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

PREPARED FOR:

IMC FERTILIZER, INC.
MULBERRY, FLORIDA
POLK COUNTY

JANUARY 1991

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

IMC FERTILIZER, INC.

RECEIVED
DER - MAIL ROOM

1991 FEB -4 PM 12: 38

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 1, 1991

Mr. Barry Andrews
Bureau of Air Management
FLORIDA DEPARTMENT OF ENVIRONMENTAL
REGULATION
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Application for a PSD Construction Permit Review

Dear Sir:

Enclosed please find six copies of an application for a construction permit to increase the rates of the existing five sulfuric acid plants at the IMC Fertilizer, Inc., New Wales Operations plant. Enclosed with the application is a copy of the modeling results performed by John B. Koogler and Associates, as well as a check in the amount of $5,000.00 for the construction permit application fee.

If you have any questions regarding this submittal, please do not hesitate to contact myself or John Koogler.

Thank you for your assistance in this matter.

Sincerely,

J. M. Baretincic
Director
Environmental Services

JMB/dws

Enclosures

CC: J. A. Brafford

FIRST-CLASS

MULBERRY FL FEB -1'91

U.S. POSTAGE 6.33

P.B. METER 6715559

J. M. Baretincic

IMC FERTILIZER, INC.

IMC Fertilizer, Inc. ∘ New Wales Operations
P. O. Box 1035 ∘ Hwy. 640 West At County Line
Mulberry, Florida 33860

TO: Mr. Barry Andrews
Bureau of Air Management
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

CERTIFIED
P 023 597 728
MAIL

FIRST FLORIDA BANK, N.A.
FORT MYERS, FLORIDA

IMC FERTILIZER, INC.
NEW WALES OPERATIONS
P.O. BOX 1035 • MULBERRY, FLORIDA 33860

IMC FERTILIZER, INC.

63-329
670

CHECK NO. 727060

OPERATING ACCOUNT

REGISTERED 5000 dol's 00 cts

MONTH	DAY	YEAR
02	01	91

AMOUNT
5000.00

PAY TO THE ORDER OF

FLORIDA DEPT. OF ENVIRONMENTAL REGULATIONS
2600 BLAIRSTONE RD.
TALLAHASSEE, FL 32301

AUTHORIZED SIGNATURE

[redacted]

NO. 727060

IMC FERTILIZER, INC.
NEW WALES OPERATIONS • P.O. BOX 1035 • MULBERRY, FLORIDA 33860

IMC FERTILIZER, INC.

INVOICE DATE			INVOICE NUMBER	REFERENCE NUMBER	PURCHASE ORDER NO.	INVOICE AMOUNT	DISCOUNT	NET PAYABLE
MONTH	DAY	YEAR						
01	29	91	C/R	578-875		5000.00		5000.00

00103 |

#5000 pd
2-4-91
Recpt.# 151240

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

AC 53-192221
PSD-FL-170

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: IMC Fertilizer, Inc. **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 Plants No. 1, 2, 3, 4 and 5

SOURCE LOCATION: Street SR 640 and County Line Road City Near Mulberry

UTM: East (17) 396.6 km North 3078.9 km

Latitude 27 ° 49' 56 "N Longitude 82 ° 02 ' 60 "W

APPLICANT NAME AND TITLE: John A. Brafford, Vice President and General Manager

APPLICANT ADDRESS: P.O. Box 1035, Mulberry, FL 33860

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

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

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

*Attach letter of authorization

Signed: [signature]

John A. Brafford, Vice President & General Manager
Name and Title (Please Type)

Date: 02/01/91 Telephone No. (813) 428-2531

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

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

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

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

Signed ____________________

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

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

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

Florida Registration No. 12925 Date: 1/25/91 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.

See Section 3 of the attached report. All plants will operate in full compliance with applicable regulations.

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

Start of Construction April 1991 Completion of Construction December 1991

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.)

No additional air pollution control equipment will be installed on the existing sulfuric acid plants.

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

See Table 2-1 in 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.

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 PSD report, Section 3.

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	80,000	

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

1. Total Process Input Rate (lbs/hr): 80,000

2. Product Weight (lbs/hr): 245,347 as 98.5/H_2SO_4 (241,667 @ 100% acid), 120.84 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	T/yr	
SO_2	483.3	2117.0	17-2.600(2)(b)	483.3	483.3	2117.0	2
Acid Mist	18.1	79.4	17-2.600(2)(b)	18.1	181.0	794.0	2
NOx	9.8	42.7	-	-	9.8	42.7	2

[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).

Potential acid mist emissions are based on mist eliminator efficiency of 90%.

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	99.7%	-	Design & Test
High Efficiency Mist Eliminator	Acid Mist	90.0%	>1	Design & Test

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.

Annual Average NA Maximum ______________

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

None

PLANTS NO. 1, 2 and 3 / PLANTS NO. 4 and 5.

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

Stack Height: 200 / 199 ft. Stack Diameter: 8.5 ft.

Gas Flow Rate: 171257 ACFM 141355 DSCFM Gas Exit Temperature: 170 °F.

Water Vapor Content: 0 % Velocity: 50 FPS

SECTION IV: INCINERATOR INFORMATION

NA

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

Description of Waste ______

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

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

Manufacturer ______

Date Constructed ______ Model No. ______

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel Type	Fuel BTU/hr	Temperature (°F)
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)] (SECTION 3)

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. (SECTION 3)

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

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.) (SECTION 3)

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). (SECTION 3)

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. (SECTION 3)

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). (SECTION 2)

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. (SECTION 2)

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation. $5,000 (similar sources)

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. NA

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

SEE SECTION 4 OF 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:

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 SECTION 3 OF 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

B. Meteorological Data Used for Air Quality Modeling

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

2. Surface data obtained from (location)____________________

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

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

C. Computer Models Used

1. ____________________ Modified? If yes, attach description.

2. ____________________ Modified? If yes, attach description.

3. ____________________ Modified? If yes, attach description.

4. ____________________ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

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

E. Emission Data Used in Modeling

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

F. Attach all other information supportive to the PSD review.

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

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

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

PREPARED FOR:

IMC FERTILIZER, INC.
MULBERRY, FLORIDA
POLK COUNTY

JANUARY 1991

PREPARED BY:

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

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

1.0 SYNOPSIS OF APPLICATION

1.1 APPLICANT

IMC Fertilizer, Inc.
New Wales Operation
State Road 640
P.O. Box 1035
Mulberry, Florida 33860

1.2 FACILITY LOCATION

IMC Fertilizer, Inc., New Wales Operations, consists of a phosphate chemical fertilizer manufacturing facility approximately seven miles southwest of Mulberry, Florida, on State Road 640 in Polk County. The UTM coordinates of the IMC facility are Zone 17, 396.6 km east and 3078.9 km north.

1.3 PROJECT DESCRIPTION

IMC proposes to increase the sulfuric acid production rate of the five existing sulfuric acid plants to 2900 tons per day (TPD) of 100% H2SO4 each. This will result in an increase in the sulfuric acid production rate at IMC from the current 13,600 TPD to 14,500 TPD 100% H2SO4.

Sulfuric acid plant Nos. 1, 2, and 3 have a permitted capacity of 2700 TPD 100% acid each, while plant Nos. 4 and 5 have a permitted capacity of 2750 TPD 100% acid each. All five plants are double absorption units.

The increase in the sulfuric acid production rates will be used to replace current sulfuric acid purchases and will not affect any other operation 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.

IMC 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 five 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 modifications on soils, vegetation and visibility.

2.0 FACILITY DESCRIPTION

IMC Fertilizer, Inc., New Wales Operations consists of a phosphate chemical fertilizer manufacturing facility approximately seven miles southwest of Mulberry, Florida, on State Road 640 in Polk County (See Figures 2-1 and 2-2). The UTM coordinates of the facility are Zone 17, 396.6 km east and 3078.9 km north.

2.1 EXISTING FACILITY

The existing fertilizer complex processes phosphate rock into several different fertilizer products and animal feed ingredients. This is accomplished by reacting the phosphate rock with sulfuric acid to produce phosphoric acid and then converting the phosphoric acid to fertilizer and animal feed ingredient products. The chemical complex includes sulfuric acid plants, phosphoric acid and superphosphoric acid plants, plants to produce monoammonium phosphate (MAP) and diammonium phosphate (DAP), granular triple superphosphate (GTSP) plants, animal feed ingredient production facilities, a uranium recovery plant, and storage, handling, grinding and shipping facilities for phosphate rock and the fertilizer products. Figure 2-3, Plot Plan, shows the location of the existing plants.

The proposed increase in sulfuric acid production rates will be used to replace current sulfuric acid purchases and will not affect the operation of the other plants.

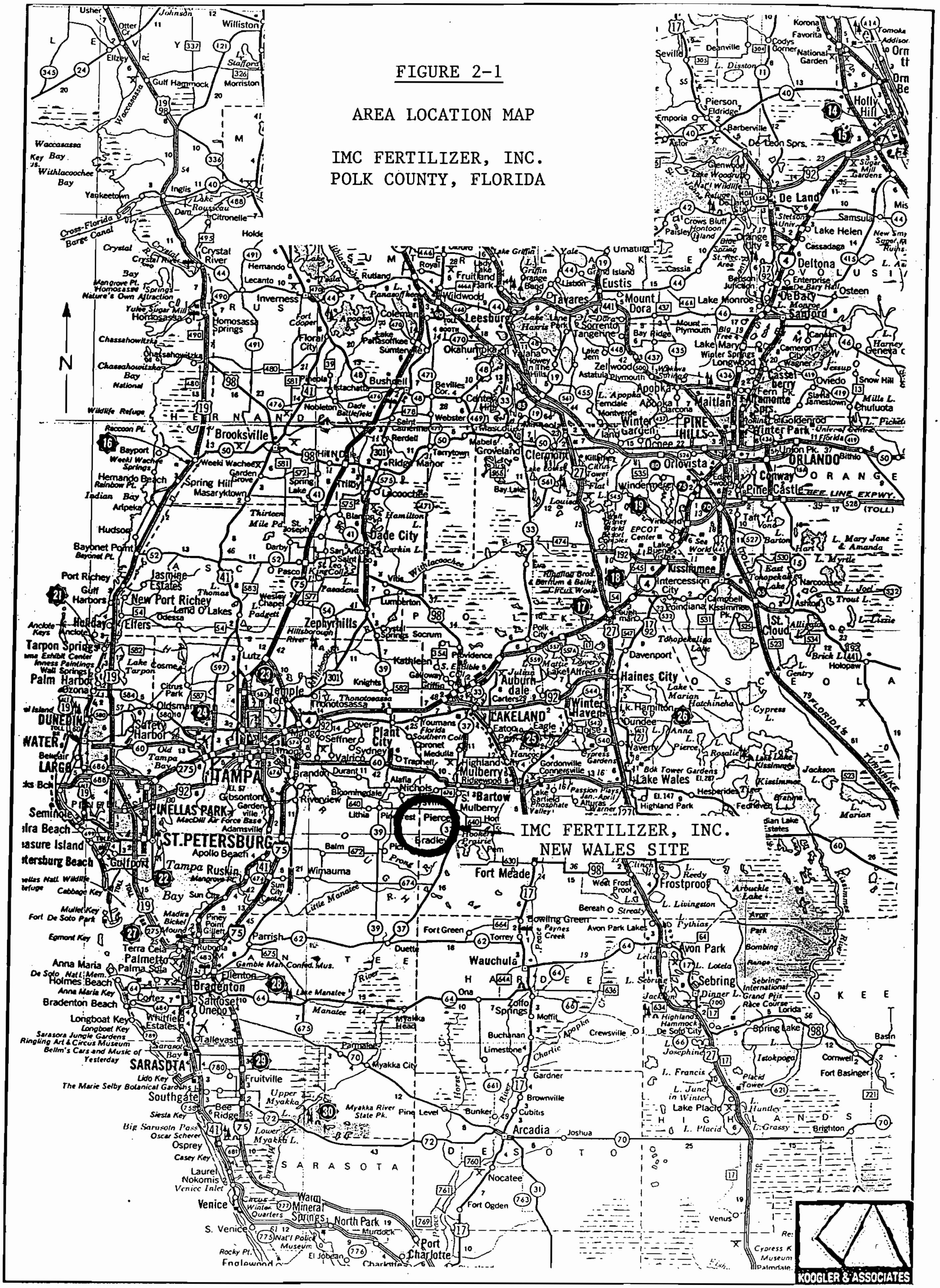

FIGURE 2-1

AREA LOCATION MAP

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

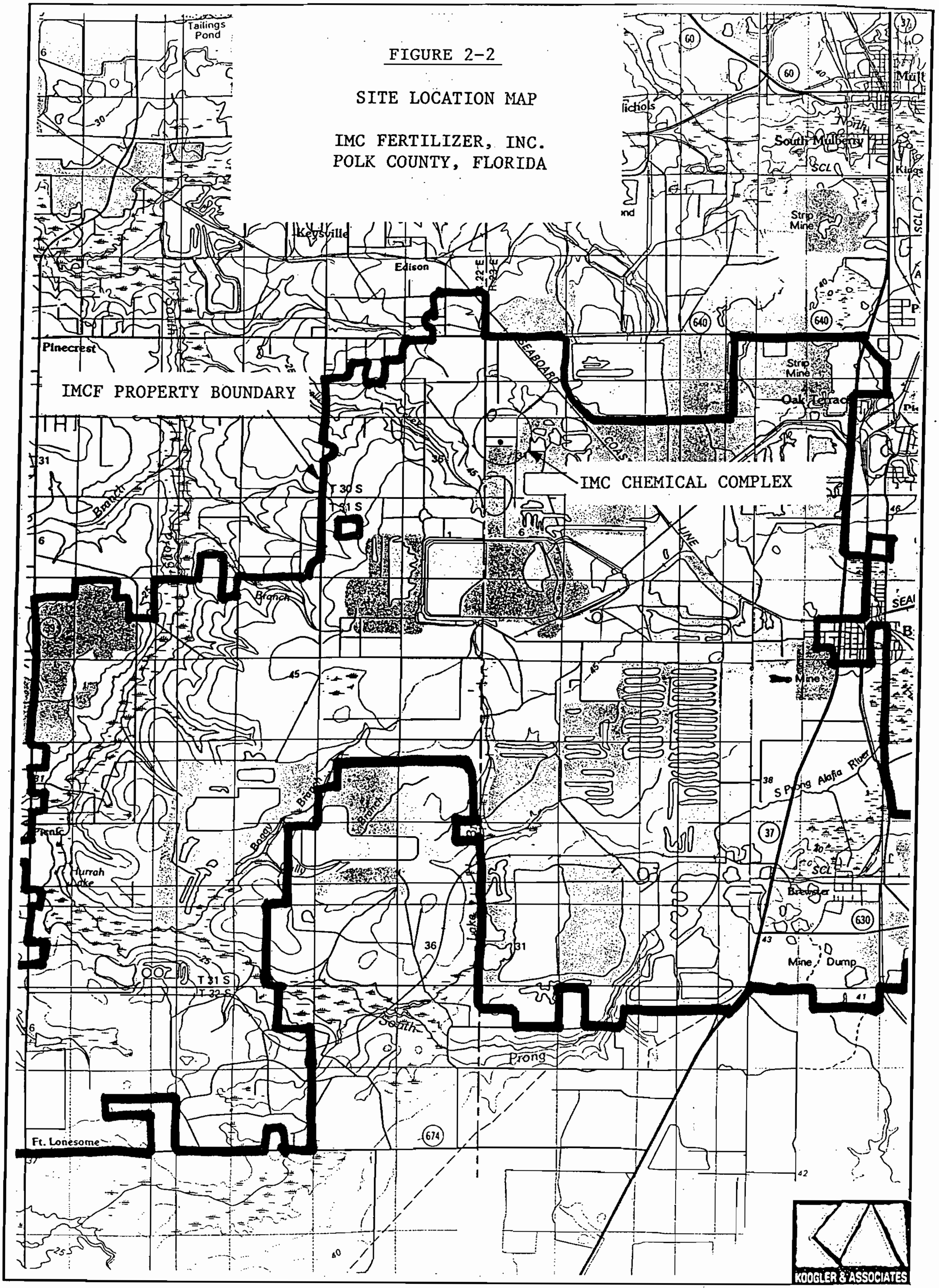
FIGURE 2-2
SITE LOCATION MAP
IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA
IMCF PROPERTY BOUNDARY
IMC CHEMICAL COMPLEX
Tailings Pond
Keysville
Edison
Pinecrest
South Mulberry
Strip Mine
Oak Terrace
SEABOARD
COAST
LINE
T 30 S
T 31 S
T 32 S
Branch
Hurrah Lake
S Prong Alafia River
Brewster
Mine Dump
Prong
Ft. Lonesome
KOOGLER & ASSOCIATES

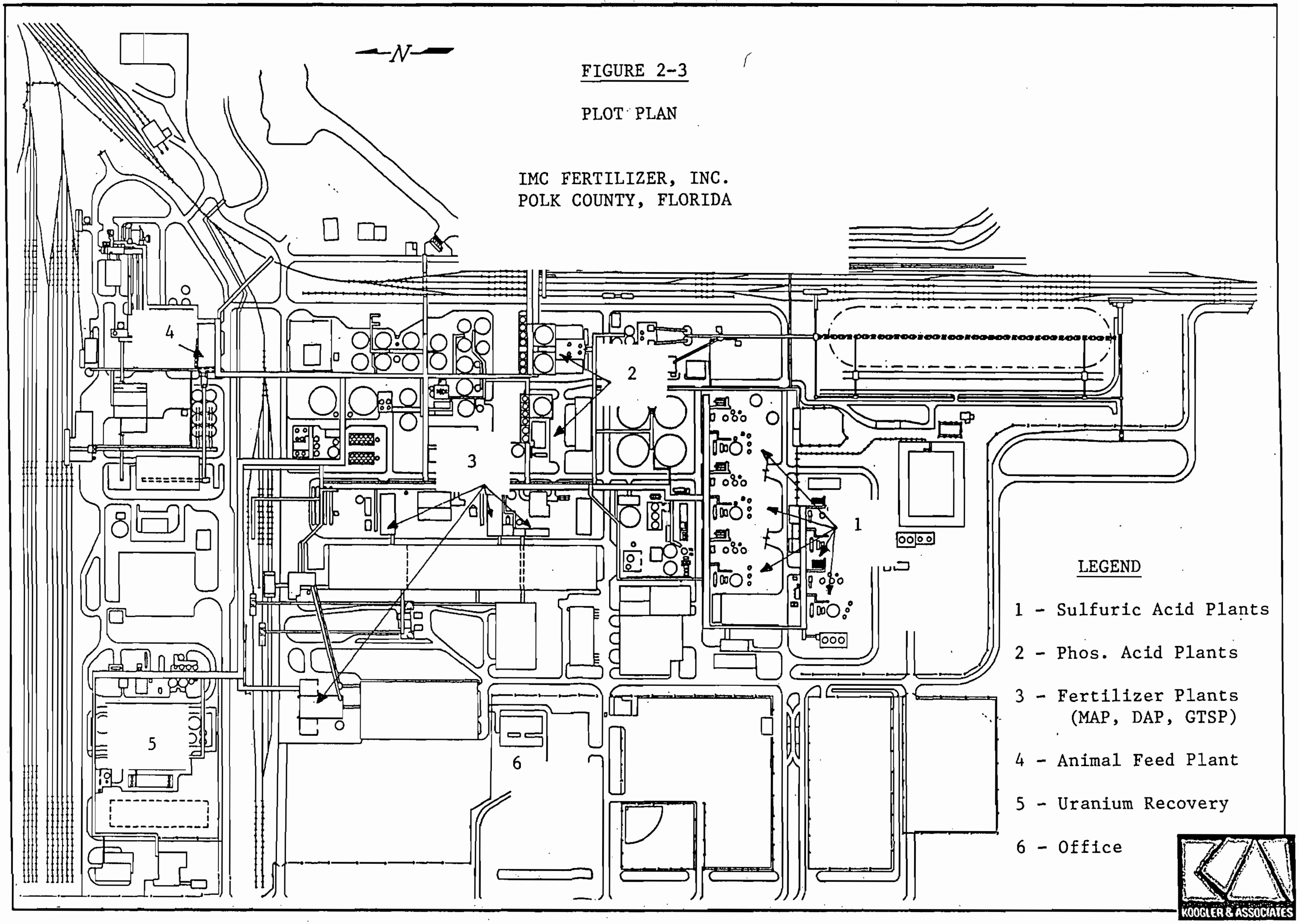

FIGURE 2-3

PLOT PLAN

2.2 SULFURIC ACID PLANTS

There are five existing sulfuric acid plants at IMC. Plants No. 1, 2, and 3 were permitted in 1973 and are rated at 2700 tons per day (tpd) of 100 percent H_2SO_4 each. Plants No. 4 and 5 were permitted in 1980 and are rated at 2750 tpd 100% acid. All five plants are subject to Federal New Source Performance Standards as set forth in 40 CFR 60, 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 five sulfuric acid plants at IMC are presented in Table 2-1.

The total annual sulfuric acid production for 1990 was 4,570,591 tons. The average annual production for 1989-90, used to calculate annual emissions, was 4,399,795 tons per year (tpy). The sulfuric acid plant production data are presented in Table 2-2. The actual emission rates of sulfur dioxide and acid mist from the sulfuric acid plants were determined from a review of emission measurements from annual compliance tests and production data from within the past five years. The actual emissions are presented in Table 2-3. The maximum measured sulfur dioxide emission rate during a compliance test was 3.6 pounds per ton of 100 percent H_2SO_4

TABLE 2-1

SULFURIC ACID PLANT AIR PERMITS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Sulfuric Acid Plant	Permit No.	Issue Date	Expiration Date
No. 1	A053-137316	11/13/87	11/05/92
No. 2	A053-137317	11/13/87	11/05/92
No. 3	A053-170486	12/07/89	12/06/94
No. 4	A053-124655	10/29/86	09/30/91
No. 5	AC53-124657	10/24/86	09/30/91

TABLE 2.2

SULFURIC ACID PRODUCTION DATA

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Plant	1989 tons acid	1990 tons acid
01	829,000	908,101
02	836,000	887,453
03	817,000	904,148
04	847,000	958,161
05	900,000	912,728
TOTAL	4,229,000	4,570,591

TABLE 2-3

SULFURIC ACID PLANT EMISSION DATA

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Plant	Emission Factors: SO2 lb/tons of H_2SO_4	Emission Factors: Sulfuric Acid Mist lb/ton of H_2SO_4
01	3.6	0.06
02	3.2	0.01
03	3.2	0.08
04	3.5	0.03
05	3.6	0.02

produced and the maximum measured acid mist emission rate was 0.08 pounds per ton of 100 percent H_2SO_4 produced.

Nitrogen oxide emissions from the sulfuric acid plants were estimated by using an emission factor of 1.15×10^{-6} pounds of nitrogen oxides per standard cubic foot (measured in the stack gas discharged from the No. 5 sulfuric acid plant) and expected stack gas flow rates for each of the plants.

3.0 PROPOSED PROJECT

3.1 PROJECT DESCRIPTION

IMC proposes to increase the sulfuric acid production rate of the New Wales facility from 13,600 tpd to 14,500 tpd 100% acid. The production rates of Plants No. 1, 2, and 3 will increase from 2700 tpd to 2900 tpd 100% acid while the production rates of Plants No. 4 and 5 will increase from 2750 tpd to 2900 tpd 100% acid.

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. See Figure 3-1 for a flow diagram of a typical double absorption sulfuric acid plant.

Table 3-1 summarizes the permitted, actual and proposed operating characteristics of the five 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).

There are no other air pollution sources affected by the requested changes

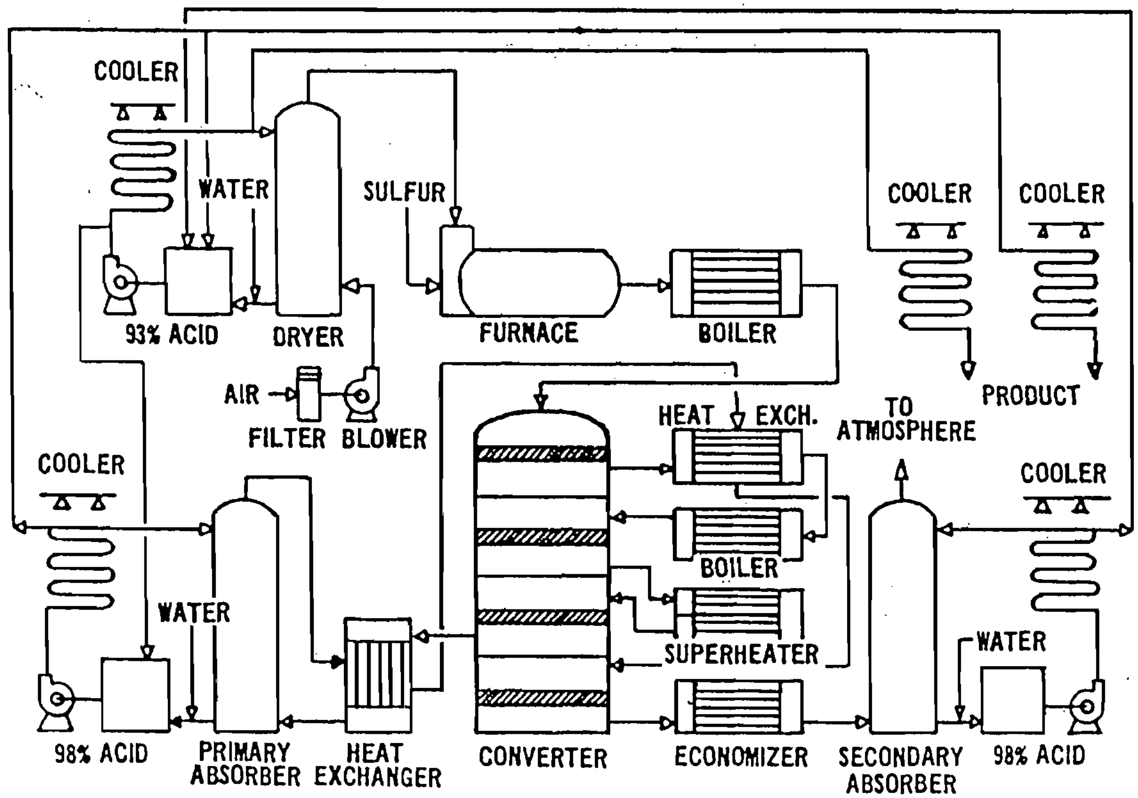

FIGURE 3-1
DUAL ABSORPTION SULFURIC ACID PLANT FLOW DIAGRAM

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

KOOGLER & ASSOCIATES

TABLE 3-1
CHANGES IN PRODUCTION AND EMISSION RATES

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

	Sulfuric Acid Plant				
	01	02	03	04	05
Permit Allowable Conditions					
Rate (TPD)	2700	2700	2700	2750	2750
SO2 (lb/ton)	4	4	4	4	4
(lb/hr)	450	450	450	458.3	458.3
(TPY)	1971	1971	1971	1925	1925
Mist (lb/ton)	0.15	0.15	0.15	0.15	0.15
(lb/hr)	16.9	16.9	16.9	17.2	17.2
(TPY)	74.0	74.0	74.0	72.2	72.2
Operating Factor	1	1	1	1	1
Actual Conditions					
Rate (TPD)	2700	2700	2700	2750	2750
SO2 (lb/ton)	3.60	3.20	3.20	3.50	3.63
(lb/hr)	405	360	360	401	415.9
(TPY)	1561.0	1371.8	1371.8	1583.3	1642.0
Mist (lb/ton)	0.064	0.013	0.080	0.030	0.026
(lb/hr)	7.2	1.5	9.0	3.4	3.0
(TPY)	27.8	5.7	34.3	13.6	11.8
Operating Factor	0.88	0.87	0.87	0.94	0.94
Proposed Conditions					
Rate (TPD)	2900	2900	2900	2900	2900
SO2 (lb/ton)	4	4	4	4	4
(lb/hr)	483.3	483.3	483.3	483.3	483.3
(TPY)	2117	2117	2117	2117	2117
Mist (lb/ton)	0.15	0.15	0.15	0.15	0.15
Mist (lb/hr)	18.1	18.1	18.1	18.1	18.1
(TPY)	79.4	79.4	79.4	79.4	79.4
Operating Factor	1	1	1	1	1

NOTE:

1. See Appendix for calculations of emission rates.
2. Sulfuric acid plants No. 1, 2, and 3 are permitted to operate 8760 hours per year, while plants No. 4 and 5 are permitted to operate 8400 hours per year.

TABLE 3-2

NET EMISSION INCREASES(1)

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Pollutant	Emissions (tons/yr) Sulfuric Acid Plant 01	02	03	04	05
SO2					
Present (actual)	1561	1371.8	1371.8	1583.3	1642
Proposed	2117	2117	2117	2117	2117
Change	556	745.2	745.2	533.7	475
Total Increase			3055.1		
Significant Increase (3)			40		
MIST					
Present (actual)	27.8	5.7	34.3	13.6	11.8
Proposed	79.4	79.4	79.4	79.4	79.4
Change	51.6	73.7	45.1	65.8	67.6
Total Increase			303.8		
Significant Increase (3)			7		
NOx					
Present (actual)(2)	35.0	34.6	34.6	36.5	36.5
Proposed(2)	42.7	42.7	42.7	42.7	42.7
Change	7.7	8.1	8.1	6.2	6.2
Total Increase			36.3		
Significant Increase (3)			40		

(1) See Appendix for emission calculations.
(2) NOx emissions based on emission factor of 1.15×10^{-6} lb/dscf.
(3) Presented in Table 500.2, Chapter 17-2, FAC.

at IMC that would have to be considered in this permit application and there are no other contemporaneous SO_2, NOx or sulfuric acid mist emission rate increases or decreases associated with this project. There have been no sources added or modified since the No. 2 DAP plant modification in 1987 which was reviewed in accordance with FAC Rule 17-2.500 (PSD review). Permitting that should be noted was the after-the-fact permit issued in 1990 by FDER for the existing molten sulfur system (current permit number A053-179954). This system has estimated SO_2 emissions of about 2.3 lbs/hr and 9.7 tpy. There will be no increase in the estimated SO_2 emissions from the molten sulfur system because the emission inventory submitted to FDER was based on the sulfur system's maximum operating conditions which will not be affected by the proposed project.

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

TABLE 3-3
MAJOR FACILITY CATEGORIES

IMC FERTILIZER, INC.
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

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Pollutant	Significant Emission Rate tons/yr	De Minimis Ambient Impacts ug/m3
CO	100	575 (8-hour)
NOx	40	14 (NO2, Annual)
SO2	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)
H2SO4 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

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

	FDER (State)		USEPA (National)			
			Primary		Secondary	
Pollutant	ug/m3	PPM	ug/m3	PPM	ug/m3	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	-

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

TABLE 3-6
PSD INCREMENTS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Pollutant	Allowable PSD Increments (State/National) Class I ug/m3	Class II ug/m3	Class III ug/m3
TSP, Annual	5	19	37
24-hour	10	37	75
SO2, Annual	2	20	40
24-hour	5	91	182
3-hour	25	512	700
NO2, Annual	2.5	25	50

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 IMC 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. 1, 2, 3, 4, and 5 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.

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 3-5 for significant emission levels).

The emission rate increases proposed by IMC 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.

Sulfur dioxide and acid mist are present in the tail gas from all contact process sulfuric acid plants. In a typical plant with the single absorption system, the sulfur dioxide in the tail gas is approximately 30 pounds per ton of acid produced and the acid mist is approximately four pounds per ton of acid produced. The nitrogen oxides that are present in the tail gas are formed in the sulfur burners as a result of the fixation of atmospheric nitrogen. Recent measurements have indicated that the concentration of nitrogen oxides in the tail gas from a sulfuric acid plant are in the range of 10 parts per million (by volume).

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 40

CFR 60, 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 most recently 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 variations in sulfur dioxide emissions as a function of catalyst age, "... 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." 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 as of 1990 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). Another review of NSPS by EPA is currently due but probably will not be published before the early 1990's. In the 1985 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 sulfur 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 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

The control alternatives for sulfur dioxide have been summarized based upon information compiled by EPA in the 1985 NSPS review for sulfur acid plants. As stated earlier, EPA is due to review these standards again but will probably not publish the results of their review until sometime in the early 1990's.

4.2.1.1 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 less than 4.0 pounds per ton of acid as required by New Source Performance Standards. The information reviewed by EPA indicates that even lower sulfur dioxide emission levels occur with new catalyst but as the catalyst ages, the conversion efficiency drops and sulfur dioxide emission rates begin to approach the 4.0 pound per ton limit.

4.2.1.2 Sodium Sulfite-Bisulfite Scrubbing

Between 1971 and 1985, two sulfuric acid plants were constructed employing sodium sulfite-bisulfite scrubbing to control sulfur dioxide emissions. One of the plants was subsequently converted to ammonia scrubbing and the second plant has never been used. As a result, sodium sulfite-bisulfite scrubbing is not considered a demonstrated sulfur dioxide control alternative.

4.2.1.3 Ammonia Scrubbing

Ammonia scrubbing uses anhydrous ammonia and water in a scrubbing system to convert sulfur dioxide to ammonium sulfate. Depending upon the market, the ammonium sulfate can be converted to a fertilizer grade product.

Five sulfuric acid plants constructed between 1971 and 1985 use ammonia scrubbing for sulfur dioxide control. The process has proved effective for reducing sulfur dioxide emissions to below 4.0 pounds per ton and also for controlling sulfuric acid mist emissions.

The major disadvantages of the ammonia scrubbing system, when compared with the dual absorption process are:

1. a waste by-product is produced unless there is a market for fertilizer grade ammonium sulfate;

2. the scrubbing system introduces a process that is foreign to sulfuric acid plant operators;
3. the scrubbing system is a high maintenance item and requires additional manpower for operation; and

4. no sulfuric acid plant size reduction benefits are achieved with the scrubbing system.

4.2.1.4 Molecular Sieves

A molecular sieve was installed at one sulfuric acid plant in Florida for sulfur dioxide control. Extensive operating problems were experienced as the molecular sieve absorbed nitrogen oxides as well as sulfur dioxide. The regeneration of these gases resulted in the formation of nitric acid within the sulfuric acid plant. The nitric acid/sulfuric acid mixture resulted in severe corrosion problems which caused the molecular sieve system to be scrapped. As a result, molecular sieves are not considered a viable alternative for sulfur dioxide control in the sulfuric acid industry.

4.2.2 Sulfuric Acid Mist Control

Control alternatives that were reviewed by EPA in the 1985 New Source Performance Standards review are summarized in the following sections.

4.2.2.1 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 choice of control 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.

4.2.2.2 Electrostatic Precipitators

The electrostatic precipitators (ESPs) have the potential for controlling sulfuric acid mist emissions from sulfuric acid plants; however, there is no demonstrated application of ESPs. The disadvantages associated with ESPs and hence, the reason they have not been used, include the initial cost, size requirements, operating and maintenance requirements and the potential for corrosion. The advantage of the ESP is that it would operate at a low pressure drop; approximately 0.5 inches of water.

4.3 COST ANALYSIS

In reviewing the cost analyses presented in this section, it should be recognized that the two control alternatives that have been analyzed for sulfur dioxide achieved about the same degree of efficiency; i.e, there is no advantage of one system over the other from the standpoint of the level of sulfur dioxide control that can be achieved. The same holds true for the control alternatives evaluated for sulfuric acid mist; both alternatives (fiber mist eliminators and electrostatic precipitators) are capable of achieving approximately the same degree of acid mist control.

Hence, the choice of the control alternative for sulfur dioxide and the control alternative for sulfuric acid mist can be made on the basis of cost, operating familiarity and operating convenience.

In Tables 4-1 and 4-2, the capital costs and annual costs of controlling sulfur dioxide emissions by dual absorption and by ammonia scrubbing are presented. In Table 4-3 and 4-4, similar costs are presented for controlling sulfuric acid mist emissions by fiber mist eliminators and electrostatic precipitators. The cost data are based upon analyses presented in EPA-450/3-85-012 and in EPA-450/3-76-014 (Capital and Operating Costs of Selected Air Pollution Control Systems); both updated to 1990 costs. The capital recovery in the annual cost calculation is based upon a 10 percent rate of return and a 10 year equipment life.

The cost analyses demonstrate that the annual cost of the dual absorption process for sulfur dioxide is less than half the annual cost for ammonia scrubbing. Similarly the annual cost for sulfuric acid mist with the fiber type mist eliminators is less than one-third the annual cost of controlling acid mist with electrostatic precipitators. As the two control alternatives for sulfur dioxide and the two control alternatives for sulfuric acid mist are capable of the same level of control, it is evident why the dual absorption and the fiber type mist eliminators have been the control alternatives of choice for sulfur dioxide and sulfuric acid mist, respectively.

TABLE 4-1

COST ANALYSIS FOR SO2 CONTROL BY DUAL ABSORPTION
2900 TPD CONTACT SULFURIC ACID PLANT

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		
Absorber	1,405,000	
Pumps	281,000	
Piping	421,000	
Heat Exchanger	703,000	
		$2,810,000
Indirect		
Engineering and Supervision	281,000	
Construction	224,000	
Contractor	169,000	
Contingency	337,000	
		1,011,000
TOTAL CAPITAL COST		$3,821,000
ANNUAL COST		
Direct		
Operating Labor and Supervision	8,000	
Maintenance Labor	7,000	
Maintenance Materials	8,000	
Utilities	2,995,000	
Catalyst	41,000	
		$3,059,000
Indirect		
OH	10,000	
Payroll	4,000	
		14,000
Capital Recovery		623,000
Insurance and Taxes		153,000
Credit for Acid Recovery		(1,233,000)
TOTAL ANNUAL COST		$2,616,000

TABLE 4-2

COST ANALYSIS FOR SO2 CONTROL BY AMMONIA SCRUBBING
2900 TPD CONTACT SULFURIC ACID PLANT

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		
Scrubber and Auxiliaries		$4,284,000
Indirect		
Engineering and Supervision	428,000	
Construction	343,000	
Contractor	257,000	
Contingency	514,000	
		1,542,000
TOTAL CAPITAL COST		$5,826,000
ANNUAL COST		
Direct		
Operating Labor and Supervision	540,000	
Maintenance Labor	80,000	
Maintenance Materials	95,000	
Utilities	311,000	
Chemicals	2,629,000	
		$3,655,000
Indirect		
OH	369,000	
Payroll	124,000	
		493,000
Capital Recovery		950,000
Insurance and Taxes		233,000
TOTAL ANNUAL COST		$5,331,000

TABLE 4-3

COST ANALYSIS FOR ACID MIST CONTROL BY FIBER TYPE MIST ELIMINATORS
2900 TPD CONTACT SULFURIC ACID PLANT

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		$ 87,000
Indirect		40,000
TOTAL CAPITAL COST		$ 127,000
ANNUAL COST		
Direct		
Utilities		$ 210,000
Indirect		
Capital Recovery	21,000	
Insurance and Taxes	5,000	
		26,000
Credit for Acid Recovery		(138,000)
TOTAL ANNUAL COST		$ 98,000

TABLE 4-4

COST ANALYSIS FOR ACID MIST CONTROL BY ELECTROSTATIC PRECIPITATOR
2900 TPD CONTACT SULFURIC ACID PLANT

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		
Collector	425,000	
Auxiliaries	147,000	
		$ 572,000
Indirect		
Engineering and Supervision	51,000	
Construction	40,000	
Contractor	31,000	
Contingency	68,000	
		190,000
TOTAL CAPITAL COST		$ 762,000
ANNUAL COST		
Direct		
Operating Labor and Supervision	23,000	
Maintenance Labor	20,000	
Maintenance Materials	40,000	
Utilities	73,000	
		$ 156,000
Indirect		
OH	25,000	
Payroll	9,000	
		34,000
Capital Recovery		124,000
Insurance and Taxes		30,000
TOTAL ANNUAL COST		$ 344,000

4.4 CONCLUSION

Based upon the analysis presented in previous sections, the dual absorption process is selected by IMC as the control alternative for sulfur dioxide control and the fiber type high efficiency mist eliminator is selected for sulfuric acid mist control. There is no effective and demonstrated technology for controlling nitrogen oxides emissions from sulfuric acid plants.

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 five sulfuric acid plants. The modeling associated with this review demonstrated that:

(1) the impact of sulfur dioxide emission increases would be less than significant; and

(2) the impact of sulfuric acid mist emissions would not exceed an acceptable ambient level.

Table 5-1 contains modeling input parameters used in the ambient air quality impacts analysis.

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(3)(e)1, FAC and presented in Table 3-4. Therefore, air quality monitoring is not required.

The air quality modeling that has been conducted demonstrates that the impact of the sulfur dioxide emission increases from the five sulfuric acid plants is not significant for the 3-hour, 24-hour or annual periods. The modeling further shows the impact of sulfuric acid mist emissions associated with the proposed project is less than the Acceptable Ambient Level (AAL) defined as a multiple of the Threshold Limit Value.

TABLE 5-1

AIR QUALITY MODELING PARAMETERS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

H_2SO_4 Plant		Stack		Stack Gas		Emission Rates	
		Ht (m)	Dia (m)	Vel (mps)	Temp (°K)	SO_2 (g/s)	Acid Mist (g/s)
01	Exist.	61.0	2.6	14.28	350	-56.75	-
	Prop.	61.0	2.6	15.31	350	60.95	2.29
02	Exist.	61.0	2.6	14.28	350	-56.75	-
	Prop.	61.0	2.6	15.31	350	60.95	2.29
03	Exist.	61.0	2.6	14.28	350	-56.75	-
	Prop.	61.0	2.6	15.31	350	60.95	2.29
04	Exist.	60.7	2.6	14.54	350	-57.80	-
	Prop.	60.7	2.6	15.31	350	60.95	2.29
05	Exist.	60.7	2.6	14.54	350	-57.80	-
	Prop.	60.7	2.6	15.31	350	60.95	2.29

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 change in the emissions rate of sulfur dioxide used for air quality modeling purposes is defined as the emission rate increase associated with the increase in sulfuric acid production of plant Nos. 1, 2, 3, 4, and 5.

The impact analysis of the change in sulfur dioxide emissions was conducted using the Industrial Source Complex - Short Term (ISC-ST) air quality model, Version 90346. The 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 associated with the project included the increase in emissions associated with the increases in the production rate of the five existing sulfuric acid plants. The sulfur dioxide emissions from the proposed project were based upon a sulfur dioxide emission limit of 4.0 pounds per ton of 100 percent sulfuric acid and a production rate of 2900 tons of 100 percent acid per day. This resulted in an hourly sulfur dioxide emission rate of 483.3 pounds per hour. For modeling purposes, it was assumed that the plant would operate 8,760 hours a year.

The modeling conducted with the ISC-ST air quality model was conducted in accordance with EPA guidelines and included receptors established by the polar grid system extending to 4.0 kilometers from the plant. Four sets of receptor rings were placed at distances ranging from 1.5 to 4.0 kilometers from the plant with receptors placed at 10 degree intervals on each receptor ring. The receptor ring at 1.5 kilometers corresponds to the nearest property boundary (see Figure 2-2).

The results of the air quality modeling, summarized in Table 5-2, demonstrate that the impacts of emission increases associated with the proposed project are not significant for the three-hour, 24-hour or annual time periods. Therefore, no further air quality modeling is required.

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. For purposes of this ambient impact analysis, an Acceptable Ambient Level (AAL) was calculated by dividing the Threshold Limit Value for sulfuric acid mist (1,000 micrograms per cubic meter) by a factor of 420 to obtain an AAL for the 24-hour period. The 24-hour AAL that has been established based upon this factor is 2.4 micrograms per cubic meter.

TABLE 5-2

SUMMARY OF SULFUR DIOXIDE IMPACT ANALYSIS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	SULFUR DIOXIDE IMPACT (ug/m^3) ANNUAL	3-HOUR	24-HOUR
1982	0.33	16.26	4.41
1983	0.26	16.83	3.58
1984	0.32	18.83	4.36
1985	0.42	17.87	3.83
1986	0.47	17.58	4.84
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

The air quality modeling that was conducted for sulfur dioxide was used to estimate the impact of sulfuric acid mist emissions. The sulfur dioxide modeling results were used to determine the impact of the sulfuric acid mist emissions associated with the proposed project by using a ratio of the acid mist emissions to the sulfur dioxide emissions. This is possible because the stack parameters and emission rate ratios are the same.

The resulting sulfuric acid mist air quality impacts are summarized in Table 5-3. The result of the modeling demonstrate that the maximum impact of ambient sulfuric acid mist levels associated with the proposed project will be within IMC's property boundary. An extrapolation of the concentrations occurring on IMC property indicate that the maximum acid mist impacts will be less than the AAL for sulfuric acid mist off plant property.

It was estimated that because of the expected magnitude of the sulfuric acid mist emissions from other sources and the distances of these sources from IMC, it would be very unlikely that any of the sources, individually or collectively, would result in a significant contribution to ambient acid mist levels in the project area.

TABLE 5-3

SUMMARY OF ACID MIST IMPACT ANALYSIS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	24-HR ACID MIST IMPACT (ug/m^3)
1982	2.0
1983	1.9
1984	2.2
1985	2.1
1986	2.3
AAL (1)	2.4

(1) AAL = TLV/420, 24-Hour Average (guideline)

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 five sulfuric acid plants' stacks is 213 feet. IMC's stacks are less than 213 feet in height above-grade. This will satisfy the good engineering practice (GEP) stack height criteria and will not result in excessive concentrations of air pollutants as a result of plume downwash as the stack will be at least 2.5 times the height of nearby structures. The GEP stack analysis is presented in Table 6-1.

TABLE 6-1

GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

IMC FERTILIZER, INC.
POLK COUNTY, FLORIDA

Building	Height H ft	Length x Width ft	Projected Width PW(1) ft	L(2) ft	5L(3) ft	Distance to H2SO4 ft	H + 1.5L(4) ft
Rock Silos	103	60 x 30	48	48	240	350	>5L(5)
Phos Acid E-W	110	200 x 50	113	110	550	750	>5L
DAP E-W	123	150 x 50	98	98	490	900	>5L
DAP Storage	100	250 x 150	219	100	500	1200	>5L
MAP Storage	100	200 x 400	319	100	500	800	>5L
MAP Tower	130	30 x 30	34	34	170	1200	>5L
GTSP Plant	123	150 x 75	120	120	600	1200	>5L

(1) Projected width = $(4/\pi \times \text{Building Width} \times \text{Building Length})^{1/2}$
(2) L is lesser of H or PW.
(3) 5L is distance the building wake effect present.
(4) H + 1.5L is stack height necessary to eliminate downwash. Only nearby buildings 80 feet or taller are considered as H_2SO_4 stack heights are 200 feet (200/2.5 = 80).
(5) Structure is more than a distance of 5L from the sulfuric acid plants and will therefore exert no influence on emissions from the sulfuric acid plants.

7.0 IMPACTS ON SOILS, VEGETATION AND VISIBILITY

The land-use in the vicinity of IMC Fertilizer, Inc. is a mixture of unimproved land, pasture land and land which has been mined for phosphate rock. The town of Mulberry is located about seven miles northeast of the site. Additionally, there are scattered residences between IMC and the population centers. The proposed project is not expected to have any significant impact on activities in the area. Air quality modeling has demonstrated that sulfur dioxide levels which will exist after the proposed modifications will not differ significantly from current levels. Also, modeling has indicated that there will not be a significant impact from sulfuric acid mist emissions. Thus it is expected that the proposed expansion will not adversely impact soils, vegetation and visibility in the area.

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.

8.0 CONCLUSION

It can be concluded from the information in this report that the proposed increase in production rates of sulfuric acid plants No. 1, 2, 3, 4 and 5 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.

APPENDIX

EMISSION RATE CALCULATIONS

EMISSION RATE CALCULATIONS

PERMITTED CONDITIONS:

SULFURIC ACID PLANTS NO. 1, 2, AND 3

2700 tons per day 100% acid (rated capacity)
SO2 - 4.0 lbs/ton, 450 lbs/hr
Mist - 0.15 lb/ton, 16.9 lbs/hr
Operating Factor - 1.0
(Based on Permits No. A053-137316, A053-137317 and A053-170486)

SULFURIC ACID PLANTS NO. 4 AND 5

2750 tons per day 100% acid
SO2 - 4.0 lbs/ton, 458.3 lbs/hr
Mist - 0.15 lb/ton, 17.2 lbs/hr
Operating Factor - 1.0
(Based on Permits No. A053-124655 and A053-124657)

ACTUAL CONDITIONS:

SULFURIC ACID PLANT NO. 1

2700 tons per day 100% acid
SO2 - 3.6 lbs/ton
Mist - 0.064 lb/ton
Operating Factor - 0.88, Annual, based on historic production data documented in Table 2-2.

SULFURIC ACID PLANT NO. 2

2700 tons per day 100% acid
SO2 - 3.2 lbs/ton
Mist - 0.01 lb/ton
Operating Factor - 0.87, Annual, based on historic production data documented in Table 2-2.

SULFURIC ACID PLANT NO. 3

2700 tons per day 100% acid
SO2 - 3.2 lbs/ton
Mist - 0.08 lb/ton
Operating Factor - 0.87, Annual, based on historic production data documented in Table 2-2.

SULFURIC ACID PLANT NO. 4

2750 tons per day 100% acid
SO2 - 3.5 lbs/ton
Mist - 0.03 lb/ton
Operating Factor - 0.94, Annual, based on historic production data documented in Table 2-2.

SULFURIC ACID PLANT NO. 5

2750 tons per day 100% acid
SO_2 - 3.6 lbs/ton
Mist - 0.02 lb/ton
Operating Factor - 0.94, Annual, based on historic production data documented in Table 2-2.

PROPOSED CONDITIONS:

SULFURIC ACID PLANTS NO. 1, 2, 3, 4, AND 5

2900 tons per day 100% acid
SO_2 - 4.0 lbs/ton
Mist - 0.15 lb/ton
Operating Factor - 1.0

PERMITTED EMISSION RATE CALCULATIONS

SULFURIC ACID PLANTS NO. 1, 2, AND 3

SO_2: Hourly = 4.0 lbs/ton x 2700/24 tons/hr
= 450.0 lb/hr

Annual = 450.0 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 1.0
= 1971 TPY

MIST: Hourly = 0.15 lb/ton x 2700/24 tons/hr
= 16.9 lbs/hr

Annual = 16.9 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 1.0
= 74.0 TPY

SULFURIC ACID PLANTS NO. 4 AND 5

SO_2: Hourly = 4.0 lbs/ton x 2750/24 tons/hr
= 458.3 lbs/hr

Annual = 458.3 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 1.0
= 1925 TPY

MIST: Hourly = 0.15 lb/ton x 2750/24 ton/hr
= 17.2 lb/hr

Annual = 17.2 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 1.0
= 72.2 TPY

ACTUAL EMISSION RATE CALCULATIONS

SULFURIC ACID PLANT NO. 1

SO_2:	Hourly	=	3.6 lbs/ton x 2700/24 tons/hr
		=	405.0 lb/hr
	Annual	=	405.0 lbs/hr x 8760 hr/yr x 1/2000 ton/lb x 0.88
		=	1561 TPY
MIST:	Hourly	=	0.064 lb/ton x 2700/24 ton/hr
		=	7.2 lb/hr
	Annual	=	7.2 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.88
		=	27.8 TPY
NO_x	Hourly	=	2700 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.1 lbs/hr (NOx emission factor based on emission test data)
	Annual	=	9.1 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.88
		=	35.0 TPY

SULFURIC ACID PLANT NO. 2

SO_2:	Hourly	=	3.2 lbs/ton x 2700/24 tons/hr
		=	360.0 lb/hr
	Annual	=	360.0 lbs/hr x 8760 hr/yr x 1/2000 ton/lb x 0.87
		=	1371.8 TPY
MIST:	Hourly	=	0.013 lb/ton x 2700/24 ton/hr
		=	1.5 lb/hr
	Annual	=	1.5 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.87
		=	5.7 TPY
NO_x	Hourly	=	2700 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.1 lbs/hr
	Annual	=	9.1 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.87
		=	34.6 TPY

SULFURIC ACID PLANT NO. 3

SO2:	Hourly	=	3.2 lbs/ton x 2700/24 tons/hr
		=	360.0 lb/hr
	Annual	=	360.0 lbs/hr x 8760 hr/yr x 1/2000 ton/lb x 0.87
		=	1371.8 TPY
MIST:	Hourly	=	0.08 lb/ton x 2700/24 ton/hr
		=	9.0 lb/hr
	Annual	=	9.0 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.87
		=	34.3 TPY
NOx	Hourly	=	2700 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.1 lbs/hr
	Annual	=	9.1 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 0.87
		=	34.6 TPY

SULFURIC ACID PLANT NO. 4

SO2:	Hourly	=	3.5 lbs/ton x 2750/24 tons/hr
		=	401.0 lb/hr
	Annual	=	401.0 lbs/hr x 8400 hr/yr x 1/2000 ton/lb x 0.94
		=	1583.3 TPY
MIST:	Hourly	=	0.03 lb/ton x 2750/24 ton/hr
		=	3.4 lb/hr
	Annual	=	3.4 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 0.94
		=	13.6 TPY
NOx	Hourly	=	2750 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.2 lbs/hr
	Annual	=	9.2 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 0.94
		=	36.5 TPY

SULFURIC ACID PLANT NO. 5

SO_2:	Hourly	=	3.63 lbs/ton x 2750/24 tons/hr
		=	415.9 lb/hr
	Annual	=	415.0 lbs/hr x 8400 hr/yr x 1/2000 ton/lb x 0.94
		=	1642.0 TPY
MIST:	Hourly	=	0.026 lb/ton x 2750/24 ton/hr
		=	3.0 lb/hr
	Annual	=	3.0 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 0.94
		=	11.8 TPY
NO_x	Hourly	=	2750 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.2 lbs/hr
	Annual	=	9.2 lbs/hr x 8400 hrs/yr x 1/2000 ton/lb x 0.94
		=	36.5 TPY

PROPOSED EMISSION RATE CALCULATIONS:

SULFURIC ACID PLANTS NO. 1, 2, 3, 4, AND 5

SO_2:	Hourly	=	2900 tons/day x 4.0 lbs/ton x 1/24 day/hr
		=	483.3 lbs/hr
	Annual	=	483.3 lbs/hr x 8760 hr/yr x 1/2000 ton/lb x 1.0
		=	2117.0 TPY
MIST:	Hourly	=	2900 tons/day x 0.15 lbs/ton x 1/24 day/hr
		=	18.1 lbs/hr
	Annual	=	18.1 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 1.0
		=	79.4 TPY
NO_x	Hourly	=	2900 tons/day x 70,190 dscf/ton x 1.15 x 10(-6) lb/dscf x 1/24 day/hr
		=	9.8 lbs/hr
	Annual	=	9.8 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb x 1.0
		=	42.7 TPY

NET ANNUAL EMISSION CHANGES

Total Actual SO2	=	1561 + 1371.8 + 1371.8 + 1583.3 + 1642.0
	=	7529.9 TPY
Total Proposed SO2	=	5 x 2117 = 10,585 TPY
Net Change SO2	=	10,585 - 7529.9 = 3055.1 TPY
Total Actual Mist	=	27.8 + 5.7 + 34.3 + 13.6 + 11.8
	=	93.2 TPY
Total Proposed Mist	=	5 x 79.4 = 397.0 TPY
Net Change Mist	=	397 - 93.2 = 303.8 TPY
Total Actual NOx	=	35 + 34.6 + 34.6 + 36.5 + 36.5 = 177.2 TPY
Total Proposed NOx	=	5 x 42.7 = 213.5 TPY
Net Change NOx	=	36.3 TPY