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

RECEIVED
JUNE 19 1991
Bureau of
Air Regulation

KA 261-91-01

June 18, 1991

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JUN 28 1991
Bureau of
Air Regulation

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

Subject: Construction Permit Application
Modification of Sulfuric Acid Plants
No. 10 and 11
Agrico Chemical Company
Polk County, Florida

Dear Mr. Fancy:

Enclosed are six signed copies of the construction permit application and a check for $5,000 (permit application fee) for the modification of Agrico Chemical Company's sulfuric acid plants No. 10 and 11 in Polk County, Florida.

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

Very truly yours,

KOOGLER & ASSOCIATES

PRaval

Pradeep A. Raval

PAR:wa
Enc.

cc: Mr. Phillip Steadham
Willard Hanks
Clone Holladay } 7-3-91 RBN
Bill Thomas, SWD
Jewell Harper, EPA } 7-5-91 BA

AGRICO
Division of Freeport-McMoRan Resource Partners

Agrico Chemical Company
P. O. Box 1110
Mulberry, FL 33860
(813) 428-1431

RECEIVED
JUN 28 1991
Bureau of
Air Regulation

To Whom It May Concern:

Please be advised that the undersigned is Senior Vice President, Florida Operations, of Agrico Chemical Company, a division of Freeport-McMoRan Resource Partners Limited Partnership, with its principal office at 1615 Poydras Street, New Orleans, Louisiana 70112, hereinafter called "Agrico".

The Environmental Manager of Agrico is authorized to make, execute and submit to any appropriate federal, state or local government authority, in behalf of Agrico, any statement, application, request or the like, that is or shall be necessary, appropriate, or useful, for normal business activities.

Very truly yours,

AGRICO CHEMICAL COMPANY

By *T P Fowler*
T. P. Fowler
Senior Vice President,
Florida Operations

AGRICO
Division of Freeport-McMoRan Resource Partners
Agrico Chemical Company

88037

50-937/213

MAY 14, 1991

Pay ******5000*DOLLARS AND 00*CENTS $5,000.00

To The Order Of
FLORIDA DEPT OF ENVIRONMENTAL
REGULATION
2600 BLAIR STONE ROAD
TALLAHASSEE, FL 323992405

Two Signatures Required over $10,000

FREEPORT

Chase Manhattan Bank, Syracuse, New York

⑈088037⑈ ⑆021309379⑆ 601⑈2⑈6454 2⑈

Agrico Chemical Company
P.O. Box 1110
Mulberry, FL 33860
(813) 428-2613

No 04069

Date Shipped: 6-26-9
Shipped Via: UPS
Collect ☐ Prepaid ☒

SHIP TO: Mr C.H. Fancy
FLA Dept of Environmental Reg
Twin Towers Office BLDG
2600 Blair Stone Rd
TALLAHASSEE FL 32399-2400

Vendor Invoice/Credit Memo:
Agrico P. O. #
Account #
Shipment Requested by:

Quantity	Unit	Description
1	EA	Box Perm & Regulations

Shipped By: Consignee/Common Carrier

Reason for Shipment:

☐ Obsolete/Surplus Material
☐ Overshipment/Wrong Destination
☐ Scrap: Weight In.
☐ Other:

Vendor Action:

☐ Replacement
☐ Credit
☐ Repair
☐ See P. O. #

AGRICO
Division of Freeport-McMoRan Resource Partners

Agrico Chemical Company
P. O. Box 1110
Mulberry, FL 33860

RECEIVED
JUN 28 1991
Division of Air
Resources Management

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

UPS DELIVERY CONFIRMATION
0052 5452 177
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1 Copy - Accounting - White
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PSD-FL-179
AC53-199112

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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Air Regulation

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Air Regulation

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: Agrico Chemical Company 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 10 and 11

SOURCE LOCATION: Street SR 630 City near Ft. Meade

UTM: East (17) 407.5 km North 3071.3 km

Latitude 27 ° 45 ' 52 "N Longitude 81 ° 56 ' 19 "W

APPLICANT NAME AND TITLE: Selwyn Presnell, Environmental Manager

APPLICANT ADDRESS: P.O. Box 1110, Mulberry, FL 33860

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Agrico Chemical Company

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: Selwyn Presnell

Selwyn Presnell, Environmental Mgr.
Name and Title (Please Type)

Date: 6-25-91 Telephone No. (813) 428-1431

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 Street, Gainesville, FL 32609
Mailing Address (Please Type)

Florida Registration No. 12925 Date: 6/18/91 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. Both plants will operate in full compliance with applicable regulations.

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

Start of Construction August 1991 Completion of Construction October 1992

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 Section 2 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 hrs/yr

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	75,000	1

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

1. Total Process Input Rate (lbs/hr): 75,000 lbs/hr Sulfur

2. Product Weight (lbs/hr): 225,000 lbs/hr Sulfuric Acid (112.5 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/hr	T/yr	
SO_2	450.0	1971.0	17-2.600(2)(b)	450.0	450.0	1971.0	2
Acid Mist	16.9	74.0	17-2.600(2)(b)	16.9	169.0	740.0	2
NOx	15.8	69.2	-		15.8	69.2	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	SO2	99.7%	-	Design & Test
High Efficency	Acid Mist	90.0%	>1	Design & Test
Mist Eliminators				

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

EACH PLANT

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

Stack Height: 150 ft. Stack Diameter: 5.1 ft.

Gas Flow Rate: 157030 ACFM 131606 DSCFM Gas Exit Temperature: 170 °F.

Water Vapor Content: 0 % Velocity: 128 FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type 0 (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)]
   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:

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 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:

AGRICO CHEMICAL COMPANY
SOUTH PIERCE CHEMICAL WORKS
POLK COUNTY, FLORIDA

JUNE 1991

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

Agrico Chemical Company
South Pierce Chemical Works
State Road 630
P.O. Box 1110
Mulberry, Florida 33860

1.2 FACILITY LOCATION

Agrico Chemical Company, South Pierce Chemical Works (SPCW), consists of a phosphate chemical fertilizer manufacturing facility approximately eight miles west of Ft. Meade and twelve miles southwest of Bartow, Florida, on State Road 630 in Polk County. The UTM coordinates of the Agrico South Pierce facility are Zone 17, 407.6 km east and 3071.3 km north.

1.3 PROJECT DESCRIPTION

Agrico proposes to increase the sulfuric acid production rate of the two existing double absorption sulfuric acid plants from 2000 to 2700 tons per day (TPD) of 100% H_2SO_4 each. This will result in an increase in the sulfuric acid production rate at Agrico SPCW from the current 4,000 TPD to 5,400 TPD 100% H_2SO_4. The proposed project will also include energy efficiency enhancements to increase waste heat recovery.

The additional sulfuric acid produced will be used for distribution to other Agrico facilities 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.

Agrico 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 two 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

Agrico Chemical Company, South Pierce Chemical Works (SPCW) consists of a phosphate chemical fertilizer manufacturing facility located on State Road 630 in Polk County, Florida (See Figures 2-1 and 2-2). The UTM coordinates of the facility are Zone 17, 407.6 km east and 3071.3 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. The chemical complex includes sulfuric acid plants, phosphoric acid plants, plants to produce purified monoammonium phosphate (MAP) and purified diammonium phosphate (DAP), a granular triple superphosphate (GTSP) plant, a silicofluorides recovery facility, and storage, handling, grinding and shipping facilities for phosphate rock, ammonia, sulfur, and fertilizer products. Figure 2-3, Plot Plan, shows the location of the existing plants.

The additional sulfuric acid produced will be used for distribution to other Agrico facilities and will not affect the operation of the other plants in the chemical complex.

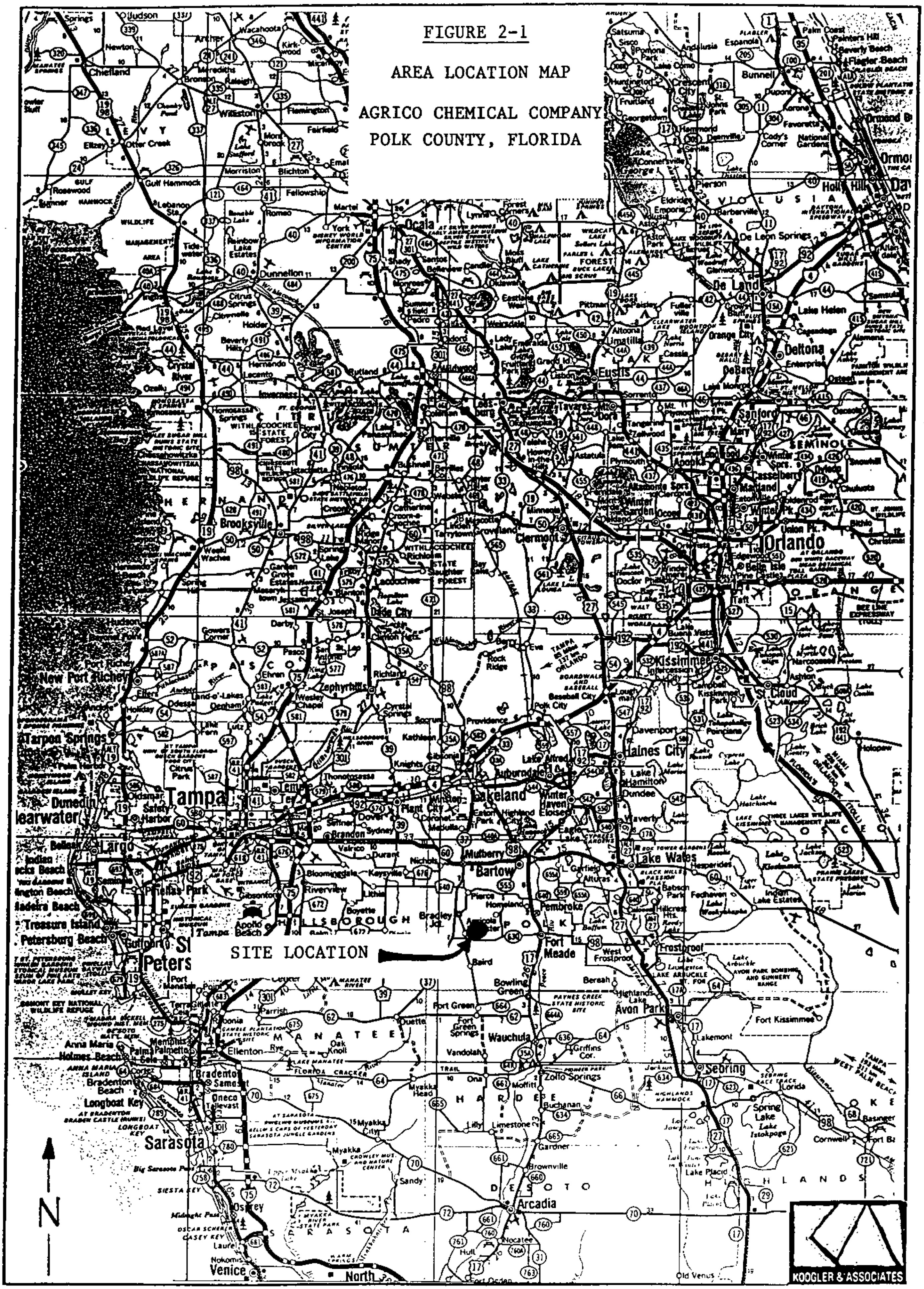


FIGURE 2-1

AREA LOCATION MAP

AGRICO CHEMICAL COMPANY

POLK COUNTY, FLORIDA

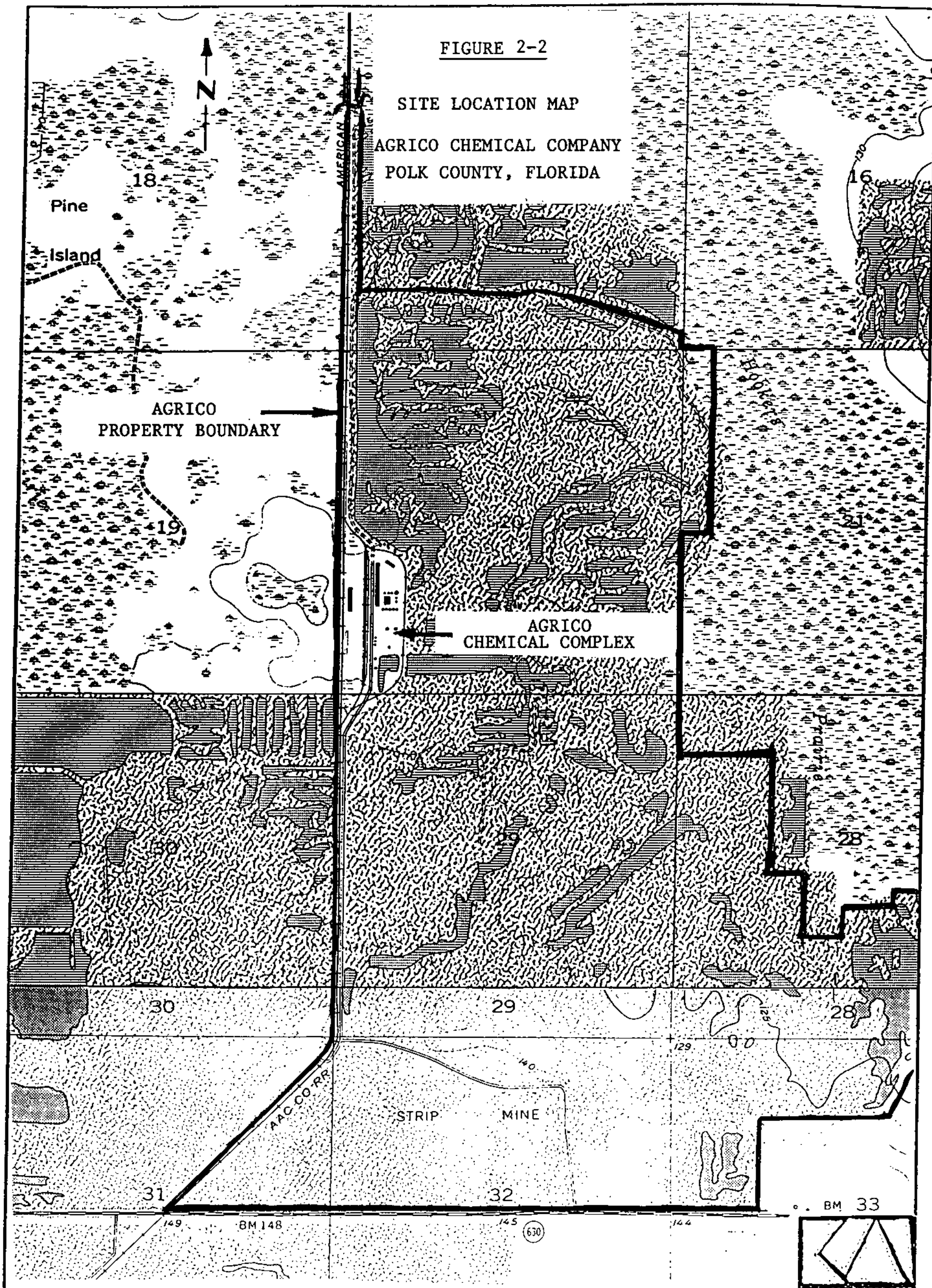
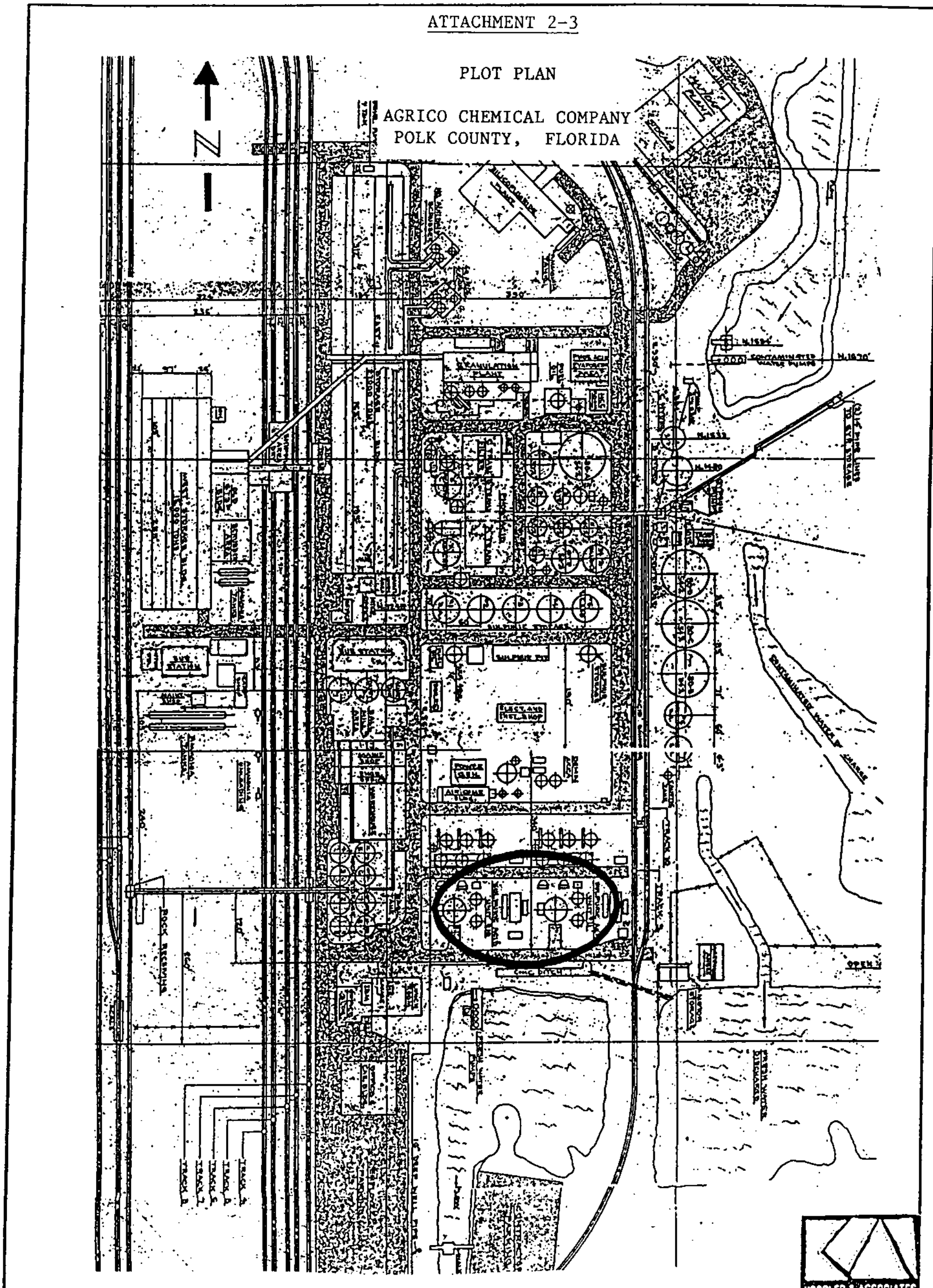


FIGURE 2-2
SITE LOCATION MAP
AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA
N
AGRICO
PROPERTY BOUNDARY
AGRICO
CHEMICAL COMPLEX
Pine
Island
18
16
19
21
30
29
28
31
32
33
STRIP MINE
AAC CO RR
BM 148
BM
KOOGLER & ASSOCIATES

ATTACHMENT 2-3



2.2 SULFURIC ACID PLANTS

There are two existing sulfuric acid plants at Agrico SPCW. Plants No. 10 and 11 were originally permitted in 1974 and are presently permitted at 2000 tons per day (TPD) of 100 percent H_2SO_4 each. Both 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 two sulfuric acid plants at Agrico SPCW are as follows:

Plant Number	Air Permit No.	Issue Date	Expiration Date
10	A053-176685	6-26-90	6-21-95
11	A053-145510	5-05-88	4-21-93

The total annual sulfuric acid production for 1990 was 1,455,087 tons. The sulfuric acid plant production data are presented below:

Plant Number	Production (Tons of Acid) 1989	1990
10	638,230	728,999
11	639,508	726,088

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 for the past five years. The actual emissions are presented in Table 2-1. The maximum measured sulfur dioxide emission rate during a compliance test was 3.6 pounds per ton of 100 percent H_2SO_4 produced and the maximum measured acid mist emission rate was 0.14 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 2×10^{-6} pounds of nitrogen oxides per standard cubic foot. This factor was based on an observed NOx emission rate during a performance test on a similar double absorption sulfuric acid plant.

TABLE 2-1
SULFURIC ACID PLANT EMISSION DATA

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

SUMMARY OF COMPLIANCE TEST RESULTS
SULFURIC ACID UNIT #10
PERMIT NO. A053-176685

	SO2		ACID MIST		
DATE	**#/TON**	**#/HR**	**#/TON**	**#/HR**	**OPACITY**
9/15/86	3.21	286.4	0.143	11.0	-0-
12/16/87	2.58	220.2	0.104	8.9	-0-
11/9/88	3.28	269.4	0.098	8.0	-0-
11/9/89	3.21	306.8	0.08	7.74	-0-
10/31/90	2.98	252.7	0.09	7.58	-0-

SULFURIC ACID UNIT #11
PERMIT NO. A053-145510

	SO2		ACID MIST		
DATE	**#/TON**	**#/HR**	**#/TON**	**#/HR**	**OPACITY**
1/14/86	3.47	273.4	0.128	10.07	-0-
8/26/87	3.41	264.6	0.127	9.8	-0-
5/26/88	3.56	296.4	0.102	8.5	-0-
9/5/89	3.53	297.7	0.105	8.9	-0-
8/1/90	3.41	291.4	0.121	10.3	-0-
PERMIT LIMITATION	4.0	333.3	0.15	12.5	10

3.0 PROPOSED PROJECT

3.1 PROJECT DESCRIPTION

Agrico proposes to increase the sulfuric acid production rate of the South Pierce facility from 4,000 TPD to 5,400 TPD 100% acid. The production rates of the two plants will increase from 2000 TPD to 2700 TPD 100% acid each.

The sulfuric acid production increase proposed for South Pierce is one portion of an overall cogeneration project. The project will increase South Pierce's waste heat recovery from 55% to 90%. Additional steam will be made available by significantly reducing the 600 psig steam usage in the sulfuric acid plant main blower turbines and by installing Heat Recovery Systems to produce 150 psig steam from waste heat in the interpass towers. A new turbogenerator will produce electrical power from the 600 psig and 150 psig steam thus made available.

The energy efficiency enhancements proposed also make it possible to increase each of the two sulfuric acid plant capacities from a nominal 2000 TPD to 2700 TPD. Average net new power generation will be 22 MW at 2100 TPD and 31 MW at 2500 TPD.

In addition to installing a new turbogenerator and its associated electrical equipment, the following sulfuric acid plant modifications and equipment additions will be necessary.

1. Pressure Drop Reduction

The SO_2 gas strength will be increased from 9.8% to 11.8% reducing the gas volume per unit of SO_2 and results in a lower pressure drop through the plant. The economizers before the interpass and final absorption towers cause high pressure drops and will be replaced with more efficient units. Reducing the gas pressure drop in the sulfuric acid plants lowers energy usage by the main blower turbines and makes more high pressure steam available for electrical power generation.

2. New Superheaters - Increased Steam Superheat

New superheaters will increase the temperature of the high pressure steam generated in the sulfuric acid plants from 600°F to 750°F. The steam temperature increase will improve the turbine efficiency and increase overall power generation.

3. Heat Recovery Systems

The existing interpass towers and acid coolers will be replaced with Heat Recovery Systems (HRS), proprietary technology supplied and licensed from Monsanto. This technology uses boilers to remove usable heat that is currently removed in the acid coolers. The product of these boilers is 150 psig steam which can be economically utilized to produce electrical power.

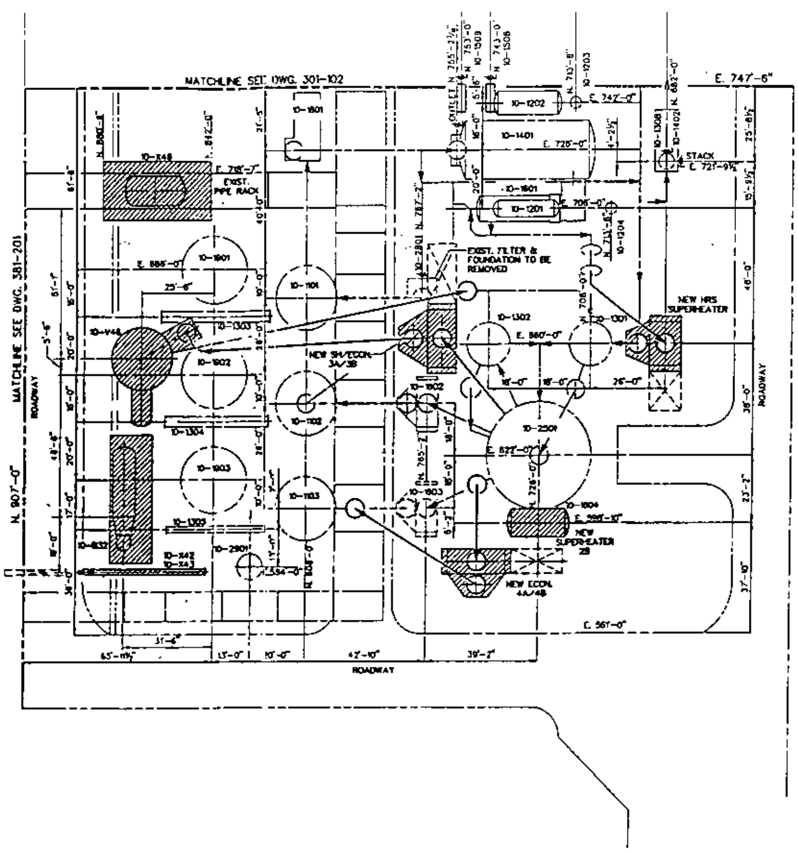
4. Increased Plant Capacity

The pressure drop reduction described above makes it possible to increase the gas flow through the sulfuric acid plant with the existing main blower turbine. Each sulfuric acid plant's production capacity can be increased from 2000 TPD nominal capacity to 2700 TPD design. The basic process is not being changed; it is being made more efficient.

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 two 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).



EQUIPMENT LIST (MAJOR EQUIPMENT ONLY)		
NUMBER	DESCRIPTION	REMARKS
10-1101	DRYING TOWER	(EXISTING)
10-1102	NO. 1 ABSORPTION TOWER	(REMOVE)
10-1103	NO. 2 ABSORPTION TOWER	(EXISTING)
10-1301	HEAT EXCHANGER	(EXISTING)
10-1302	HEAT EXCHANGER	(EXISTING)
10-1303	DRYING TOWER ACID COOLER	(EXISTING)
10-1304	NO. 1 ABSORPTION TOWER ACID COOLER	(REMOVE)
10-1305	NO. 2 ABSORPTION TOWER ACID COOLER	(EXISTING)
10-1602	HEAT EXCHANGER	(REMOVE)
10-1603	HEAT EXCHANGER	(REMOVE)
10-1604	SUPER HEATER	(REMOVE)
10-1901	DRYING TOWER ACID PUMP TANK	(EXISTING)
10-1902	NO. 1 ABSORPTION TOWER ACID PUMP TANK	(REMOVE)
10-1903	NO. 2 ABSORPTION TOWER ACID PUMP TANK	(EXISTING)
10-2501	CONVERTER	(EXISTING)
10-2801	AIR FILTER	(REMOVE)
	SUPERHEATER/ECONOMIZER 3A/3B	NEW
	ECONOMIZER 4A/4B	NEW
	SUPERHEATER 2B	NEW
	HRS SUPERHEATER	NEW
10-B32	HRS BOILER	NEW
10-P11A/B	HP BOILER FEED WATER PUMPS	NEW – NOT SHOWN
10-P38	HRS CIRC. PUMP	NEW – NOT SHOWN
10-P40A/B	HRS DRAIN PUMPS	NEW – NOT SHOWN
10-P41A/B	HRS BOILER FEED WATER PUMPS	NEW – NOT SHOWN
10-V48	HRS TOWER/PUMP BOOT	NEW
10-X42	HRS HEATER	NEW
10-X43	HRS PREHEATER	NEW
10-X48	HRS DEAERATOR	NEW
10-Z48	HRS DILUTER	NEW – NOT SHOWN

NOTE:
NEW EQUIPMENT IS HIGHLIGHTED WITH CROSSHATCHING

FIGURE 3-1A

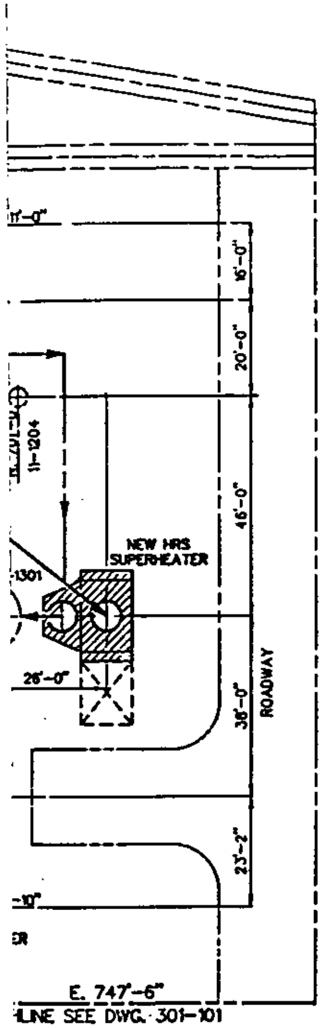
PROCESS FLOW DIAGRAM

MONSANTO ENVIRO-CHEM SYSTEMS, INC.
ST. LOUIS, MISSOURI

PLANT LAYOUT
SULFURIC ACID UNIT #10
AGRICO CHEMICAL CO. SOUTH PIERCE, FL.

BY	DATE	JOB NO.	DRAWING NO.	REVISION
DLM	3/91	2647	301-101	A

PROPOSAL



EQUIPMENT LIST
(MAJOR EQUIPMENT ONLY)

NUMBER	DESCRIPTION	REMARKS
11-1101	DRYING TOWER	(EXISTING)
11-1102	NO. 1 ABSORPTION TOWER	(REMOVE)
11-1103	NO. 2 ABSORPTION TOWER	(EXISTING)
11-1301	HEAT EXCHANGER	(EXISTING)
11-1302	HEAT EXCHANGER	(EXISTING)
11-1303	DRYING TOWER ACID COOLER	(EXISTING)
11-1304	NO. 1 ABSORPTION TOWER ACID COOLER	(REMOVE)
11-1305	NO. 2 ABSORPTION TOWER ACID COOLER	(EXISTING)
11-1602	HEAT EXCHANGER	(REMOVE)
11-1603	HEAT EXCHANGER	(REMOVE)
11-1604	SUPER HEATER	(REMOVE)
11-1901	DRYING TOWER ACID PUMP TANK	(EXISTING)
11-1902	NO. 1 ABSORPTION TOWER ACID PUMP TANK	(REMOVE)
11-1903	NO. 2 ABSORPTION TOWER ACID PUMP TANK	(EXISTING)
11-2501	CONVERTER	(EXISTING)
11-2801	AIR FILTER	(REMOVE)
	SUPERHEATER/ECONOMIZER 3A/3B	NEW
	ECONOMIZER 4A/4B	NEW
	IP STEAM VENT	NEW
	SUPERHEATER 2B	NEW
	HRS SUPERHEATER	NEW
11-B32	HRS BOILER	NEW
11-P39	HRS CIRC. PUMP	NEW - NOT SHOWN
11-P40A/B	HRS DRAIN PUMPS	NEW - NOT SHOWN
11-V46	HRS TOWER	NEW
11-X42	HRS HEATER	NEW
11-X43	HRS PREHEATER	NEW
11-Z48	HRS DILUTER	NEW - NOT SHOWN

NOTES:

1.) FOUNDATION FOR THIS ECONOMIZER WILL HAVE TO BE INSTALLED DURING THE TURNAROUND.

2.) NEW EQUIPMENT IS HIGHLIGHTED WITH CROSSHATCHING.

FIGURE 3-1B

PROCESS FLOW DIAGRAM

MONSANTO ENVIRO-CHEM SYSTEMS, INC.
ST. LOUIS, MISSOURI

PLANT LAYOUT
SULFURIC ACID UNIT #11

AGRICO CHEMICAL CO. SOUTH PIERCE, FL.

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	DLM	3/91			2647	
CHECKED					DRAWING NO.	

REFERENCES

PROPOSAL

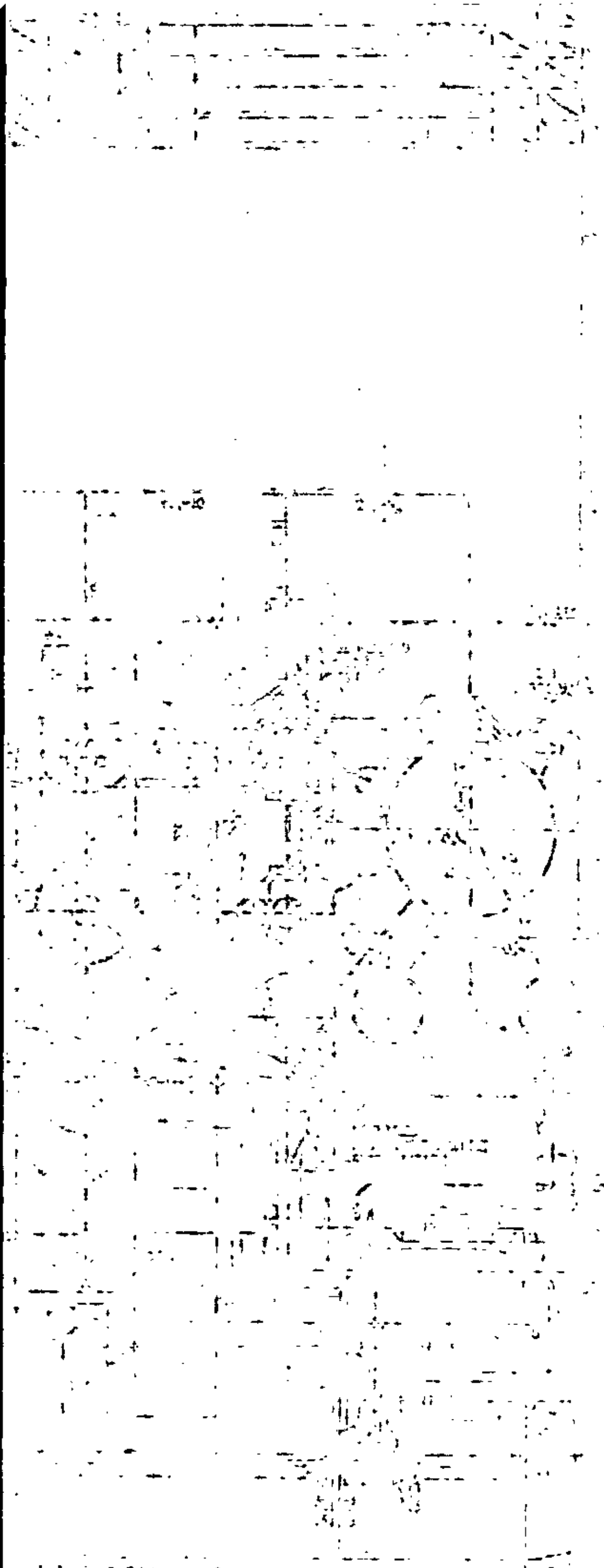


TABLE 3-1

CHANGES IN PRODUCTION AND EMISSION RATES

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

	Sulfuric Acid Plant	
	10	11
Permit Allowable Conditions		
Rate (TPD)	2000	2000
SO2 (lb/ton)	4	4
(lb/hr)	333.3	333.3
(TPY)	1460	1460
Mist (lb/ton)	0.15	0.15
(lb/hr)	12.5	12.5
(TPY)	54.8	54.8
Operating Factor	1	1
Actual Conditions		
Rate (TPD)	2000	2000
SO2 (lb/ton)	3.3	3.6
(lb/hr)	306.8	297.7
(TPY)	1343.8	1303.9
Mist (lb/ton)	0.14	0.13
(lb/hr)	11.0	10.3
(TPY)	48.2	45.1
Operating Factor	1.0	1.0
Proposed Conditions		
Rate (TPD)	2700	2700
SO2 (lb/ton)	4	4
(lb/hr)	450.0	450.0
(TPY)	1971.0	1971.0
Mist (lb/ton)	0.15	0.15
Mist (lb/hr)	16.9	16.9
(TPY)	73.9	73.9
Operating Factor	1	1

NOTE:

1. See Appendix for calculations of emission rates.
2. Sulfuric acid plants No. 10 and 11 are permitted to operate 8760 hours per year.

TABLE 3-2

NET EMISSION INCREASES(1)

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

Pollutant	Emissions (tons/yr) Sulfuric Acid Plant 10	11
SO2		
Present (actual)	1343.8	1303.9
Proposed	1971.0	1971.0
Change	627.2	667.1
Total Increase	1294.3	
Significant Increase (3)	40	
MIST		
Present (actual)	48.2	45.1
Proposed	73.9	73.9
Change	25.7	28.8
Total Increase	54.5	
Significant Increase (3)	7	
NOx		
Present (actual)(2)	51.2	51.2
Proposed(2)	69.2	69.2
Change	18.0	18.0
Total Increase	36.0	
Significant Increase (3)	40	

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

There are no other air pollution sources affected by the requested changes at Agrico SPCW 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 PSD permitting in 1981. 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 A053-187290). This system has estimated SO_2 emissions of about 1.9 lbs/hr and 7.1 tpy. There will be a negligible increase in the estimated SO_2 emissions from the molten sulfur system corresponding to the increase in the molten sulfur utilization rate (addressed under seperate cover).

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

TABLE 3-3
MAJOR FACILITY CATEGORIES

AGRICO CHEMICAL COMPANY
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

AGRICO CHEMICAL COMPANY
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

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

Pollutant	FDER (State)		USEPA (National) Primary		USEPA (National) Secondary	
	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	-

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).

TABLE 3-6
PSD INCREMENTS

AGRICO CHEMICAL COMPANY
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

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 Agrico SPCW 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. 10 and 11 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.

Although the estimated increase in the emissions of nitrogen oxides as a result of the proposed project will be less than significant, nitrogen oxides are addressed in both the Best Available Control Technology review and the Ambient Air Quality Analysis.

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 Agrico 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 a 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 - 20 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 in the immediate future. 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 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

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 in the immediate future.

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 1991 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 about 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
2700 TPD CONTACT SULFURIC ACID PLANT

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

CAPITAL COST			
Direct			
	Absorber	1,341,000	
	Pumps	268,000	
	Piping	402,000	
	Heat Exchanger	671,000	
			$2,682,000
Indirect			
	Engineering and Supervision	268,000	
	Construction	215,000	
	Contractor	161,000	
	Contingency	322,000	
			966,000
TOTAL CAPITAL COST			$3,648,000
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			593,000
Insurance and Taxes			146,000
Credit for Acid Recovery			(1,150,000)
TOTAL ANNUAL COST			$2,662,000

TABLE 4-2

COST ANALYSIS FOR SO2 CONTROL BY AMMONIA SCRUBBING
2700 TPD CONTACT SULFURIC ACID PLANT

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		
Scrubber and Auxiliaries		$4,090,000
Indirect		
Engineering and Supervision	409,000	
Construction	327,000	
Contractor	245,000	
Contingency	491,000	
		1,472,000
TOTAL CAPITAL COST		$5,562,000
ANNUAL COST		
Direct		
Operating Labor and Supervision	540,000	
Maintenance Labor	80,000	
Maintenance Materials	95,000	
Utilities	311,000	
Chemicals	2,450,000	
		$3,476,000
Indirect		
OH	369,000	
Payroll	124,000	
		493,000
Capital Recovery		905,000
Insurance and Taxes		222,000
TOTAL ANNUAL COST		$5,096,000

TABLE 4-3

COST ANALYSIS FOR ACID MIST CONTROL BY FIBER TYPE MIST ELIMINATORS
2700 TPD CONTACT SULFURIC ACID PLANT

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

CAPITAL COST		
Direct		$ 83,000
Indirect		38,000
TOTAL CAPITAL COST		$ 121,000
ANNUAL COST		
Direct		
Utilities		$ 210,000
Indirect		
Capital Recovery	20,000	
Insurance and Taxes	5,000	
		25,000
Credit for Acid Recovery		(128,000)
TOTAL ANNUAL COST		$107,000

TABLE 4-4

COST ANALYSIS FOR ACID MIST CONTROL BY ELECTROSTATIC PRECIPITATOR
2700 TPD CONTACT SULFURIC ACID PLANT

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

CAPITAL COST			
Direct			
	Collector	406,000	
	Auxiliaries	140,000	
			$ 546,000
Indirect			
	Engineering and Supervision	55,000	
	Construction	44,000	
	Contractor	33,000	
	Contingency	66,000	
			198,000
TOTAL CAPITAL COST			$ 744,000
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			121,000
Insurance and Taxes			30,000
TOTAL ANNUAL COST			$ 341,000

4.4 CONCLUSION

Based upon the analysis presented in previous sections, the dual absorption process is selected by Agrico 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 two sulfuric acid plants. The modeling associated with this review demonstrated that:

(1) the impact of sulfur dioxide emission increases would be greater than significant, but will result in no violations of the ambient air quality standards or the allowable PSD increments.

(2) the impact of sulfuric acid mist emissions is not expected to be of great concern because of the low concentrations.

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.

TABLE 5-1

AIR QUALITY MODELING PARAMETERS

AGRICO CHEMICAL COMPANY
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)
10	Exist.	45.7	1.6	29.37	350	-42.04	-
	Prop.	45.7	1.6	39.06	350	56.75	2.13
11	Exist.	45.7	1.6	29.37	350	-42.04	-
	Prop.	45.7	1.6	39.06	350	56.75	2.13

The air quality modeling that has been conducted demonstrates that the impact of the sulfur dioxide emission increases from the two sulfuric acid plants is significant for the 3-hour, 24-hour and annual periods, but does not result in any violations of the ambient air quality standards or the allowable PSD increments. The modeling further shows the impact of sulfuric acid mist emissions associated with the proposed project is not expected to be of great 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 maximum allowable emission rate associated with the increased sulfuric acid production rates of plant Nos. 10 and 11.

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 (ISC-ST) air quality model, Version 90346. 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 two 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. For modeling purposes, it was assumed that the plant would operate 8,760 hours a year.

The ASI modeling included receptors established by the polar grid system extending to 12.5 kilometers from the plant. Eleven sets of receptor rings were placed at distances ranging from 0.5 to 12.5 kilometers from the plant with receptors placed at 10 degree intervals on each receptor ring. The receptor ring at 0.5 kilometers approximately corresponds to the nearest property boundary (see Figure 2-2).

The results of the ASI modeling, summarized in Table 5-2A, demonstrate that the impacts of emission increases associated with the proposed project were significant for the three-hour, 24-hour and annual time periods. The ASI modeling also demonstrated that the impacts from the proposed project were not significant beyond 12.5 kilometers (see Table 5-2B).

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

Since the predicted sulfur dioxide impacts from the proposed project are greater than significant levels, additional modeling was conducted for sulfur dioxide for ambient air quality and PSD increment analyses. Ambient air impacts resulting from the increase in nitrogen oxides emissions can be estimated using a ratio of the sulfur dioxide impacts. The maximum predicted nitrogen oxides impact based on the ratio would be 0.03 ug/m3; less than the significant impact level of 1.0 ug/m3, annual average.

5.1.2. <u>PSD Increment Analysis</u>

To evaluate the PSD increment consumption, the emission rates of all sources creating a significant impact at the project site constructed or permitted after applicable baseline dates are input to the model along with emission rate reductions after the baseline dates. The impacts of these emission rate increases and decreases are then compared with the allowable PSD increments for the applicable periods of time. The list of sources creating a significant impact at the project site is provided in Table 5-3. Sulfur dioxide emitting facilities up to 200 kilometers from the site were screened using the "20 x D" rule to compile the source inventory used in the modeling.

The receptor grid chosen for the PSD increment modeling reflected the extent of Agrico's significant impact. The results of the PSD increment modeling are presented in Table 5-4. The results show that the proposed project is not expected to cause or contribute to any violation of the allowable PSD increments.

5.1.3 Ambient Air Quality Standard Analysis

Ambient air quality standards (AAQS) have been established for several criteria pollutants to protect the health and welfare of the general public. Modeling was conducted to estimate the maximum impacts from all the sulfur dioxide emitting sources creating a significant impact at the project site. As mentioned earlier, the list of the facilities modeled, provided in Table 5-3, was compiled using the "20 x D" rule.

The receptor grid chosen for the AAQS modeling reflected the extent of Agrico's area of significant impact. Background levels for sulfur dioxide were assumed to be zero. This assumption was made since all the sulfur dioxide emitting facilities within several kilometers of the project site are permitted and documented in the FDER air pollutant inventory system which was used to compile the emission inventory used in the air modeling. Using background levels in the analysis would have resulted in double-counting.

The results of the AAQS modeling are summarized in Table 5-5. The results show that the maximum impacts from all the sources modeled are not expected to violate the sulfur dioxide AAQS.

TABLE 5-2A

SUMMARY OF SULFUR DIOXIDE SIGNIFICANT IMPACT ANALYSIS

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	SULFUR DIOXIDE IMPACT (ug/m^3)		
	ANNUAL	3-HOUR	24-HOUR
1982	0.71	35.47	9.33
1983	0.53	36.81	8.51
1984	0.71	37.72	8.71
1985	0.91	40.17	7.69
1986	1.12	39.12	9.87
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

TABLE 5-2B

AREA OF SIGNIFICANT IMPACT FOR SULFUR DIOXIDE

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	IMPACTS DISTANCE (METERS)		
	ANNUAL	3-HOUR	24-HOUR
1982	NSI	3,000	7,500
1983	NSI	5,000	7,500
1984	NSI	3,000	12,500
1985	NSI	5,000	10,000
1986	2,000	3,000	7,500

NOTE: NSI - No significant impact by Agrico's proposed project.

TABLE 5-3

20-D TABLE (407.5, 3071.5 Agrico South Pierce) State of Florida SO2 Source Emissions

Plant Name	County	UTM Coordinates East (m)	UTM Coordinates North (m)	Total Emiss. (TPY) SO2	Dist (Km)	20-D Rule Emissions (TPY)	Significant for SO2
ADAMS PACKING	POLK	421700	3104200	40	36	713	NO
AGRICO S. PIERCE	POLK	407500	3071500	3498	0	0	YES
AJAX PAVING	CHARLOTTE	378100	2977300	58	99	1974	NO
ALAD CONSTRUCTION	OSCEOLA	455300	3127100	249	73	1466	NO
ALCOMA PACKING	POLK	451600	3085500	328	46	925	NO
ALL CHILDRENS HOSPITAL	PINELLAS	338100	3071600	44	69	1388	NO
AMERICAN ASPHALT	ORANGE	444800	3158200	53	94	1888	NO
AMERICAN ORANGE CORP	HARDEE	429800	3047300	198	33	658	NO
AMOCO OIL	HILLSBOROUGH	357800	3092000	166	54	1075	NO
APAC-FLORIDA (MACASPHALT)	LEE	424300	2930200	66	142	2846	NO
APAC-FLORIDA (MACASPHALT)	COLLIER	429200	2898800	46	174	3481	NO
APAC-FLORIDA (MACASPHALT)	CHARLOTTE	387900	2988900	132	85	1698	NO
ASPHALT DEVELOPERS	CHARLOTTE	400700	2977600	85	94	1883	NO
ASPHALT PAVERS	HERNANDO	361400	3168400	198	107	2146	NO
ATLANTIC SUGAR	PALM BEACH	553300	2945000	571	193	3861	NO
BERRY GROVES	HENDRY	450600	2955100	245	124	2482	NO
BETTER ROADS OF LAKE PLACID	COLLIER	432500	2889700	94	184	3670	NO
BETTER ROADS	COLLIER	422000	2899400	52	173	3454	NO
BETTER ROADS OF LAKE PLACID	HIGHLANDS	465600	3008700	169	86	1711	NO
BETTER ROADS OF LAKE PLACID	DESOTO	412000	3005000	59	67	1333	NO
BREWER CO OF FLORIDA	POLK	413000	3086200	75	16	314	NO
BRISSON ENTERPRISES	LEE	417600	2945000	53	127	2538	NO
CENTRAL POWER & LIME	HERNANDO	360000	3162500	4556	103	2053	YES
CF BARTOW	POLK	408400	3082400	5394	11	219	YES
CF PLANT CITY	HILLSBOROUGH	388000	3116000	8377	49	972	YES
CITRUS BELLE	HENDRY	456400	2905400	220	173	3463	NO
CITRUS HILL	POLK	447900	3068300	410	41	811	NO
CITRUS SERVICE	HERNANDO	364200	3158300	51	97	1940	NO
CITRUS WORLD	POLK	441000	3087300	877	37	741	YES
CITY ELECTRIC SYSTEM	MONROE	449400	2729200	34	345	6897	NO
CLM CHLORIDE METALS		361800	3088300	731	49	974	NO
COASTAL FUELS MARKETING	MANATEE	346500	3057800	30	63	1250	NO
COLUMBUS CO		361900	3077800	167	46	921	NO
CONSERVE NICHOLS	POLK	398700	3084200	1582	15	309	YES
CONSOLIDATED MINERALS	HILLSBOROUGH	393800	3096300	817	28	567	YES
COUCH CONSTRUCTION	HILLSBOROUGH	362100	3096700	59	52	1038	NO
COUCH CONSTRUCTION	PASCO	340700	3119500	158	82	1645	NO
CRYSTAL RIVER QUARRIES	CITRUS	340500	3205300	146	150	2993	NO
DELTA ASPHALT	HILLSBOROUGH	372100	3105400	51	49	980	NO
DES LITTLE & SONS	PASCO	333400	3133100	274	96	1927	NO
E R JAHNA INDUSTRIES	GLADES	470600	2965300	40	124	2471	NO
EVANS		383300	3135800	2178	69	1374	YES
EVERGLADES SUGAR	HENDRY	509600	2954200	1413	156	3110	NO
EXXON		362200	3087200	27	48	959	NO
FARMLAND GREEN BAY	POLK	409500	3080100	3825	9	177	YES
FLORIDA CRUSHED STONE	HERNANDO	360000	3162500	4007	103	2053	YES
FLORIDA KEYS ELEC COOP	MONROE	490700	2732700	197	349	6977	NO
FLORIDA MINING & MATL	HERNANDO	355900	3169100	47	110	2206	NO
FLORIDA SUGAR	PALM BEACH	550200	2950900	177	187	3737	NO
FPC ANCLOTE	PASCO	324400	3118700	118208	96	1911	YES
FPC BARTOW	PINELLAS	342400	3082600	65105	66	1321	YES
FPC BAYBORO	PINELLAS	338800	3071300	6876	69	1374	YES

TABLE 5-3..CONTINUED

FPC CRYSTAL RIVER	CITRUS	334600	3205400	131757	152	3049	YES
FPC HIGGINS	PINELLAS	336500	3098400	19063	76	1519	YES
FPC OSCEOLA	OSCEOLA	446300	3126000	4374	67	1338	YES
FPC RIO PINAR	ORANGE	475200	3156800	109	109	2178	NO
FPL AVON PARK	HIGHLANDS	451400	3050500	58	49	973	NO
FPL FT MYERS	LEE	422100	2952900	26853	119	2390	YES
FPL MANATEE	MANATEE	367200	3054100	55143	44	878	YES
GARDINIER	HILLSBOROUGH	362900	3082500	5480	46	919	YES
GARDINIER MINE	POLK	415300	3063300	1173	11	226	YES
GOLD BOND BUILDING	HILLSBOROUGH	347300	3082700	307	61	1225	NO
GULF COAST CENTER	LEE	426000	2948300	20	125	2492	NO
GULF COAST LEAD	HILLSBOROUGH	364000	3093500	1641	49	975	YES
HARDEE POWER PLANT		404800	3057400	16081	14	287	YES
HARPER BROTHERS	LEE	400300	2947000	47	125	2494	NO
HARPER BROTHERS	LEE	413600	2934100	98	138	2751	NO
HILLSBOROUGH RESOURCE RECOV	HILLSBOROUGH	368200	3092700	702	45	893	NO
HOLLY HILL FRUIT	POLK	441000	3115400	398	55	1104	NO
IMC LONESOME MINE	HILLSBOROUGH	389600	3067900	1547	18	365	YES
IMC NEW WALES	POLK	396700	3079400	10561	13	268	YES
IMC NORALYN		414700	3080300	1378	11	227	YES
IMC PRAIRIE	POLK	402900	3087000	137	16	323	NO
INTERNATIONAL PETROLEUM	HILLSBOROUGH	389000	3098000	61	32	646	NO
JOHN CARLO FLORIDA	POLK	426200	3104100	33	38	752	NO
KEY WEST UTILITY BOARD	MONROE	419100	2716500	5741	355	7104	NO
KEY WEST UTILITY BOARD	MONROE	425700	2716700	5425	355	7105	NO
KISSIMMEE ELECTRIC	OSCEOLA	460100	3129300	1738	78	1563	YES
LAFARGE	HILLSBOROUGH	358000	3090600	12134	53	1061	YES
LAKELAND LARSEN	POLK	409000	3106200	3998	35	695	YES
LAKELAND MCINTOSH	POLK	409200	3106200	30176	35	695	YES
L B PLANTE	SEMINOLE	474500	3179200	34	127	2537	NO
MACASPHALT	SEMINOLE	470200	3175800	22	122	2434	NO
MACASPHALT	COLLIER	437900	2898700	54	175	3509	NO
MOBIL NICHOLS	POLK	398400	3085300	814	17	331	YES
MOBIL BIG 4 MINE	HILLSBOROUGH	394700	3069600	569	13	259	YES
MOBIL ELECTROPHOS	POLK	405600	3079400	194	8	163	YES
MUNICIPAL SERVICE DIST	MONROE	567900	2791100	49	323	6461	NO
MUNICIPAL SERVICE DIST	MONROE	448700	2729100	33	345	6897	NO
MUNICIPAL SERVICE DIST	MONROE	518100	2745100	49	345	6893	NO
MYAKKA PROCESSORS	DESOTO	409900	3010300	108	61	1225	NO
NATIONAL LINEN SERV	LEE	417600	2945900	35	126	2520	NO
NATL GYPSUM	HILLSBOROUGH	347400	3082500	136	61	1222	NO
NITRAM		363100	3089000	108	48	954	NO
OKEELANTA CORP	PALM BEACH	524900	2940100	99	176	3524	NO
OMAN CONSTRUCTION	HERNANDO	359700	3164000	69	104	2082	NO
ORLANDO CITY SLUDGE DRYER	ORANGE	478200	3166500	22	118	2368	NO
OSCEOLA FARMS	PALM BEACH	544200	2968000	357	171	3429	NO
OVERSTREET PAVING	PASCO	355900	3134700	94	82	1632	NO
OWENS-ILLINOIS GLASS	POLK	406000	3102300	21	31	617	NO
PASCO RESOURCE RECOVERY	PASCO	347000	3139000	413	91	1813	NO
PINELLAS RESOURC RECOV	PINELLAS	335200	3084100	2300	73	1468	YES
PLASTI-KRAFT CORP	PINELLAS	325400	3105500	66	89	1777	NO
RALSTON PURINA	ORANGE	451100	3167700	54	106	2112	NO
REEDY CREEK ENERGY	ORANGE	442000	3139000	67	76	1516	NO
REEDY CREEK ENERGY	ORANGE	443100	3144300	54	81	1621	NO
ROGERS GROUP	ORANGE	455800	3167100	38	107	2142	NO
ROYSTER MULBERRY	POLK	406800	3085100	1265	14	272	YES
ROYSTER PINEY PT.	MANATEE	348680	3057318	1971	61	1210	YES
SEBRING UTILITIES	HIGHLANDS	456800	3042500	137	57	1144	NO
SEBRING UTILITIES	HIGHLANDS	464300	3035400	3864	67	1342	YES

TABLE 5-3..CONTINUED

SEMINOLE FERTILIZER	POLK	409800	3086600	8674	15	305	YES
SIMMONS CONSTRUCTION	GLADES	487800	2967700	35	131	2625	NO
SLOAN CONSTRUCTION	ORANGE	463200	3143000	20	91	1813	NO
STANDARD SAND & SILICA	POLK	441500	3118200	349	58	1155	NO
STAUFFER CHEMICAL	PINELLAS	325600	3116700	79	94	1871	NO
STILWELL FOODS	HILLSBOROUGH	389800	3098900	22	33	652	NO
SUGAR CANE GROWERS COOP	PALM BEACH	534900	2953300	4935	174	3476	YES
SULFER TERMINAL	HILLSBOROUGH	358000	3090000	103	53	1057	NO
SULPHURIC ACID TRADING	HILLSBOROUGH	349000	3081500	156	59	1187	NO
SWINDLE BROS	HENDRY	450500	2956800	38	122	2450	NO
TAMPA GENERAL HOSP	HILLSBOROUGH	356400	3091000	59	55	1094	NO
TAMPA (MCKAY) RES RECOV	HILLSBOROUGH	360000	3091900	745	52	1034	NO
TARMAC FLORIDA	HILLSBOROUGH	362600	3097000	21	51	1029	NO
TECO BIG BEND	HILLSBOROUGH	361900	3075000	364554	46	915	YES
TECO GANNON	HILLSBOROUGH	360000	3087500	126940	50	1002	YES
TECO HOOKERS PT	HILLSBOROUGH	358000	3091000	13522	53	1064	YES
THATCHER GLASS		361800	3088300	176	49	974	NO
TRICIL RECOVERY SERV	POLK	422700	3091900	240	25	509	NO
TROPICANA PRODUCTS	MANATEE	346800	3040900	36	68	1360	NO
USSAC FT. MEADE	POLK	416000	3069000	2710	9	177	YES
US SUGAR	PALM BEACH	538800	2968100	755	167	3343	NO
US SUGAR	HENDRY	505900	2956900	2155	151	3021	NO
WACHULA CITY POWER	HARDEE	418400	3047000	180	27	536	NO
WINTER GARDEN CITRUS	ORANGE	443800	3159600	145	95	1906	NO
ZELLWOOD FARMS	ORANGE	440800	3180000	101	113	2270	NO

TABLE 5-4

SUMMARY OF SULFUR DIOXIDE PSD INCREMENTS ANALYSIS

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	SULFUR DIOXIDE IMPACT (ug/m^3)		
	ANNUAL	3-HOUR	24-HOUR
1982	NSI*	134.80	44.33
1983	NSI	133.08	31.52
1984	NSI	123.81	37.41
1985	NSI	135.31	31.93
1986	3.17	142.25	35.84
Allowable Class II PSD Increment	20	512	91

*NSI - No significant impact by Agrico's proposed project.

TABLE 5-5

SUMMARY OF AMBIENT AIR QUALITY STANDARDS
ANALYSIS FOR SULFUR DIOXIDE

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	SULFUR DIOXIDE IMPACT (ug/m^3)		
	ANNUAL	3-HOUR	24-HOUR
1982	29.85	400.00	165.02
1983	31.85	436.92	145.33
1984	32.89	385.15	229.14
1985	34.71	438.84	170.82
1986	36.30	451.05	168.26
Ambient Air Quality Standard	60	1300	260

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 and under the FDER Air Toxics Policy (January 1991) there has been no No Threat Level (NTL) established.

Air quality modeling was conducted to estimate the impact of sulfuric acid mist emissions. The predicted sulfuric acid mist air quality impacts are summarized in Table 5-6. 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 Agrico, 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.

The maximum predicted sulfuric acid mist impacts occur at locations which are both remote and far from the population centers. On the west side of the Agrico facility there is a large settling pond and on the east side is Hookers Prairie. Both those areas are fairly inaccessible. Furthermore, 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 great concern.

TABLE 5-6

SUMMARY OF ACID MIST IMPACT ANALYSIS

AGRICO CHEMICAL COMPANY
POLK COUNTY, FLORIDA

METEOROLOGICAL DATA	24-HR ACID MIST IMPACT (ug/m^3)
1982	3.40
1983	3.17
1984	2.82
1985	3.46
1986	3.25

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. Agrico'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.

It should be noted that when an attempt was made to consider building effects in modeling by including the rock silos, shown in Table 6-1 with H=150 feet, it was rejected by the model as "not applicable." It can be concluded from the modeling result that the rock silos do not affect the predicted air modeling impacts because the sulfuric acid plant stack height is 150 feet.

TABLE 6-1

GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

AGRICO CHEMICAL COMPANY
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	60	160 x 80	127	60	300	100	150
Ball Mill	61	30 x 30	34	34	170	250	>5L
Mill Storage	45	125 x 75	109	45	225	250	>5L
Phos Acid	67	72 x 226	143	67	335	500	>5L
E. Storage	71	672 x 126	328	71	355	500	>5L
DAP	160	80 x 65	81	81	405	650	>5L
Shipping	140	29 x 52	44	44	220	700	>5L
GTSP	123	50 x 166	103	103	515	800	>5L

(1) Projected width = $(4/\pi \times \text{Building Width} \times \text{Building Length})^{\frac{1}{2}}$
(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.
(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

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 at the Agrico SPCW site, as a result of the operation of Agrico and all facilities expected to have an impact at the project site, will be well below both primary and secondary air quality standards. As a result, it is reasonable to conclude that there will be no adverse effect to the soils, vegetation or visibility of the area. In the following paragraphs, the surrounding areas are discussed and related to the expected concentrations of air pollutants for the area.

The Agrico 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 Agrico supports various plant communities. The vegetation can be divided into upland and wetland categories. In each category, the following major formations have been identified:

Upland	Wetland
Pine flatwoods	Cypress swamp
Oak Scrub	Shrub swamp
Sandhill	Marsh

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 Agrico facility.

In most areas, the soils encountered are coarse and contain increasing amounts of silt and clays until they contact the phosphate rock deposits.

Soils in areas of low relief are influenced by flatwood vegetation, high water tables and organic or mineral pan of varying thickness. Mucks are found in the lower physiographic areas where large amounts of plant debris have accumulated.

The soils and vegetation of the area will be exposed to Agrico's air pollutant levels when they lie downwind of the Agrico facility. The areas other than those downwind of the facility will be exposed to existing concentrations of air pollutants from other major emitting facilities in the immediate area. The results of the air modeling shows that the effects of air pollutants on plants or soils are expected primarily from the short-term higher doses or from acute effects.

Sulfur dioxide can produce two types of injury to vegetation; acute and chronic. The amount of acute injury caused by sulfur dioxide depends on the absorption rate of the gas which is a function of the concentration. Different varieties of plants vary widely in their susceptibility to sulfur dioxide injury. The threshold response of alfalfa to acute injury is 3400 micrograms per cubic meter over one hour, whereas privet requires 15 times this concentration for the same injury. Some species of trees and shrubs have shown injury at exposures of 1400 micrograms per cubic meter for seven hours, while injury has been produced in other species at three hour exposures of 1500 micrograms per cubic meter. From the various studies, it appears that acute symptoms of vegetation damage will not occur if the maximum annual concentration does not exceed 800 micrograms per cubic meter.

Chronic symptoms of sulfur dioxide exposure, including excessive leaf drop, may occur as a result of long-term exposure to lower concentrations. Such symptoms have been reported in areas where the mean annual concentration of sulfur dioxide is in the range of 80 micrograms per cubic meter.

Sulfur dioxide concentrations in the range of 270-680 micrograms per cubic meter react synergistically with either ozone or nitrogen dioxide during exposure periods of approximately four hours to produce moderate to severe injury in certain sensitive plants.

Sulfuric acid mist can cause injury as a result of the deposition of acid droplets. Such injury may occur at sulfuric acid mist concentrations in the range of 100 micrograms per cubic meter.

The effects reported in the above paragraphs have been summarized from criteria documents for sulfur dioxide, prepared by the U.S. Environmental Protection Agency. These documents further state that the sensitivity of plants is affected significantly by the plant species and environmental conditions, such as temperature, relative humidity, soil moisture, light intensity, and nutrient level.

As a comparison to the levels of sulfur dioxide that have reportedly caused vegetation damage, the maximum sulfur dioxide levels expected in the vicinity of Agrico resulting from sulfur dioxide emissions from all facilities effecting the area will be 36 micrograms per cubic meter, annual average; 451 micrograms per cubic meter, 3-hour average; and 229 micrograms per cubic meter, 24-hour average. The concentrations of sulfur dioxide will be well below levels at which vegetation damage has been observed and well below standards that the U.S. Environmental Protection Agency has promulgated to protect human health and welfare.

The sulfur dioxide in the atmosphere reaches the soil by deposition from the air and is converted to sulfates. The sulfates that are deposited could cause a slight acidification of already acidic soils. The predicted concentrations of sulfur dioxide from stack emissions will not be at a level, however, that will result in a measurable increase in sulfates; even over a long period of time. The slight increase that could occur is not expected to have an effect on natural vegetation.

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 shows no significant sulfur dioxide impacts beyond 12.5 kilometers, it can be concluded that the proposed project is not expected to have an adverse impact on visibility in the area. Thus, it is expected that the proposed modification will not adversely impact soils, vegetation and visibility in the area.

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. 10 and 11 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: (Each Plant)

SULFURIC ACID PLANTS NO. 10 AND 11

2000 tons per day 100% acid (rated capacity)
SO_2 - 4.0 lbs/ton, 333.3 lbs/hr
Mist - 0.15 lb/ton, 12.5 lbs/hr
Operating Factor - 1.0
(Based on Permits No. A053-176685 and A053-145510

ACTUAL CONDITIONS:

(Emissions based on five years of compliance test results)

SULFURIC ACID PLANT NO. 10

2000 tons per day 100% acid
SO_2 - 3.3 lbs/ton, 306.8 lbs/hr
Mist - 0.14 lb/ton, 11.0 lbs/hr
Operating Factor - 1.0 (Based on production data)

SULFURIC ACID PLANT NO. 11

2000 tons per day 100% acid
SO_2 - 3.6 lbs/ton, 297.7 lbs/hr
Mist - 0.13 lb/ton, 10.3 lbs/hr
Operating Factor - 1.0

PROPOSED CONDITIONS: (Each Plant)

SULFURIC ACID PLANTS NO. 10 AND 11

2700 tons per day 100% acid
SO_2 - 4.0 lbs/ton
Mist - 0.15 lb/ton
Operating Factor - 1.0

PERMITTED EMISSION RATE CALCULATIONS (Each Plant)

SULFURIC ACID PLANTS NO. 10 AND 11

SO_2:	Hourly	=	4.0 lbs/ton x 2000/24 tons/hr
		=	333.3 lb/hr
	Annual	=	333.3 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	1460.0 TPY
MIST:	Hourly	=	0.15 lb/ton x 2000/24 tons/hr
		=	12.5 lbs/hr
	Annual	=	12.5 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	54.8 TPY

ACTUAL EMISSION RATE CALCULATIONS

(Emissions based on five years of compliance test results)

SULFURIC ACID PLANT NO. 10

SO_2:	Hourly	=	306.8 lbs/hr
	Annual	=	306.8 lbs/hr x 8760 hr/yr x 1/2000 ton/lb
		=	1343.8 TPY
MIST:	Hourly	=	11.0 lbs/hr
	Annual	=	11.0 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	48.2 TPY
NO_x	Hourly	=	2000 tons/day x 70,190 dscf/ton
			x 2 x 10(-6) lb/dscf x 1/24 day/hr
		=	11.7 lbs/hr
			(NO_x emission factor based on emission test data from similar source)
	Annual	=	11.7 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	51.2 TPY

SULFURIC ACID PLANT NO. 11

SO_2:	Hourly	=	297.7 lbs/hr
	Annual	=	297.7 lbs/hr x 8760 hr/yr x 1/2000 ton/lb
		=	1303.9 TPY
MIST:	Hourly	=	10.3 lbs/hr
	Annual	=	10.3 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	45.1 TPY
NOx	Hourly	=	2000 tons/day x 70,190 dscf/ton x 2 x 10(-6) lb/dscf x 1/24 day/hr
		=	11.7 lbs/hr
	Annual	=	11.7 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	51.2 TPY

PROPOSED EMISSION RATE CALCULATIONS: (Each Plant)

SULFURIC ACID PLANTS NO. 10 AND 11

SO_2:	Hourly	=	2700 tons/day x 4.0 lbs/ton x 1/24 day/hr
		=	450.0 lbs/hr
	Annual	=	450.0 lbs/hr x 8760 hr/yr x 1/2000 ton/lb
		=	1971.0 TPY
MIST:	Hourly	=	2700 tons/day x 0.15 lbs/ton x 1/24 day/hr
		=	16.9 lbs/hr
	Annual	=	16.9 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	73.9 TPY
NOx	Hourly	=	2700 tons/day x 70,190 dscf/ton x 2 x 10(-6) lb/dscf x 1/24 day/hr
		=	15.8 lbs/hr
	Annual	=	15.8 lbs/hr x 8760 hrs/yr x 1/2000 ton/lb
		=	69.2 TPY

NET ANNUAL EMISSION CHANGES

Total Actual SO2	=	1343.8 + 1303.9 = 2647.7 TPY
Total Proposed SO2	=	2 x 1971 = 3942.0 TPY
Net Change SO2	=	3942 - 2647.7 = 1294.3 TPY
Total Actual Mist	=	48.2 + 45.1 = 93.3 TPY
Total Proposed Mist	=	2 x 73.9 = 147.8 TPY
Net Change Mist	=	147.8 - 93.3 = 54.5 TPY
Total Actual NOx	=	2 x 51.2 = 102.4 TPY
Total Proposed NOx	=	2 x 69.2 = 138.4 TPY
Net Change NOx	=	138.4 - 102.4 = 36 TPY