARIABLES		
LHT	Height field control variable	True
LTEMP	Height field control variable	True
LWD	Wind direction field control variable	True
LWS	Wind speed field control variable	True

TABLE 3

OPTIONS SELECTED FOR MESOPAC-II

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NYR, IDYSTR, IHRMAX	Year, start, day and number	As needed
NSSTA, NUSTA	Number of surface and rawinsonde stations	As needed
3. CARD GROUP 3 - GRID DATA		
IMAX, JMAX	Number of grid points in the X and Y direction	15, 15
DGRID	Grid spacing	20 km
4. CARD GROUP 4 - OUTPUT OPTIONS		
VARIOUS	Disk and printer control variables for writing data to disk	As needed
5. CARD GROUP 5 - LAND USE CATEGORIES AT EACH GRID POINT		
ILANDU	Land use categories at each grid point	15 by 15 array

(Continued)

TABLE 3 (CONTINUED)

Variable	Description	Selected Value
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Surface wind speed measurement heights control variable	0 (Default-10 m)
IOPTS(2)	von Karman constant control variable	0 (Default)
IOPTS(3)	Friction velocity constants control variable	0 (Default)
IOPTS(4)	Mixing height constants control variable	0 (Default)
IOPTS(5)	Wind speed control variable	0 (Default - RADIUS=99 km, ILWF = 2, IUWF = 4)
IOPTS(6)	Surface roughness lengths control variable	0 (Default)
IOPTS(7)	Option to adjust heat flux estimate	0 (Default)
IOPTS(8)	Radiation reduction factors control variable	0 (Default)
IOPTS(9)	Heat flux constant control variable	0 (Default)
IOPTS(10)	Option to begin run at date other than at start of meteorological data files	0 or 1, as needed
7 - 14. CARD GROUPS 7 TO 14		
VARIOUS	Options input to override default values	Not used

(Continued)

TABLE 3 (CONTINUED)

Variable	Description	Selected Value
15. CARD GROUP 15 - SURFACE STATION DATA		
VARIOUS	Surface meteorological station information	As needed
16. CARD GROUP 16 - RAWINSONDE STATION DATA		
VARIOUS	Rawinsonde meteorological station information	As needed

TABLE 4

OPTIONS SELECTED FOR MESOPAC-II

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NSYR, NSDAY, NSHR	Year, start day and hour	As needed
NADVIS	Number of hours in run	As needed
NPTS	Number of point sources	As needed
NAREAS	Number of area sources	Not used
NREC	Number of non-gridded receptors	13 (Class I Area)
NSPEC	Number of chemical species to model	1 (SO2)
3. CARD GROUP 3 - COMPUTATIONAL VARIABLES		
IAVG	Concentration averaging time	24 hours
NPUF	Puff release rate for each source	1 puff/hr
NSAMAD	Minimum sampling rate	2 samples/hr
LVSAMP	Variable sampling rate option	True (increase rate with higher wind speeds)
WSAMP	Reference wind speed height (used if LVSAMP is true)	10 m
LSGRID	Control variable for concentration computations at sampling grid points	False (sampling at non-gridded points only
AGEMIN	Minimum age of puffs to be sampled	900 seconds

(Continued)

TABLE 4 (CONTINUED)

Variable	Description	Selected Value
4. CARD GROUP 4 - GRID INFORMATION		
VARIOUS	Numbers that define the beginning and end of the meteorological and computational grids	1, 15
MESHDN	Sampling grid spacing factor	1
5. CARD GROUP 5 - TECHNICAL OPTIONS		
LGAUSS	Vertical concentration distribution option	True
LCHEM	Chemical transformation option	True/False(1)
LDRY	Dry deposition option	True/False(1)
LWET	Wet deposition option	True/False(1)
L3VL	Three vertical layer option	False(1)
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
VARIOUS	Disk and printer option to write data to disk	As needed
LPRINT	Printer output option (Print every IPRINT hours)	True
IPRINT	Printing interval	24 hours

(Continued)

TABLE 4 (CONTINUED)

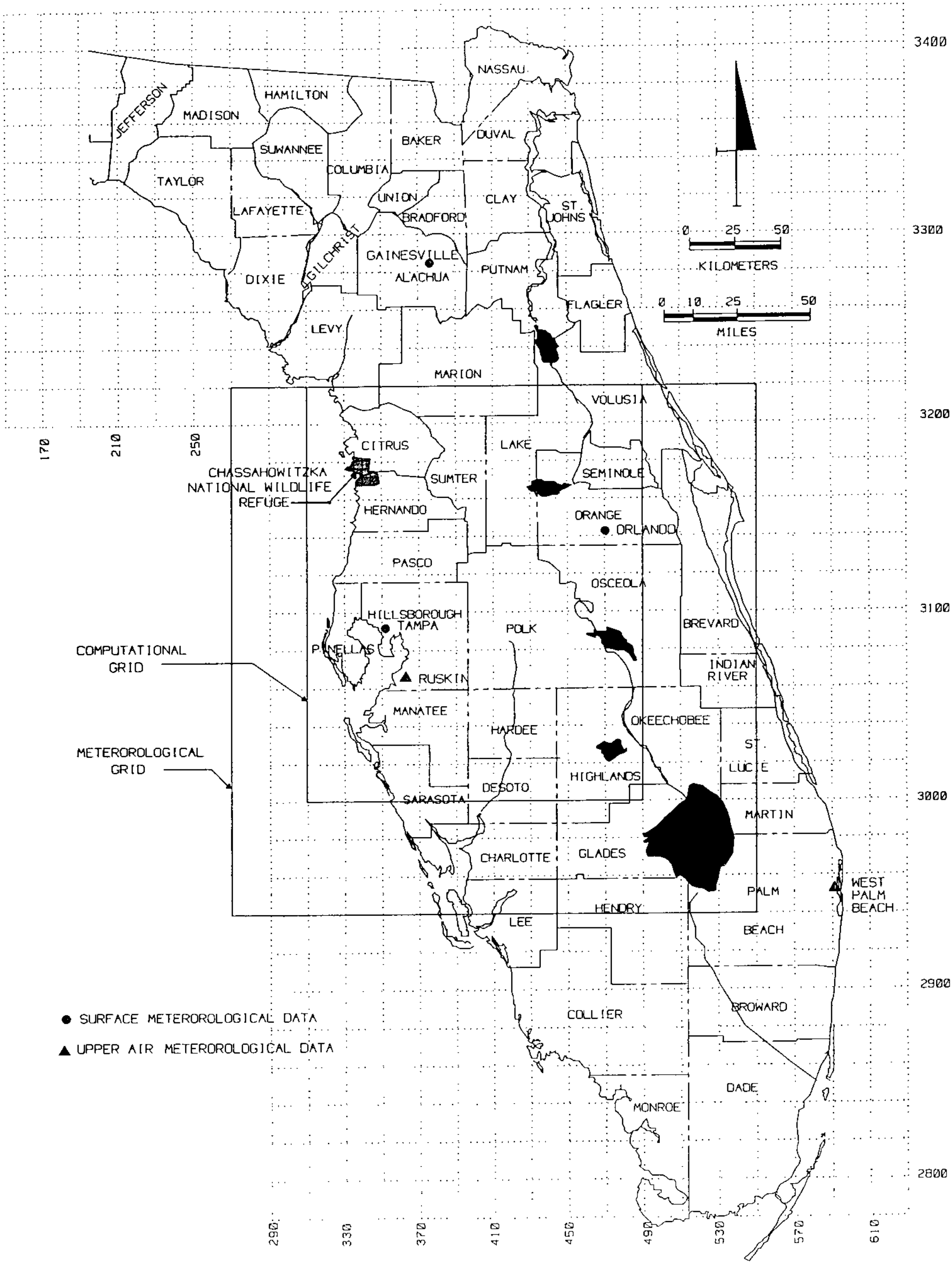
Variable	Description	Selected Value
7. CARD GROUP 7 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Control variable for input of dispersion parameters	1 (see Card Group 8)
IOPTS(2)	Control variable for input of diffusivity constants	0 (Default)
IOPTS(3)	Control variable for input of SO2 canopy resistance	0 (Default)
IOPTS(4)	Control variable for input of dry deposition parameters	0 (Default)
IOPTS(5)	Control variable for input of wet removal parameters	0 (Default)
IOPTS(6)	Control variable for input of chemical transformation method	0 (Default)
8. CARD GROUP 8 - DISPERSION PARAMETERS		
AY, BY, ZY BZ, AZT	Arrays of dispersion coefficients	Default
TMDEP	Distance beyond which the time-dependent equations are used for Sigma Y and Z	50,000 m
JSUP	Stability class used to determine growth rates for puffs above boundary layer	5 (Default)
9-13. CARD GROUPS 9 TO 13		
VARIOUS	Options input to override default values	Not used

(Continued)

TABLE 4 (CONTINUED)

Variable	Description	Selected Value
14. CARD GROUP 14 - POINT SOURCE DATA		
VARIOUS	Point source information-location, stack and emission data	As needed
15. CARD GROUP 15 - AREA SOURCE DATA		
VARIOUS	Area source information-location, initial dispersion and emission data	Not used
16. CARD GROUP 16 - NON-GRIDDED RECEPTOR COORDINATES		
XREC, YREC	X and Y coordinates of non-gridded receptors	Used

(1) Model runs use various combinations of these transformation and removal options. The use is identified in model output.


JEFFERSON
MADISON
HAMILTON
SUWANNEE
TAYLOR
LAFAYETTE
DIXIE
GILCHRIST
COLUMBIA
BAKER
UNION
BRADFORD
NASSAU
DUVAL
CLAY
ST. JOHNS
GAINESVILLE
ALACHUA
PUTNAM
FLAGLER
LEVY
MARION
VOLUSIA
CITRUS
LAKE
SUMTER
SEMINOLE
CHASSAHOWITZKA NATIONAL WILDLIFE REFUGE
HERNANDO
ORANGE
ORLANDO
PASCO
OSCEOLA
HILLSBOROUGH
TAMPA
POLK
BREVARD
PINELLAS
COMPUTATIONAL GRID
RUSKIN
INDIAN RIVER
MANATEE
HARDEE
OKEECHOBEE
ST. LUCIE
METERDROLOGICAL GRID
HIGHLANDS
DESOTO
SARASOTA
MARTIN
CHARLOTTE
GLADES
PALM BEACH
WEST PALM BEACH
HENDRY
LEE
COLLIER
BROWARD
DADE
MONROE
0 25 50
KILOMETERS
0 10 25 50
MILES
3400
3300
3200
3100
3000
2900
2800
170
210
250
290
330
370
410
450
490
530
570
610
● SURFACE METERDROLOGICAL DATA
▲ UPPER AIR METERDROLOGICAL DATA