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D.E.R.
FEB 3 1983
SOUTHWEST
TAMPA

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO ~~OPERATE~~/CONSTRUCT AIR POLLUTION SOURCES 12/10/82 12/27/82 1/27/83

SOURCE TYPE: Air Pollution [X] New[1] [ ] Existing[1] (New for PSD purposes)

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

COMPANY NAME: AMAX Phosphate, Inc. COUNTY: Hillsborough

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Big Four Mine Phosphate Rock Dryer

SOURCE LOCATION: Street SR 674 & Bethlehem Road City Fort Lonesome

UTM: East 394.77 North 3069.62

Latitude ____ ° ____ ' ____ "N Longitude ____ ° ____ ' ____ "W

APPLICANT NAME AND TITLE: S. R. Sandrik, Plant Manager

APPLICANT ADDRESS: Post Office Box 508, Bradley, Florida 33835

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of AMAX Phosphate, Inc.

I certify that the statements made in this application for a Construction (modification) 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: S.R. Sandrik

S. R. Sandrik, Plant Manager
Name and Title (Please Type)

Date: ________ Telephone No. (813) 688-1130

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 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: JBKoogler

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

(Affix Seal)

CERTIFICATE NO. 12925 STATE OF FLORIDA REGISTERED ENGINEER

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS, INC
Company Name (Please Type)

1213 NW 6th Street, Gainesville, Florida 32601
Mailing Address (Please Type)

Florida Registration No. 12925 Date: 1/28/83 Telephone No. (904) 377-5822

[1] See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

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 ATTACHMENT (Page 2A)

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

Start of Construction Not Applicable   Completion of Construction Not Applicable

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.)

Not Applicable; The control systems are existing and presently in operation.

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

The Big Four Mine phosphate rock dryer is currently operating under FDER Permit No. A029-22821, which was issued on September 20, 1979 and expires on August 15, 1984.

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes __X__ No

F. Normal equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ; if power plant, hrs/yr N/A ;

if seasonal, describe:

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

1. Is this source in a non-attainment area for a particular pollutant? YES
   a. If yes, has "offset" been applied? Not Applicable
   b. If yes, has "Lowest Achievable Emission Rate" been applied? Not Applicable
   c. If yes, list non-attainment pollutants.

      Ozone and Volatile Organic Carbons

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. YES
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirements apply to this source? If yes, see Sections VI and VII. YES
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? YES
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? NO

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

SECTION II: General Project Information (Continued)

This project will provide alternate energy sources for an existing 299 tons per hour phosphate rock dryer. This source is used to dry beneficiated phosphate rock from a moisture of 10-15% to a moisture of 1.5-3.50%. The dryer is a Heyl Patterson 12-foot diameter fluid bed dryer followed by a Peabody emissions control system consisting of two cyclones and a wet impingement scrubber with a demisting section. The dryer presently uses No. 6 fuel oil containing approximately 0.7% sulfur. Due to the rapidly escalating price of fuel oil, which is increasing faster than the weakened price of dried phosphate rock, it was necessary for AMAX to seek alternate fuel sources for the operation of the dryer. Two alternate fuels were selected which are higher in sulfur content: No. 6 fuel oil (up to 2.5%) and a coal-oil-water mixture with sulfur content up to 2.5%.

This project will result in an increase in the annual particulate matter, nitrogen oxides and sulfur dioxide emissions from the dryer point source. These increased emissions are expected to exceed the significance levels as defined in Section 172.500, Table 5003 of the Florida Administrative Code. The sulfur dioxide emissions are expected to increase from the 1981 level of 354 tons per year to 568 tons per year, the particulate emissions will increase from 38.5 tons per year to 78.8 tons per year and nitrogen oxides emissions will increase from 74.2 tons per year to a maximum of 117.2 tons per year. These emissions increases will be due to fuel changes. There will also be some minor particulate matter emissions increases due to changes in the hours of operation.

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

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

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Wet Phosphate Rock	Dust	100	600,000*	Attachment D
*Includes 10-15%	moisture			

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

1. Total Process Input Rate (lbs/hr): 600,000 (including 10-15% moisture)
2. Product Weight (lbs/hr): 534,000 (including 1.5-3.5% moisture)

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
Particulate	18.0	78.8	0.06 lbs/ton input	18	600*	2626*	D
SO_2	129.8	568.5	1.10 lbs/MM BTU	129.8	373	1634	D
NOx	26.8	117.2	N/A	26.8	27	117	D
CO	4.5	19.5	N/A	4.5	5	20	D
HC	1.1	5.0	N/A	1.1	1	5	D

*Variable with type of material being dried (Pebble, concentrate or combinations of the two). These numbers represent average, the max would be 1500 lbs/hr or 5616 tons/year.

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Peabody Engineering Co.	Particulate	+97%	Not Applicable	Test Data
Impingement Scrubber,	Sulfur Dioxide	48-78%	Not Applicable	Test Data
Type M160, Size 88				

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. — 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)

[5] If Applicable

19.9 X 42 = 835.8 gal

E. Fuels $\frac{(157)(.7)(835.8)}{1000}$ = $\frac{91.85 \text{ \#}SO_2\text{/hr}}{125 \times 10^6}$ = .73 $\frac{\text{\#}SO_2}{10^6 Btu}$

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
No. 6 fuel oil (0.7% S), or	10.8 BBL	19.9 BBL	125
No. 6 fuel oil (2.5% S), or	10.8 BBL	20.2 BBL	125
Coal-Oil-Water Mix (2.5% S)	10.8 BBL	21.9 BBL	125

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis: No. 6 oil/No. 6 oil/COM

Percent Sulfur: 0.7/2.5/2.5 Percent Ash: 0.1/0.2/1.9

Density: 8.1/8.3/9.3 lbs/gal Typical Percent Nitrogen: 0.2/0.2/Unknown

Heat Capacity: 18,502/17,744/14,704* BTU/lb 149,500/147,095/135,876* BTU/gal

*These values are typical values and may vary as much as ± 10%.

Other Fuel Contaminants (which may cause air pollution): None

F. If applicable, indicate the percent of fuel used for space heating. Annual Average N/A Maximum N/A

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

Collected solids are pumped to a closed circuit recirculated mine water system.

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

Stack Height: 100 ft. Stack Diameter: 5.96 ft.

Gas Flow Rate: 65,000 ACFM Gas Exit Temperature: 142 °F.

Water Vapor Content: 18 % Velocity: 38.79 FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

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

Description of Waste

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

Approximate Number of Hours of Operation per day days/week

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 Diameter ______________ Stack Temp. ______________

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

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

Type of pollution control 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.):

____

____

____

____

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation. See Attachment A
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. See Attachments B and C
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). See Attachment C
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, etc.). (See Sect. IIA and IIID for existing scrubber information)
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). (See Sect. IIID for test data)
6. An 8½" 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. See Attachment D
7. An 8½" 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). See Attachment E
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. See Attachment F

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
[x] Yes [ ] No

Contaminant	Rate or Concentration
Particulate Matter	0.06 lbs/ton of rock

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy) [ ] Yes [x] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration
Particulate Matter	0.06 lbs/ton of rock
Sulfur Dioxide	1.1 lbs/10^6 BTU
Nitrogen Oxides	0.21 lbs/10^6 BTU

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

1. Control Device/System: SEE SECTION 3.0 OF PSD APPLICATION.
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

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: SEE SECTION 3.0 OF PSD APPLICATION.

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: 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*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

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:

*Explain method of determining efficiency.

**Energy to be reported in units of electrical power – KWH design rate.

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

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*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

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*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

SEE SECTION 3.0 OF PSD APPLICATION.

*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 SECTIONS 4.0 AND 5.0 OF PSD APPLICATION.

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.

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 on 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.

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

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.

ATTACHMENT A

Total Process Input Rate

300 tons per hour of wet phosphate rock (14% moisture content) or 600,000 lbs/hr.

Total Product Weight

600,000 lbs/hr input - 64,500* lbs/hr moisture removed in dryer - 1500 lbs/hr particulate to the scrubbers
= 534,000 lbs/hour product weight.

* (Assumes a reduction in moisture from 14% to approximately 2.5%)

ATTACHMENT B

The following coal-oil-water mixture (COM) stack emissions test was run at the AMAX Big Four Mine dryer on March 2, 1982. This test had the highest sulfur dioxide emissions rate of any of the COM tests run on this dryer; therefore, this test could be considered to be the "worst case" emperical data. The sulfur dioxide removal for this test series was found to be 77.42%.

The allowable sulfur dioxide emissions, based on the recent FDER BACT ruling of 1.1 lbs per million BTU, is:

7.93 GPM firing rate x 9.3 lbs/gallon Density = 73.75 lbs/min.
x 60 min/hr = 4,425 lbs/hour x 14,704 BTU/lb heat Content
= 65,064,318 BTU/hour heat input.

65.06 MMBTU/hr x 1.1 lbs SO_2/MMBTU input

71.57 lbs SO_2/hour allowable emissions

Actual Emissions = 30.8 lbs/hour SO_2

The allowable particulate emissions based upon the EPA New Source Performance Standard of 0.06 pounds of particulate per ton of input to a phosphate rock dryer is as follows:

0.06 lbs of particulate/ton of rock input x 300 tons/hour phosphate rock input = 18.0 lbs/hour allowable particulate emissions.

Actual Emissions = 17.49 lbs/hr particulate.

MEMORANDUM

AMAX Phosphate, Inc.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801

TO: Mr. Fred Mullins

DATE: March 12, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

During the second coal-oil mixture test burn on March 2, 1982, we again conducted tests to determine particulate and sulfur dioxide emission rates. During the test, pebble was being dried at an average rate of 252 tons per hour. Test results were as follows:

	Stack Conditions		Particulate Emissions		Sulfur Dioxide Emissions
Run	DSCFM	Temp°F	Lbs./Hr.	Grains/DSCF	Lbs./Hr.
1	55,028	123	15.50	.0328	25.11
2	54,319	123	14.11	.0302	28.69
3	55,164	126	22.85	.0482	38.23
Avg.	54,837	124	17.49	.0371	30.68

The average sulfur dioxide removal efficiency of scrubber was 77.42%, ash contribution to total scrubber loading from COM combustion was 83.22 lbs./hour. Attached you will find scrubber water analyses of samples collected during a stack test conducted on February 18, 1982; at which time pebble was being dried and #6 fuel oil was the source of combustion. Comparatively, the analyses of scrubber water samples collected on February 22, 1982; during first COM test burn showed an appreciable increase in solids of scrubber discharge water. This would indicate effective scrubbing of ash, given similarities of the two tests and if feed quality was relatively similar.

George Townsend

George Townsend

GT/rit

cc: Mr. H. P. Mott
Mr. S. R. Sandrik
Mr. R. S. Swanson
Mr. G. P. Uebelhoer

737 Executive Park, Louisville, Kentucky 40207
(502) 893-0106

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED

0.24 Chlorine

- Seam: Blue Gem
- Source: G&G Coal, London Ky
- BTU/Lb.: 13,951
- Ash (%): 3.75
- Sulfur (%): 0.78
- Moisture (%): 3.99
- Hardness: 46
- Fusion(Ash): 2500+
- Volatiles (%): 40.17
- Fixed Carbon (%): 52.09
- Percent Passing 200 Mesh: 90.3

OIL USED

- Type: Fuel Oil 6
- Source: Amax Phosphate
- BTU/Lb.: 17,737
- Ash (%): 0.24
- Sulfur (%): 2.33
- B. S. & W: < 0.1
- Sp. Grav.: 0.995
- API: 10.71
- Lb./Gal.: 8.29
- Viscosity (@ 122°F): 200 cps
- Flash: 248°F
- Chlorine .013

COM

- Coal (%): 50.13
- Oil (%): 41.11
- Water (%): 8.76
- BTU/Lb.: 14,704
- Sulfur: 1.54
- Ash (%): 1.86
- Sp. Grav.: 1.13
- Lb./Gal.: 9.3
- Flash: 257°F
- Viscosity (@ 122°F): 16,500 cps
- Chlorine 0.11

Percentages are by weight

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000+	140	8,410
60	100,000+	150	6320
70	100,000+	160	3950
80	80,000	170	1440
90	56,000	180	810
100	42,000	190	600
110	33,600	200	475
120	18,800	220	370
130	11,450	240	185

Name William L Brown

Position Quality Control Mgr

4,140 Gallons

A Subsidiary of MCDONNELL DOUGLAS

EMISSION RATE CALCULATIONS

Basis: 125×10^6 heat input/hr

PROPOSED ACTUAL

PARTICULATE MATTER

= 300 tons/hr x 0.06 lb/ton
= 18.00 lb/hr
x 8760/2000
= 78.8 tpy

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT
$= (1.1 \text{ lb } SO_2/10^6 \text{ BTU})(118 \times 10^6 \text{ BTU/hr})$
= 129.80 lb/hr
x 8760/2000
= 568.5 tpy

$1.1 \#SO_2/10^6$ Btu
$\times 125 \times 10^6$
$137.5 \#SO_2/hr$
602.25 TPY

Uncontrolled with 0.7% Sulfur fuel oil
$= (115 \times 10^6 \text{ BTU/hr})(1/149500 \text{ BTU/gal})(8.08 \text{ lb/gal})$
$\times (0.007 \times 2 \text{ lb } SO_2/\text{lb fuel})$
= 87.0 lb/hr
< 129.8 lb/hr; therefore no SO_2 sorption is necessary to meet the proposed emission limiting standard

$\frac{(157)(.7)}{1000}(19.9)(42) = 91.8 \#SO_2/hr$

Uncontrolled with 2.5% Sulfur fuel oil
$= (118 \times 10^6 \text{ BTU/hr})(1/147095 \text{ BTU/gal})(8.29 \text{ lb/gal})$
$\times (0.025 \times 2 \text{ lb } SO_2/\text{lb fuel})$
= 332.6 lb/hr
Absorption necessary to meet proposed std
= (332.6 - 129.8) x 100/332.6
= 61.0%

$\frac{(157)(2.5)}{1000}(19.9)(42) = 328 \#SO_2/hr$

$\frac{328-138}{328} \times 100 = 57.9\%$

Uncontrolled with ~~2.00~~ 2.50% Sulfur COM
$= (109 \times 10^6 \text{ BTU/hr})(1/135876 \text{ BTU/gal})(9.3 \text{ lb/gal})$
$\times (0.025 \times 2 \text{ lb } SO_2/\text{lb fuel})$
= 373.0 lb/hr
Absorption necessary to meet proposed std
= (373.0 - 129.8) x 100/373.0
= 65.2% ✓

$\frac{125 \times 10^6}{14,704} = 8500 \#COM/hr$
COM 40% Coal - 10% water - 50% oil
8500 x .4 = 3400# coal
8500 x .5 = 4250# oil
AP-42 (2.5% S)
Coal - $\frac{39(2.5)}{\text{Ton}} 1.7 = 165.75 \#SO_2$
oil - $\frac{157(2.5)(525)}{1000} = 206.06 \#SO_2$
371.81 $\#SO_2$ TOTAL

$\frac{372-138}{372} \times 100 = 63\%$ ✓

Nitrogen Oxides

For fuel oil combustion an NO_x stack gas concentration of 61 ppm was assumed (PSD-FL-088; Brewster). For coal combustion this concentration was increased by a factor equal to the AP-42 coal NO_x emission factor divided by the AP-42 oil NO_x emission factor. For COM the NO_x emission factor was calculated as:

(Oil NO_x factor)(0.45) + (Coal NO_x factor)(0.55)

NO_x from Coal - AP-42

= 18 lb / ton
× (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)

= 0.67 lb NO_x / 10^6 BTU

NO_x from Oil - AP-42

= 60 lb / 1000 gal
× (1/1000)(1/147040 BTU/gal)(10^6)

= 0.41 lb NO_x / 10^6 BTU

NO_x emissions from Oil (same as present)

= 19.83 lb/hr

NO_x emissions from Coal (by ratio)

= 19.83 (0.67 / 0.41)
= 32.41 lb / hr

NO_x emissions from COM

= 19.83 (0.45) + 32.41 (0.55)
= 26.75 lb/hr

× 8760/2000
= 117.2 tpy

CARBON MONOXIDE

CO from Coal - AP-42

= 1 lb/ton

x (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)

= 0.037 lb CO/10^6 BTU

CO from Oil - AP-42 (Same as present)

= 4.18 lb/hr @ 125x10^6 BTU/hr

= 0.033 lb CO/10^6 BTU

CO emissions from COM

= 4.18 (0.45) + 4.18 (0.037/0.033)(0.55)

= 4.46 lb/hr

x 8760/2000

= 19.5 tpy

HYDROCARBONS

HC from Coal - AP-42

= 0.3 lb/ton

x (1/2000 lb/ton)(13350 BTU/lb)(10^6)

= 0.011 lb HC/10^6 BTU

HC from Oil - AP-42 (Same as present)

= 0.84 lb/hr @ 125x10^6 BTU/hr

= 0.007 lb HC/10^6 BTU

HC emissions from COM

= 0.84 (0.45) + 0.84 (0.011/0.007)(0.55)

= 1.14 lb/hr

x 8760/2000

= 5.0 tpy

Proposed Uncontrolled

Particulate Matter - Based on 97% efficiency determined by test data

= 18.00 (1/[1-0.97])
= 600 lb/hr (average)
x 8760/2000

= 2626 tpy

Sulfur Dioxide

= 373.0 lb/hr - from previous section
x 8760/2000

= 1634 tpy

NO_x

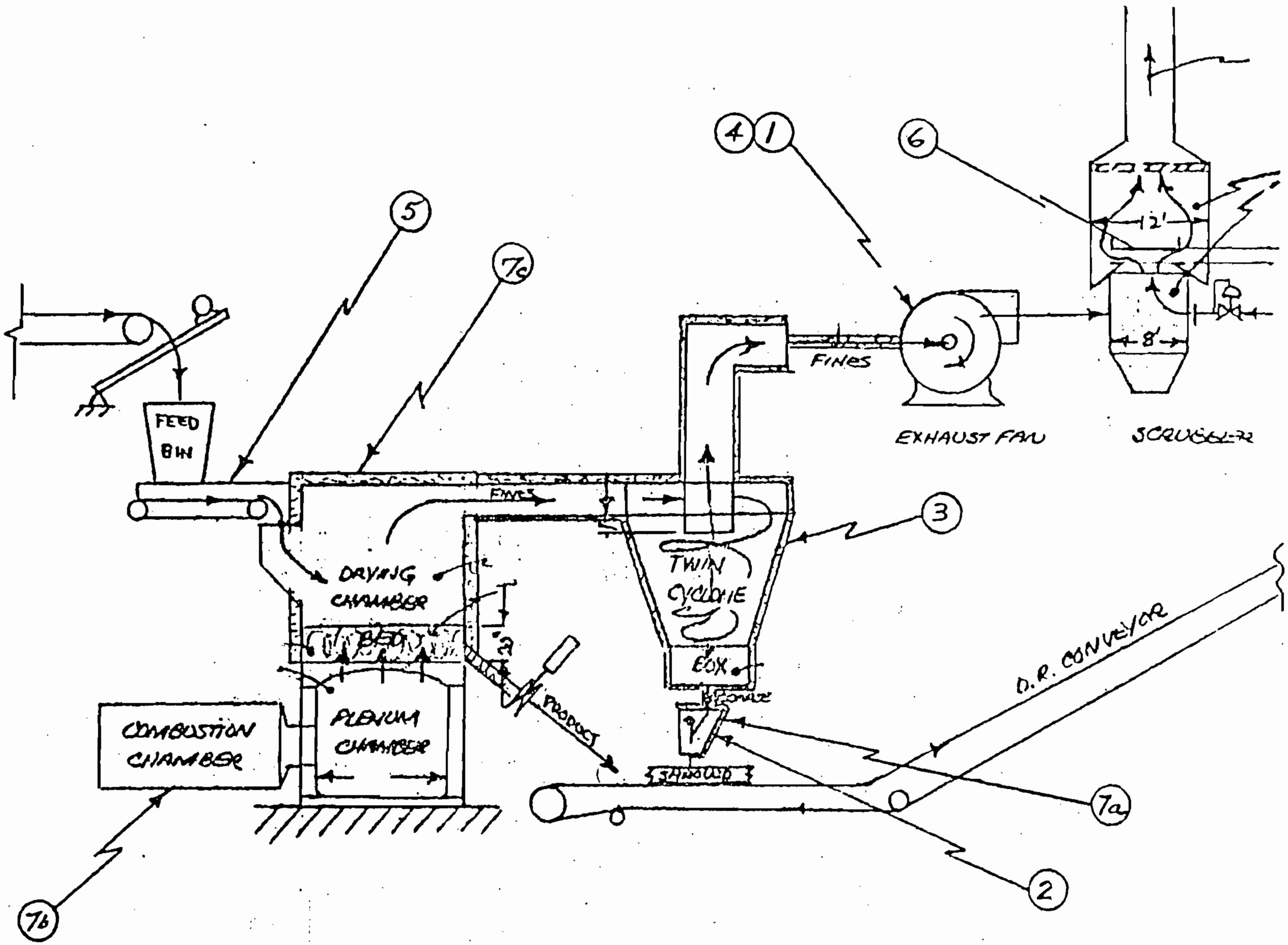
= 26.7 lb/hr and 117.2 tpy
(Same as Actual)

CO

= 4.5 lb/hr and 19.5 tpy
(Same as Actual)

HC

= 1.1 lb/hr and 5.0 tpy
(Same as Actual)



SCHEMATIC DRYER ARRANGEMENT

ATTACHMENT D

6

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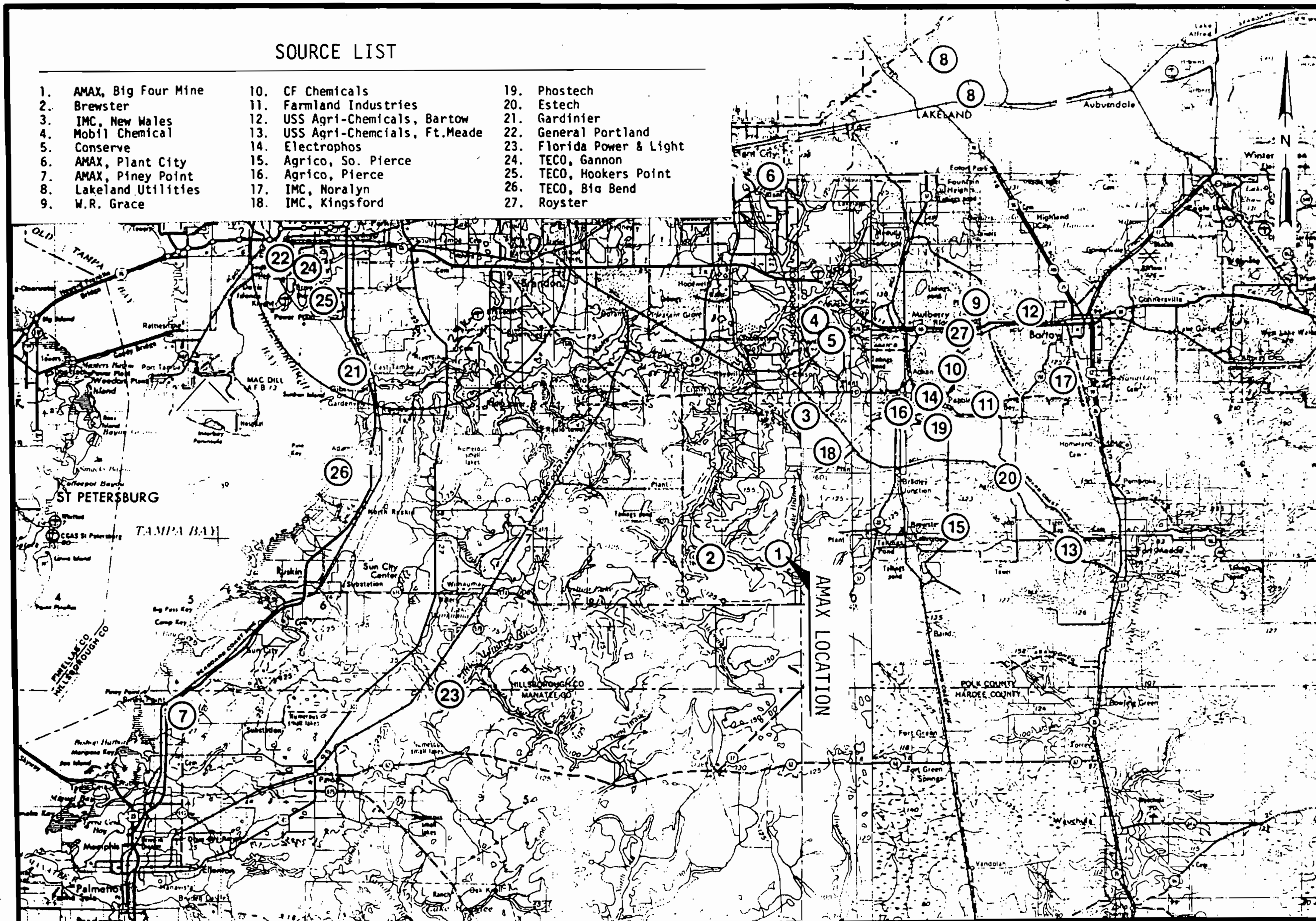
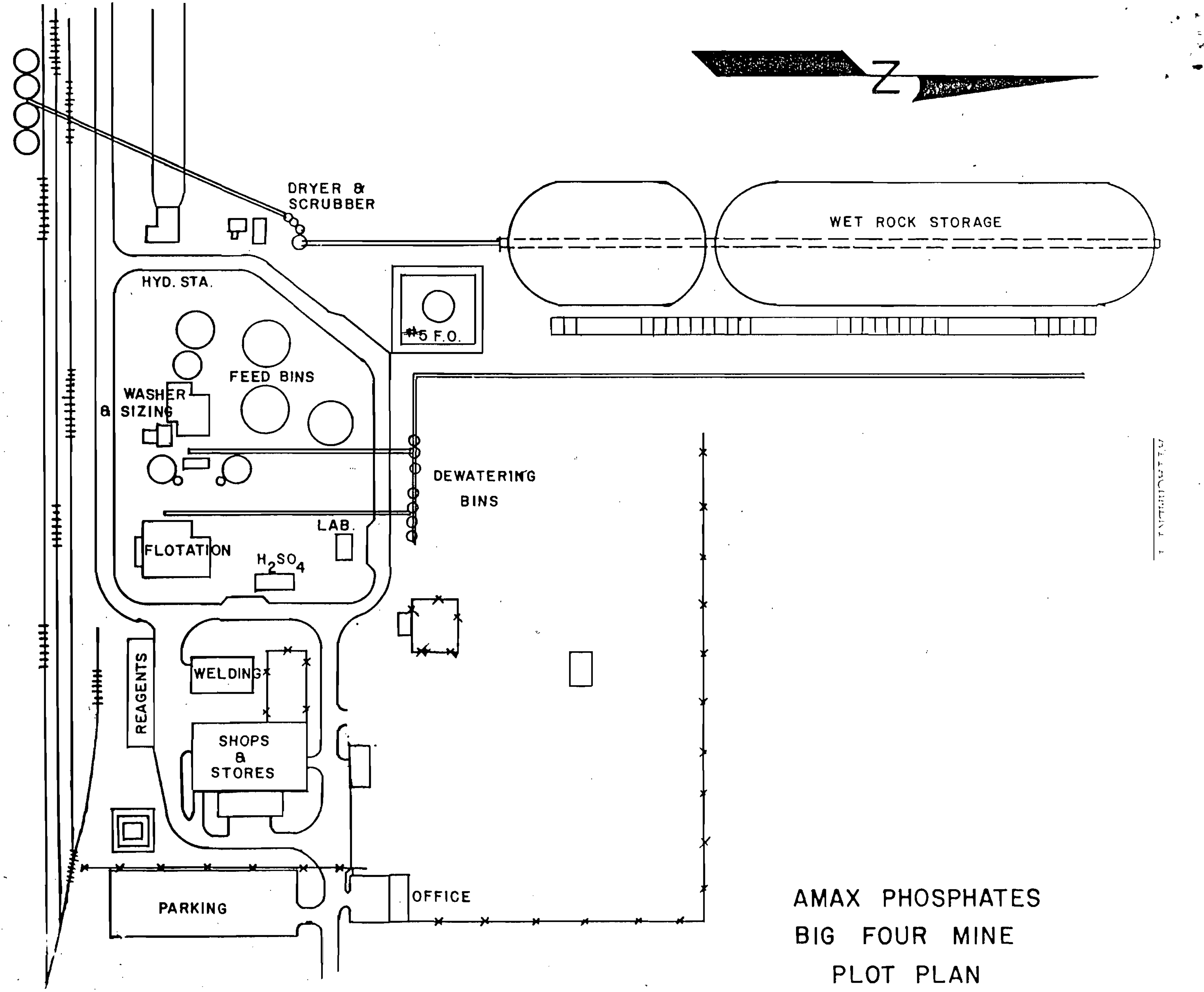
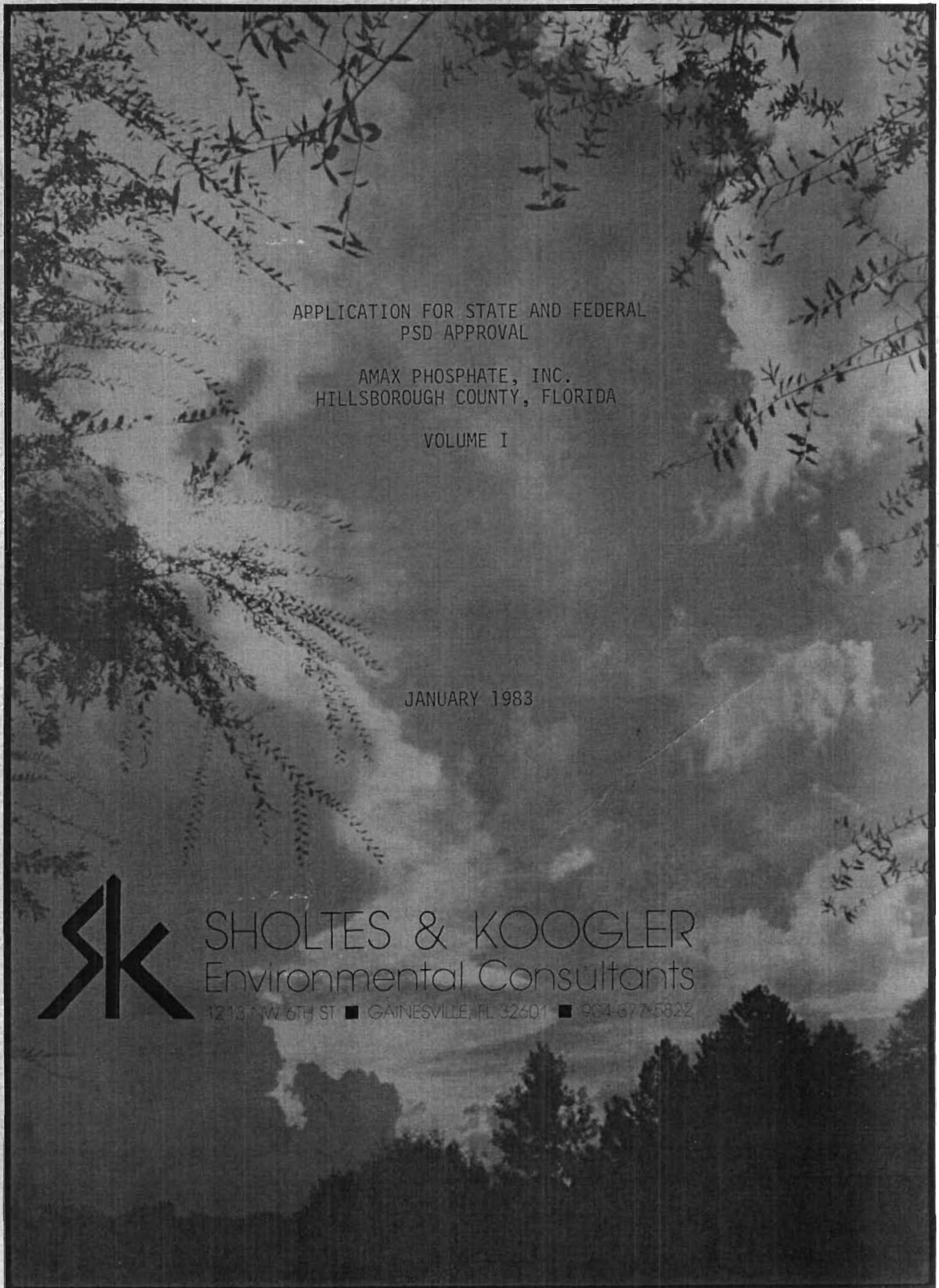


SHOLTES & KOOGLER

ATTACHMENT E



AMAX PHOSPHATES
BIG FOUR MINE
PLOT PLAN



APPLICATION FOR STATE AND FEDERAL
PSD APPROVAL

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

VOLUME I

JANUARY 1983

SHOLTES & KOOGLER
Environmental Consultants
1213 N.W. 6TH ST ■ GAINESVILLE, FL 32601 ■ 904-377-5822

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TABLE OF CONTENTS

1.0 INTRODUCTION

AMAX Phosphate, Inc. (AMAX) is a producer of phosphate rock and phosphate products. The company, a subsidiary of AMAX, Inc. with offices located in Lakeland, Florida, presently operates a phosphate fertilizer complex at Piney Point in Manatee County, an animal feed supplement plant in Plant City, Florida and a phosphate mine in southeast Hillsborough County.

This application for state and federal PSD approval addresses a request to use alternative fuels in a fluidized bed phosphate rock dryer located at the Big Four phosphate mine in southeast Hillsborough County. Presently, the dryer is permitted to be fired with fuel oil containing 0.7 percent sulfur or less and has a permitted particulate matter emission rate of 10.29 pounds per hour (0.03 grains per standard cubic foot at a flow rate of 40,000 standard cubic feet per minute). The presently permitted emission rates are equivalent to 0.76 pounds of sulfur dioxide per million BTU of heat input to the dryer assuming no sulfur dioxide absorption and 0.03 pounds of particulate matter per ton of wet rock fed to the dryer.

40,000 x .03 x 60 / 7000 = 10.28 .034

AMAX is proposing to use oil or a coal-oil-water mix fuel which will result in a maximum sulfur dioxide emission rate of 1.1 pounds per million BTU heat input to the dryer. Because the use of coal-oil-water mix fuel triggers a Prevention of Significant Deterioration (PSD) review, AMAX agrees to accept the New Source Performance Standard (NSPS) of 0.06 pounds of particulate matter per ton of wet rock fed to the dryer.

The Big Four Mine where the subject phosphate rock dryer is located is a contiguous 6,000 acre tract in southeastern Hillsborough County. The mine is located adjacent to and west of the Polk/Hillsborough County Line; between State Roads 37 and 39; and north of State Road 674. The mine was purchased by AMAX from Borden, Inc. in July, 1980. The beneficiation plant, the phosphate rock dryer, the dry rock storage silos and the rail rock loading facilities associated with the mine were permitted and constructed in 1976-1977. As a result of the permitting dates, all air pollution sources located at the Big Four Mine are increment consuming sources for purposes of PSD permitting.

Of the 6,000 acres owned by AMAX, a total of 3,784 acres are permitted to be mined. Prior to 1982, 1,063 acres had been mined and the remaining 2,721 acres are scheduled to be mined at the average rate of 450 acres per year. At this rate, the life of the mine will terminate in 1988.

The phosphate matrix mined at the Big Four Mine is transported hydraulically to the beneficiation plant located in the east central portion of the property. At this plant the phosphate rock is separated from the matrix using conventional separation techniques. After separation, the rock is transported to a wet rock storage area. From the wet rock storage area the rock is either dried and shipped from the site as dry rock or is shipped from the site as wet rock. Most rock, wet or dry, is shipped from the site by rail.

The air pollution sources at the Big Four Mine are a fluid-bed phosphate rock dryer with a rated capacity of 300 tons per hour, a dry rock shipping facility, dry rock storage silos and a process boiler. All four sources emit particulate matter. In addition, the rock dryer and the process boiler are sources of sulfur dioxide, nitrogen oxide, carbon monoxide and hydrocarbons. The process boiler is presently permitted to burn fuel oil with a 0.7 percent sulfur content. AMAX does not propose to change the permit conditions applicable to this boiler.

AMAX is submitting this document as a PSD application requesting approval to use alternative fuels in the phosphate rock dryer and to increase the allowable hours of operation of the rock dryer. Due to these modifications, AMAX requests for the rock dryer an allowable sulfur dioxide emission rate of 1.1 pounds per million BTU heat input and an allowable particulate matter emission rate of 0.06 pounds per ton of wet rock fed to the dryer; the latter being equivalent to federal NSPS.

For the purpose of this application, the production rate of the dryer was taken as 2.6 million tons of wet rock per year. This is equivalent to the dryer operating at a maximum wet rock input rate of 300 tons per hour for 8760 hours per year. The actual operating rate will depend upon market demand and mechanical availability. Under present permit conditions the dryer is permitted to operate at a maximum wet rock input rate of 299 tons per hour for a maximum of 7488 hours per year.

The use of the alternative fuels will result in a significant increase in the sulfur dioxide, particulate matter and nitrogen oxide emission rates as defined in Chapter 17-2.500 FAC. Increases in the emission rates of carbon monoxide and hydrocarbons are not significant and will not be subject to a PSD review.

Assuming market demand and mechanical availability are sufficient to support continuous operation of the dryer, there will be a 1.2 ton per year maximum increase in the particulate matter emissions from dry rock loading and a 1.3 ton per year maximum increase in emissions resulting from transferring dry rock from the dryer to the dry rock storage silo. These increases will result from handling the additional dry rock produced as a result of the increased hours of operation of the rock dryer. There will be no increase in the maximum hourly emission rate from either the rock loading facility or the dry rock storage silo.

Since the rate of production will remain constant, rail traffic to transport phosphate rock from the Big Four site will not increase. Since rail traffic will not increase, fugitive pollutant emissions associated with rail traffic will not increase. Also, the use of alternative fuels will not result in additional employment at the Big Four Mine; hence there will be no increase in mobile source air pollutant emissions.

The increased hours of operation of the rock dryer will result in the consumption of a maximum of one million additional gallons of fuel per year pending market demand and mechanical availability. This will result in approximately 100 additional round trips per year to the AMAX facility by fuel trucks. Air pollutant emission rates from these additional trucks will be in the range of hundredths of tons per year and are considered insignificant.

The alternative fuels being proposed by AMAX are both liquid fuels as is the presently permitted fuel. The storage and handling of these alternative fuels will result in no increase in pollutant emission rates.

In summary, the use of the alternative fuels in the rock dryer as requested by AMAX will result in a significant increase in the sulfur dioxide particulate matter and nitrogen oxide emission rate. Emission rate increases of carbon monoxide and hydrocarbons will be less than the increases established by state and federal regulations to trigger a PSD review.

Included in the following sections of this application are all elements required for a complete PSD review for sulfur dioxide, particulate matter and nitrogen dioxide. These elements include a description of the existing facility; a description of the proposed action; a review of BACT for sulfur dioxide, particulate matter and nitrogen oxides; an Air Quality Review describing the impact of air pollutant emissions resulting from the proposed action on ambient air quality; and a review of the secondary impacts of the proposed action.

2.0 FACILITY DESCRIPTION

AMAX Phosphate, Inc. operates a phosphate mine in southeastern Hillsborough County (Figure 2-1). The mine is referred to as the Big Four Mine and includes 6,000 acres of land; 3,784 acres of which is permitted to be mined. AMAX estimates that the phosphate reserves at the Big Four Mine will be depleted during 1988.

The phosphate matrix from the mine, consisting of phosphate rock, clay and sand, is transported hydraulically to a beneficiation plant located in the east central portion of the property. At the beneficiation plant, the phosphate rock is separated from the matrix by conventional separation techniques. The rock is either shipped from the site wet or dried in a fluid-bed rock dryer and shipped as dry rock.

The location of the beneficiation plant at the Big Four Mine is shown in Figure 2-2 and the layout of the plant area is shown in Figure 2-3. The plant is located 1.1 kilometers from the nearest property line, 27.7 kilometers from the boundary of the Hillsborough County particulate matter non-attainment area, 77.4 kilometers from the boundary of the Pinellas County sulfur dioxide non-attainment area and 116.2 kilometers from the Chassahowitzka National Wildlife Refuge; the Class I PSD area nearest the site.

The AMAX Big Four beneficiation plant consist of washers, floatation units, phosphate dewatering tanks, a wet rock storage area, the rock dryer, dry rock storage silos and a dry rock rail loadout facility. In addition to these facilities, there is a 6.3 million BTU per hour boiler used for generating steam required within the plant.

The activities associated with handling and processing the phosphate rock from the time that it is mined through reclamation from the wet rock storage piles generates insignificant air pollutant emissions since the rock is wet (14 percent moisture or greater) and the size distribution of the rock is quite coarse by air pollution standards. The potential for air pollutant emissions occurs during rock drying, the transfer of dry rock from the dryer to the rock storage silos and the loadout of the dry rock from the storage silos to rail cars. Particulate matter emissions are associated with all of these activities. Sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbon emissions are associated with the rock drying. The auxiliary boiler, fired with 0.7 percent sulfur fuel oil has the potential for emitting all of the above mentioned pollutants. Neither the fuel for the boiler nor the boiler operating time will change as a result of the action proposed herein.

All air pollution emitting facilities at the AMAX Big Four beneficiation plant were permitted in 1976. The sources, therefore, are considered new air pollution sources for purposes of state and federal PSD regulations. AMAX is currently proposing to make some modifications in the methods of operation at the Big Four Mine that will result in increases in air pollutant emission rates deemed significant by state and federal PSD regulations. AMAX is proposing two alternative fuels for the existing rock dryer and is proposing to increase the allowable hours of operation of the rock dryer. The increase in the hours of operation of the rock dryer will increase the amount of dried rock produced and hence, increase the hours of operation of the rock storage and rock loadout facilities.

The rock dryer presently on site is a Heyl Patterson 12-foot diameter fluid-bed rock dryer. This dryer is currently permitted to operate with a wet rock feed rate of 299 tons per hour. The dryer is designed to decrease the moisture content of beneficiated phosphate rock from nominally 14 percent to nominally 2.5 percent.

The heat input to the dryer, at maximum drying capacity, is 125 million BTU per hour. This heat is presently supplied with No. 5 fuel oil having a maximum sulfur content of 0.7 percent. The combustion of this fuel results in a maximum sulfur dioxide emission rate of 94.6 pounds per hour for up to 7,488 hours per year or 0.76 pounds of sulfur dioxide per million BTU. This emission rate was established by a federally enforceable construction permit conditions and is the rate used to establish the baseline sulfur dioxide emission rate of 354 tons per year.

AMAX is proposing the use of No. 6 fuel oil with a 2.5 percent sulfur content or a coal-oil-water mix with a sulfur content of 2.5 percent as alternative fuels for the dryer. These fuels, when providing a maximum heat input of 125 million BTU per hour, will result in a sulfur dioxide emission rate of approximately 299 pounds per hour or 1.1 pounds per million BTU. The annual increase in sulfur dioxide emissions will be 214 tons per year.

Under present permit conditions, the dryer can operate at a maximum rate of 299 tons of wet rock per hour for up to 7488 hours per year. This results in a dried rock production rate of 267 tons per hour or a maximum annual production rate of 1.97 million tons per year.

AMAX is proposing to operate the dryer at a maximum wet rock input rate of 300 tons per hour for up to 8760 hours per year. Under these operating conditions, the maximum dried rock production rate of the dryer will be 267 tons per hour or 2.32 million tons per year.

Since it is proposed to permit the rock dryer for a maximum of 8760 hours per year, the operating permit for the rock storage silo must be modified to allow dry rock input to the silos for up to 8760 hours per year. The permitted dried rock input rate to the storage silos will remain unchanged at 267 tons per hour and the permitted hourly particulate matter emission rate from the rock storage silo will remain unchanged at 2.06 pounds per hour. Due to the increased hours of operation, the annual permitted particulate matter emissions from the rock storage silos will increase from 7.7 tons per year to 9.0 tons per year.

The dried rock rail loadout facility is permitted and rated at 800 tons of dried rock per hour. It will be necessary to modify the operating permit for this facility to increase the allowable hours of operation from 2500 hours per year to 2924 hours per year. The loadout rate from the facility is not proposed to change nor will the presently permitted allowable particulate matter rate of 5.96 pounds per hour. The annual particulate matter emissions will increase however, from 7.5 tons per year to 8.7 tons per year as a result of the increased hours of operation.

As stated earlier in this section, no modifications are proposed for the operation of the steam boiler. The hours of operation of the boiler will not change nor will the boiler fuel. The boiler is presently fired with No. 5 fuel oil with 0.7 percent sulfur content and it will continue to be fired with this type of fuel.

Presently, the dryer has a maximum permitted allowable emission rate of 10.29 pounds per hour for 7488 hours per year or 0.034 pounds particulate matter per ton of wet rock feed. This emission rate is based on a federally enforceable construction permit conditions and was used to establish PSD baseline particulate matter emissions. Federal New Source Performance Standards for new phosphate rock dryers allow a particulate matter emission rate of 0.06 pounds particulate matter per ton of wet rock feed. This emission rate is proposed by AMAX as the emission limiting standard for the rock dryer because of the proposed modifications. This emission limit will result in a particulate matter emission rate of 18.0 pounds per hour or 79 tons per year, assuming 8760 hours per year operation. The increase in the particulate matter emission rate will be 40 tons per year.

Under presently permitted operating conditions, the maximum nitrogen dioxide emission rate from the dryer was calculated to be 19.8 pounds per hour or 0.16 pounds per million BTU. This is equivalent to a maximum annual emission rate of 74 tons per year. With the use of the alternative fuel oil proposed by AMAX, the nitrogen oxides emissions are not expected to increase. The use of the proposed coal-oil-water fuel, however, is expected to increase nitrogen oxides emissions due to the increased nitrogen content of the coal in the fuel. The nitrogen oxides emission rate expected with the coal-oil-water fuel was calculated to be 26.7 pounds per hour or 0.21 pounds per million BTU. The maximum annual emission rate increase will be 43 tons per year.

When applying state and federal PSD regulations, the existing Big Four Mine beneficiation plant is a major emitting facility, under present permit conditions, for sulfur dioxide. The present permitted annual emission rate for sulfur dioxide is 354 tons per year. The presently permitted annual particulate matter emission rate for all sources at

Big Four is 58 tons per year. For nitrogen oxides the annual emission rate is approximately 84 tons per year, for carbon monoxide - 18 tons per year and for hydrocarbons - 4 tons per year.

The modifications proposed by AMAX will result in increases in sulfur dioxide emissions of 214 tons per year; particulate matter emissions of 40 tons per year and nitrogen oxides emissions of 43 tons per year. All of these increases exceed the de minimus increases defined in PSD Regulations, therefore each of the increases is subject to a PSD review.

The present annual emission rate of carbon monoxide from the Big Four facility is 18 tons per year and the expected increase in carbon monoxide emissions will be 4 tons per year. The present hydrocarbon emission rate is approximately 3 tons per year and the expected increase will be approximately 2 tons per year. The existing facility is not a major emitting facility in terms of either of these pollutants and the expected increases in the emission rates will not cause them to be subject to a PSD review. Emission rate calculations are included in Appendix 2A-1.

Fugitive air pollutant emissions will not increase measurably as a result of the proposed modifications. Mining activities will not increase as a result of the fuel change, hence the handling of wet rock will not increase. The drying of phosphate rock and the handling of the dried rock have been addressed in the preceding paragraphs as point source emissions. The on-site handling and storage of alternative fuels will not increase fugitive emissions since both alternative fuels will be handled in the same manner as the presently permitted fuel. An increase in the number of rail cars used to ship dried rock from the site will be required if the actual hours of drying operation increase beyond the currently permitted maximum. There will be no measurable increase in fugitive emissions resulting from rail traffic, however.

The only increase in fugitive emissions will result from truck traffic that is used to transport fuel onto the site. This increase in traffic will be necessitated if market demand and mechanical availability are sufficient to increased hours of dryer operation. The maximum potential increase in emission rates of pollutants from this source are expected to be less than 0.1 tons per year. The proposed actions will not result in an additional work force at the mine, hence, there will be no increase in fugitive emissions from automotive sources.

The present and proposed annual emission rates of all pollutants are summarized in Table 2-1.

The existing stack through which emissions from the fluid bed rock dryer are exhausted is 100 feet high. The height of this stack will not be changed as a result of the proposed modifications. Since the stack is less than 63 meters (200 feet) in height, good engineering practice stack height does not need to be addressed. An evaluation of the potential for pollutant downwash adjacent to this stack is addressed in Section 5.0 of this application.

Air pollution construction permits required by the State of Florida, reflecting the modifications proposed for the rock dryer and reflecting the increased hours of operation for the rock storage silos and the dried rock loadout facility are attached to this application.

TABLE 2-1

SUMMARY OF EMISSION CHANGES RESULTING FROM THE USE OF ALTERNATIVE FUELS

AMAX PHOSPHATE, INC.
BIG FOUR MINE
HILLSBOROUGH COUNTY, FLORIDA

Source	Pollutant Emission Rate Increase (tons/year)				
	Particulate Matter	SO_2	NOx	CO	HC
Dryer					
Present	38.5	354.1	74.2	15.6	3.1
Proposed - Oil	78.8	568.5	74.2	15.6	3.1
- COM	78.8	568.5	117.2	19.5	5.0
Max. Increase	40.3	214.4	43.0	3.9	1.9
Dry Rock Storage					
Present	7.7				
Proposed	9.0				
Max. Increase	1.3				
Dry Rock Loadout					
Present	7.5				
Proposed	8.7				
Max. Increase	1.2				
Boiler	N O C H A N G E				
Traffic	A L L C H A N G E S <0.1 TPY				
Total Increase	42.8	214.4	43.0	3.9	1.9
Significant Increase	25	40	40	100	40

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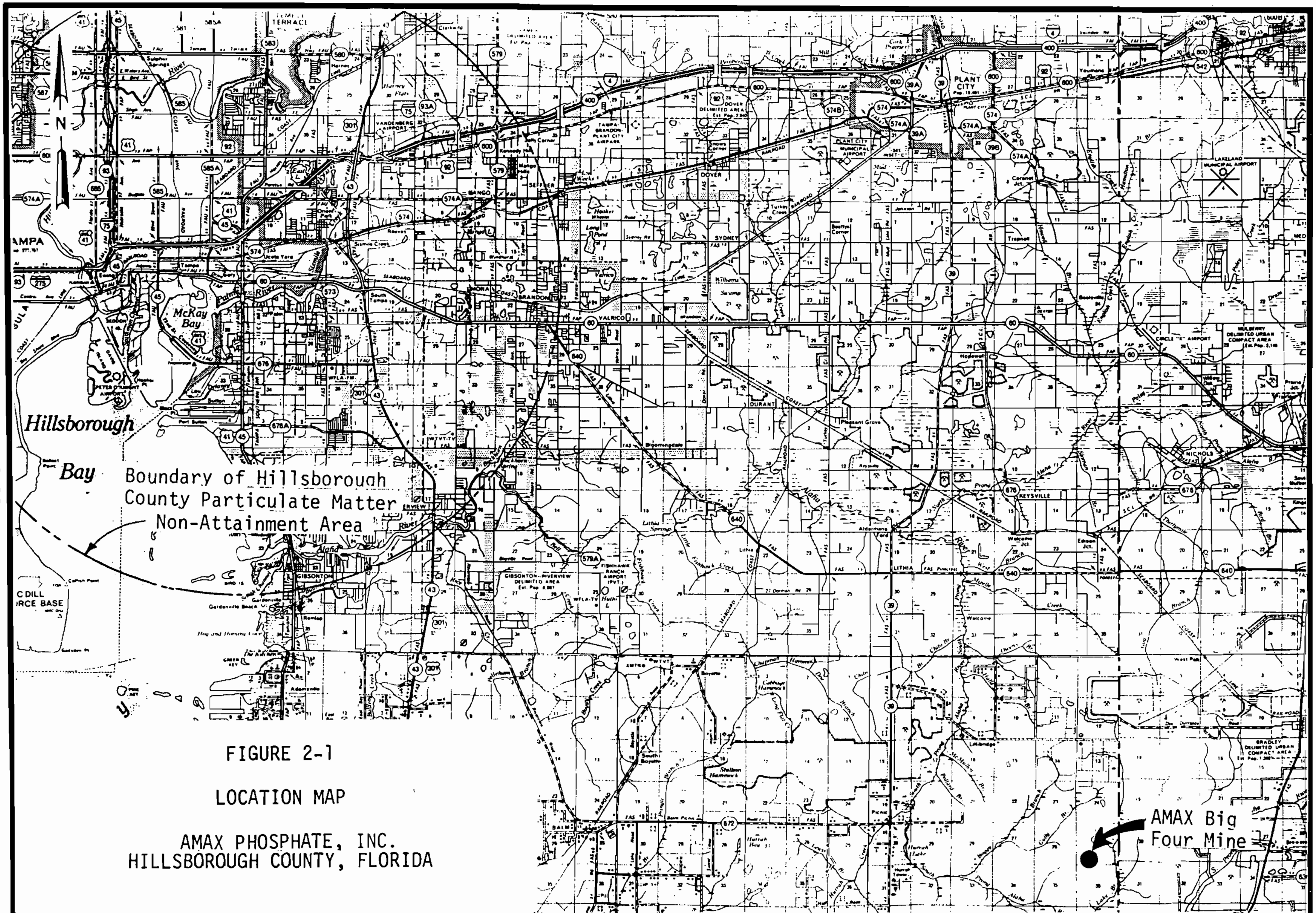

FIGURE 2-1

LOCATION MAP

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

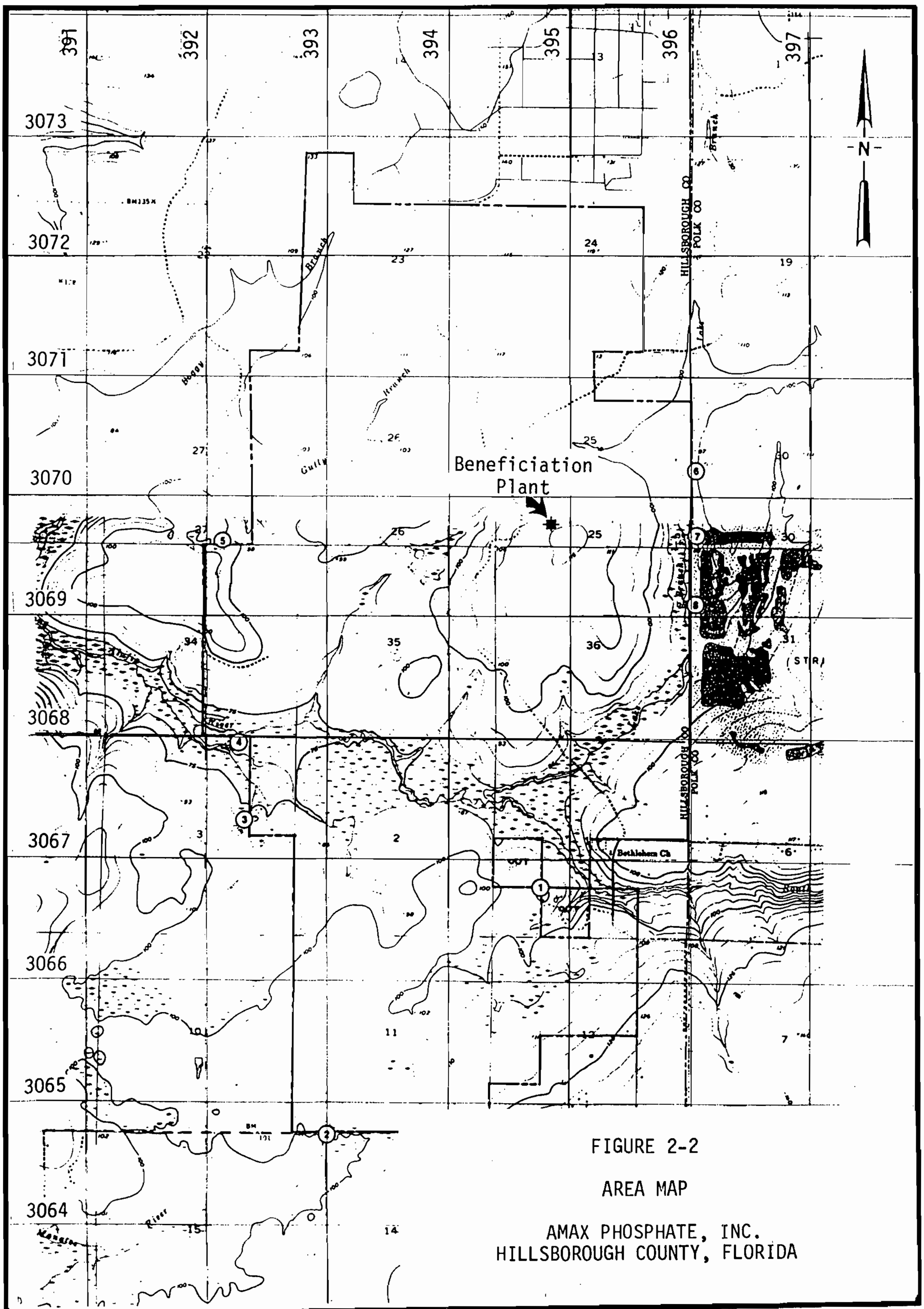

FIGURE 2-2

AREA MAP

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

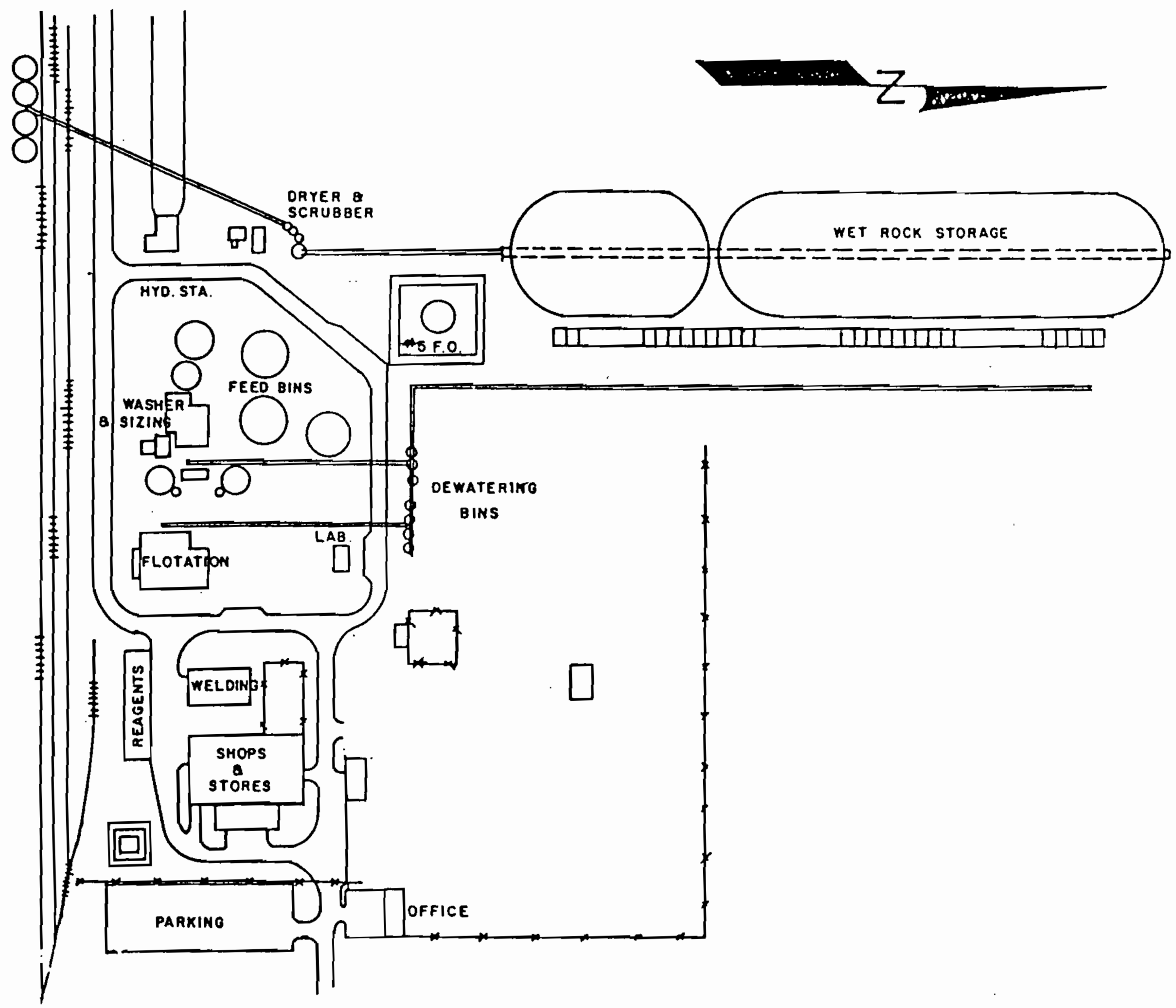

FIGURE 2-3

AMAX BIG FOUR MINE
BENEFICIATION PLANT

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

APPENDIX 2A-1

EMISSION CALCULATIONS

AMAX BIG FOUR MINE

AMAX PHOSPHATE, INC.

Calculation of Air Pollutant Emission Increases Resulting from Use of Alternative Fuels

Present

1. Rock Dryer - Permitted for 299 ton/hr, wet rock (267 tons/hr, dried rock) and 7488 hours per year.
   Part. Matter = 10.29 lb/hr (0.034 lb/ton wet rock)
   SO_2 = 94.58 lb/hr (0.757 lb/10^6 BTU)

2. Rock Storage - Permitted for 267 ton/hr dried rock and 7488 hours per year
   Particulate Matter = 2.06 lb/hr
   = 7.7 tons/year

3. Rock Loading - Permitted for 800 tons/hour. 2500 hr/yr are required to load-out all dried rock
   Particulate Matter = 5.96 lb/hour
   = 7.5 tons/year

4. Boiler - No change

Proposed

1. Rock Dryer - To be permitted for 300 ton/hr, wet rock (267 tons/hr, dried rock) and 8760 hours per year.
   Part. Matter = 18.00 lb/hr (0.06 lb/ton wet rock)
   SO_2 = 129.8 lb/hr (1.1 lb/10^6 BTU)

2. Rock Storage - 267 tons/hr and 8760 hours per year
   Part. Matter = 2.06 lb/hr
   = 9.0 tons/year

3. Rock Loading - 800 tons/hour; 2924 hours will be required to load-out all dried rock
   Particulate Matter = 5.96 lb/hour
   = 8.7 tons/year

4. Boiler - No change

Emission Rate Calculations

Rock Dryer

Present

Particulate Matter

= 10.29 lb/hr permitted (actual emissions are equal to or greater than this rate)

× 7488/2000

= 38.5 tpy

Sulfur Dioxide

$=(125 \times 10^6 \text{ BTU/hr})(1/18502 \text{ BTU/lb})(0.007 \times 2 \frac{\text{lb } SO_2}{\text{lb oil}})$

= 94.58 lb/hour

× 7488/2000

= 354.1 tpy

Nitrogen Oxides

Based on a flow of 45350 scfm (actual) and a concentration of 61 ppm (see PSD-FL-088; Brewster)

$=(45350 \text{ ft}^3/\text{min})(60 \text{ min/hr})(61 \times 10^{-6} \frac{\text{ft}^3 NO_x}{\text{ft}^3})$

$\times (1/385 \text{ ft}^3 NO_x/\text{lb-mole})(46 \text{ lb } NO_x/\text{lb-mole})$

= 19.83 lb/hr

× 7488/2000

= 74.2 tpy

Carbon Monoxide

Based on 5 lb CO/1000 gal (AP-42)

$=(125 \times 10^6 \text{ BTU/hr})(1/149500 \text{ BTU/gal})$

× (5/1000 lb CO/gal)

= 4.18 lb/hour

× 7488/2000

= 15.6 tpy

Hydrocarbons

Based on 1.0 lb HC/1000 gal (AP-42)

$= (125 \times 10^6)(1/149500)(1/1000)$

= 0.84 lb/hour

× 7488/2000

= 3.1 tpy

Rock Dryer (Cont.)

Proposed

Particulate Matter

= 300 tons/hr x 0.06 lb/ton
= 18.00 lb/hr
x 8760/2000
= 78.8 tpy

Sulfur Dioxide

Proposed Emission Limit
= (1.1 lb SO_2/10^6 BTU)(118 x 10^6 BTU/hr)
= 129.80 lb/hr
x 8760/2000
= 568.5 tpy

Uncontrolled with 0.7% Sulfur fuel oil
= (115 x 10^6 BTU/hr)(1/149500 BTU/gal)(8.08 lb/gal)
x (0.007 x 2 lb SO_2/lb fuel)
= 87.0 lb/hr
< 129.8 lb/hr; therefore no SO_2 sorption is necessary to meet the proposed emission limiting standard

Uncontrolled with 2.25% Sulfur fuel oil
= (118 x 10^6 BTU/hr)(1/147095 BTU/gal)(8.29 lb/gal)
x (0.0225 x 2 lb SO_2/lb fuel)
= 299.3 lb/hr
Absorption necessary to meet proposed std.
= (299.3 - 129.8) x 100/299.3

= 56.6%

Uncontrolled with 2.00% Sulfur COM
= (109 x 10^6 BTU/hr)(1/135876 BTU/gal)(9.3 lb/gal)
x (0.02 x 2 lb SO_2/lb fuel)
= 298.4 lb/hr
Absorption necessary to meet proposed std
= (298.4 - 129.8) x 100/298.4

= 56.5%

Nitrogen Oxides

For fuel oil combustion an NO_x stack gas concentration of 61 ppm was assumed (PSD-FL-088; Brewster). For coal combustion this concentration was increased by a factor equal to the AP-42 coal NO_x emission factor divided by the AP-42 oil NO_x emission factor. For COM the NO_x emission factor was calculated as:

(Oil NO_x factor)(0.45) + (Coal NO_x factor)(0.55)

NO_x from Coal - AP-42

= 18 lb / ton

× (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)

= 0.67 lb NO_x / 10^6 BTU

NO_x from Oil - AP-42

= 60 lb / 1000 gal

× (1/1000)(1/147040 BTU/gal)(10^6)

= 0.41 lb NO_x / 10^6 BTU

NO_x emissions from Oil (same as present)

= 19.83 lb/hr

NO_x emissions from Coal (by ratio)

= 19.83 (0.67 / 0.41)

= 32.41 lb / hr

NO_x emissions from COM

= 19.83 (0.45) + 32.41 (0.55)

= 26.75 lb/hr

× 8760/2000

= 117.2 tpy

CARBON MONOXIDE

CO from Coal - AP-42

$= 1 \text{ lb/ton}$

$\times (1/2000 \text{ lb/ton})(1/13350 \text{ BTU/lb})(10^6)$

$= 0.037 \text{ lb CO}/10^6 \text{ BTU}$

CO from Oil - AP-42 (Same as present)

$= 4.18 \text{ lb/hr} @ 125 \times 10^6 \text{ BTU/hr}$

$= 0.033 \text{ lb CO}/10^6 \text{ BTU}$

CO emissions from COM

$= 4.18(0.45) + 4.18(0.037/0.033)(0.55)$

$= 4.46 \text{ lb/hr}$

$\times 8760/2000$

$= 19.5 \text{ tpy}$

HYDROCARBONS

HC from Coal - AP-42

$= 0.3 \text{ lb/ton}$

$\times (1/2000 \text{ lb/ton})(13350 \text{ BTU/lb})(10^6)$

$= 0.011 \text{ lb HC}/10^6 \text{ BTU}$

HC from Oil - AP-42 (Same as present)

$= 0.84 \text{ lb/hr} @ 125 \times 10^6 \text{ BTU/hr}$

$= 0.007 \text{ lb HC}/10^6 \text{ BTU}$

HC emissions from COM

$= 0.84(0.45) + 0.84(0.011/0.007)(0.55)$

$= 1.14 \text{ lb/hr}$

$\times 8760/2000$

$= 5.0 \text{ tpy}$

3.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Best Available Control Technology (BACT) is required to control emissions of all regulated pollutants which are subject to a PSD review. In the case of AMAX Phosphate, Inc., the pollutants subject to a PSD review are sulfur dioxide, particulate matter and nitrogen oxides. The other pollutants that will be emitted from the facility at an increased rate as a result of the use of the alternative fuels are carbon monoxide and hydrocarbons. The increases in the emission rates of these pollutants are less than the increases that will trigger a PSD review. The BACT addressed in this section, therefore, is limited to the control of sulfur dioxide, particulate matter and nitrogen oxides.

The sources that will be affected by the BACT determinations are the fluid-bed rock dryer, the dried rock storage silo and the dried rock loadout facility. All of these sources emit particulate matter but only the dryer emits sulfur dioxide and nitrogen oxides. In Section 2.0 of this application these sources are described and the effects of the proposed modification are discussed.

3.1 BACT - Dried Rock Storage and Loadout Facilities

AMAX proposes that the particulate matter emission rate from both the dried rock storage silo and the dried rock loadout facility remain unchanged as a result of the proposed action. Only the hours of operation of these sources may change and hence, the annual particulate matter emissions could change.

The dried rock storage silos are vented at the rate of approximately 8,000 actual cubic feet per minute. The present allowable particulate matter emission rate from this source is 2.06 pounds per hour or 0.03 grains per standard cubic foot. Actual emission rates consistently have been measured below the allowable emission rate hence, AMAX is proposing as BACT the impingement scrubber control system presently on the silos and the present allowable particulate matter emission rate of 2.06 pounds per hour or 0.03 grains per standard cubic foot because: (1) no NSPS has been established for these sources; (2) the existing standard is stricter than allowed by the FDER Process Weight Table; and (3) the impingement scrubbers are consistently complying with present requirements.

The dried rock loading facility is vented at the rate of 23,000 actual cubic feet per minute. The present allowable particulate matter emission rate from this source is 5.96 pounds per hour or 0.03 grains per standard cubic foot. Actual particulate matter emission rates consistently have been measured below the allowable emission rate. AMAX is proposing as Best Available Control Technology the existing impingement scrubber control system from the dried rock loadout facility and an emission rate of 5.96 pounds per hour or 0.03 grains per standard cubic foot for the same reasons cited above for the dried rock storage silos.

The alternative to the existing control systems on the rock silos and the shipping facility is the replacement of the existing control systems with fabric filter collectors. With these collectors, a particulate matter concentration in the gas stream discharge to the atmosphere of 0.015 grains per standard cubic foot could be achievable. These collectors would reduce the particulate matter emission rate from the dried rock loadout facility to approximately 3.0 pounds per hour and the particulate matter emissions from the rock silos to approximately 1.5 pounds per hour. The particulate matter emission rate reduction from the two sources combined could approximate 15 tons per year.

The cost of achieving this reduction, exclusive of the cost of removing the existing control systems, and incremental operating costs, if any, would be approximately $80,000 for the rock silos and approximately $128,000 for the shipping facility; or a total cost of $208,000*. For the emission rate reduction achieved the capital expenditure would be approximately $13,900 per ton of particulate matter removed. The impact of particulate matter emissions from these two sources under present permitted conditions, at the point of greatest impact, is 8.1 micrograms per cubic meter, 24-hour average. If the present control systems on the rock silos and shipping facilities are replaced by fabric filter collectors, the maximum 24-hour impact could be reduced to 4.6 micrograms per cubic meter. The cost of reducing the ambient total suspended particulate matter concentration by one microgram per cubic meter by changing the control systems is approximately $59,000. In evaluating this cost it should be realized that the maximum 24-hour total suspended particulate matter concentration in the vicinity of the AMAX property will be more than 20 percent under the particulate matter air quality standard even after the modifications requested in this application have been implemented.

* Cost data from Air Pollution Control Technology and Costs in Seven Selected Areas, USEPA,PB-231-757, 12/1973 but updated to 1982 dollars.

3.2 BACT - Phosphate Rock Dryer

3.2.1 Particulate Matter BACT

Particulate matter emissions from the rock dryer are controlled with a Peabody Engineering Company, Type M160 impingement scrubber. The gas flow rate through this scrubber averages 65,000 actual cubic feet per minute or 46,800 standard cubic feet per minute. The existing permit for this dryer limits the particulate matter emission rate to 0.03 grains per standard cubic foot at a flow rate of 40,000 standard cubic feet per minute. This corresponds to a mass particulate matter emission rate of 10.29 pounds per hour or an emission rate of 0.034 pounds of particulate matter per ton of wet rock fed to the dryer.

AMAX proposes that the New Source Performance Standard for phosphate rock dryers adopted by EPA on April 16, 1982, be applied by FDER in this permit as Best Available Control Technology (BACT). This standard limits particulate emissions to 0.06 pounds per ton of wet rock feed to the dryer, which yields a particulate matter stack concentration in the stack gas of 0.045 grains per standard cubic foot or an emission rate of 18.0 pounds per hour at the proposed 300 tons per hour wet rock feed rate.

There are three reasons why AMAX believes the New Source Performance Standard should apply to the Big Four dryer as BACT. First, federal and state PSD rules clearly define the change to an alternative fuel as a modification, even though physical construction is not required. Second, AMAX does not believe that a stricter emission rate is justified in this case given existing ambient air quality, the impact of dryer emissions, and scrubber retrofit/replacement costs. Finally, AMAX agrees with the EPA assessment that continuous attainment of a stricter standard cannot be ensured with existing technology due to the "variable operation conditions which are likely to recur." Each of these reasons are discussed in the following paragraphs.

As stated previously, AMAX believes that the NSPS should be applied as BACT because the change of fuel types represents a permit modification as defined by state and federal regulations and triggers PSD review requirements and, therefore, application of NSPS. AMAX recognizes that a BACT determination is a case-by-case analysis; however, unless ambient air quality standards are not being met or the incremental particulate matter impact is likely to be exceeded, it seems as if the basis of NSPS is not being adhered to if an existing dryer burning an alternate fuel is more strictly limited than a new, grass roots dryer. The essence of this point is that: (1) EPA devoted significant resources to develop the emission rate achievable by BACT when promulgating the NSPS; (2) the NSPS limit does not cause existing air quality to be significantly degraded nor does it result in a violation of applicable NAAQS; (3) the NSPS standard is a " . . . uniform application of control requirements nationwide . . ." for all new sources, of which this is one; and (4) it seems logical to apply the NSPS instead of another particulate emission limitation that is either less stringent and uncompetitive for new grass roots dryers and more stringent and uncompetitive for AMAX when compared to other sources. In addition, it is important to note that the phosphate rock dryer NSPS represents a 58 percent reduction in particulate emissions from the level allowed by Chapter 17-2, F.A.C. (Process Weight Table).

Given the current conditions at Big Four, AMAX does not believe that the expected improvement from a more advanced emission control system would offset the cost of installing or operating such a system. When establishing the NSPS for phosphate rock dryers, EPA concluded that the use of baghouses or high energy venturi scrubbers is BACT when considering emission controls and economics and that a more stringent NSPS was not economically justifiable. In this case, the cost of retrofitting the Big Four dryer with either of these systems will increase beyond the "typical Florida mine costs" because the mine life is limited to about five years. The total annual cost of a scrubber system is $316,000 and the total annual cost for use of a baghouse is approximately $485,000. These expenditures are not considered warranted for a 7.6 pounds per hour or 33 tons per year improvement in the emission rate.

Finally, EPA concluded that the use of baghouses or high energy venturi scrubbers could not be expected to continuously achieve an emission rate below 0.06 pounds per ton due to the variable conditions that occur in rock dryers. Because the wet rock feed varies in terms of its potential dustiness and this dust source represents between 80 and 90 percent of the total scrubber inlet loading, the emission rate is likely to vary even though the scrubber is operating properly. At Big Four, AMAX stack data indicates that the stack gas concentration can range from 0.027 grains per standard cubic foot to 0.055 grains per standard cubic foot solely because of the type of pebble phosphate (worst case) being dried. AMAX agrees with EPA that a lower emission rate (or the existing limit) is probably not continuously achievable even if AMAX retrofitted the dryer with a high energy venturi scrubber; therefore, the cost of doing so is not justified when stack data are available to demonstrate that the existing particulate emission control system is capable of meeting the same standard that EPA says is the most stringent achievable by a baghouse or high energy scrubber.

3.2.2 Sulfur Dioxide BACT

The existing Peabody impingement scrubber, in combination with the fluid bed rock dryer, is quite effective for removing sulfur dioxide generated during the combustion of fuel in the rock dryer. A study conducted by AMAX, and included in the construction permit application for the dryer modifications, showed a sulfur dioxide removal efficiency of 77.4 percent when a fuel with 1.54 percent sulfur was being fired to dry pebble rock. In contrast, the scrubber addressed in PSD application PSD-FL-088 achieved a sulfur dioxide removal efficiency of only 44 percent under similar conditions. Extrapolating the AMAX data, using the data presented in the PSD-FL-088, AMAX can expect a sulfur dioxide removal efficiency of approximately 60-65 percent when fuel with a 2.5 percent sulfur content is used to dry pebble rock. This would be the lowest expected sulfur dioxide removal efficiency for the system since the removal efficiencies increase with decreased fuel sulfur and increase during the drying of rock concentrate or combinations of rock concentrate and pebble rock.

AMAX is proposing the use of two alternate fuels in the rock dryer; fuel oil with a 2.5 percent sulfur content and coal-oil-water mix with a 2.5 percent sulfur content. AMAX is further proposing a sulfur dioxide emission limiting standard of 1.1 pounds per million BTU heat input. With the proposed alternative fuels, the maximum uncontrolled sulfur dioxide emissions will be approximately 373 pounds per hour. With this emission rate, a sulfur dioxide removal efficiency of approximately 65 percent will be required to meet the emission limitation of 1.1 pounds of sulfur dioxide per million BTU heat input.

Since AMAX, under worst case conditions, can reasonably expect to achieve a sulfur dioxide removal efficiency of 60-65 percent, the fuels proposed by AMAX are consistent with the emission limiting standard for sulfur dioxide proposed by AMAX.

To achieve a more stringent emission standard for sulfur dioxide, AMAX would have to use a fuel with a lower sulfur content. The capital and operating costs of a flue-gas desulfurization system, taking into consideration the limited life of the Big Four Mine, make this alternative unfeasible. Based on current fuel prices and the assumption that the rock dryer will operate 8,760 hours per year, the annual fuel cost savings of 2.5 percent sulfur fuel compared to the existing 0.7 percent sulfur fuel will be approximately $700,000 per year. With the coal-oil-water mix, the annual fuel cost from burning 2.5 percent sulfur fuel instead of 0.7 percent sulfur fuel will result in a savings of approximately $600,000 per year.

Considering the limited life of the mine, the cost differential that presently exists in fuels, the availability of fuels, the expected ambient sulfur dioxide concentrations, and reasonableness of requiring similar emission limits for similar sources, AMAX is of the opinion that a sulfur dioxide limit of 1.1 pounds per million BTU heat input to the dryer represents Best Available Control Technology for sulfur dioxide.

3.2.3 Nitrogen Oxides BACT

The combustion of fuel, whether it be oil or a coal-oil-water mix, in the phosphate rock dryers will generate some nitrogen oxides as a result of the fixation of atmospheric nitrogen and oxygen at the peak temperatures achieved in the flame. Tests conducted on a fluid-bed rock dryer in January, 1981 (PSD-FL-088) when a fuel oil with a 2.4 percent sulfur content was being burned, showed nitrogen oxides concentrations in the dryer stack gas of 61 parts per million. It is expected that the combustion of the presently permitted fuel and alternative fuel oil proposed by AMAX will result in nitrogen oxides emissions of approximately this same level.

The nitrogen oxides concentration of 61 parts per million corresponds to a mass emission rate of 19.8 pounds per hour or an emission rate of 0.16 pounds of nitrogen oxides per million BTU heat input. This emission rate is expected when either the presently permitted or the proposed fuel oil is burned in the dryer. When the coal-oil-water mix fuel is burned in the dryer the expected nitrogen oxides emission rate will be 26.8 pounds per hour or 0.21 pounds per million BTU heat input.

The increase in the nitrogen oxides emissions expected with the coal-oil-water fuel results because of the increased nitrogen content of the coal in the fuel. Calculations presented in Appendix 2A-1 and summarized in

Table 2-1 indicated that there will be significant increases in nitrogen oxides emissions as a result of using the coal-oil-water mix fuel.

In considering the control of nitrogen oxides emissions from rock dryers the function of the dryer must be placed in perspective. The purpose of the burner in a rock dryer is to heat air which in turn is used to drive excess moisture from the phosphate rock. This performance differs from that of a boiler where the intent is to transfer the heat of combustion to water. The latter requires as little excess combustion air as possible since the heat transferred to the excess air is lost.

In a dryer, about 150 percent stoichiometric combustion air (50 percent excess air) is fed through the burner. Downstream of the burner nozzle additional air is added resulting in a total air flow equivalent to 300 to 500 percent excess air. The injection of the air downstream of the burner results in the burner that functions much like a "low NOx" burner used in boilers. Additionally, the water present in the coal-oil-water mix fuel will function to reduce peak flame temperatures much as steam atomization functions to reduce peak flame temperatures and, hence, reduce nitrogen oxides emissions in boilers.

Because of the nature of the drying operation and the characteristics of the coal-oil-water mix fuel further modifications of the burner to reduce nitrogen oxides emissions, such as by reducing primary combustion air, is not feasible. Flue gas recirculation is likewise not feasible because of the high excess air rate used in the dryer. The high excess air rate results in a flue gas oxygen content not significantly lower than that of air, hence, no significant oxygen reduction would be achieved by flue gas recirculation.

It is the opinion of AMAX that the burner presently used in the rock dryer represents the best practical means of controlling nitrogen oxides emissions when oil is used as a fuel and that the burner combined with the water present in the coal-oil-water mix fuel represents the best practical means of controlling nitrogen oxides emissions when this fuel is used. Since AMAX is presently doing everything possible to minimize nitrogen oxides emissions, and will continue to do so, an emission rate of 0.21 pounds of nitrogen oxides per million BTU heat input to the dryer is proposed as BACT. In the evaluation of BACT for the nitrogen oxides emissions reference should also be made to Section 6.0 which shows the impact of increased nitrogen oxides emissions on ambient air quality to be less than significant.

4.0 EXISTING AIR QUALITY DATA

State and federal PSD regulations require that an air quality review be conducted for regulated air pollutants that have been determined to be subject to a PSD review. The air quality review is to include both air quality monitoring and a projected impact analysis conducted with air quality models. The regulations, however, exempt from air quality monitoring those pollutants which are determined by air quality modeling to have less than a de minimus impact on ambient air quality. The de minimus impact levels are defined as 13 micrograms per cubic meter, 24-hour average, for sulfur dioxide, 10 micrograms per cubic meter, 24-hour average, for particulate matter and 14 micrograms per cubic meter, annual average for nitrogen oxides; the pollutants emitted by AMAX that are subject to this PSD review.

Air quality modeling was conducted to evaluate the impact of the increased particulate matter, sulfur dioxide and nitrogen oxides emissions. The modeling was conducted with the CRSTER air quality model using meteorological data from Tampa, Florida representative of the period of 1970 through 1974. The results of this modeling showed that the maximum 24-hour impact resulting from the increased particulate matter emissions addressed in this PSD application is 3.0 micrograms per cubic meter. This impact is considerably less than the de minimus impact level of 10 micrograms per cubic meter, 24-hour average. Hence, air quality monitoring is not required for particulate matter.

The modeling did show, however, that the 24-hour impact of the increased sulfur dioxide emissions was approximately 83 micrograms per cubic meter. This impact exceeds the de minimus impact level and requires that air quality monitoring data for sulfur dioxide be submitted as part of the air quality review for sulfur dioxide. The impact of increased nitrogen oxides emissions was calculated to be less than one micrograms per cubic meter, annual average, which is much less than the de minimus impact.

The sulfur dioxide monitoring data that AMAX is submitting with this application are data collected with a continuous sulfur dioxide monitor at SAROAD Site 101800097. This site is located approximately five miles southwest of the AMAX plant site. The data included with this application were collected during the period of October 1, 1981 through January 31, 1982 and were also included in PSD application PSD-FL-088.

To summarize the sulfur dioxide monitoring data, the four month average sulfur dioxide concentration was 3.8 micrograms per cubic meter. The highest 24-hour concentration measured during the four month period was 35 micrograms per cubic meter compared with a 24-hour sulfur dioxide standard of 260 micrograms per cubic meter. The highest three-hour sulfur dioxide concentration measured was 112 micrograms per cubic meter compared with a three-hour ambient standard of 1300 micrograms per cubic meter. A concentration of zero was measured 76 percent of the time during the four month period; indicating that the background sulfur dioxide concentration in the area is zero. The SAROAD sheets containing the sulfur dioxide monitoring data are included in Appendix 4A-1.

Although air quality monitoring data are not required for total suspended particulate matter, 24-hour and annual average background concentrations for this contaminant are required for air quality modeling. Ambient total suspended particulate matter monitoring data presented in PSD application PSD-FL-014 indicate that the annual average total suspended particulate matter background levels in the southeastern Hillsborough County - southwestern Polk County area is 30 micrograms per cubic meter. Assuming a standard geometric deviation of 1.5, which is typical for 24-hour total suspended particulate matter observations, a maximum 24-hour concentrations consistent with a 30 microgram per cubic meter annual geometric mean concentration was calculated. The maximum expected 24-hour concentration was calculated to be 98 micrograms per cubic meter. The second high 24-hour concentration was calculated to be 88 micrograms per cubic meter.

For background total suspended particulate matter levels, 30 micrograms per cubic meter, annual average, and 88 micrograms per cubic meter, 24-hour average, were assumed. These concentrations are consistent with data included in other PSD applications and are background concentrations that can reasonably be expected in a rural area such as the area AMAX is located in.

APPENDIX 4A-1

AMBIENT SULFUR DIOXIDE

MONITORING DATA

This is an EPA SAROAD Format

Data as printed may be read in units of parts per billion (ppb)

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD	FT. LONESOME, FL.	Air Monitoring	One (1) Hour	P.P.M.

STATE (1–2)	AREA (3–6)	SITE (7–10)	AGENCY (11)	PROJECT (12–13)	TIME (14)	YEAR (15–16)	MONTH (17–18)
1 1	0 1 8 0	0 0 9 7	J	0 5	1	8 1	1 0

PARAMETER CODE (23–27)	METHOD (28–29)	UNITS (30–31)	DP (32)
4 2 4 0 1	1 6	0 7	3

DAY (19–20)	ST HR (21–22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
01	00	0	0	0	0	0	0	0	0	0	0	0	0
01	12	0	0	0	0	0	0	0	0	0	0	0	0
02	00	0	0	0	0	0	0	0	0	0	0	0	0
02	12	0	0	0	0	0	0	0	0	0	0	0	0
03	00	0	0	0	0	0	0	0	0	0	0	0	0
03	12	0	0	0	0	0	0	0	0	0	0	0	0
04	00	0	0	0	0	0	0	0	0	0	0	0	0
04	12	0	0	0	0	0	0	0	0	0	0	0	0
05	00	0	0	0	0	0	0	0	0	0	0	0	0
05	12	0	0	0	0	0	0	0	0	0	0	0	0
06	00	0	0	0	0	0	0	0	0	0	0	1	0
06	12	0	0	0	0	0	0	0	0	0	0	0	0
07	00	0	0	0	0	0	0	0	0	0	1	1	1
07	12	8	7	6	2	0	0	0	0	0	0	0	0
08	00	0	0	0	0	0	0	0	0	0	0	0	0
08	12	3	0	0	0	0	0	0	0	0	0	0	0
09	00	0	0	0	0	0	0	0	0	0	0	0	0
09	12	0	0	0	0	0	6	0	0	0	0	0	0
10	00	0	0	0	0	0	0	0	0	0	0	6	11
10	12	1	0	0	3	0	10	9	0	0	0	0	0
11	00	0	0	0	0	0	0	0	0	0	0	0	0
11	12	0	0	0	0	0	0	0	0	0	0	0	0
12	00	0	0	0	0	0	0	0	0	0	0	0	0
12	12	0	0	0	0	0	0	0	0	0	0	0	0
13	00	0	0	0	0	0	0	0	0	0	0	0	0
13	12	0	0	0	0	0	0	0	0	0	0	0	0
14	00	0	0	0	0	0	0	0	0	0	0	0	0
14	12	0	0	0	0	0	0	0	0	0	0	0	0
15	00	0	0	0	0	0	0	0	0	0	0	0	0
15	12	0	0	0	0	0	0	0	0	0	0	0	0
16	00	0	0	0	0	0	0	0	0	0	0	0	0

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Data as printed may be read in units of parts per billion (ppb)

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD.	FT. LONESOME, FL	Air Monitoring	One (1) Hour	P.P.M.

(1)	STATE (2–3)	AREA (4–7)	SITE (8–10)	AGENCY (11)	PROJECT (12–13)	TIME (14)	YEAR (15–16)	MONTH (17–18)
1	10	1800	097	J	05	1	81	10

PARAMETER CODE (23–27)	METHOD (28–29)	UNITS (30–31)	DP (32)
42401	16	07	3

DAY (19–20)	ST (21)	HR (22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
16	1	2	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1	2	0	0	0	0	0	0	0	0	1	6	7	15
18	0	0	0	14	12	6	8	5	10	24	20	6	5	26
18	1	2	19	14	13	5	0	0	0	0	2	2	1	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1	2	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	2	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	1	2	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	2	0	0	0	0	0	0	0	0	11	10	4	2
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1	2	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	1	2	0	0	0	0	17	70	16	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	1	2	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	1	2	2	4	6	6	13	9	4	14
29	1	2	14	5	5	3	2	0	0	4	14	3	9	0
30	0	0	0	0	0	0	0	0	0	0	0	5	0	0
30	1	2	0	0	0	0	0	0	0	0	0	3	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	1	2	0	0	0	0	0	0	0	0	0	7	5	0

This is an EPA SAROAD Format

Data as printed may be read in units of parts per billion (ppb)

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD		
Brewster Phosphates	Sulfur Dioxide	Flame Photometric		
SITE ADDRESS Hiscock Rd.	**CITY NAME** Ft. Lonesome, Fl.	**PROJECT** Air Monitoring	**TIME INTERVAL OF OBS.** One (1) Hour	**UNITS OF OBS.** P.P.M.

1	STATE (2–3)	AREA (4–7)	SITE (8–10)	AGENCY (11)	PROJECT (12–13)	TIME (14)	YEAR (15–16)	MONTH (17–18)
1	1 0	1 8 0 0	0 9 7	J	0 5	1	8 1	1 1

PARAMETER CODE (23–27)	METHOD (28–29)	UNITS (30–31)	DP (32)
4 2 4 0 1	1 6	0 7	3

DAY (19–20)	ST (21)	HR (22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
01	0	0	0	0	0	0	0	0	0	0	8	0	0	0
01	1	2	0	0	0	0	0	0	0	0	0	0	0	1
02	0	0	0	0	0	0	0	0	0	0	1	0	0	0
02	1	2	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	0	0	0	0	2	2	4	8	7	0	0	0
03	1	2	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	0	0	0	0	8	4	0	0	0	0	0
04	1	2	0	0	0	0	2	0	4	0	0	0	0	0
05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	1	2	0	0	0	0	125	4	0	0	0	0	0	0
06	0	0	0	0	0	0	0	0	0	0	0	0	3	3
06	1	2	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	2	11	7	1	0	0	0	0	0
07	1	2	0	0	0	11	12	22	28	14	8	2	0	0
08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08	1	2	0	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	0	0	0	4	5	0	0
09	1	2	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	2	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	2	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	2	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	2	9
13	1	2	1	0	0	2	3	0	0	4	10	9	2	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	2	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	6	19	8	2	0
15	1	2	0	0	0	9	21	37	25	11	3	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD.	FT. LONGSOME, FL	Air Monitoring	One (1) Hour	P.P.M.

	STATE	AREA	SITE	AGENCY	PROJECT	TIME	YEAR	MONTH
1	10	1800	097	J	05	1	81	11
(1)	(2–3)	(4–7)	(8–10)	(11)	(12–13)	(14)	(15–16)	(17–18)

PARAMETER CODE	METHOD	UNITS	DP
42401	16	07	3
(23–27)	(28–29)	(30–31)	(32)

DAY (19–20)	ST (21)	HR (22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
16	1	2	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	6	9
17	1	2	11	10	7	2	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	1	2	0	0	0	2	1	0	0	6	9	8	0	0
19	0	0	0	0	0	0	0	0	0	0	2	2	0	0
19	1	2	0	0	7	41	23	14	1	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	6
20	1	2	0	0	0	3	0	0	18	0	0	0	10	11
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	0	0	0	0	0	0	13	13	1	0	0	0
22	0	0	0	0	0	0	0	0	0	0	9	10	0	0
22	1	2	0	0	0	0	0	3	9	3	0	0	0	0
23	0	0	0	0	0	1	9	12	10	4	9	10	9	7
23	1	2	5	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	5	11
24	1	2	3	0	0	0	0	4	5	9	11	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	11	11	9
25	1	2	0	0	1	11	5	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	1	2	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	3	0
28	1	2	3	25	4	2	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	7	10
29	1	2	2	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	1	2	0	0	0	0	0	0	0	0	0	0	0	0
~~31~~	~~0~~	~~0~~												
~~31~~	~~1~~	~~2~~												

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
Brewster Phosphates	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
Hiscock Rd.	Ft. Lonesome, Fl	Air Monitoring	One (1) Hour	P.P.M.

	STATE	AREA	SITE	AGENCY	PROJECT	TIME	YEAR	MONTH
1	10	1800	097	J	05	1	81	12
1	2 3	4 5 6 7	8 9 10	11	12 13	14	15 16	17 18

PARAMETER CODE	METHOD	UNITS	DP
42401	16	07	3
23 24 25 26 27	28 29	30 31	32

DAY (19 20)	ST HR (21 22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
01	00	0	0	0	0	0	0	0	0	0	0	0	0
01	12	0	0	0	0	0	0	0	0	0	0	0	0
02	00	0	0	0	0	0	0	0	0	0	0	0	0
02	12	0	0	0	0	0	0	0	0	0	0	0	0
03	00	0	0	0	0	0	0	0	0	0	0	1	0
03	12	5	1	0	0	0	0	0	0	0	0	0	0
04	00	0	0	0	0	0	0	0	0	0	4	0	0
04	12	0	0	8	3	0	8	0	0	0	0	0	0
05	00	0	0	0	0	0	0	0	0	0	0	0	0
05	12	0	0	0	0	0	0	0	0	0	0	0	0
06	00	0	0	0	0	0	0	0	6	21	30	14	4
06	12	0	0	0	0	0	0	0	0	0	0	0	0
07	00	0	0	0	0	0	0	0	0	0	0	0	0
07	12	0	0	0	17	53	37	18	14	14	8	6	0
08	00	0	0	0	0	0	0	0	0	0	8	38	21
08	12	28	16	28	27	14	3	0	0	0	0	0	0
09	00	0	0	0	0	0	0	0	0	0	0	0	0
09	12	0	0	0	0	8	9	10	27	25	17	8	0
10	00	0	0	14	13	5	0	0	0	3	6	7	13
10	12	18	26	16	6	0	11	13	0	0	0	0	0
11	00	0	0	0	0	0	0	0	0	8	8	8	10
11	12	12	29	0	23	33	32	22	16	8	2	0	0
12	00	0	0	0	0	0	8	9	6	6	8	17	13
12	12	19	18	14	20	8	4	8	15	14	11	13	14
13	00	0	9	5	7	9	8	5	5	0	0	0	0
13	12	0	0	0	0	0	0	0	0	0	0	0	0
14	00	0	0	0	0	0	0	0	0	0	0	0	0
14	12	0	0	0	0	0	0	0	0	0	0	0	0
15	00	0	0	0	0	0	0	0	0	0	0	0	0
15	12	27	10	0	0	2	1	12	0	0	0	0	0
16	00	0	0	0	0	0	0	0	0	0	0	0	0

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD.	FT. LONESOME, FL.	Air Monitoring	One (1) Hour	P.P.M.

	STATE	AREA	SITE	AGENCY	PROJECT	TIME	YEAR	MONTH
1	1 0	1 8 0 0	0 9 7	J	0 5	1	8 1	1 2
1	2 3	4 5 6 7	8 9 10	11	12 13	14	15 16	17 18

PARAMETER CODE	METHOD	UNITS	DP
4 2 4 0 1	1 6	0 7	3
23 24 25 26 27	28 29	30 31	32

DAY (19 20)	ST HR (21 22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
16	12	3	5	2	0	0	0	0	0	1	0	0	0
17	00	0	0	0	0	0	2	1	5	4	5	9	5
17	12	3	1	0	0	0	0	0	0	0	0	0	0
18	00	10	11	0	0	0	0	0	0	0	0	5	0
18	12	0	0	0	0	0	0	0	0	0	0	0	0
19	00	0	0	0	0	0	0	0	0	0	0	0	0
19	12	0	0	0	0	0	0	0	0	0	0	0	0
20	00	0	0	0	0	0	0	0	0	0	0	0	0
20	12	0	0	0	0	0	0	0	5	4	3	6	10
21	00	0	0	0	0	0	0	0	0	0	0	0	0
21	12	0	0	0	0	0	0	0	0	0	0	0	0
22	00	0	0	0	0	0	0	0	0	0	0	0	0
22	12	0	0	0	0	0	0	0	0	0	0	0	0
23	00	0	0	0	0	0	0	0	0	0	0	0	0
23	12	0	0	0	0	0	0	0	0	0	0	0	0
24	00	0	0	0	0	0	0	0	0	0	0	0	0
24	12	0	0	0	0	0	0	0	0	0	0	0	0
25	00	0	0	0	0	0	0	0	0	0	0	0	0
25	12	0	0	0	0	24	13	0	0	0	0	0	0
26	00	0	0	0	0	0	0	0	0	0	0	0	0
26	12	0	0	0	0	0	0	0	0	0	0	0	0
27	00	0	0	0	0	0	0	0	0	0	0	0	0
27	12	0	0	0	0	0	0	0	0	0	0	0	0
28	00	0	0	0	0	0	0	0	0	0	0	0	0
28	12	0	0	0	0	0	0	0	0	0	0	0	0
29	00	0	0	0	0	0	0	0	0	0	0	0	0
29	12	5	32	34	16	14	9	0	0	0	0	0	0
30	00	0	0	0	0	0	2	2	7	8	5	11	5
30	12	4	0	3	6	5	4	3	4	0	0	0	0
31	00	0	0	0	0	0	0	0	0	0	0	0	0
31	12	0	0	0	0	0	0	0	0	0	0	0	0

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Data as printed may be read in units of parts per billion (ppb)

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD.	FT. LONESOME, FL.	Air Monitoring	One (1) Hour	P.P.M.

(1)	STATE (2–3)	AREA (4–7)	SITE (8–10)	AGENCY (11)	PROJECT (12–13)	TIME (14)	YEAR (15–16)	MONTH (17–18)
1	1 0	1 8 0 0	0 9 7	J	0 5	1	8 2	0 1

PARAMETER CODE (23–27)	METHOD (28–29)	UNITS (30–31)	DP (32)
4 2 4 0 1	1 6	0 7	3

DAY (19–20)	ST HR (21–22)	RDG 1 (33–36)	RDG 2 (37–40)	RDG 3 (41–44)	RDG 4 (45–48)	RDG 5 (49–52)	RDG 6 (53–56)	RDG 7 (57–60)	RDG 8 (61–64)	RDG 9 (65–68)	RDG 10 (69–72)	RDG 11 (73–76)	RDG 12 (77–80)
01	00	0	0	0	0	0	0	0	0	0	0	0	0
01	12	0	0	2	4	5	2	0	0	0	0	0	0
02	00	0	0	0	0	0	0	0	0	0	0	0	0
02	12	0	0	0	0	0	0	0	0	0	0	0	0
03	00	0	0	0	0	0	0	0	0	0	0	0	0
03	12	0	0	0	0	0	0	0	0	0	0	0	0
04	00	0	0	0	0	0	0	0	0	0	0	0	0
04	12	0	0	0	9	14	6	2	0	0	0	0	0
05	00	0	0	0	0	0	0	0	0	0	8	9	10
05	12	6	3	2	0	0	1	1	0	0	6	3	0
06	00	0	0	1	0	1	1	6	4	5	1	0	0
06	12	0	0	0	0	17	38	5	0	0	0	0	0
07	00	0	0	0	0	0	0	0	0	0	0	0	0
07	12	0	0	0	0	0	0	0	0	0	0	0	0
08	00	0	0	0	0	0	0	0	0	0	0	3	1
08	12	0	0	0	0	0	0	1	3	0	0	0	0
09	00	0	3	2	1	0	0	3	20	48	18	3	17
09	12	29	20	19	8	6	3	19	27	46	20	9	2
10	00	0	0	0	0	1	4	7	17	10	3	3	4
10	12	1	0	0	12	0	0	0	0	0	0	0	0
11	00	0	0	0	0	0	0	0	0	0	0	0	0
11	12	0	0	0	0	0	0	0	3	13	14	6	3
12	00	0	0	0	0	0	0	0	3	8	7	7	5
12	12	0	0	0	0	0	0	9	9	10	11	4	0
13	00	0	0	0	7	2	1	4	10	12	3	0	0
13	12	1	0	0	0	0	0	0	0	0	0	0	0
14	00	0	0	0	0	0	0	0	0	0	0	0	0
14	12	2	1	14	0	0	6	18	10	2	0	0	0
15	00	0	0	0	0	4	6	4	4	9	6	2	0
15	12	0	8	10	9	3	0	0	0	0	0	0	0
16	00	0	0	0	0	0	0	0	0	0	6	4	1

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

SITE ADDRESS	CITY NAME	PROJECT	TIME INTERVAL OF OBS.	UNITS OF OBS.
HISCOCK RD.	FT. LONESOME, FL.	Air Monitoring	One (1) Hour	P.P.M.

	STATE	AREA	SITE	AGENCY	PROJECT	TIME	YEAR	MONTH
1	10	1800	097	J	05	1	82	01
1	2 3	4 5 6 7	8 9 10	11	12 13	14	15 16	17 18

PARAMETER CODE	METHOD	UNITS	DP
42401	16	07	3
23 24 25 26 27	28 29	30 31	32

DAY (19 20)	ST HR (21 22)	RDG 1 (33-36)	RDG 2 (37-40)	RDG 3 (41-44)	RDG 4 (45-48)	RDG 5 (49-52)	RDG 6 (53-56)	RDG 7 (57-60)	RDG 8 (61-64)	RDG 9 (65-68)	RDG 10 (69-72)	RDG 11 (73-76)	RDG 12 (77-80)
16	12	0	0	0	0	0	0	0	0	0	0	0	0
17	00	0	0	0	0	0	0	5	3	17	30	20	16
17	12	10	4	3	4	4	4	5	1	2	4	3	0
18	00	0	0	0	0	0	0	0	0	0	0	0	0
18	12	0	0	0	0	1	16	1	0	0	0	0	0
19	00	0	0	0	0	0	0	0	0	0	0	0	0
19	12	0	0	0	0	0	0	0	0	0	0	0	0
20	00	0	0	0	0	0	0	0	0	0	3	3	0
20	12	0	0	0	0	0	0	0	0	1	0	0	0
21	00	0	0	0	0	0	0	0	0	0	0	0	0
21	12	2	5	19	42	8	8	11	3	0	0	0	0
22	00	0	0	0	0	0	0	0	0	0	0	0	0
22	12	0	0	0	0	0	0	0	0	0	0	0	0
23	00	0	0	0	0	0	0	0	0	0	0	0	0
23	12	0	0	0	0	0	0	0	0	0	0	0	0
24	00	0	0	0	0	0	0	0	0	0	0	0	0
24	12	0	0	0	0	0	0	0	0	0	0	0	0
25	00	0	1	0	7	10	9	7	10	3	3	0	0
25	12	0	0	0	3	0	0	0	0	0	0	0	2
26	00	0	0	0	0	0	0	0	0	0	0	0	0
26	12	0	0	0	0	0	0	0	0	0	0	4	22
27	00	0	0	0	0	0	0	0	0	0	0	0	0
27	12	0	0	0	0	0	0	0	0	0	0	0	0
28	00	0	0	0	0	0	0	0	0	0	0	0	0
28	12	0	0	0	0	0	0	0	0	0	0	0	0
29	00	0	3	1	0	0	0	0	0	0	16	16	1
29	12	0	0	0	0	0	0	0	0	0	0	0	0
30	00	0	0	0	0	0	0	0	0	0	0	0	0
30	12	0	0	0	0	0	0	0	0	0	0	0	0
31	00	0	0	0	0	0	0	0	0	0	0	0	0
31	12	0	0	0	0	0	0	0	0	0	0	0	0

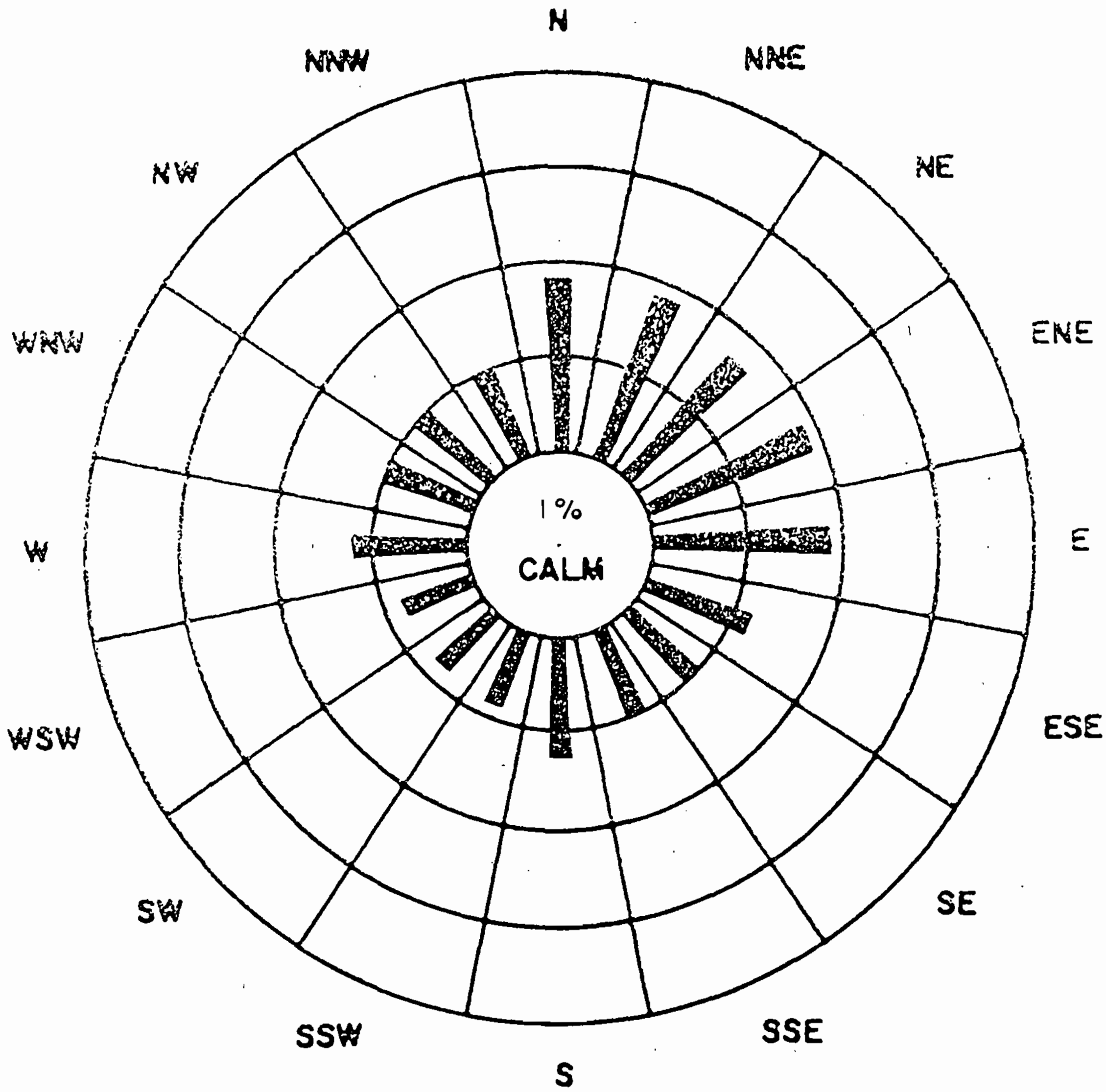
5.0 SITE METEOROLOGY

The AMAX Big Four Mine site is located in west-central Florida, approximately 40 kilometers southeast of Tampa and 40 kilometers east of the Gulf Coast. Meteorological data from Tampa for the period 1970 through 1974 were used in the preparation of this PSD application. Annually, the prevailing site winds are easterly; however, there are some seasonal variation. During the winter months, the predominate winds are from the north, during the spring from the east, during the summer from the southeast, and during the fall from the northeast. A typical annual wind rose for Tampa, Florida is presented in Figure 5-1. This wind direction distribution is considered representative of the AMAX Big Four Mine site.

The annual average wind speed at this site, as represented by Tampa meteorological data, is 8.7 miles per hour. Throughout the year the monthly average wind speeds are quite constant; varying at the most one mile per hour from the annual average wind speed. The highest monthly average wind speeds occur during the spring months (9.5 miles per hour) and the lowest monthly wind speeds occur during the late summer months (7.4 miles per hour). An annual wind speed distribution for Tampa is shown in Figure 5-2.

Atmospheric stability is one of the key factors effecting the dispersion of air pollutants. This factor is a measure of the turbulance of the atmosphere. For purposes of this application, stability will be considered in three general categories; unstable, neutral and stable. At the AMAX site, an unstable atmosphere can be expected to occur 22 percent of the time, a neutral atmosphere 37 percent of the time and a stable atmosphere 40 percent of the time on an annual basis. During the winter season, the occurrence of an unstable atmosphere decreases to 18.3 percent, a neutral atmosphere exists 38 percent of the time and a stable atmosphere exists 44 percent of the time. During the summer months an unstable atmosphere can be expected 37 percent of the time, a neutral atmosphere 20 percent of the time and a stable atmosphere 42 percent of the time.

In the southeast Hillsborough County area, inversions based at 500 feet or less occur approximately 32 percent of the time annually; 36 percent of the time during the winter; 30 percent of the time during the spring; 25 percent of the time during the summer and 36 percent of the time during the fall. The mean maximum depth for the area is approximately 3300 feet during the winter months and approximately 5000 feet during the summer months.



Note: Concentric circles represent 5 percent frequency intervals.

FIGURE 5-1

ANNUAL WIND ROSE FOR TAMPA, FLORIDA
1960 - 1964

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

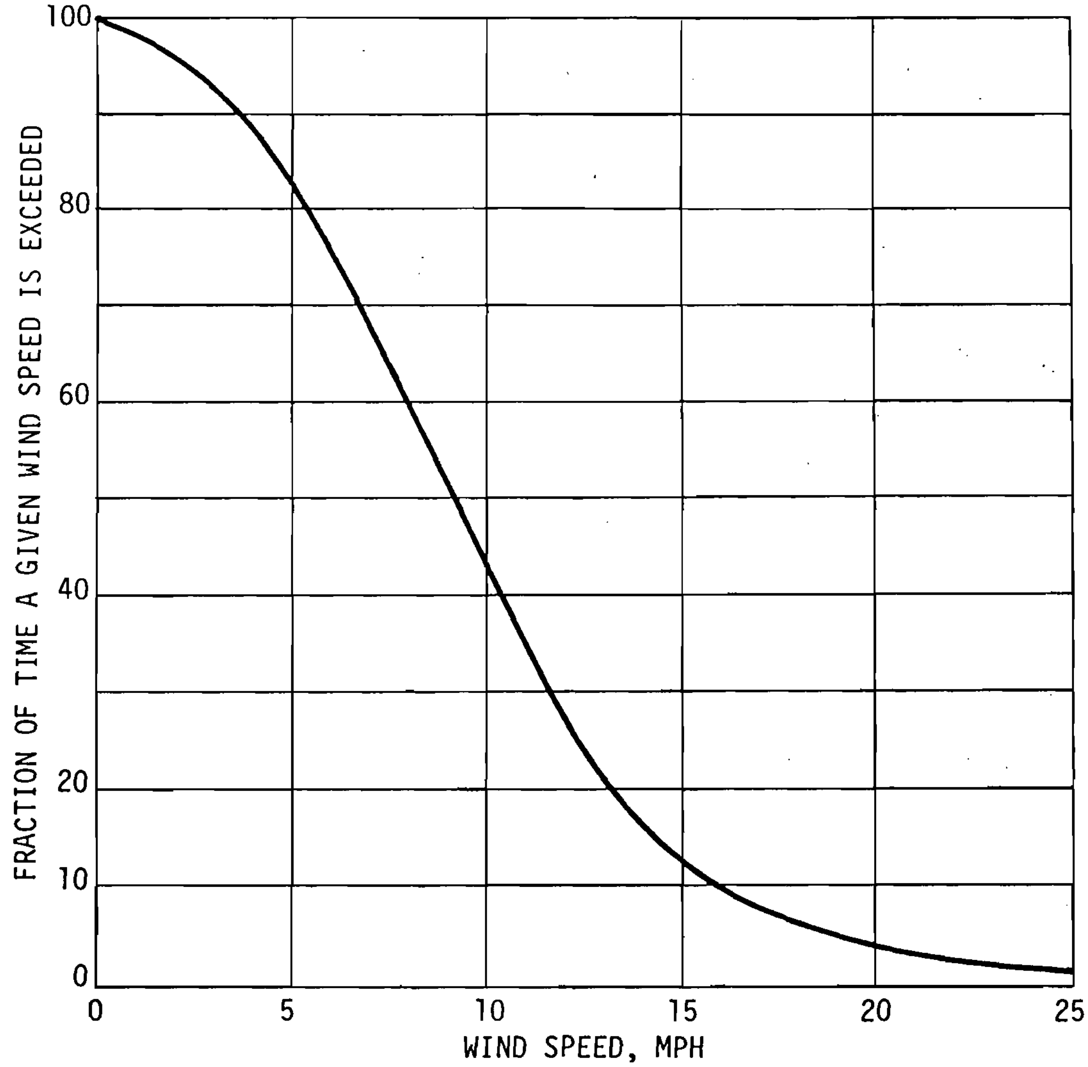


FIGURE 5-2

WIND SPEED DISTRIBUTION
FOR TAMPA, FLORIDA

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

6.0 AIR QUALITY IMPACT ANALYSIS

6.1 Introduction

An air quality review was required to evaluate the impact of increased particulate matter and sulfur dioxide emissions from the AMAX Big Four Mine. The baseline concentration for the pollutants and the impacts of new and modified sources (all major sources constructed since January 6, 1975 and all sources since August 7, 1977) have been established by air quality modeling. The impacts of existing, new and modified sources within the area of the proposed facility have been included in the air quality impact analysis.

The air quality modeling performed to assess long-term and short-term impacts was conducted in accordance with guidelines established by EPA (Guideline for Air Quality Models, March 1978). For particulate matter the annual and 24-hour impacts were evaluated, for sulfur dioxide the annual, 24-hour and 3-hour impacts were investigated, and for nitrogen oxides the annual impact was investigated. These periods of investigation correspond to periods for which air quality standards exist for these pollutants.

The annual impact of pollutants was evaluated using the Industrial Source Complex-Long Term (ISC-LT) model. The short-term impacts, that is the 24-hour and 3-hour impacts, were evaluated using the CRSTER and PTMTPW models. With all models, five years of meteorological data from Tampa representing the period 1970-1974 were used.

Source emission data for all major sources within approximately 75 kilometers of the proposed site were used in the air quality review. In addition to these major sources, all sources within 50 kilometers of the site that would have a significant impact on the site were included in the review.

6.2 Meteorological Data

The EPA guidelines for air quality modeling recommend that five years of meteorological data be used for an air quality review. The closest and most representative source of meteorological data was Tampa, Florida (40 kilometers northwest of the site). Hourly surface meteorological data are available from Tampa for the period 1970-1974. These data were combined with Tampa upper air data for the same period of record to obtain mixing heights applicable to the area. The data were also summarized into the STAR format with five stability classes for use with the ISC-LT model.

6.3 Emission Data

The permit files of the FDER office in Tampa were reviewed for sources which might have an impact on the air quality at the AMAX Big Four Mine site. The sources included in the emission inventory are shown on Figure 6-1 and are listed in Appendix 6A-1.

The sources included in the emission inventory include all major sources (such as power plants) within approximately 75 kilometers of the proposed site and other sources within 50 kilometers of the proposed site which were judged to have a potential impact on air quality at the site. Several small sources within 50 kilometers of the site, such as asphalt plants and commercial and pathological incinerators, were excluded from the emission inventory because it was estimated that these sources would not have a significant impact on the air quality at the site.

In conducting the air quality review, meteorological conditions were selected which would align the various sources shown in Figure 6-1 with the sources at the AMAX site so that source interaction could be investigated.

6.4 Air Quality Review

The air quality review included both the short-term and long-term impact of air pollutants. The short-term impacts are defined as the 3-hour and 24-hour impacts of pollutants emitted from sources in the study area. The short-term impact analysis was conducted with the CRSTER and PTMTPW air quality models. The CRSTER model was run first using as input the emission data from the proposed sources and the meteorological data for the period 1970-1974 from Tampa, Florida. The four inner receptor distances in the CRSTER model were set to predict the point of maximum impact for the pollutants and the outer set of CRSTER receptors was set at a distance that would demonstrate a less than significant impact on the particulate matter and sulfur dioxide non-attainment areas and the nearest Class I PSD area.

Meteorological data for evaluating the 3-hour and 24-hour pollutant levels in the ambient air were selected from the CRSTER model output. A summary of the maximum impacts for each year of meteorology and the meteorology selected for evaluating pollutant impacts in several directions is included with the CRSTER output for particulate matter and for sulfur dioxide in Volume II of this application.

Meteorological data resulting in the highest second-high 24-hour and 3-hour impacts in several directions were selected for further investigation. These directions corresponded to the direction of the highest second-high impact regardless of direction and the highest second-high impact in the directions that would align the various sources with the AMAX sources.

The long-term air quality impact is defined as the annual average impact of pollutants emitted from sources within the study area. The long-term impact analyses were conducted with the ISC-LT. The input data to the ISC-LT included emission data from all sources within the study area and meteorological data from Tampa for the period 1970-1974. These data were in the STAR format with five stability classes.

6.4.1 Sulfur Dioxide Impact Analysis

6.4.1.1 Short-Term Sulfur Dioxide Impact

The short-term impact analysis for sulfur dioxide involved the 3-hour impact analysis and a 24-hour impact analysis. These time periods correspond to applicable short-term air quality standards for sulfur dioxide. The CRSTER model was run with sulfur dioxide emission data from the modified AMAX sources. The receptors were set to determine the maximum air quality impact of the source. From these runs the meteorological conditions resulting in the highest second-high 24-hour and 3-hour impacts at several locations were selected. The locations selected represented the direction to the maximum highest second-high concentration for both 24-hour and 3-hour periods and the directions that would allow the investigation of the interaction of pollutants emitted from the various sources defined in Figure 6-1 with AMAX emissions. The meteorological conditions selected for evaluating impacts with various source alignments are summarized at the beginning of the CRSTER output for sulfur dioxide in Volume II of this application.

Also, from this set of CRSTER runs the annual, 24-hour and 3-hour impacts of sulfur dioxide on the Chassahowitzka National Wildlife Refuge (Class I PSD area) and on the Pinellas County Sulfur Dioxide Non-Attainment Area were evaluated. The Class I PSD Area is 116 kilometers north-northwest of the AMAX site and the non-attainment area is 77 kilometers northwest of the site. It was determined from the CRSTER model runs that the sulfur dioxide emissions from the AMAX facility will not significantly impact the Class I area or the non-attainment area.

The critical meteorological conditions established with the CRSTER model and the emission data from the AMAX sources and other new and existing sources were input to the PTMTPW model to determine the maximum impact of sulfur dioxide for each condition investigated. The receptor spacing used for determining the point of maximum impact was 0.1 kilometers. The results of the short-term sulfur dioxide air quality review are summarized in Table 6-2 and Figures 6-2 and 6-3.

6.4.1.2 Long-Term Sulfur Dioxide Impact

The long-term sulfur dioxide air quality review was conducted with the ISC-LT. This model was run first to establish a baseline sulfur dioxide concentration; that is the air quality level resulting from the sulfur dioxide emissions from existing sources in the study area. The model was run a second time to determine the impact of emissions from new and modified sources within the study area including the AMAX sources and a third time to determine the impact of the sulfur dioxide emissions from all sources.

The annual average sulfur dioxide levels resulting from these various combinations of sources are summarized in Table 6-2 and Figures 6-4 through 6-6.

6.4.2 Particulate Matter Impact Analysis

6.4.2.1 Short-Term Particulate Matter Impact

The short-term impact analysis for particulate matter involved a 24-hour particulate matter analysis. This time period corresponds to the applicable short-term air quality for particulate matter.

The short-term particulate matter air quality review was conducted in a manner identical to the short-term sulfur dioxide impact analysis. The meteorological data which were selected from the CRSTER run for further investigation with PTMTPW are summarized immediately preceding the CRSTER output for particulate matter in Volume II of this application. The maximum 24-hour particulate matter impacts resulting from AMAX emissions and the interaction of AMAX emissions with the other source emissions are summarized in Figure 6-7 and Table 6-2.

The CRSTER model run was also used to confirm that the annual and 24-hour particulate matter impacts at the boundaries of the Class I PSD area and the Hillsborough County Particulate Matter Non-Attainment Area (27.6 kilometers northwest of the AMAX site) were not significant.

6.4.2.2 Long-Term Particulate Matter Impact

The long-term particulate matter air quality review was conducted in a manner identical to the long-term sulfur dioxide impact review. The annual average particulate matter levels resulting from the emissions for all sources within the study area, are summarized in Table 6-2 and in Figures 6-8 through 6-10.

6.4.3 Nitrogen Oxides Impact Analysis

The long-term nitrogen oxides air quality review was conducted in a manner identical to the long-term sulfur dioxide review. Since both nitrogen oxides and sulfur dioxide emissions from Big Four sources addressed in this PSD application all eminate from the dryer stack, the nitrogen oxides impact of increased dryer emissions and of total dryer emissions can be determined by factoring annual sulfur dioxide impacts by the ratio of nitrogen oxides to sulfur dioxide emissions.

By using this procedure, it was determined that the annual impact of the increased nitrogen oxides emissions is 0.3 micrograms per cubic meter and that the impact of total dryer emissions is expected to be 0.8 micrograms per cubic meter. These impacts compare to an annual air quality standard for nitrogen oxides of 100 micrograms per cubic meter.

6.5 Impact on Class I Areas and Non-Attainment Areas

The nearest Class I area to the AMAX site is the Chassahowitzka National Wildlife Refuge 116 kilometers north-northwest of the site. The nearest particulate matter and sulfur dioxide non-attainment areas are 28 and 79 kilometers distant, respectively. By reviewing the output of the CRSTER model for sulfur dioxide and particulate matter, it was apparent that emissions from the modified AMAX sources do not significantly impact the Class I PSD area nor the particulate matter nor sulfur dioxide non-attainment areas.

6.6 Downwash Analysis

Downwash can develop when emissions from various sources within a plant are trapped in the wake of the stack or an adjacent building and are rapidly mixed to ground-level. For the AMAX sources, the effects of downwash were analyzed on the 24-hour particulate matter impact, the 24-hour sulfur dioxide impact and the 3-hour sulfur dioxide impact. It should be recognized in reviewing the results of these analyses that the potential for downwash to exist during an entire 24-hour period is extremely remote.

The particulate matter downwash was analyzed for conditions which resulted in the greatest particulate matter impact from AMAX sources under normal conditions. This was with meteorology from day 175, 1972 and Receptor No. 7 shown in Figure 6-7. The maximum impact of particulate matter emissions at this receptor under normal dispersion conditions was 7.9 micrograms per cubic meter. Under downwash conditions, as analyzed with the ISC-ST model, the maximum impact is 8.2 micrograms per cubic meter. The reduced impact under downwash conditions undoubtedly results from the fact that the particulate matter emissions are dispersed over a wider area normal to the wind. This factor apparently offsets the increased impact expected due to the particulate matter reaching ground level more rapidly.

The 24-hour sulfur dioxide downwash analysis was conducted also with meteorology from day 175, 1972 and Receptor No. 7 in Figure 6-3. The maximum impact under normal dispersion conditions was 56.6 micrograms per cubic meter. Under downwash conditions, as defined by the ISC-ST model, the maximum impact will be 58.8 micrograms per cubic meter.

For the 3-hour sulfur dioxide downwash analysis, conditions represented by meteorology from day 200(6), 1971 were used with the receptor shown at Receptor No. 7 in Figure 6-2. Under normal dispersion conditions, the maximum 3-hour impact of emissions from the AMAX dryer at this receptor was 101.4 micrograms per cubic meter. Under downwash conditions, as defined by the ISC-ST model, the maximum of 3-hour impact will be 99.8 micrograms per cubic meter.

The results of the downwash analyses show that the 24-hour particulate matter and sulfur dioxide emission impacts will increase 1-2 micrograms per cubic meter if downwash occurs during the entire 24-hour period. The analyses further show that the impact of 3-hour sulfur dioxide emissions will decrease by two micrograms per cubic meter if downwash occurs during the worst case 3-hour period. These changes in impacts will not result in violations of applicable air quality standards or applicable PSD increments.

6.7 Impact of Site Preparation and Plant Construction

There will be no construction activities associated with the proposed modifications.

6.8 Air Quality Review Summary

The air quality review for the AMAX Big Four Mine was conducted with modeling guidelines established by the U.S. Environmental Protection Agency. The long-term impact analyses were conducted with the ISC-LT model and short-term analyses were conducted with the CRSTER and PTMTPW models.

The air quality review indicates that the use of alternative fuels, the increased hours of operation and the increased particulate matter emission rate from the rock dryer can be approved with no threat to ambient air quality standards, to PSD increments, or to non-attainment areas for particulate matter or sulfur dioxide.

TABLE 6-1

AIR QUALITY STANDARDS AND INCREMENTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

Time Period	Air Quality Standard (ug/m^3)	Class II PSD Increment (ug/m^3)	Class I PSD Increment (ug/m^3)	Significant Impact Levels (ug/m^3)
Sulfur Dioxide				
Annual	60	20	2	1
24-Hour	260	91	5	5
3-Hour	1300	512	25	25
Particulate Matter				
Annual	60	19	5	1
24-Hour	150	37	10	5
Nitrogen Oxides				
Annual	100	NA	NA	NA

TABLE 6-2

SUMMARY OF AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

Pollutant	Impact (ug/m^3) CLASS II AREAS: Max. Impact New Sources	Max. Impact Existing Sources	Max. Impact All Sources
Particulate Matter			
Annual(4)	2	38	40(1)
24-Hour	17	96	106(2)
Sulfur Dioxide(3)			
Annual(4)	4	40	40
24-Hour	48	71	119
3-Hour	173	170	343
Nitrogen Oxides			
Annual	0.3	---	---

(1) Includes a background of 30 ug/m^3
(2) Includes a background of 88 ug/m^3
(3) Includes a background of zero for all time periods
(4) Impact near AMAX

NOTE: Impacts on Pinellas County Sulfur Dioxide Non-Attainment area, Hillsborough County Particulate Matter Non-Attainment area and nearest Class I Area are less than significant for all time periods.

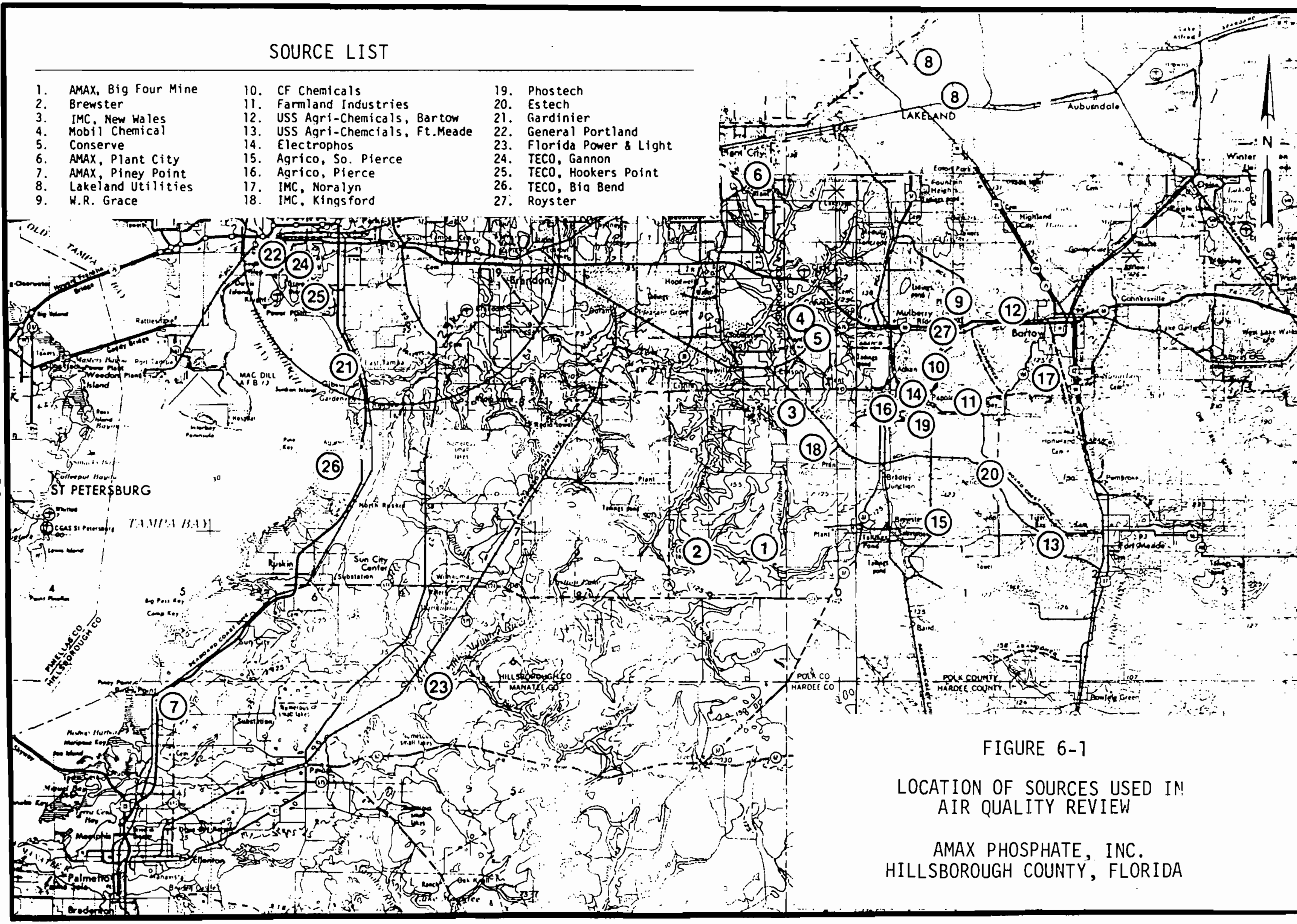


FIGURE 6-1

LOCATION OF SOURCES USED IN AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

	3-Hour SO_2 Impact (ug/m^3)		
Receptor	Existing	New	All Sources
1	1	52	53
2	80	78	158
3	80	44	124
4	21	37	58
5	42	76	118
6	170	173	343
7	3	108	111
8	56	93	149
PSD Increment		512	
Air Quality Standard			1300

NOTE: SO_2 Background = 0.0

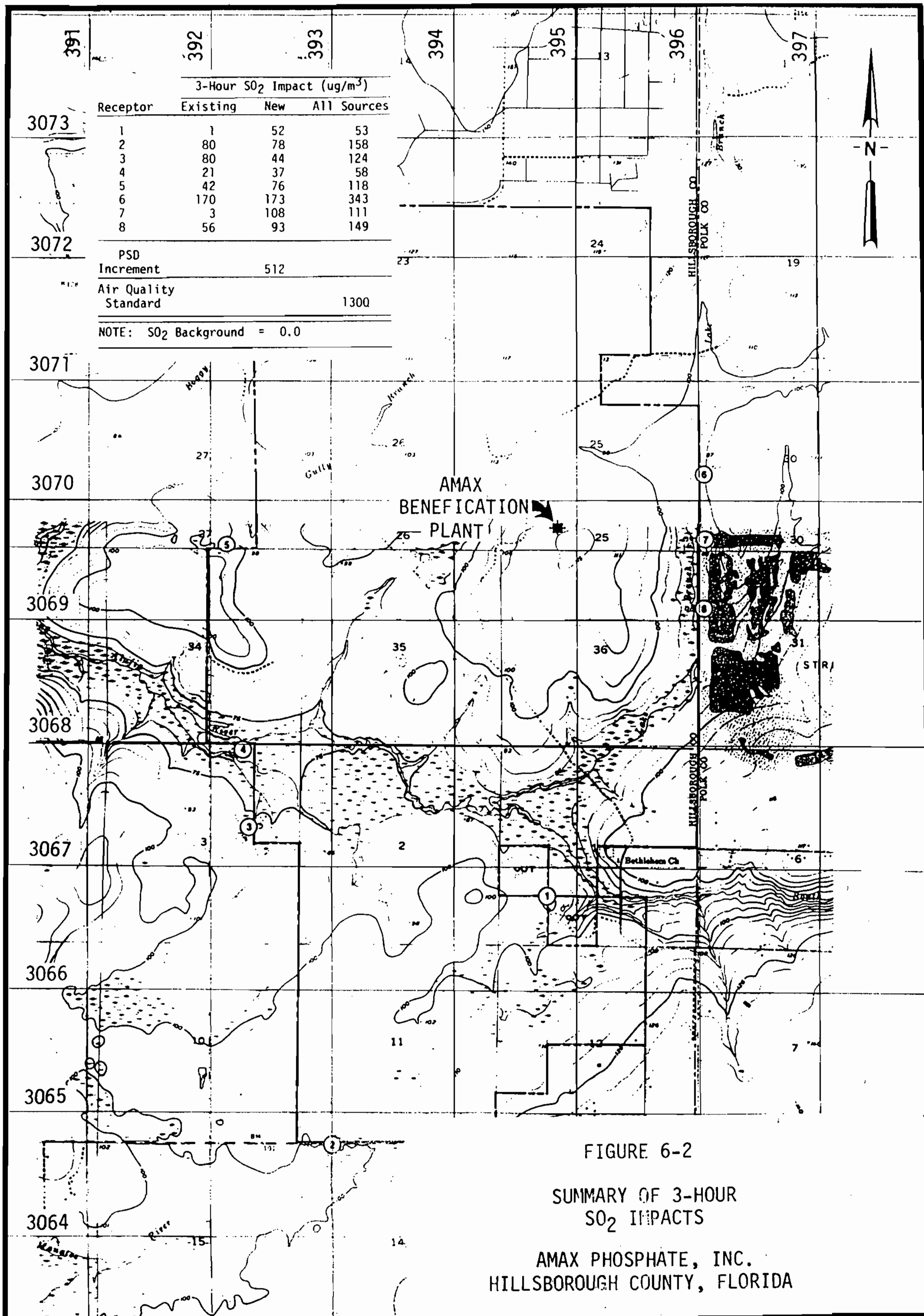
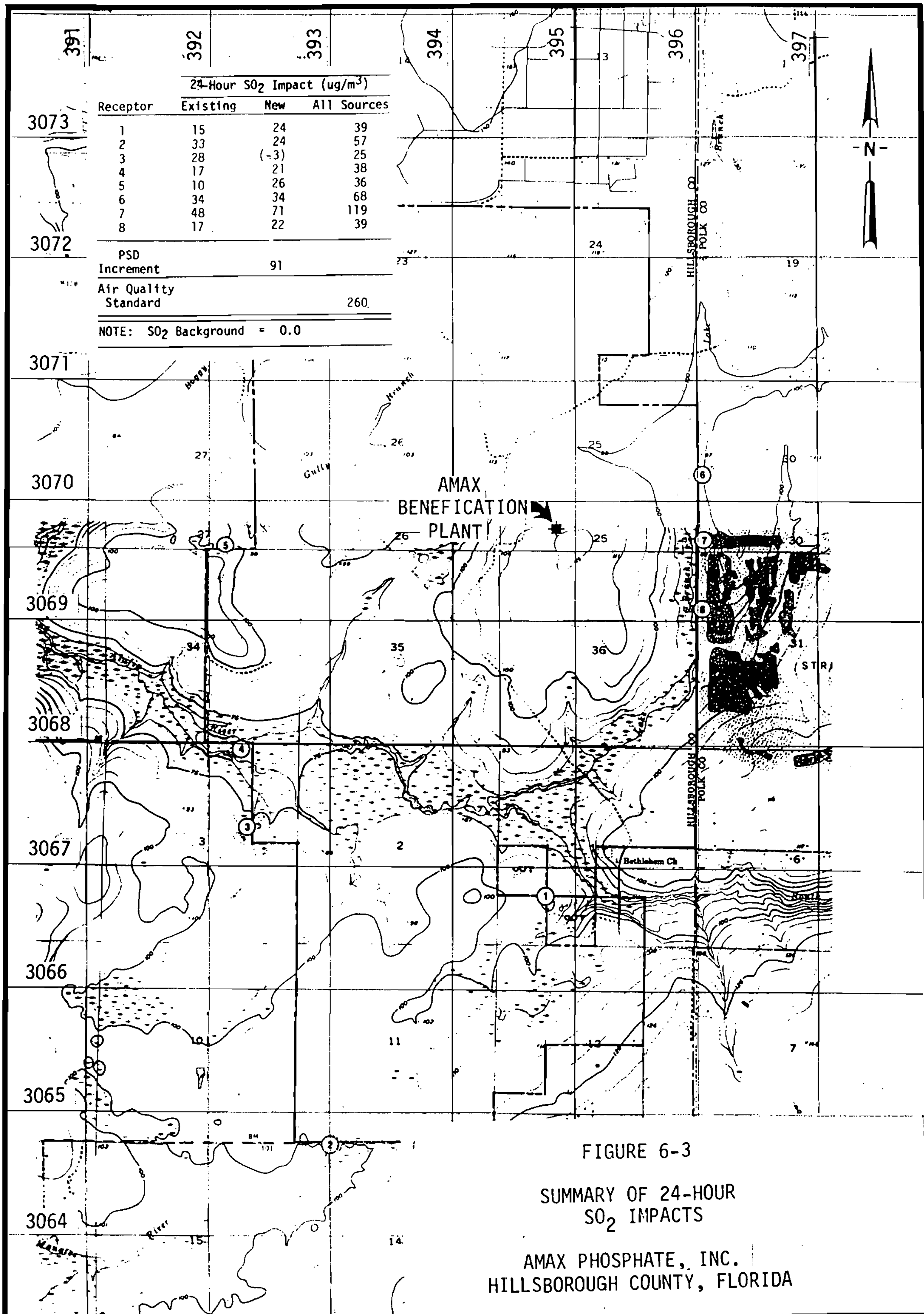


FIGURE 6-2

SUMMARY OF 3-HOUR SO_2 IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA



Receptor	24-Hour SO_2 Impact (ug/m^3) Existing	New	All Sources
1	15	24	39
2	33	24	57
3	28	(-3)	25
4	17	21	38
5	10	26	36
6	34	34	68
7	48	71	119
8	17	22	39
PSD Increment		91	
Air Quality Standard			260

NOTE: SO_2 Background = 0.0

FIGURE 6-3

SUMMARY OF 24-HOUR SO_2 IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

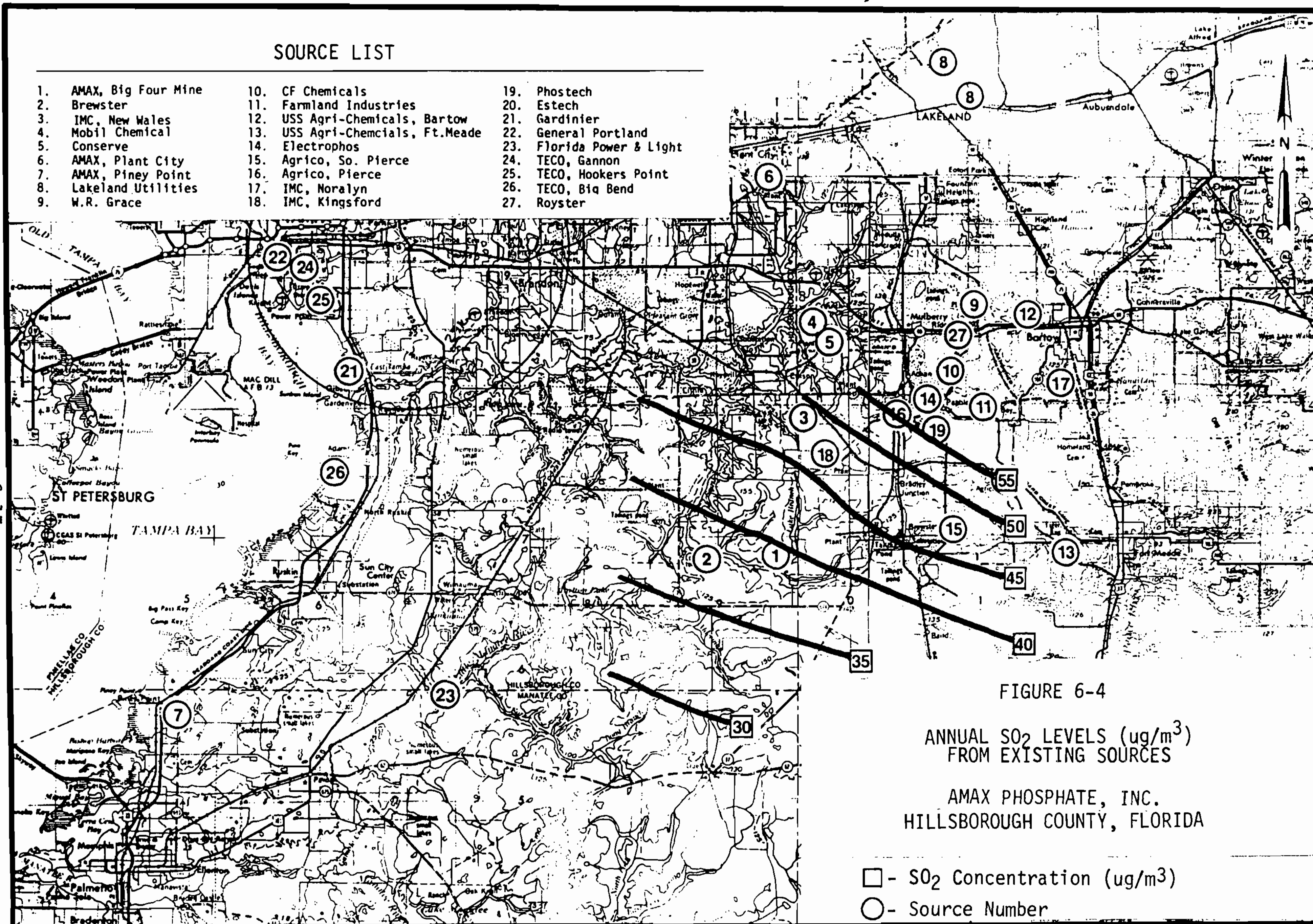


FIGURE 6-4

ANNUAL SO_2 LEVELS (ug/m^3)
FROM EXISTING SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

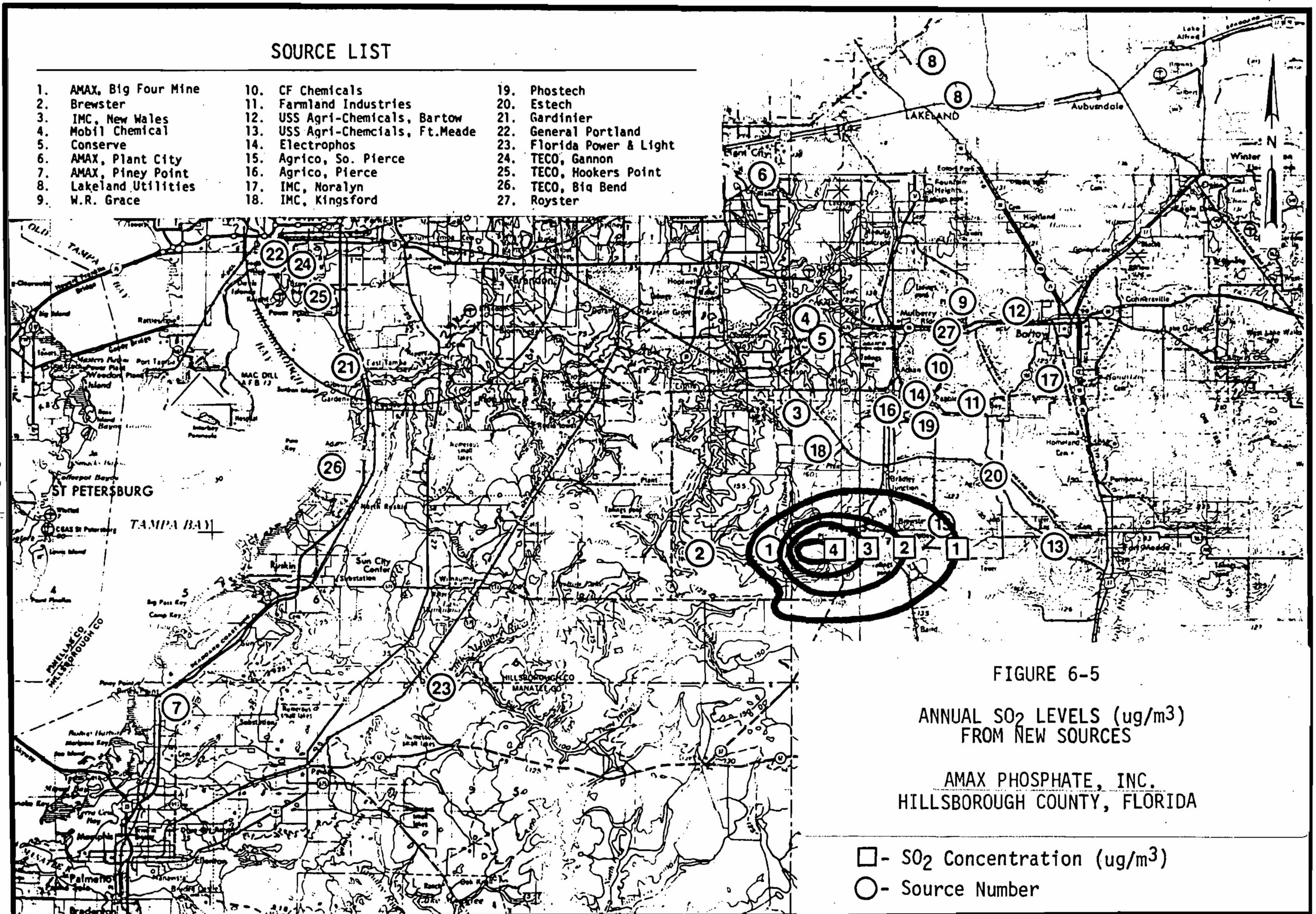


FIGURE 6-5

ANNUAL SO_2 LEVELS (ug/m^3) FROM NEW SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

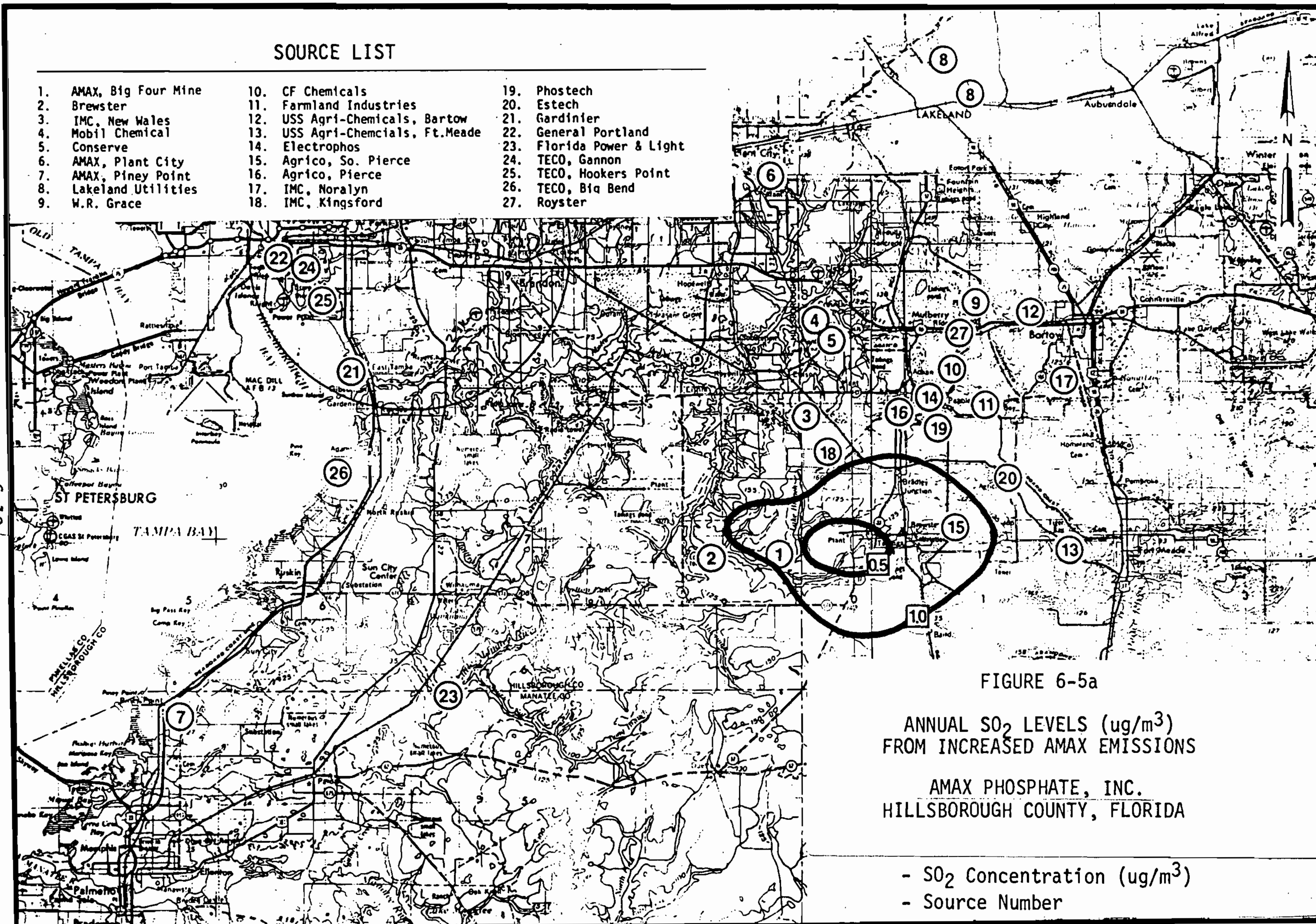


FIGURE 6-5a

ANNUAL SO_2 LEVELS (ug/m^3) FROM INCREASED AMAX EMISSIONS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

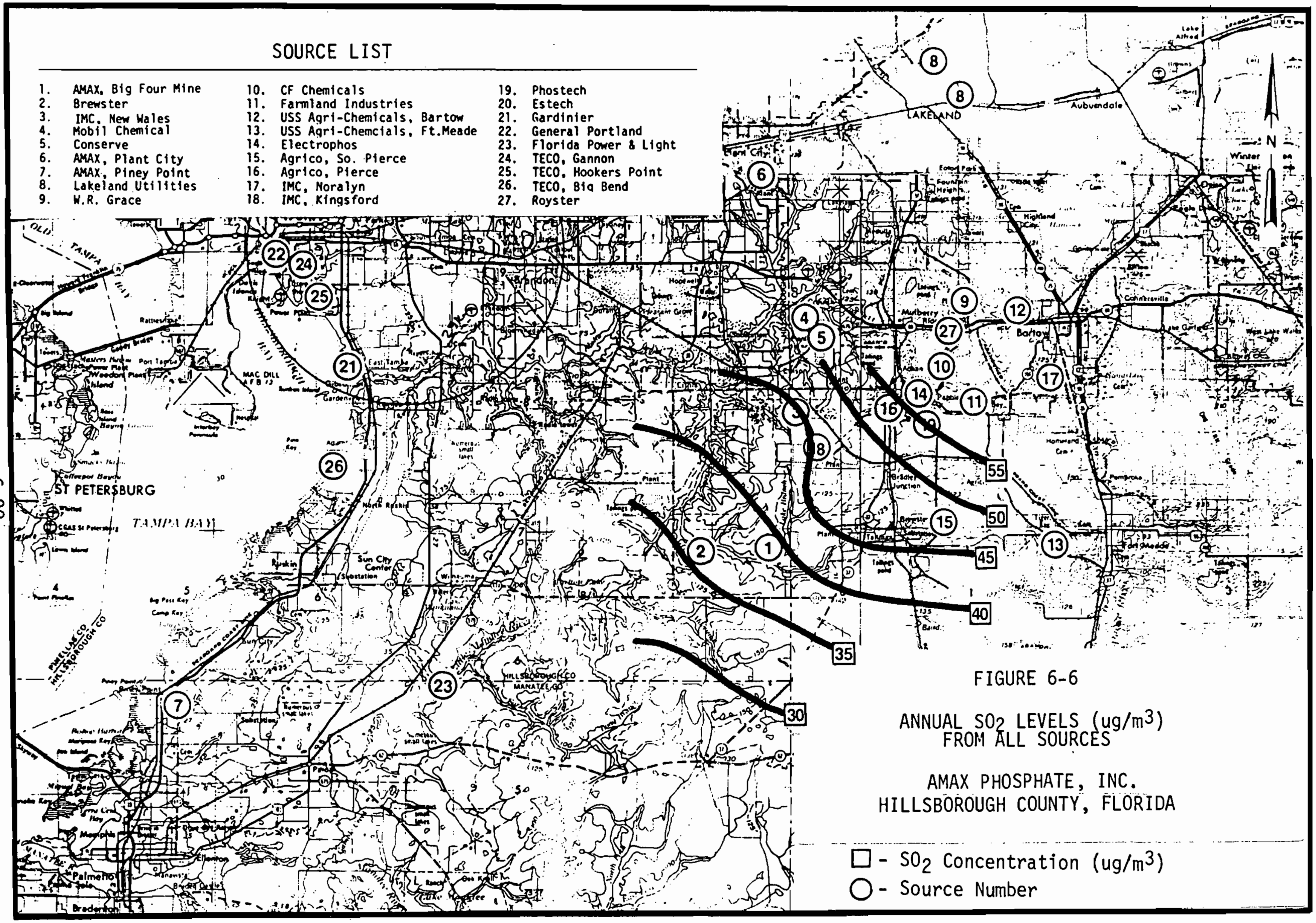
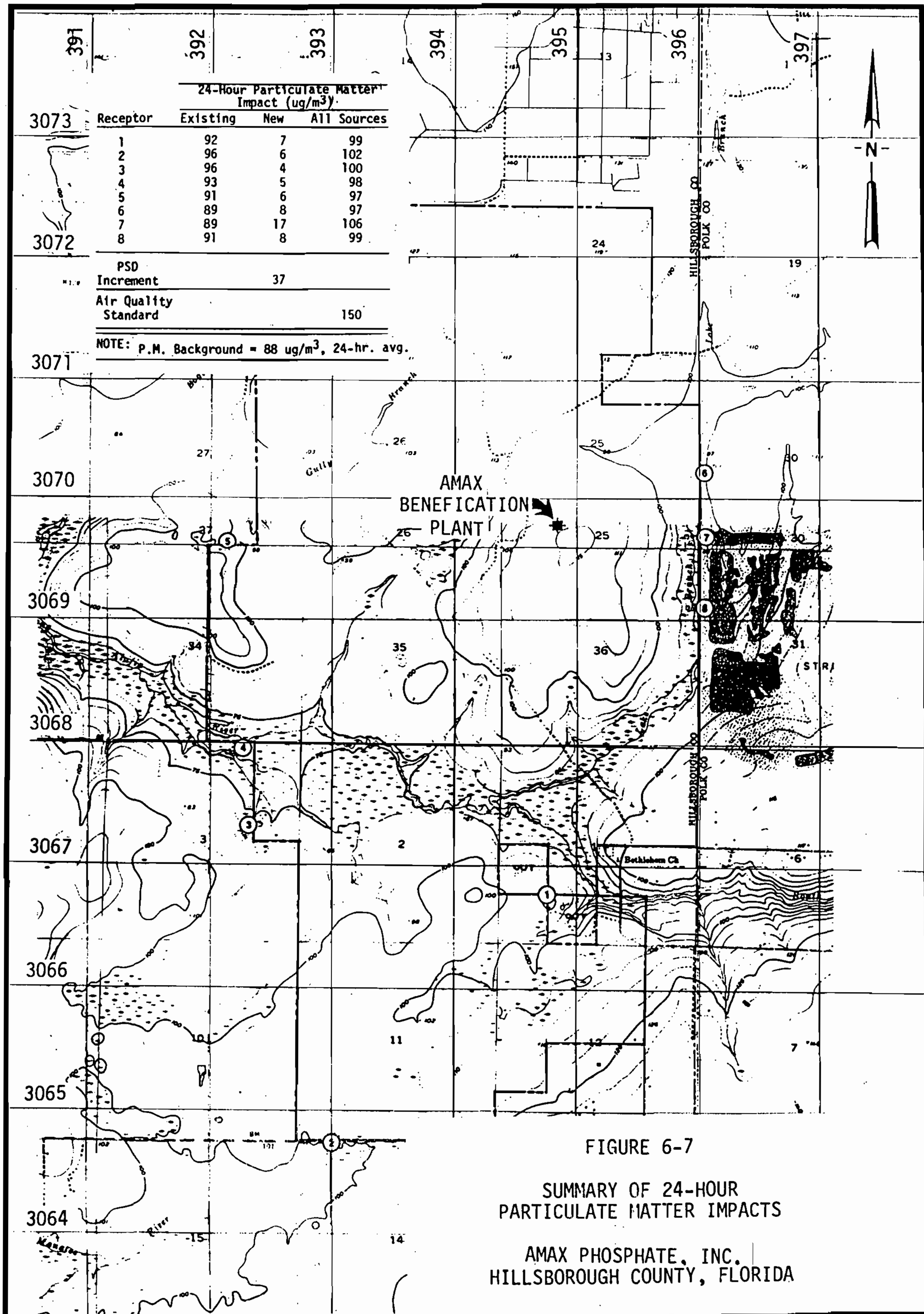


FIGURE 6-6

ANNUAL SO_2 LEVELS (ug/m^3) FROM ALL SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA



Receptor	24-Hour Particulate Matter Impact (ug/m³) Existing	New	All Sources
1	92	7	99
2	96	6	102
3	96	4	100
4	93	5	98
5	91	6	97
6	89	8	97
7	89	17	106
8	91	8	99
PSD Increment		37	
Air Quality Standard			150

NOTE: P.M. Background = 88 ug/m^3, 24-hr. avg.

FIGURE 6-7

SUMMARY OF 24-HOUR PARTICULATE MATTER IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

Best Available Copy

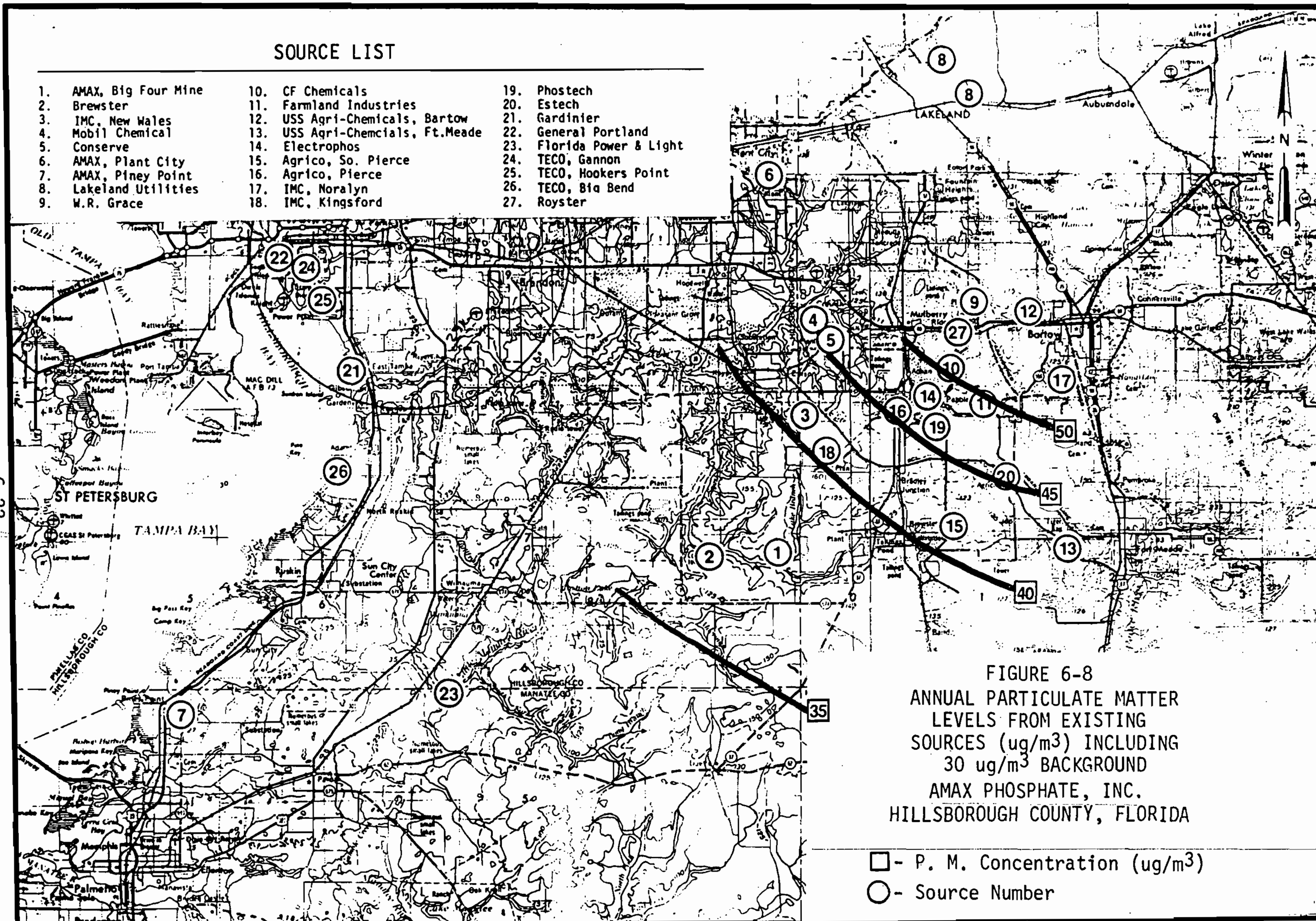


FIGURE 6-8
ANNUAL PARTICULATE MATTER LEVELS FROM EXISTING SOURCES (ug/m^3) INCLUDING 30 ug/m^3 BACKGROUND
AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

SOURCE LIST

1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce
16. Agrico, Pierce
17. IMC, Noralyn
18. IMC, Kingsford
19. Phostech
20. Estech
21. Gardinier
22. General Portland
23. Florida Power & Light
24. TECO, Gannon
25. TECO, Hookers Point
26. TECO, Big Bend
27. Royster

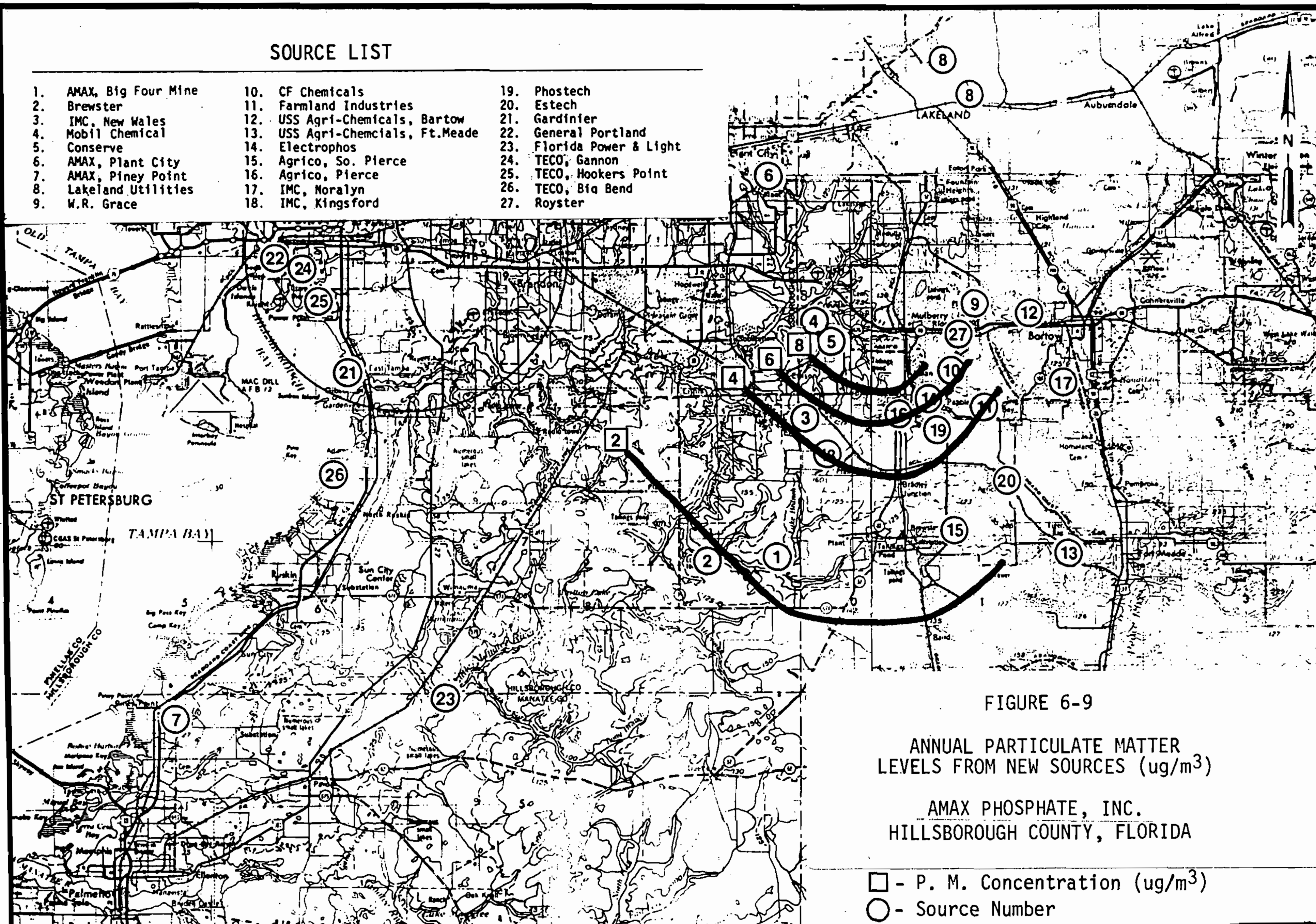


FIGURE 6-9

ANNUAL PARTICULATE MATTER LEVELS FROM NEW SOURCES (ug/m3)

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

□ - P. M. Concentration (ug/m3)
○ - Source Number

Best Available Copy

SOURCE LIST

1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce
16. Agrico, Pierce
17. IMC, Noralyn
18. IMC, Kingsford
19. Phostech
20. Estech
21. Gardinier
22. General Portland
23. Florida Power & Light
24. TECO, Gannon
25. TECO, Hookers Point
26. TECO, Big Bend
27. Royster

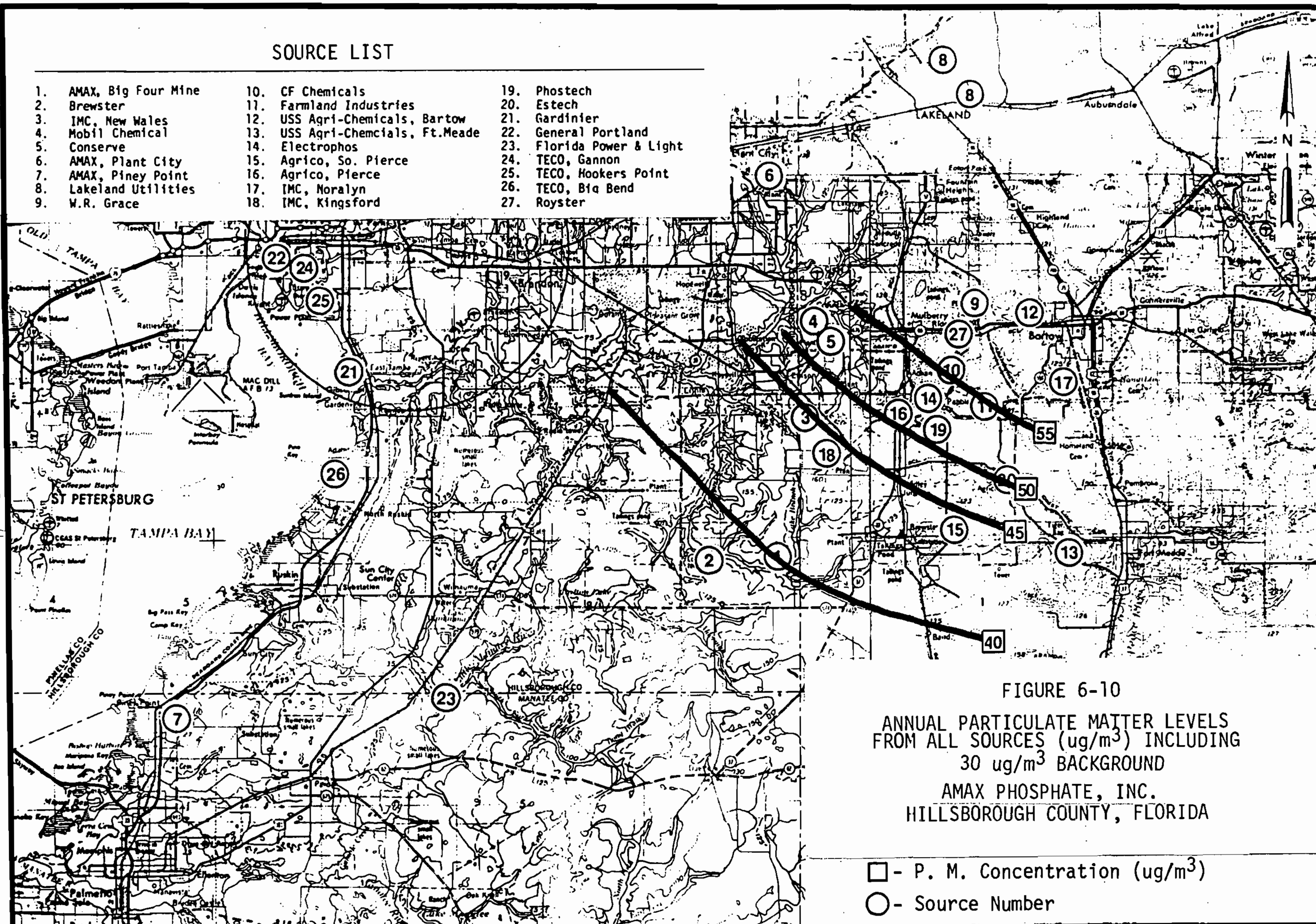


FIGURE 6-10

ANNUAL PARTICULATE MATTER LEVELS FROM ALL SOURCES (ug/m^3) INCLUDING 30 ug/m^3 BACKGROUND

AMAX PHOSPHATE, INC.

HILLSBOROUGH COUNTY, FLORIDA

□ - P. M. Concentration (ug/m^3)

○ - Source Number

APPENDIX 6A-1

SOURCE DATA

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

Source	Emission Rates PM (G/Sec)	SO2 (G/Sec)	Stack Height (M)	Stack Diam. (M)	Stack Velocity (MPS)	Gas Temp. (Deg K)	X Coord. (km)	Y Coord. (km)
AMX 1 Big 4 - Rock Shipping	0.75	0.00	10.40	0.96	15.06	314.0	394.900	3069.650
AMX 1 Big 4 - Rock Storage	0.26	0.00	8.20	0.63	17.03	314.0	394.740	3069.690
AMX 1 Big 4 - Rock Dryer	2.27	16.35	30.50	1.82	7.26	334.0	394.850	3069.770
AMX 1 Big 4 - Boiler	0.08	0.60	8.20	0.41	7.57	505.0	394.800	3069.720
BPI 2 * Brewster Composite	6.30	35.70	38.10	2.44	15.20	339.0	389.500	3068.000
BPI 2 * Brewster Composite	0.00	13.40	38.10	2.44	15.20	339.0	389.500	3068.000
NW 3 NW05 RAIL GND ROCK UNLOAD	0.60	0.00	12.20	0.90	20.20	315.0	396.760	3078.660
NW 3 NW09 DAP PLANT	3.60	0.00	40.40	2.10	15.50	319.0	396.540	3079.030
NW 3 NW10 GTSP PLANT	4.22	0.00	40.40	1.80	20.60	316.0	396.550	3079.150
NW 3 NW11 MAP PLANT	2.51	0.00	40.40	1.20	10.70	333.0	396.530	3079.010
NW 3 NW12 GTSP STORAGE	3.62	0.00	40.40	1.80	18.90	315.0	396.530	3079.170
NW 3 NW13 AUX BOILER	4.01	0.00	29.00	1.70	17.10	564.0	396.560	3078.810
NW 3 NW21 GTSP ROCK BIN	0.60	0.00	13.70	0.30	12.70	315.0	396.530	3079.170
NW 3 NW24 MULTIPHOS SHIP BIN	0.45	0.00	16.80	0.30	13.90	315.0	396.600	3079.490
NW 3 NW25 LIMESTONE STG SILO	0.45	0.00	35.40	0.30	10.70	315.0	396.640	3079.360
NW 3 NW26 SILICA HANDLING	0.20	0.00	5.50	0.30	10.00	315.0	396.700	3079.480
NW 3 NW27 AFI PLANT	4.64	0.00	52.40	2.40	13.10	322.0	396.750	3079.350
NW 3 NW28 AFI STG SILOS(2)	1.20	0.00	35.40	0.50	14.90	315.0	396.640	3079.350
NW 3 NW29 FERT PRODUCTS SHIP	2.52	0.00	40.40	0.90	10.10	315.0	396.450	3079.270
NW 3 NW30 AFI LIMESTN FEED SILO	0.45	0.00	36.00	0.30	12.70	315.0	396.680	3079.360
NW 3 NW31 AFI TRUCK SHIP	0.45	0.00	20.00	0.30	8.40	315.0	396.600	3079.330
NW 3 NW32 AFI RAIL SHIP	0.45	0.00	31.90	0.30	10.70	315.0	396.600	3079.490
NW 3 NW33 MULTIPHOS PLANT	3.33	0.00	52.40	1.40	7.10	315.0	396.830	3079.420
NW 3 NW34 SODA ASH UNLOAD	0.45	0.00	18.30	0.30	3.20	315.0	396.840	3079.480
NW 3 NW35 SODA ASH CONVEYING	0.45	0.00	13.70	0.30	3.20	315.0	396.840	3079.470
NW 3 NW36 MULTIPHOS COOLER A	0.60	0.00	26.50	0.50	8.50	438.0	396.740	3079.430
NW 3 NW37 MULTIPHOS COOLER B	0.60	0.00	26.50	0.50	8.50	464.0	396.740	3079.410
NW 3 NW38 MULTIPHOS SIZING	0.20	0.00	5.20	0.40	8.10	380.0	396.730	3079.440
NW 3 NW39 MULTIPHOS CLASS	0.45	0.00	17.40	0.40	8.10	352.0	396.730	3079.430
NW 3 NW40 SECOND PRODUCT L/O	0.45	0.00	32.70	0.70	11.70	315.0	396.310	3079.230
NW 3 NW90 LIMING STATION	0.06	0.00	21.70	0.30	10.40	315.0	396.830	3078.130
NW 3 NW91 THIRD PRODUCT L/O	0.45	0.00	30.50	0.70	11.70	315.0	396.310	3079.130
NW 3 NW92 DAP SCRUBBER 1	1.78	0.00	51.60	1.80	20.90	315.0	396.540	3079.090
NW 3 NW93 DAP SCRUBBER 2	1.78	0.00	51.60	1.80	20.40	315.0	396.540	3079.220
NW 3 NW94 DAP BAG COLLECTOR	0.57	0.00	28.10	1.80	10.20	315.0	396.440	3079.150
NW 3 NW14 GTSP RAIL LOADING	0.63	0.00	30.50	0.50	24.10	315.0	396.410	3079.200
NW 3 NW50 AREA 10	0.19	0.00	26.20	0.30	25.90	315.0	396.810	3079.500
NW 3 NW51 AREA 40	0.06	0.00	28.80	0.60	1.80	315.0	396.820	3079.500
NW 3 3 59 02 NW	0.00	42.00	61.00	2.50	10.00	350.2	396.600	3078.750
NW 3 3 59 03 NW	0.00	42.00	61.00	2.50	10.00	350.2	396.530	3078.750
NW 3 3 59 04 NW	0.00	42.00	61.00	2.50	10.00	350.2	396.450	3078.750
NW 3 3 59 09 NW	0.00	0.82	36.60	2.10	15.60	319.1	396.540	3079.030
NW 3 3 59 10 NW	0.00	1.89	36.60	1.80	20.40	325.2	396.550	3079.150
NW 3 3 59 13 NW	0.00	48.89	29.00	1.70	17.20	564.1	396.560	3078.810
NW 3 1 59 27 NW	0.00	3.78	52.40	2.40	13.00	321.9	396.750	3079.350
NW 3 1 59 33 NW	0.00	5.36	52.40	2.40	7.10	319.1	396.830	3079.430

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

Source	Emission PM (G/Sec)	Rates SO2 (G/Sec)	Stack Height (M)	Stack Diam. (M)	Stack Velocity (MPS)	Gas Temp. (Deg K)	X Coord. (km)	Y Coord. (km)
NW 3 1 59 94 NW	0.00	57.75	60.70	2.60	13.40	349.7	396.490	3078.640
NW 3 1 59 95 NW	0.00	57.75	60.70	2.60	13.40	349.7	396.560	3078.640
NW 3 1 59 96 NW	0.00	5.54	36.60	1.80	20.80	319.1	396.450	3079.150
MCC 4 Nichols Calciner	4.08	0.00	30.50	1.09	19.30	339.0	398.410	3085.210
MCC 4 Nichols #1 Dryer	4.80	0.00	25.90	2.28	12.70	344.0	398.480	3085.120
MCC 4 Nichols #2 Dryer	4.80	0.00	25.90	2.28	12.70	344.0	398.520	3085.140
MCC 4 Nichols #3 Dryer	1.03	0.00	30.50	1.68	24.20	326.0	398.220	3085.000
MCC 4 Nichols #4 Dryer	3.59	0.00	25.90	2.28	16.20	339.0	398.160	3085.040
MCC 4 Nichols Dry Rock Storage	5.04	0.00	25.90	1.68	23.50	315.0	398.310	3085.200
MCC 4 Nichols Mills #1 & #2	3.53	0.00	24.40	0.48	12.00	327.0	398.350	3085.180
MCC 4 Nichols Mills #3 & #4	3.53	0.00	24.40	0.48	18.00	323.0	398.400	3085.160
MCC 4 Nichols Dry Rock L/O	4.16	0.00	25.90	1.52	13.90	315.0	398.310	3085.100
MCC 4 Nichols Truck Loading Fac.	0.11	0.00	12.20	0.50	12.00	314.0	398.400	3085.100
MCC 4 Nichols Calciner Cooler	1.51	0.00	12.20	1.07	11.80	314.0	398.430	3085.230
MCC 4 Mobil	0.00	2.40	25.90	2.30	16.00	339.0	398.000	3085.300
MCC 4 Mobil	0.00	56.50	30.50	2.00	11.00	350.0	398.000	3085.300
CON 5 * Conserve Composite	23.20	0.00	25.30	1.10	20.00	327.0	398.500	3084.200
CON 5 Conserve	0.00	18.20	10.00	0.80	11.00	533.0	398.400	3084.200
CON 5 Conserve	0.00	17.20	24.40	1.70	5.00	330.0	398.400	3084.200
CON 5 Conserve	0.00	-15.20	30.50	1.80	18.90	308.0	398.400	3084.200
CON 5 Conserve	0.00	42.00	45.70	2.30	10.30	352.0	398.400	3084.200
AMX 6 PC REACTOR/PARAGON	5.29	0.00	45.70	1.76	17.40	315.0	393.800	3096.300
AMX 6 PC 3, 4, 5 KILNS	2.11	0.00	45.70	1.76	14.70	315.0	393.800	3096.300
AMX 6 PC 6, 7 KILNS	1.89	0.00	45.70	1.76	17.60	315.0	393.800	3096.300
AMX 6 PC FEED PREP	2.52	0.00	30.50	1.37	11.50	318.0	393.800	3096.300
AMX 6 PC DIKAL	1.68	0.00	24.40	1.68	8.60	338.0	393.800	3096.300
AMX 6 PC CRANEWAY	4.32	0.00	53.40	2.81	15.20	317.0	393.800	3096.300
AMX 6 PC FEED PREP, NORTH	0.07	0.00	29.60	0.36	15.20	317.0	393.800	3096.300
AMX 6 PC FEED PREP, SOUTH	0.04	0.00	29.60	0.28	15.20	317.0	393.800	3096.300
AMX 6 PC FEED PREP, SODA	0.03	0.00	22.60	0.22	15.20	317.0	393.800	3096.300
AMX 6 PC LIME BIN, DIKAL	0.02	0.00	14.00	0.20	15.20	317.0	393.800	3096.300
AMX 6 PC CDP BIN, DIKAL	0.12	0.00	16.50	0.48	15.20	317.0	393.800	3096.300
AMX 6 PC DIKAL	0.06	0.00	15.90	0.34	15.20	317.0	393.800	3096.300
AMX 6 PC MILLROOM 1	0.90	0.00	10.40	1.05	15.20	317.0	393.800	3096.300
AMX 6 PC MILLROOM 2	0.22	0.00	12.20	0.63	15.20	317.0	393.800	3096.300
AMX 6 PC 800 TON BIN	0.22	0.00	17.40	0.63	15.20	317.0	393.800	3096.300
AMX 6 PC BAGHOUSE, WEST	0.09	0.00	20.40	0.40	15.20	317.0	393.800	3096.300
AMX 6 PC BAGHOUSE, EAST	0.15	0.00	21.30	0.53	15.20	317.0	393.800	3096.300
AMX 6 PC BULK LOADING	0.22	0.00	16.50	0.63	15.20	317.0	393.800	3096.300
AMX 6 PC TRUCK LOADING	0.27	0.00	18.90	0.53	26.40	317.0	393.800	3096.300
AMX 7 PP AUX BOILER #2	0.88	0.00	9.10	1.20	14.90	557.9	348.500	3057.300
AMX 7 PP PHOSPHORIC ACID PLANT	3.62	0.00	60.90	0.90	27.30	315.0	348.500	3057.300
AMX 7 PP UNGROUND ROCK UNLOAD.	3.43	0.00	10.60	1.00	22.20	315.0	348.500	3057.300
AMX 7 PP BALL MILL #1	3.43	0.00	37.70	0.60	22.00	320.7	348.500	3057.300
AMX 7 PP ROCK STG BUILDING	3.43	0.00	9.70	1.00	23.30	315.0	348.500	3057.300
AMX 7 PP FERTILIZER (DAP)	2.83	0.00	60.90	2.10	28.30	315.0	348.500	3057.300

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AMX 7 PP GROUND ROCK UNLOADING	1.85	0.00	22.80	0.30	5.80	315.0	348.500	3057.300
AMX 7 PP QUICK LIME STG	1.42	0.00	23.70	0.10	9.00	315.0	348.500	3057.300
AMX 7 AMAX Piney Point	0.00	37.80	61.00	1.90	13.40	322.0	348.500	3057.300
LKU 8 * Lakeland Utils Composite	6.03	0.00	47.70	2.70	15.10	405.0	409.200	3106.200
LKU 8 * Lakeland Utils Composite	17.45	0.00	60.30	4.00	15.70	371.0	409.200	3106.200
LKU 8 LARSEN 7	0.00	7.52	50.30	3.10	3.40	422.0	409.200	3102.800
LKU 8 MC INTOSH 1	0.00	139.00	47.70	2.70	15.10	405.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES #1	0.00	393.60	76.20	4.90	19.70	354.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES #2	0.00	21.20	47.70	3.10	11.70	389.0	408.500	3105.800
WRG 9 Dry Mill - Rock Dryers 29004	7.56	0.00	15.20	2.10	8.60	330.0	409.610	3085.860
WRG 9 Dry Mill - Rock Stg 13378	5.80	0.00	16.80	1.10	13.60	315.0	409.600	3085.900
WRG 9 Dry Mill - Rock Convey 14740	2.90	0.00	15.60	0.40	11.40	315.0	409.620	3085.550
WRG 9 Dry Mill - Grind Mill 14739	1.26	0.00	15.00	0.30	18.30	315.0	409.600	3085.900
WRG 9 Dry Mill - Rock Ship 51464	0.91	0.00	15.30	0.90	9.90	315.0	409.800	3086.600
WRG 9 Chem Pl-Rock Grind 25188	4.54	0.00	22.00	0.60	9.60	315.0	409.700	3086.890
WRG 9 Chem Pl-Ball Mill 26977	1.51	0.00	25.30	0.40	10.20	331.0	409.810	3086.890
WRG 9 Chem Pl-300X GTSP DAP 25191	3.48	0.00	32.80	2.20	12.40	320.0	409.980	3086.810
WRG 9 Chem Pl-300Y GTSP&ROP 13210	3.15	0.00	24.40	2.20	12.40	321.0	409.980	3086.830
WRG 9 Chem Pl-GTSP Storage 25192	0.63	0.00	32.80	2.10	11.90	315.0	409.670	3086.900
WRG 9 Chem Pl-GTSP Shipping 27026	1.26	0.00	28.00	0.80	5.30	315.0	409.900	3086.700
WRG 9 Chem Pl-Fert.Plant DAP 06840	3.78	0.00	30.20	2.30	16.00	333.0	409.810	3086.780
WRG 9 Chem Pl-DAP #3 24460	3.77	0.00	40.40	2.10	26.50	322.0	409.290	3086.960
WRG 9 Chem Pl-ROP Belt 14475	0.50	0.00	14.00	0.60	12.90	315.0	409.810	3086.560
WRG 9 Chem Pl-ROP Storage 14674	0.76	0.00	21.30	1.20	12.10	315.0	409.600	3085.900
WRG 9 Chem Pl-ROP Shipping 13449	0.63	0.00	27.00	1.00	6.30	315.0	409.600	3055.900
WRG 9 Chem Pl-DAP Shipping 32628	3.15	0.00	24.40	0.70	9.50	315.0	409.840	3086.630
WRG 9 Chem Pl-NEW DAP Ship 36672	1.95	0.00	30.50	1.50	16.90	315.0	409.410	3086.880
WRG 9 3 46 14 W. R. GRACE	0.00	91.80	61.00	1.50	25.90	346.0	409.700	3086.000
WRG 9 3 46 15 W. R. GRACE	0.00	57.70	45.70	1.50	16.70	322.0	409.700	3086.000
WRG 9 2 46 16 W. R. GRACE	0.00	36.80	61.00	2.80	7.30	346.0	409.700	3086.000
WRG 9 2 46 17 W. R. GRACE	0.00	36.80	61.00	2.80	7.30	346.0	409.700	3086.000
WRG 9 W. R. GRACE	0.00	-216.00	45.70	1.40	16.50	352.0	409.700	3086.000
CF 10 * CF Composite	36.50	0.00	42.20	2.00	12.10	331.0	408.500	3083.000
CF 10 * CF Composite	2.63	0.00	60.00	2.40	10.00	350.0	408.500	3083.000
CF 10 3 52 03 C. F.	0.00	45.40	34.50	1.30	14.20	319.0	408.500	3083.000
CF 10 3 52 04 C. F.	0.00	46.70	34.50	1.30	20.00	319.0	408.500	3083.000
CF 10 3 52 05 C. F.	0.00	56.70	63.40	2.10	6.90	347.0	408.500	3083.000
CF 10 3 52 06 C. F.	0.00	56.70	63.40	2.10	6.90	351.0	408.500	3083.000
CF 10 2 52 14 C. F.	0.00	52.90	67.10	2.40	9.80	351.0	408.500	3083.000
CF 10 2 52 21 C. F.	0.00	4.30	9.10	0.70	22.50	450.0	408.500	3083.000
CF 10 CF	0.00	-110.60	30.50	1.68	4.60	350.0	408.500	3083.000
FAR 11 * Farmland Composite	30.73	0.00	33.80	1.40	17.30	324.0	409.500	3079.500
FAR 11 * Farmland Composite	4.91	0.00	14.00	1.00	2.60	388.0	409.500	3079.500
FAR 11 3 53 01 FARMLAND	0.00	42.00	30.50	1.40	19.80	319.0	409.500	3079.500
FAR 11 3 53 02 FARMLAND	0.00	42.00	30.50	1.40	22.40	319.0	409.500	3079.500
FAR 11 3 53 03 FARMLAND	0.00	57.70	30.50	1.40	24.30	319.0	409.500	3079.500

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FAR 11 3 53 03 FARMLAND	0.00	57.70	30.50	1.40	26.50	319.0	409.500	3079.500
FAR 11 2 53 26 FARMLAND	0.00	2.30	14.00	1.20	12.70	444.0	409.500	3079.500
USS 12 Bartow - Rock Dryers (2)	5.04	0.00	17.00	1.80	13.30	342.0	413.300	3086.500
USS 12 Bartow - Rock Silo	5.04	0.00	20.00	1.50	9.40	315.0	413.300	3086.500
USS 12 Bartow - DAP Loading	5.04	0.00	24.00	0.60	48.50	315.0	413.300	3086.500
USS 12 Bartow - DAP Dryer	5.92	0.00	40.00	2.10	15.00	315.0	413.300	3086.500
USS 12 Bartow - Rock Grinding	0.88	0.00	15.00	0.30	27.70	330.0	413.300	3086.500
USS 12 Bartow	0.00	49.20	29.00	2.10	8.00	305.0	413.200	3086.300
USS 13 Ft. Meade - Rock Dryers	5.09	0.00	17.00	1.80	11.30	333.0	416.000	3068.900
USS 13 Ft. Meade - Rock Silo	3.78	0.00	40.00	0.76	21.60	315.0	416.000	3068.900
USS 13 Ft. Meade - GTSP Shipping	5.04	0.00	21.00	0.52	22.20	315.0	416.000	3068.900
USS 13 Ft. Meade - Rock Grinding	0.76	0.00	19.00	0.40	11.30	340.0	416.000	3068.900
USS 13 Ft. Meade	0.00	46.80	28.00	1.50	17.00	330.0	416.000	3069.000
USS 13 Ft. Meade	0.00	-73.50	61.00	3.10	6.50	314.0	416.000	3069.000
USS 13 Ft. Meade	0.00	92.40	53.30	2.60	9.40	355.0	416.000	3069.000
USS 13 Ft. Meade - GTSP 11X,11Y,12	5.42	0.00	28.40	1.50	15.00	325.0	416.000	3068.900
ELE 14 Electro DRYER	4.20	0.00	30.50	1.32	7.40	327.0	405.500	3079.400
ELE 14 Electro CALCINER	3.50	0.00	25.60	2.13	6.90	322.0	405.500	3079.400
ELE 14 Electro DUST COLLECTOR	3.70	0.00	15.20	0.91	24.90	315.0	405.500	3079.400
ELE 14 Electro TAP HOLE SCRUBB	4.10	0.00	29.30	2.13	6.80	338.0	405.500	3079.400
ELE 14 Electro COKE DRYER	1.80	0.00	18.30	0.76	13.80	322.0	405.500	3079.400
ELE 14 Electro BOILER 1	0.20	0.00	6.10	0.91	7.70	464.0	405.500	3079.400
ELE 14 Electro BOILER 2	0.20	0.00	7.30	0.91	5.10	464.0	405.500	3079.400
ELE 14 Electrophos	0.00	6.20	25.60	2.10	8.00	322.0	405.600	3079.400
AGR 15 GTSP Rock Bin Baghouse	3.78	0.00	20.00	0.16	35.21	395.0	407.500	3071.400
AGR 15 #2 Ball Mill Baghouse	4.16	0.00	18.00	0.53	18.58	433.0	407.500	3071.400
AGR 15 Fluoride Production	0.26	0.00	18.00	0.60	2.00	363.0	407.500	3071.400
AGR 15 West Shipping	4.16	0.00	30.00	1.21	7.00	365.0	407.500	3071.400
AGR 15 Ground Rock Unloading	4.31	0.00	10.00	0.50	41.25	360.0	407.500	3071.400
AGR 15 DAP/MAP	3.02	0.00	38.00	3.10	14.60	328.0	407.500	3071.400
AGR 15 DAP Storage & Ship	0.43	0.00	38.00	1.10	15.80	319.0	407.500	3071.400
AGR 15 DAP/MAP #2	0.54	0.00	23.00	1.20	14.20	322.0	407.500	3071.400
AGR 15 AGRICO #12 H2SO4	0.00	42.00	45.70	2.90	9.50	350.0	407.580	3071.340
AGR 15 AGRICO DAP	0.00	7.36	38.10	3.10	14.60	328.0	407.380	3071.700
AGR 15 #10 H2SO4 AGRICO	0.00	37.80	45.70	2.70	9.90	350.0	407.520	3071.240
AGR 15 #11 H2SO4 AGRICO	0.00	37.80	45.70	2.70	9.90	350.0	407.570	3071.240
AGR 15 AUX. BOILER AGRICO	0.00	10.08	10.70	1.50	18.40	491.0	407.520	3071.380
AGR 15 GTSP AGRICO	0.00	23.18	42.70	2.70	12.90	319.0	407.520	3071.520
AGR 16 * Pierce Composite	13.00	0.00	22.50	1.00	22.50	322.0	403.700	3079.000
IMC 17 * IMC Noralyn Composite	22.94	0.00	17.90	0.90	30.50	330.0	415.300	3079.900
IMC 17 IMC Noralyn	0.00	9.00	17.00	1.30	36.70	343.0	414.700	3080.300
IMC 17 IMC Noralyn	0.00	30.64	13.70	1.22	40.40	330.0	414.700	3080.300
IMC 18 * IMC Kingsford Composite	10.43	0.00	24.90	0.90	31.00	324.0	398.000	3075.500
IMC 18 IMC Kingsford 1 34 06	0.30	0.00	10.70	0.80	10.00	319.0	398.000	3075.700
IMC 18 IMC Kingsford	0.00	11.60	21.30	2.10	12.90	344.0	398.200	3075.700
PTI 19 * PhosTech Composite	0.73	0.00	27.40	1.00	27.40	322.0	405.500	3078.500

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PTI 19 Phostech	0.00	2.84	27.40	1.00	29.00	322.0	405.200	3078.500
EST 20 * EsTech Composite	7.31	0.00	17.60	1.80	13.10	332.0	411.500	3074.200
EST 20 Estech SAP	0.00	32.20	30.80	2.10	3.90	358.0	411.500	3074.200
EST 20 Estech Dryer	0.00	51.50	18.50	3.00	7.00	340.0	411.500	3074.200
GAR 21 * Gardinier Composite	66.80	413.60	29.40	2.10	9.10	333.0	363.400	3082.400
GAR 21 * Gardinier Composite	66.80	-210.26	36.50	2.00	11.80	344.0	363.400	3082.400
GPI 22 * Gen'l Portland Composite	59.00	101.00	44.30	4.72	6.60	473.0	358.000	3090.600
FPL 23 * FPL Manatee Composite	133.30	1465.80	152.10	7.90	20.70	425.0	367.100	3053.800
TEC 24 Gannon 1	15.80	174.20	93.30	3.70	22.50	438.0	360.000	3087.500
TEC 24 Gannon 2	15.80	174.20	93.30	3.10	32.40	438.0	360.000	3087.500
TEC 24 Gannon 3	18.00	198.20	93.30	3.20	35.40	427.0	360.000	3087.500
TEC 24 Gannon 4	23.60	260.00	93.30	2.90	24.60	443.0	360.000	3087.500
TEC 24 Gannon 5	28.80	316.60	93.30	4.50	20.70	415.0	360.000	3087.500
TEC 24 Gannon 6	47.80	526.40	93.30	5.40	23.40	415.0	360.000	3087.500
TEC 25 Hookers Pt. 1	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 2	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 3	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 4	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 5	7.70	84.50	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 6	9.80	107.80	85.40	2.90	17.90	436.0	358.000	3091.000
TEC 26 Big Bend 1	28.00	2301.50	149.40	7.30	12.90	426.0	361.500	3075.000
TEC 26 Big Bend 2	25.50	1983.60	149.40	7.30	13.60	405.0	361.500	3075.000
TEC 26 Big Bend 3	51.80	3370.20	149.40	7.30	10.80	410.0	361.500	3075.000
TEC 26 Big Bend 4	16.38	654.70	149.40	7.32	20.00	342.0	361.600	3075.000
ROY 27 * Royster Composite	7.60	0.00	30.50	1.40	15.00	340.0	406.700	3085.200
ROY 27 * Royster Composite	0.00	52.50	61.00	2.13	9.90	356.0	406.700	3085.200
ROY 27 * Royster Composite	0.00	-31.50	61.00	2.13	9.90	356.0	406.700	3085.200
ROY 27 ROYSTER #2	0.00	42.00	61.00	2.13	9.93	356.0	406.700	3085.200
ROY 27 ROYSTER #1	0.00	-257.60	51.00	2.13	9.90	356.0	406.700	3085.200

7.0 IMPACT ON SOILS, VEGETATION AND VISIBILITY AND SECONDARY IMPACTS

A qualitative evaluation of the impact of the alternative fuels and the increased particulate matter emissions from the dryer on soils, vegetation and visibility and commercial growth in the area has been prepared. The land use in the general area of the AMAX Big Four Mine is dedicated to agriculture and mining with agriculture activities being devoted primarily to cattle ranching. The use of the alternative fuels and the increased particulate matter emissions proposed by AMAX will result in a significant increase in sulfur dioxide emissions and an increase in particulate matter emissions that is subject to PSD review. The impact of neither of these emission increases is anticipated to adversely impact any activity presently practiced in the area.

Much of the property in the area is dedicated to cattle ranching. The present activities practiced by AMAX and others; that is mining, beneficiation and rock drying, have had no adverse impact on these cattle. The impact of the increased sulfur dioxide emissions, which will increase annual ambient sulfur dioxide levels approximately 1.3 micrograms per cubic meter and the maximum 24-hour sulfur dioxide levels approximately 17 micrograms per cubic meter, is not expected to adversely impact existing agricultural activities. These increases, when superimposed on existing sulfur dioxide levels, will still result in total ambient sulfur dioxide levels which are well below secondary air quality standards. These are standards which have been adopted to protect both human health and welfare.

The increase in particulate matter emissions are expected to increase ambient particulate matter levels for the annual period by less than one microgram per cubic meter and the 24-hour levels by approximately 3.0 micrograms per cubic meter. These slight increases are not anticipated to have any adverse impact on present activities in the area.

AMAX will continue to operate the Big Four Mine beneficiation plant and rock dryer in compliance with State emission limiting standards. AMAX will also continue to take all reasonable precautions to minimize fugitive particulate matter emissions from in-plant traffic, dry rock transfer and dry rock loading.

The use of the alternative fuels proposed by AMAX will not result in any increase in plant personnel or automobile traffic to or from the plant. Neither will the proposed activities result in any construction activities which might be expected to generate more than the normal amount of fugitive particulate matter or increase the labor force at the plant site.

In summary, it can be concluded that the impacts resulting from the use of the alternative fuels and the increased particulate matter emissions proposed by AMAX will not result in significant impacts on the soils, vegetation or visibility within the southeastern Hillsborough County area nor will they result in increases in long-term or short-term traffic flow to or from the plant site or increases in the labor force at the site.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) DETERMINATION
AMAX PHOSPHATE, INC.
Hillsborough County

The applicant plans to use an alternate fuel to fire an existing 300 ton per hour (118 million Btu per hour heat input) fluidized bed phosphate rock dryer in operation at their Big Four phosphate mine located near Fort Lonesome, Florida. The source is presently permitted to fire residual oil containing a maximum of 0.7 percent sulfur. The applicant plans to fire residual oil or a coal-oil-water mixture (COWM) both fuels having a 2.5 percent sulfur content. In addition to the fuel change, the applicant has requested the permitted annual operating hours to be increased from 7488 to 8760. Resultant air pollutant emissions are summarized in Table 1.

Table 1

DRYER EMISSIONS (tons/year)

Pollutant	Particulates	SO_2	NO_x
Present	39	354	99
Planned-OIL	79	569	115
-COWM	79	569	156
Increase	40	215	57
Significant Rate	25	40	40

The increase in the rock dryer operating hours will result in a production increase of 382,000 tons per year. The movement of this additional tonnage to dry rock storage and shipping will increase particulate emissions an additional 3 tons per year.

The rock dryer exhaust gases discharge through a cyclone separator into a Peabody Engineering Company, Type M160 impingement scrubber. Present permit conditions limit particulate emission to 0.034 pounds per hour and 0.73 pounds SO_2 per million Btu based upon firing oil containing 0.7 percent sulfur. The phosphate rock dryer is currently operating per conditions of FDER permit number AO29-22821, which limits dryer operation to 7488 hours per year.

The change in operation of the phosphate rock dryer will result in an increase in emissions and is therefore a modification per Rule 17-2.100(102), FAC. The source is subject to Rule 17-2.500 FAC, Prevention of Significant Deterioration (PSD). A BACT determination is required for all pollutants for which emissions will increase above the significant levels listed in Table 500-2. A BACT determination will be required for the pollutants sulfur dioxide, particulate matter and nitrogen oxides.

BACT Determination Requested by the Applicant:

Air pollutant emission limits from the phosphate rock dryer to be; 0.06 pounds particulate matter per ton of wet rock feed; 1.1 pounds sulfur dioxide per million Btu heat input; 0.30 pounds of nitrogen oxides per million Btu heat input.

Date of Receipt of a BACT Application:

February 10, 1983

Date of Publication in the Florida Administrative Weekly:

February 25, 1983

Review Group Members:

Willard Hanks - New Source Review, BAQM
Tom Rogers - Air Modeling Section, BAQM
Dan Williams - DER Southwest District Office.

BACT Determined by DER:

Big Four Mine 300 ton per hour rock dryer:

Pollutant	Emission Limit
Particulates	0.06 pounds per ton of wet rock feed.
Sulfur Dioxide	1.1 pounds per million Btu heat input.
NO_x	0.30 pounds per million Btu heat input
Visible Emission	Not to exceed 10% opacity

Compliance with the particulate emission limit will be in accordance with 40 CFR 60, Appendix A; Methods 1, 2, 3, and 5. Compliance with the sulfur dioxide emission limit will be in accordance with DER Method 6. Compliance with the opacity of emissions limitation will be in accordance with DER Method 9.

BACT Determination Rationale:

The source was originally permitted in 1976. The particulate emission limit was 0.03 grains per SCF at an exhaust gas flow rate of 40,000 SCFM. A New Source Performance Standard (NSPS), Subpart NN, was promulgated April 16, 1982 which limits particulate emission from this source to 0.06 pounds per ton of phosphate rock feed. Any source which is modified after September 21, 1979 is subject to the requirements of this NSPS.

The applicant has requested that the particulate emission limit be changed to the NSPS particulate emission limit of 0.06 pounds per ton of dryer fed. Three test runs were made with the dryer operating at 84% of capacity and firing a coal-oil-water mixture. The average stack gas flow rate was 54,837 DSCFM. The emission rate, using the 0.03 gr/SCF standard, is 14.1 lb/hr or 0.055 lbs/ton feed. Based upon the new information presented, the Department agrees with the applicant's request that BACT be equal to the NSPS particulate standard of 0.06 pounds per ton of dryer feed.

The intent of the original permit condition was to control sulfur dioxide emissions by limiting the fuel sulfur content. Data has been presented to the Department showing that SO_2 removal efficiency inherent in the process is a function of dryer feed stock and fuel sulfur content. The Department agrees with the applicant that, in this case, controlling SO_2 emissions by limiting fuel sulfur content does not allow the applicant fuel flexibility and therefore to take advantage of the SO_2 removed in the process.

The Department has determined BACT to be 1.1 pounds SO_2 per million Btu heat input. This process-rate standard determined as BACT is a reasonable compromise to protect our environment and still allow the applicant cost flexibility by using various grades and types of fuel.

A practical method to remove NO_x from a phosphate rock dryer is yet to be demonstrated. In the typical combustion process of fuels with excess air, the high temperature of combustion causes the nitrogen and oxygen in the air to combine to form nitric oxide. Then, as the hot gases move away from the source of high temperature, further oxidation takes place, and nitrogen dioxide is formed. The amount of excess air used and the method of firing a rock dryer tempers the combustion temperature and consequently the NO_x produced. The NO_x emission rate of 0.30 pounds per million Btu heat input proposed by the applicant is determined as BACT.

The applicant presently uses residual oil as fuel to fire the dryer. The applicant also plans to fire a coal-oil-water mixture (COWM) as an alternate fuel. COWM is a viscous liquid which is handled the same as residual oil. No major modifications, except burner nozzles, were made to the fuel handling system. The source was considered capable of accommodating the new fuel.

Details of the Analysis May be Obtained by Contacting:

Edward Palagyi, BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended By:

[signature]

C. H. Fancy, Deputy Bureau Chief

Date: Oct. 7, 1983

Approved:

[signature]

Victoria J. Tschinkel, Secretary

Date: Oct 7, 1983

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

February 11, 1983

Mrs. Liz Cloud
Florida Administrative Weekly
Department of State
The Capitol
Tallahassee, Florida 32304

Re: Receipt of an application for BACT determination

Dear Mrs. Cloud:

Please publish the attached notice in the February 25, 1983 issue of the Florida Administrative Weekly.

Should you have any questions, please call me at 488-1344.

Sincerely,

Edward Palagyi

Edward Palagyi, BACT
Coordinator
Bureau of Air Quality
Management

EP/ks

Attachment:

cc: Geneva Hartsfield
2600 Blair Stone Road
Tallahassee, Florida 32301

THE DEPARTMENT OF ENVIRONMENTAL REGULATION announces receipt on February 3, 1983 of an application for determination of Best Available Control Technology (BACT) to minimize air pollutant emissions resulting from the use of an alternate fuel in a phosphate rock dryer, Amax Phosphate, Inc., Fort Lonesome, Hillsborough County, Florida.

Information regarding this application may be obtained by writing to: Edward Palagyi, BACT Coordinator, Florida Department of Environmental Regulation, Bureau of Air Quality Management, 2600 Blair Stone Road, Tallahassee, Florida 32301, Telephone (904)488-1344.

AMAX Chemical Corporation
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801 • (813) 687-2561

May 31, 1983

DER
JUN 08 1983
BAQM

Mr. C. H. Fancy, P.E.
Deputy Bureau Chief
Bureau of Air Quality Management
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: AMAX Chemical Corporation, Big Four Mine, Application for PSD Approval; PSD-FL-094, AC29-65834

Dear Mr. Fancy:

The following is a response to your letter of incompleteness for the above-referenced PSD review and Construction Permit application. The responses are presented in the same order as the questions and comments listed in your March 3, 1983, letter to Mr. Sandrik.

1. Property Boundaries
   You requested that the nature of the plant or facility boundaries be described along with any physical barriers that would prevent general public access to the property. The property boundaries of the Big Four Mine have been delineated in the aerial photograph attached to this letter (Exhibit A).

   These property lines are bounded by fences and are posted against unauthorized entry. In addition to the fencing and posting, all entrances to the property are blocked by locked gates or stop-check points (guardhouses), and security personnel routinely patrol the property to prevent unauthorized entry.

   In order for the general public to gain access to the Big Four Mine property, they must either go through a locked gate, pass two guard stations, or cut a fence. It is important to note that public access is first controlled at guard stations jointly maintained by AMAX and Brewster Phosphates near the intersections of the privately owned Haynesworth - Lonesome Road and State Roads 37 and 39. These intersections are located 6.28 and 8.21 kilometers from the source respectively. Any one illegally entering the property is subject to arrest and prosecution. (Photographs of the security systems have been attached for your information.)

2. <u>Short-Term Air Quality Modeling</u>
Dr. John Koogler has provided a detailed response to this question in his attached letters.

3. <u>Annual Wind Speed/Wind Direction Distributions for Long-Term Air Quality Monitoring</u>
Dr. John Koogler has provided a detailed response to this question in his attached letters.

4. <u>Phosphate Rock Dryer Heat Input Rate</u>
Dr. John Koogler has provided a detailed response to this question in his attached letters.

5. <u>Reasons for the Use of Alternate Fuels</u>
AMAX is proposing to convert to alternate fuels because: (1) coal-oil mix fuel is cheaper than oil for any given sulfur or heat content; (2) low sulfur residual oil is disproportionately expensive, particularly when considering the sulfur dioxide removal efficiency of the Big Four impingement scrubber; and (3) the proposed alternate fuels are more likely to be readily available at a more stable price than low sulfur oil.

Coal-Oil-Water Mix (COWM) is the preferred alternate fuel because conversion costs are minimal in comparison to 100 percent coal, gas or other fuels. Given the liquid state of COWM, extensive fuel handling and/or storage facilities are avoided. Also, the literature, other PSD applications on file with the Department, and other public sources have documented the cost savings that can be achieved by burning coal instead of oil. While COWM advantages are not as great, they are significant when compared to oil.

Throughout the past decade, low sulfur oil has consistently been more expensive, less readily available, and more subject to upward price pressures than higher sulfur oil. Current price quotations provide an excellent example. Even though oil is in surplus and prices are depressed compared to 12 or 24 months ago, low sulfur fuel prices are still approximately 8 percent more expensive. More importantly, during this period, low sulfur oil prices have dropped by 3 percent compared to 9 percent for higher sulfur oil during the same period.

Finally, the Department should be familiar with the low sulfur oil supply problems that utilities and other residual fuel customers experienced during the past five years; similar conditions cannot be precluded from re-occurring during the remaining life of the Big Four Mine. AMAX believes that it can best minimize its exposure to this risk by reducing the oil content of the dryer fuel to 40 percent and seek an increase in the sulfur content of the fuel.

6. Cost and Availability of Alternate Fuels
The question of availability of alternate fuel sources is difficult to answer because it is dependent on the current world oil supply. The world supply and demand is subject to change at any time; and due to the high demand, the first shortages of oil occur in the low sulfur fuels. Therefore, it is impossible for fuel vendors to guarantee an adequate future supply of low sulfur fuel oil to AMAX.

The current cost of No. 6 fuel oil, 0.7 percent sulfur content, is $0.7057 per gallon and the current price of No. 6 fuel oil with 2.5 percent sulfur content is $0.6497 per gallon. Based on 100,000 barrels per year usage, the current cost of 0.7% No. 6 fuel oil is $2,963,940 and the annual cost of 2.5% sulfur content No. 6 fuel oil is $2,728,740 or a net savings of $235,000 per year from the use of 2.5% sulfur content fuel oil. Based on a 7-year life-of-mine, the total savings would amount to $1,646,400 in 1983 dollars; with compounding, the the seven year return would be $2,231,389.

The current cost of the coal-oil-water mixture (COWM) containing 2.5% sulfur is $0.5847 per gallon. Based on 100,000 barrels per year consumption, the current annual cost of 2.5% sulfur COWM is $2,455,740 or a net savings of $508,200 per year in fuel costs as compared to the use of 0.7% sulfur No.6 fuel oil. Using a 7-year mine life, the total savings would be $3,557,400 in 1983 dollars; with compounding, the 7-year return would be $4,821,395.

It is important to remember that the current fuel oil prices are at their lowest point in two years (more than 8 percent below the May 1982 prices) and can be expected to escalate even more over the next few years. The above cost benefits are based on current prices and do not include additional cost savings that will result from the expected future increases in oil prices.

7. Nitrogen Oxide Emissions Data
   Dr. John Koogler has provided a detailed response to this question in his attached letter.

Response to Hillsborough County Environmental Protection Commission Letter:

The Hillsborough County Environmental Protection Commission reviewed the PSD study and had several comments. The responses to the comments are presented below in the same order as they appeared in the HCEPC memorandum dated February 25, 1983.

1. Secondary Particulate Matter Emissions
   There will be no increase in the rate of mining or other secondary particulate matter emissions as a result of the dryer operation changes proposed in this Application. The mining rate is controlled by a DRI Development Order and an Amended Mine Operating Permit, both approved by the Hillsborough County Commission on April 14, 1982. These approvals restrict total production and the rate of mining to approximately 2.5 million tons and 450 acres mined per year on an annual basis. As described in Section 1.0 of the original Application, the proposed rock drying capacity is consistent with the mining and beneficiation capacity.

   In addition, as described in Section 1.0 of the Application, AMAX's request to increase the allowable hours of operation of the rock dryer does not mean that the dryer will operate 100 percent of the allowable hours. As previously stated, market demand for dry rock will dictate the amount of rock to be dried and, therefore, the hours the dryer will be operated up to the permitted maximum.

   The combination of these two factors simply indicates that the product mix of the Big Four Mine would be allowed to fluctuate in accordance with market demand if this

Application is approved. Given the current state of the phosphate rock market, this additional flexibility is an important factor in providing AMAX the opportunity to operate the Big Four Mine at the 2.5 million tons per year permitted rate.

2. <u>Rail Traffic</u>
   To clarify the apparent discrepancy on Page 1-4 and 2-8 of Volume 1, there will be no increase in rail traffic. The statement on Page 1-4, Volume 1, that there will be no increase in rail traffic is correct. The statement on Page 2-8, Volume 1, indicates an increase in rail cars needed to ship dry phosphate rock and will decrease the number of rail cars needed to ship wet phosphate rock. As discussed in response 1, an increase in drying capacity would allow the wet/dry product mix to change with market demand. An increase in dry rock rail cars will proportionately decrease the number of wet rock rail cars. (See Page 4 of Dr. Koogler's attached letter for additional information.)

3. <u>Receptor Locations</u>
   Dr. John Koogler has provided a detailed response to this comment in his attached letter.

4. <u>Additional Sulfur Dioxide Sources</u>
   Dr. John Koogler has provided a detailed response to this comment in his attached letter.

5. <u>Impact on Hillsborough County Particulate Matter Non-Attainment Area</u>
   Dr. John Koogler has provided a detailed response to this comment in his attached letter.

6. <u>Emission Limitations</u>
   The application of New Source Performance Standards (NSPS) to the Big Four dryer is appropriate given the modifications contained in the PSD review. The modifications will result in significant net emissions increases of particulate matter, sulfur dioxide, and nitrogen oxides as defined in 17-1.500(2)(d)2 of the F.A.C. that subjects the facility to NSR 17-2.500(2)(d)4a(ii) and the application of NSPS. The use of coal-oil-water mixture is expected to increase the particulate matter loading to the scrubber in the form of ash as well as increase the particulate emissions from the source.

The statement in the HCEPC letter that the dryer has continuously met the current emissions standard during the past several years is not correct. The dryer has been marginally in compliance since its installation and has occasionally exceeded the 0.03 grains/ft^3 during point source tests. Since AMAX purchased the facility, all of these tests have been reported to HCEPC and the FDER. This point source test data indicates that the Big Four wet dryer impingement scrubber is not as efficient as other types of scrubbers for particulate matter removal, but is more efficient that most other types for the removal of sulfur dioxide.

It should be noted that the 0.03 grains/ft^3 was a proposed standard by the U. S. Environmental Protection Agency, and was never adopted because it was not consistently achievable. This information may be found in EPA Docket Number OAQPS-79-6, which supports the current NSPS of 0.06 pounds of particulate matter emissions per ton of mass input to the phosphate rock dryer. The stack test data on file with FDER and HCEPC supports the U.S. E.P.A.'s conclusions that variations in inlet loading to rock dryer scrubbers are sufficient to prevent continuous compliance with 0.03 grains/ft^3 limitation.

The 0.03 grains/ft^3 standard was applied only to two sources during the late 1970's (AMAX being one of the two) and is no longer in use. Past performance data on the Big Four dryer indicates the dryer can meet the NSPS while using all of the fuel alternates including the coal-oil-water mixture.

7. <u>Sulfur Dioxide Removal Efficiency</u>
The request for data to support the SO_2 removal efficiency of 60 to 65% while using 2.5% sulfur fuel is answered on pages 2 and 3 and Attachment 2 of Dr. John Koogler's letter dated April 29, 1983. Additionally, it was noted that a compliance test conducted on August 27, 1981, demonstrated a SO_2 removal efficiency of less than 60 to 65%.

The August 27, 1981, point source test was an anomaly and the reduced efficiency was due to an unusual factor. This was the sulfur content of the fuel oil. An analysis of the fuel oil in early September indicated that the sulfur content of the fuel oil was higher than the

2.5% reported. This higher sulfur content was discovered in a subsequent point source test performed on September 4, 1981, and it was found that the SO_2 loading to the scrubber was 134% of the highest inlet value available.

When the efficiencies of the August 27, 1981, test were re-calculated using the revised fuel sulfur data, the SO_2 removal efficiency of this system averaged 60.1%.

8. Short-Term Air Quality Monitoring
   Dr. John Koogler has provided a detailed response to this comment on page 1 of his attached letter.

9. Wind Instrument Elevation
   The height of the wind instrument at the Tampa International Airport was corrected in the revised long-term air quality modeling. (See page 6 of Dr. John Koogler's attached letter dated April 29, 1983.)

10.& 11. Meteorological Input Data
   Dr. Koogler has provided a response to these comments on page 6 of his attached letter.

If after reviewing this material, you find that you have questions or need additional information, please let me know.

Sincerely,

Fred G. Mullins, III
Regulatory Compliance Manager

FGM/ko

cc: John Koogler
Iwan Choroneko/Frank Shindle (HCEPC)
Dan Williams (FDER, Tampa)
Gary Uebelhoer
Randy Sandrik
Fred Crabill

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS
1213 N.W. 6th Street Gainesville, Florida 32601 (904) 377-5822

SKEC 144-82-02

May 27, 1983

DER
JUN 08 1983
BAQM

Mr. Clair Fancy
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Subject: AMAX Chemical Corporation Big Four Mine
Applications for PSD Approval
PSD-FL-094 and AC 29-65834

Dear Mr. Fancy:

The following information is provided in response to your letter of March 3, 1983 to Mr. Sandrick of AMAX Chemical Corporation. In that letter you requested information needed by the Department to complete the review of the subject permit applications.

1. Property Boundaries

The AMAX property, as addressed in more detail in correspondence from AMAX, is enclosed by physical barriers which preclude the general public from entering the property. In view of this, it was not necessary to revise the air quality modeling to incorporate receptors representing locations on AMAX property.

2. Short-Term Air Quality and Modeling Mixing Height Input Data

Short-term air quality modeling to determine the maximum impact of sulfur dioxide and particulate matter emissions was revised to incorporate rural mixing height data. The results of the revised modeling for 24-hour particulate matter impacts, 24-hour sulfur dioxide impacts and 3-hour sulfur dioxide impacts are summarized in Table 6-2 and in Figures 6-7, 6-3 and 6-2, respectively.

A review of the revised air quality modeling indicates that the use of alternative fuels, as requested by AMAX in the subject applications, will not cause a violation of air quality standards or PSD increments. The output from the short-term air quality modeling is attached hereto.

3. Annual Wind Speed/Wind Direction Distribution for Long-Term Air Quality Modeling

Meteorological data from Tampa, Florida for the five year period 1970-1974 were compiled in a STAR format that is consistent with the Department's format. These meteorological data were then input to the ISC-LT model and the annual impacts of particulate matter and sulfur dioxides were evaluated. The sulfur dioxide impacts are summarized in Figures 6-4 through 6-6. The revised particulate matter impacts are summarized in Figures 6-8 through 6-10. The output from the long-term air quality modeling is attached hereto.

A review of the revised long-term modeling shows, as did the short-term modeling, that the alternative fuels proposed by AMAX can be used without causing a violation of ambient air quality standards or PSD increments.

4. Phosphate Rock Dryer Heat Input Rate

The maximum heat input rate to the fluid-bed rock dryer at the AMAX Big Four Mine is listed in the various places in the permit applications as 118 million BTU per hour and as 125 million BTU per hour. The maximum sulfur dioxide emission rates are calculated based on a maximum heat input rate of 118 million BTU per hour.

The maximum expected heat input rate to the dryer will be 118 million BTU per hour; the heat input rate used for calculating the sulfur dioxide emission rates. The heat input rate of 125 million BTU per hour should be disregarded.

5. Reasons for Use of Alternative Fuels

AMAX Chemical Corporation has provided a detailed response to this question.

6. Cost and Availability of Alternative Fuels

AMAX Chemical Corporation has provided a detailed response to this question.

7. Sulfur Dioxide Removal Efficiency

AMAX conducted eight sulfur dioxide removal efficiency tests on the fluid-bed dryer and scrubber system at the AMAX Big Four Mine during the period starting September 4, 1981 through April 1, 1982. The results of these tests are summarized in Attachment 2 to this letter.

The sulfur dioxide removal efficiency tests were conducted with both fuel oil and coal-oil-water mix fuel. The sulfur contents of the fuels ranged from 0.58 percent to 3.0 percent. The tests were conducted with dryer production rates ranging from 252 tons per hour to 300 tons per hour and with feed materials of pebble rock, rock concentrate and a blend of pebble and concentrate.

The data summarized in Attachment 2 show that the sulfur dioxide removal efficiency of the fluid-bed dryer and scrubber will exceed 60-65 percent when fuel with a 2.5 percent sulfur content is fired in the dryer.

8. Nitrogen Oxide Emission Data

The concentration of nitrogen oxides in the gases exhausted from the scrubber at the AMAX Big Four phosphate rock dryer will be in the range of 81 parts per million (volume) when the dryer is operating at maximum rated capacity. In the original permit applications, the nitrogen oxides concentration had been estimated to be 61 parts per million. The revised nitrogen oxides emission rate is based on information contained in PSD-FL-088.

Based on an 81 parts per million nitrogen oxides concentration, the present maximum nitrogen oxides emission rate from the AMAX Big Four dryer is estimated to be 26.3 pounds per hour or 98.5 tons per year. Based on this revised emission data, the maximum annual nitrogen oxides emission rate, when the dryer is fired with fuel oil and the maximum hours of operation are increased as requested in the permit applications, will be 115.3 tons per year. When the dryer is fired with a coal-oil-water mix the maximum nitrogen oxides emission rate will be 35.5 pounds per hour or 155.6 tons per year. The calculations supporting these revised emission rates are included in Attachment 3 to this letter.

The revised maximum annual nitrogen oxides emission rate will change the predicted impact of increased emissions from the AMAX Big Four dryer from 0.3 micrograms per cubic meter, annual average, to 0.4 micrograms per cubic meter, annual average. These impacts compare with an annual ambient air quality standard for nitrogen oxides of 100 micrograms per cubic meter.

Response to Hillsborough County Environmental Protection Commission Comments

The Hillsborough County Environmental Protection Commission reviewed the subject permit applications and submitted comments to your office in a memorandum dated February 25, 1983. These comments are responded to in the following paragraphs.

1. Secondary Particulate Matter Emissions

The rate of phosphate rock mining projected by AMAX will not increase as a result of using alternative fuels, as requested in the permit applications, or as a result of increasing the hours of operation of the dryer. The current rate of mining at AMAX is more than sufficient to provide all of the rock required for the dryer if the dryer were to operate at maximum rated capacity for the maximum number of hours requested in the permit application. AMAX Chemical Corporation has responded to this comment in more detail.

2. Rail Traffic

The reference to rail cars on Page 1-4 of Volume 1 of the subject PSD application is to all rail cars used to ship wet and dry phosphate rock from AMAX Big Four Mine. The reference to rail cars on Page 2-8 of Volume 1 of the PSD application is to rail cars that will be required to ship dry rock. As stated in the previous response, the rate of mining at the AMAX Big Four Mine will not increase, hence, total rail traffic will not increase.

3. Receptor Locations

The location of receptors has been addressed in the response to Item 1 of the Department's letter of March 3, 1983.

4. Additional Sulfur Dioxide Sources

In the revised air quality modeling addressed in responses 2 and 3 to the Department's letter of March 3, 1983, sulfur dioxide emissions from Gulf Coast Lead and sulfur dioxide emissions from Chloride Metals have both been included in the sulfur dioxide emission inventory.

5. Impact on Hillsborough County Particulate Matter Non-Attainment Area

A letter dated October 30, 1982 from Sholtes & Koogler, Environmental Consultants, Inc. to AMAX was forwarded to the Department in November, 1982. This letter described the impact of particulate matter emissions from the AMAX Big Four facility on the Hillsborough County Particulate Matter Non-Attainment Area. In this letter, the results of two sets of particulate matter emission rates were addressed. One set of conditions was entitled "Present Actual Emissions". The emission rates used to represent this condition were:

Rock dryer - 17.54 pounds per hour,
Dry rock storage - 2.06 pounds per hour,
Dry rock loading - 6.03 pounds per hour, and
Process boiler - 0.63 pounds per hour.

The maximum impacts of these emissions at the boundary of the Hillsborough County Particulate Matter Non-Attainment Area were 0.07 micrograms per cubic meter, annual average, and 0.8 micrograms per cubic meter, 24-hour average.

The particulate matter emission rates proposed in the subject applications are:

Rock dryer - 18.0 pounds per hour,
Dry rock storage - 2.06 pounds per hour,
Dry rock loading - 5.96 pounds per hour, and
Process boiler - 0.63 pounds per hour.

The proposed emission rates are very similar to the "Present Actual Emissions" modeled and reported to the Department in November, 1982.

Since the results of the modeling reported to the Department in November, 1982 were well below the levels defined as significant, it is apparent that the proposed emissions will result in impacts that are also well below the significant impact levels.

6. Emission Limitations

AMAX Chemical Corporation has responded to this comment in detail.

7. Sulfur Dioxide Removal Efficiency

This comment was addressed in response to Item No. 6 of the Department's letter of March 3, 1983. AMAX Chemical Corporation has also provided additional comment on this matter.

8. Short-Term Air Quality Modeling

The use of mixing heights as meteorological input data to the short-term air quality models was addressed in response to Item No. 2 in the Department's letter of March 3, 1983.

9. Wind Instrument Elevation

The height of the wind instrument at the Tampa International Airport was corrected in the revised long-term air quality modeling.

10 & 11. Meteorological Input Data

The meteorological data preprocessing program used by SKEC results in a stability class of 5 for hour number 18 of day 024, 1973 and a stability class of 4 for hour 18 of day 220, 1972.

If there are any questions regarding the information provided herein, or additional questions regarding the subject applications, please do not hesitate to contact me.

Very truly yours,

SHOLTES & KOOGLER,
ENVIRONMENTAL CONSULTANTS, INC.

John B. Koogler, Ph.D., P.E.

JBK:ldh
Attachments

cc: Mr. Fred Mullins
Mr. Dan Williams
Mr. Ivan Choronenko

ATTACHMENT 1

REVISED AIR QUALITY REVIEW

TABLE 6-2

SUMMARY OF AIR QUALITY REVIEW

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

Pollutant	Impact (ug/m^3)		
	CLASS II AREAS		
	Max. Impact New Sources	Max. Impact Existing Sources	Max. Impact All Sources
Particulate Matter			
Annual (4)	3*	40 (1)*	45 (1)*
24-Hour	17*	96	109 (2)*
Sulfur Dioxide (3)			
Annual (4)	7*	40*	35*
24-Hour	64*	71	99*
3-Hour	173	170	343
Nitrogen Oxides			
Annual	0.4	---	---

(1) Includes a background of 30 ug/m^3
(2) Includes a background of 88 ug/m^3
(3) Includes a background of zero for all time periods
(4) Impact near AMAX

NOTE: Impacts on Pinellas County Sulfur Dioxide Non-Attainment area, Hillsborough County Particulate Matter Non-Attainment area and nearest Class I Area are less than significant for all time periods.

* REVISED 4/29/83

	3-Hour SO_2 Impact (ug/m³)		
Receptor	Existing	New	All Sources
1	1	52	53
2	80	78	158
3	80	44	124
4	21	27*	66*
5	42	73*	115*
6	170	173	343
7	3	108	111
8	56	93	149
PSD Increment		512	
Air Quality Standard			1300

NOTE: SO_2 Background = 0.0

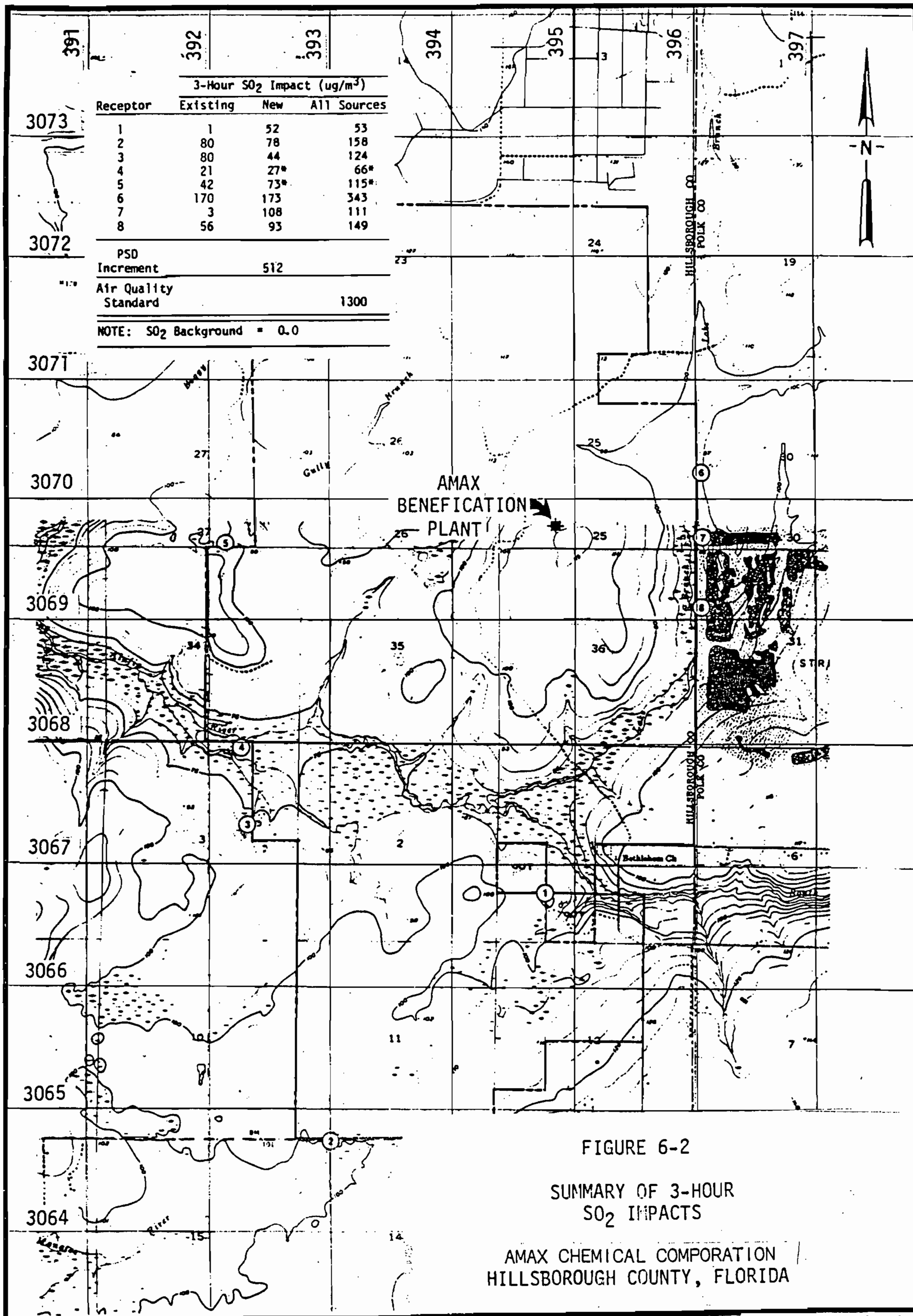


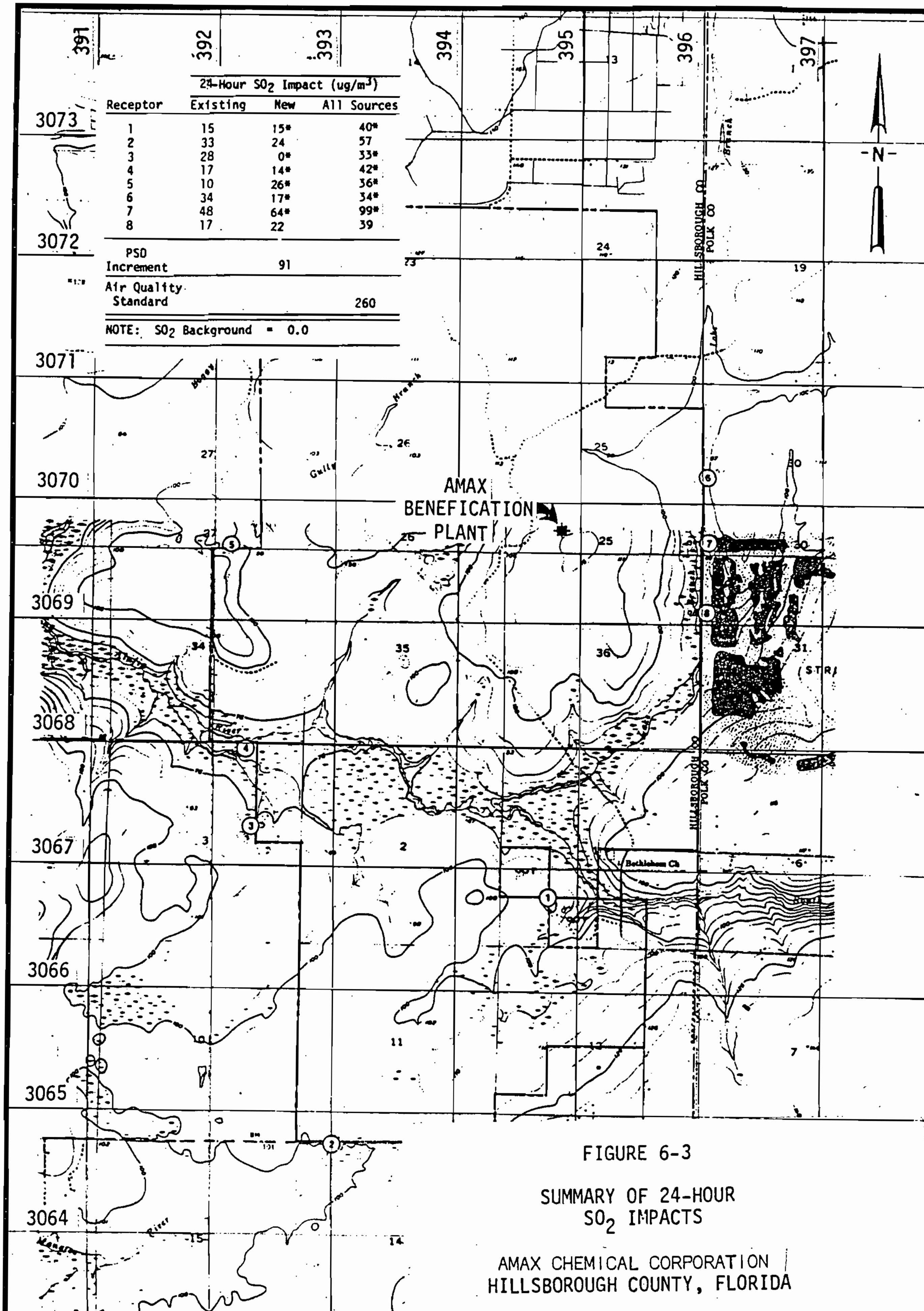
FIGURE 6-2

SUMMARY OF 3-HOUR SO_2 IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

SHOLTES & KOOGLER



Receptor	24-Hour SO_2 Impact (ug/m³) Existing	New	All Sources
1	15	15*	40*
2	33	24	57
3	28	0*	33*
4	17	14*	42*
5	10	26*	36*
6	34	17*	34*
7	48	64*	99*
8	17	22	39
PSD Increment		91	
Air Quality Standard			260

NOTE: SO_2 Background = 0.0

FIGURE 6-3

SUMMARY OF 24-HOUR SO_2 IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

SHOLTES & KOOGLER

Best Available Copy

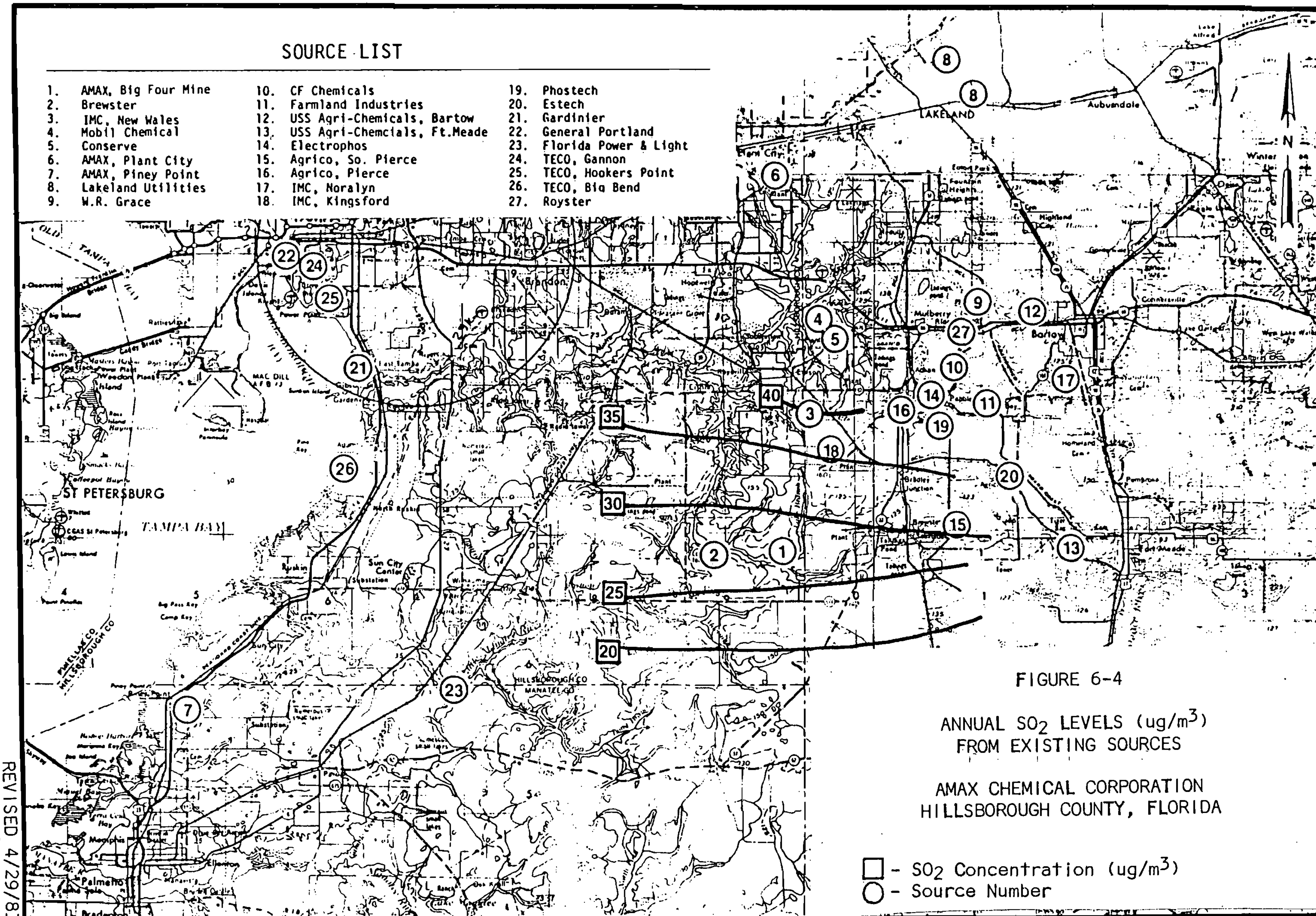


FIGURE 6-4

ANNUAL SO_2 LEVELS (ug/m^3)
FROM EXISTING SOURCES

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83
SHOLTES & KOOGLER

SOURCE LIST

1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce
16. Agrico, Pierce
17. IMC, Noralyn
18. IMC, Kingsford
19. Phostech
20. Estech
21. Gardinier
22. General Portland
23. Florida Power & Light
24. TECO, Gannon
25. TECO, Hookers Point
26. TECO, Big Bend
27. Royster

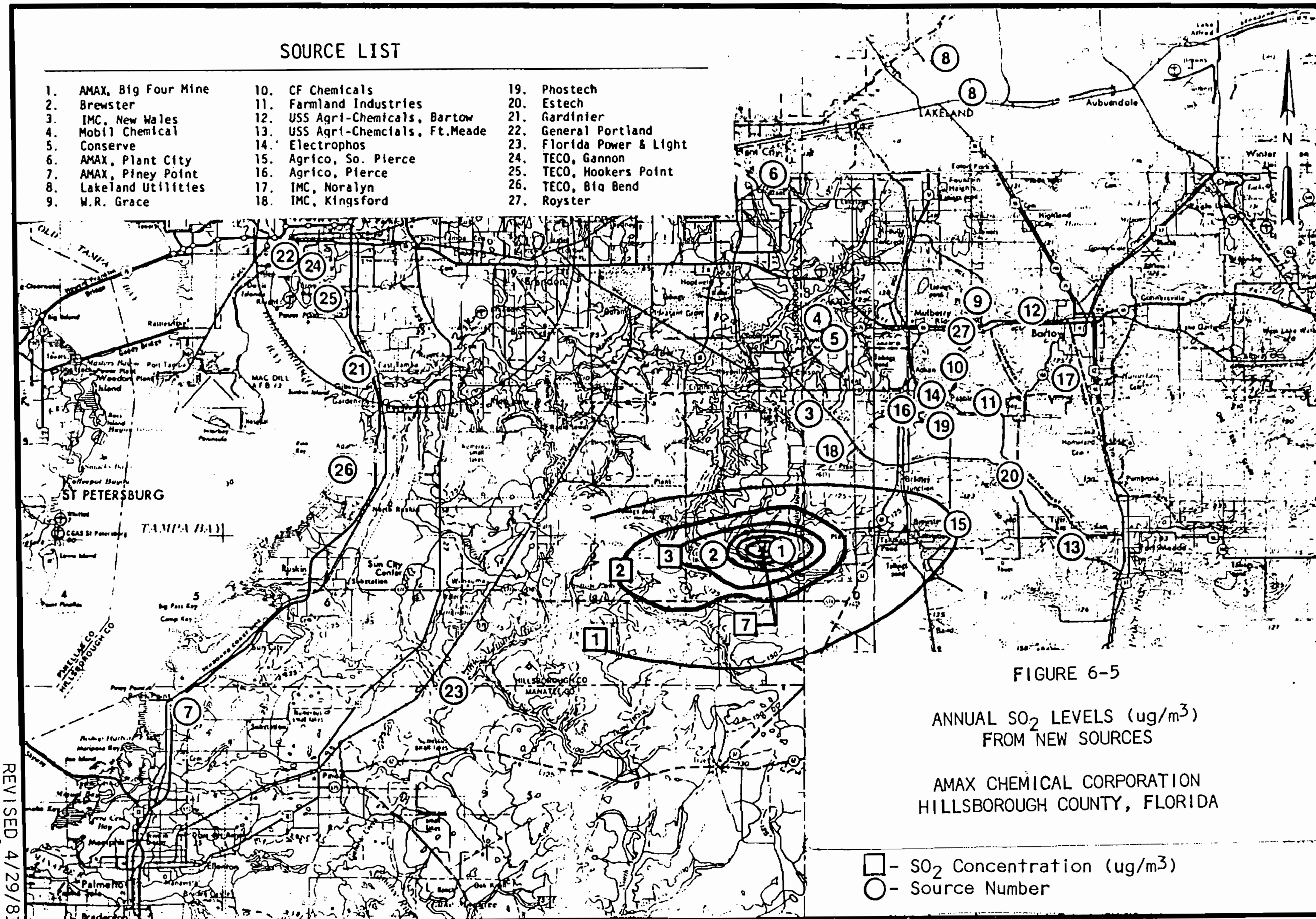


FIGURE 6-5

ANNUAL SO_2 LEVELS (ug/m^3) FROM NEW SOURCES

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - SO_2 Concentration (ug/m^3)
○ - Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

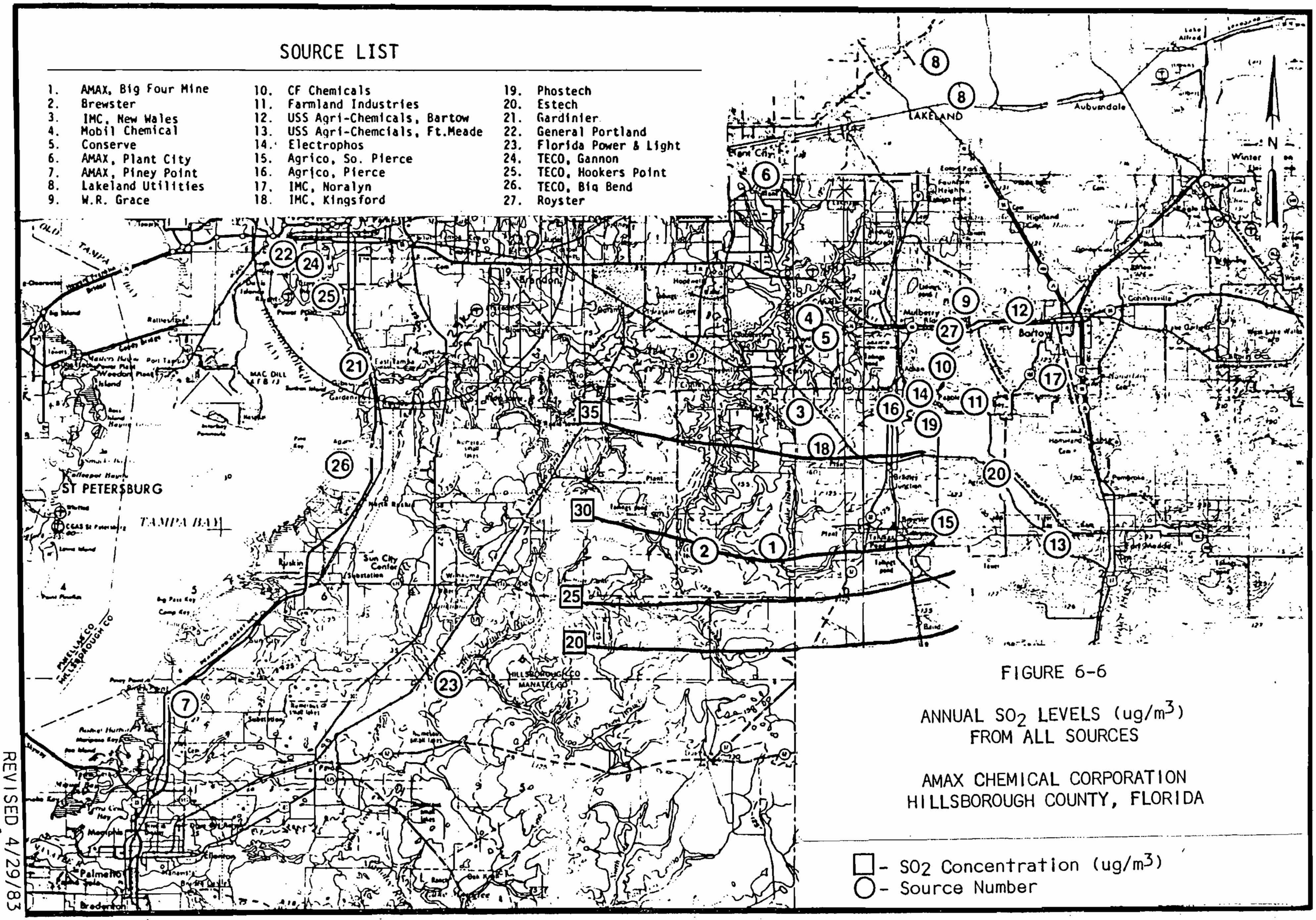
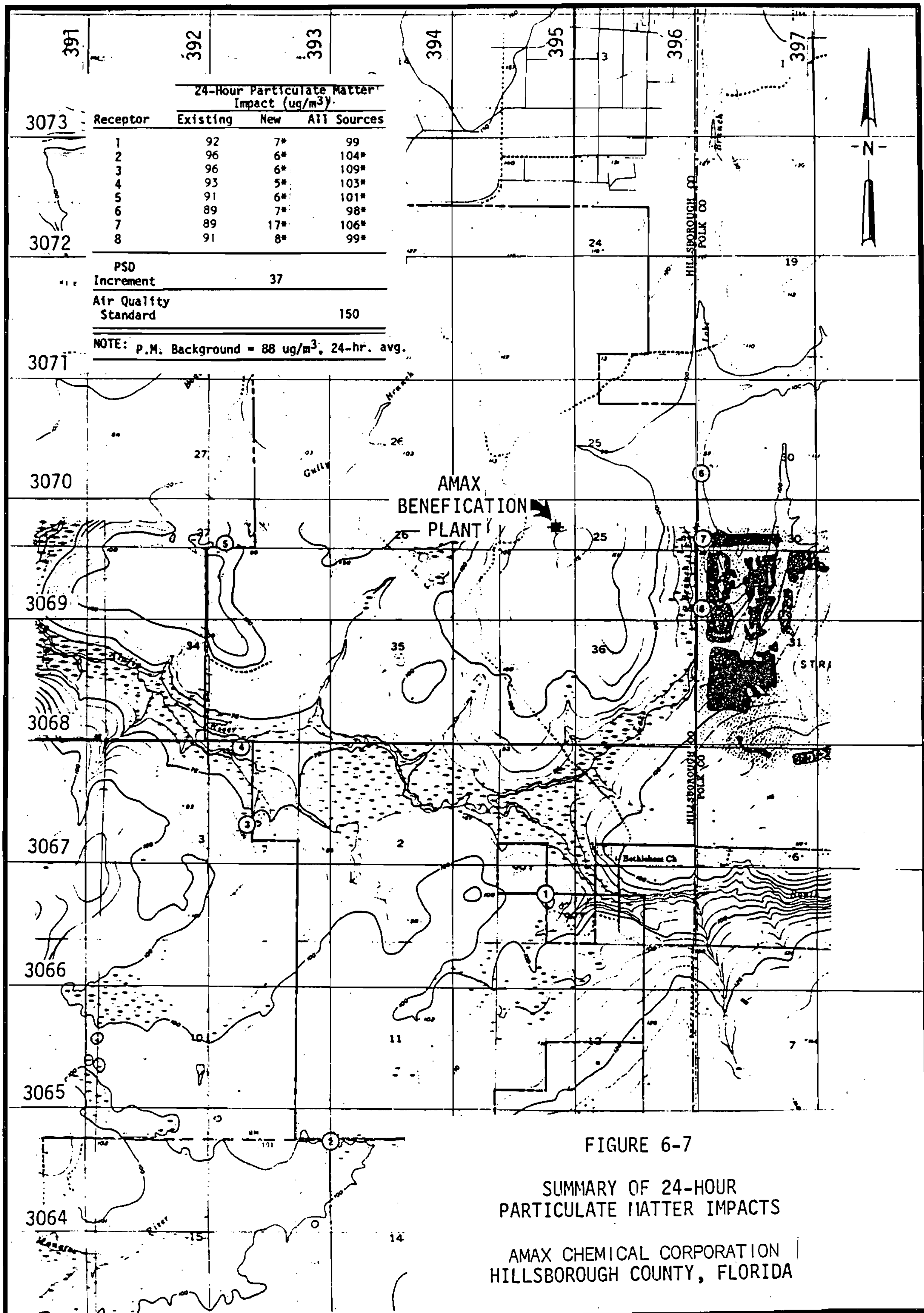


FIGURE 6-6

ANNUAL SO_2 LEVELS (ug/m^3)
FROM ALL SOURCES

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83
SHOLTES & KOOGLER



Receptor	24-Hour Particulate Matter Impact (ug/m³) Existing	New	All Sources
1	92	7*	99
2	96	6*	104*
3	96	6*	109*
4	93	5*	103*
5	91	6*	101*
6	89	7*	98*
7	89	17*	106*
8	91	8*	99*
PSD Increment		37	
Air Quality Standard			150

NOTE: P.M. Background = 88 ug/m^3, 24-hr. avg.

FIGURE 6-7

SUMMARY OF 24-HOUR PARTICULATE MATTER IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

SHOLTES & KOOGLER

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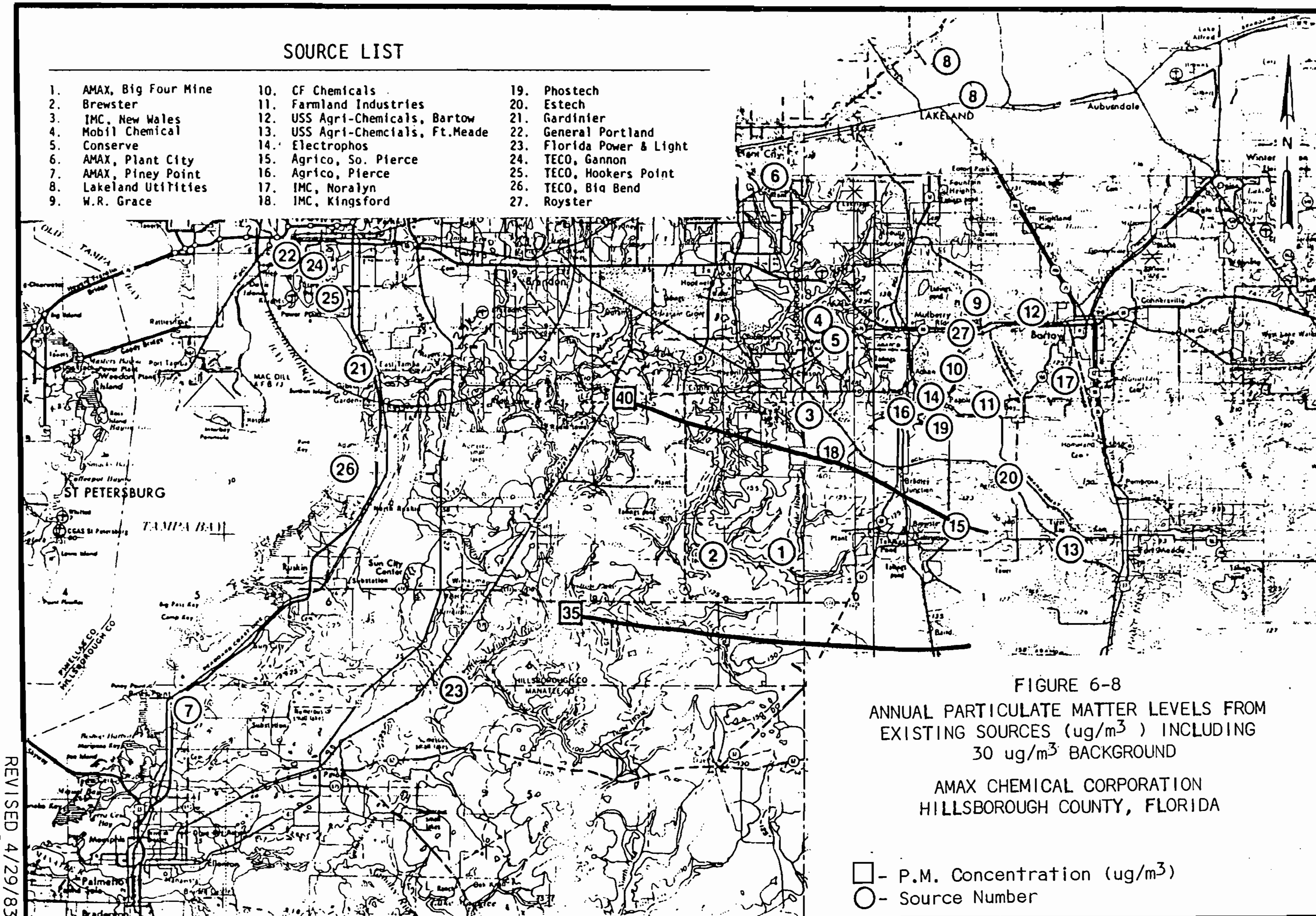


FIGURE 6-8
ANNUAL PARTICULATE MATTER LEVELS FROM EXISTING SOURCES (ug/m^3) INCLUDING 30 ug/m^3 BACKGROUND

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83
SHOLTES & KOOGLER

Best Available Copy

SOURCE LIST

1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce
16. Agrico, Pierce
17. IMC, Noralyn
18. IMC, Kingsford
19. Phostech
20. Estech
21. Gardinier
22. General Portland
23. Florida Power & Light
24. TECO, Gannon
25. TECO, Hookers Point
26. TECO, Big Bend
27. Royster

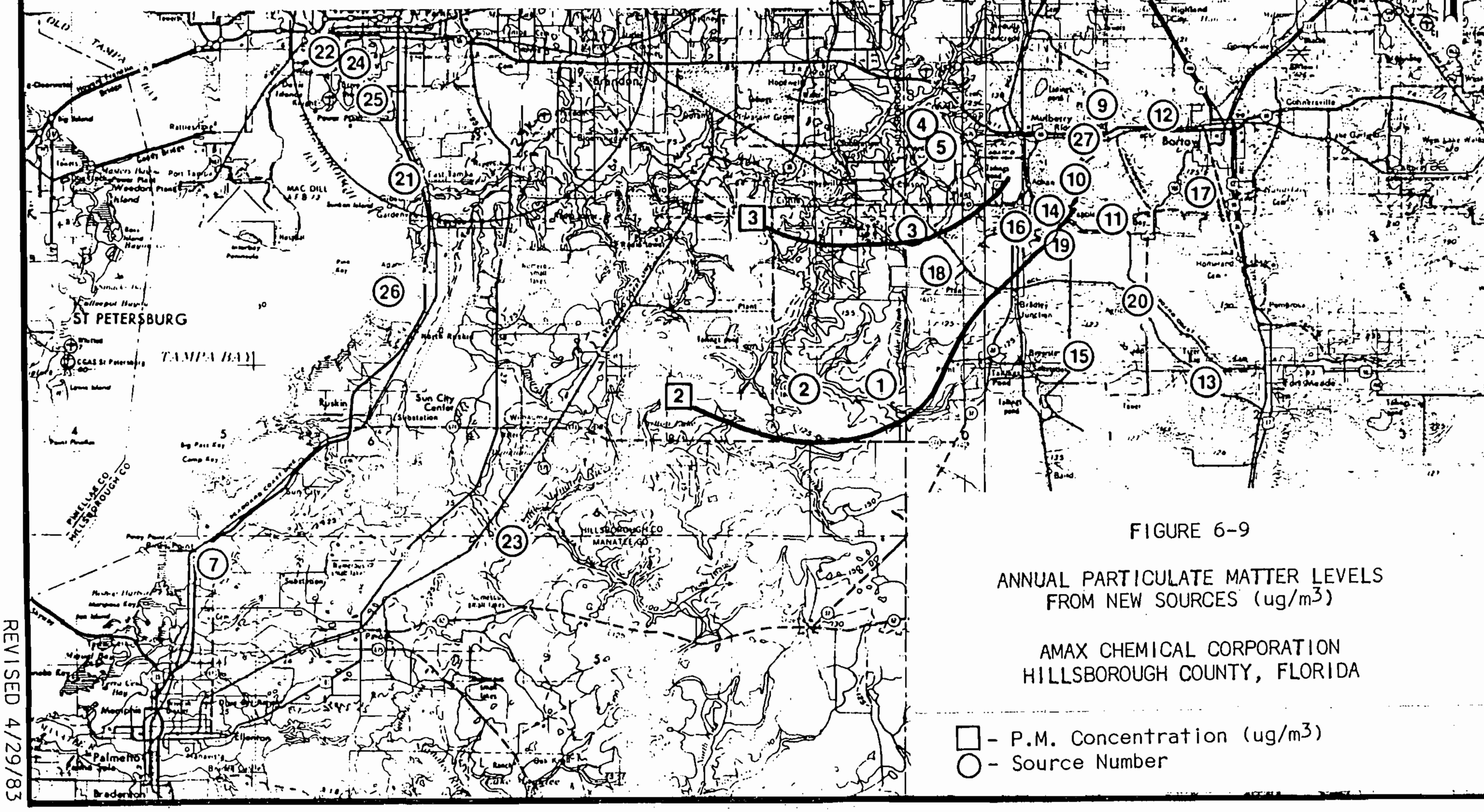


FIGURE 6-9

ANNUAL PARTICULATE MATTER LEVELS FROM NEW SOURCES (ug/m³)

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - P.M. Concentration (ug/m³)
○ - Source Number

REVISED 4/29/83

SHOLTES & KOOGLER

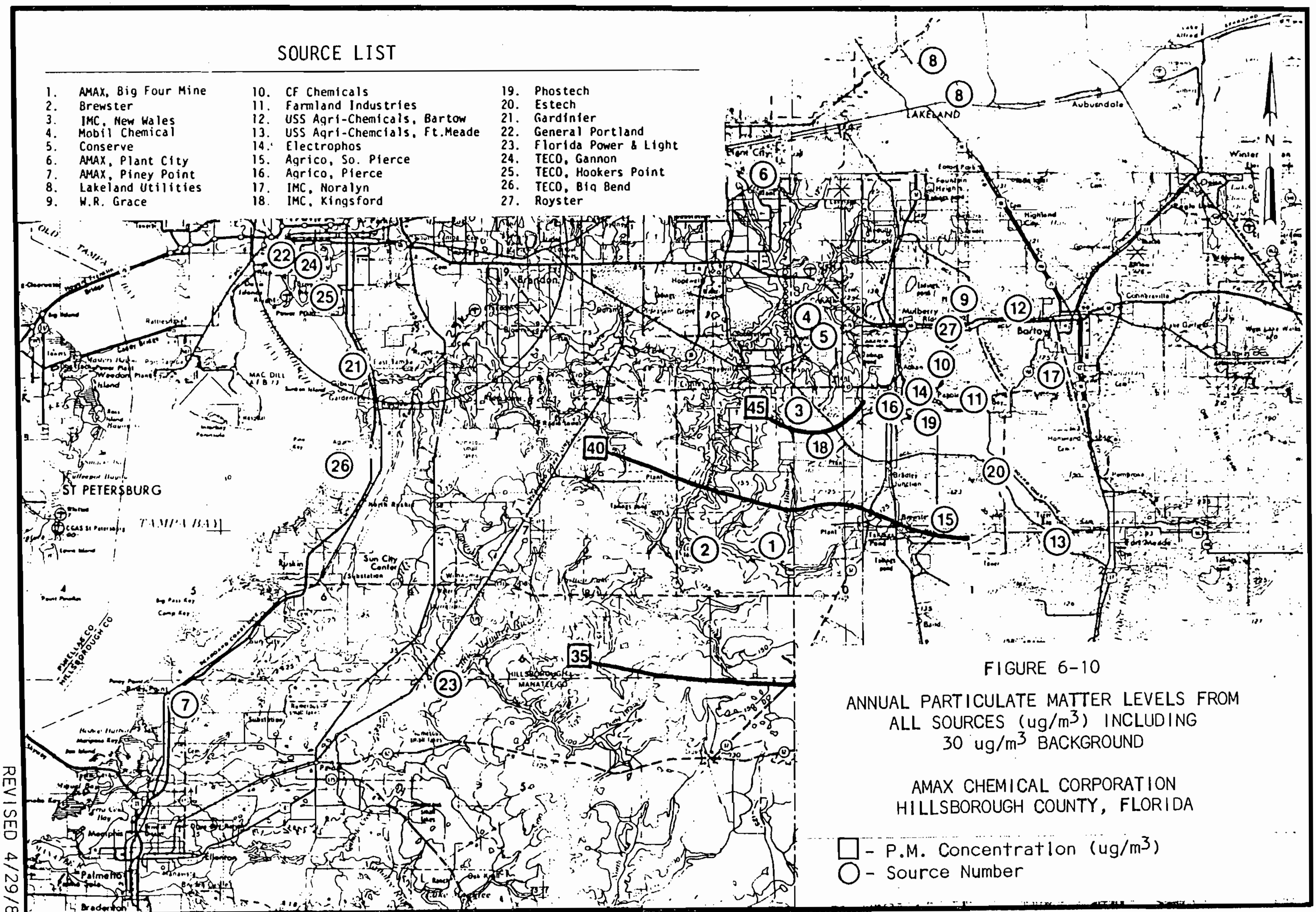


FIGURE 6-10

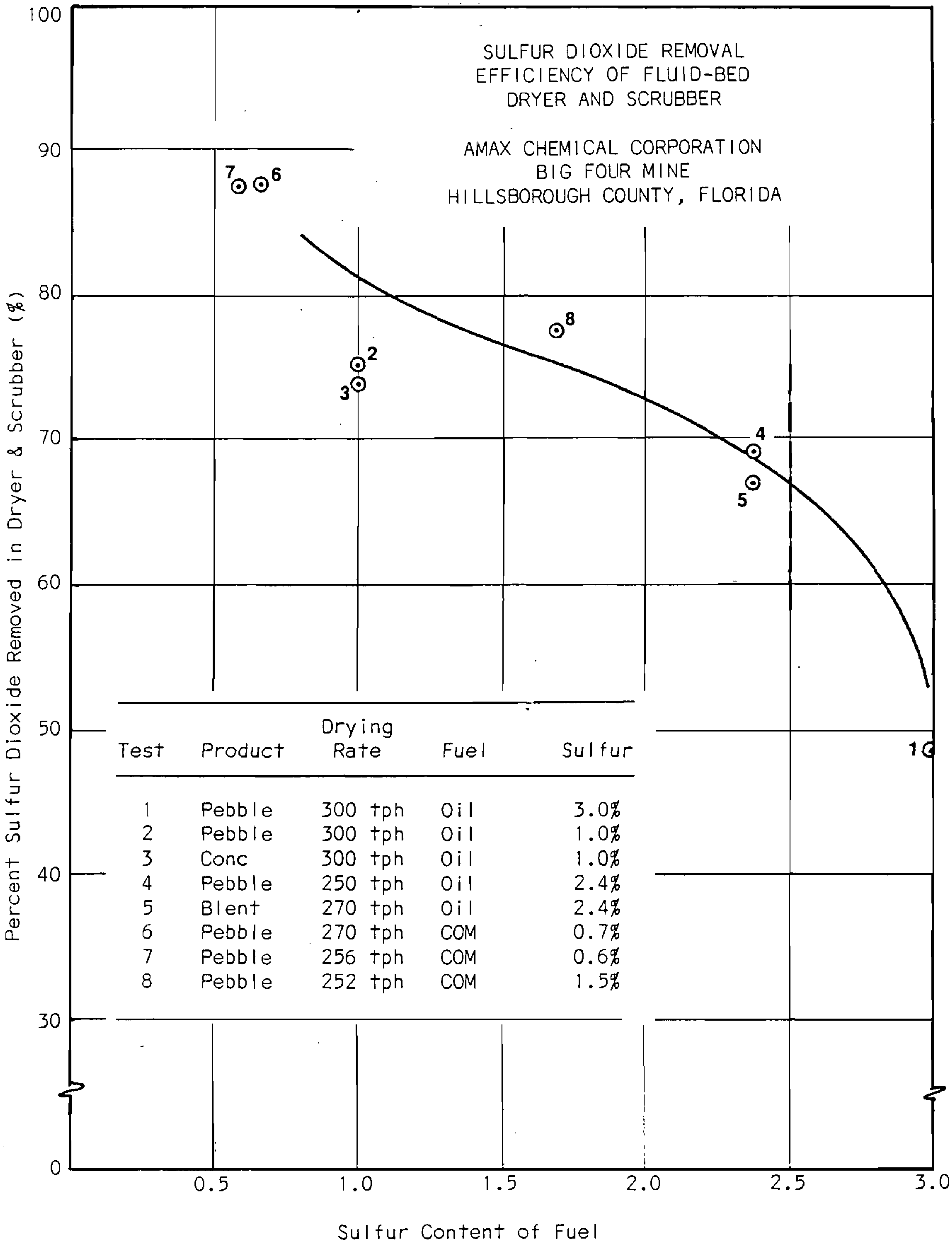
ANNUAL PARTICULATE MATTER LEVELS FROM ALL SOURCES (ug/m^3) INCLUDING 30 ug/m^3 BACKGROUND

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83
SHOLTES & KOOGLER

ATTACHMENT 2

SULFUR DIOXIDE
REMOVAL EFFICIENCY DATA



Test	Product	Drying Rate	Fuel	Sulfur
1	Pebble	300 tph	Oil	3.0%
2	Pebble	300 tph	Oil	1.0%
3	Conc	300 tph	Oil	1.0%
4	Pebble	250 tph	Oil	2.4%
5	Blent	270 tph	Oil	2.4%
6	Pebble	270 tph	COM	0.7%
7	Pebble	256 tph	COM	0.6%
8	Pebble	252 tph	COM	1.5%

SHOLTES & KOOGLER

ATTACHMENT 3

NITROGEN OXIDES
EMISSION RATE CALCULATIONS

Emission Rate Calculations

Rock Dryer

Present

Particulate Matter

= 10.29 lb/hr permitted (actual emissions are equal to or greater than this rate)

× 7488/2000

= 38.5 tpy

Sulfur Dioxide

$= (125 \times 10^6 \text{ BTU/hr})(1/18502 \text{ BTU/lb})(0.007 \times 2 \frac{\text{lb } SO_2}{\text{lb oil}})$

= 94.58 lb/hour

× 7488/2000

= 354.1 tpy

Nitrogen Oxides

Based on a flow of 45350 scfm (actual) and a concentration of 81 ppm (see PSD-FL-088; Brewster) *

$= (45350 \text{ ft}^3/\text{min})(60 \text{ min/hr})(81 \times 10^{-6} \frac{\text{ft}^3 NO_x}{\text{ft}^3})$ *

$\times (1/385 \text{ ft}^3 NO_x/\text{lb-mole})(46 \text{ lb } NO_x/\text{lb-mole})$

= 26.33 lb/hr *

× 7488/2000

= 98.5 tpy *

Carbon Monoxide

Based on 5 lb CO/1000 gal (AP-42)

$= (125 \times 10^6 \text{ BTU/hr})(1/149500 \text{ BTU/gal})$

× (5/1000 lb CO/gal)

= 4.18 lb/hour

× 7488/2000

= 15.6 tpy

Hydrocarbons

Based on 1.0 lb HC/1000 gal (AP-42)

$= (125 \times 10^6)(1/149500)(1/1000)$

= 0.84 lb/hour

× 7488/2000

= 3.1 tpy

* Revised 4/28/83

NITROGEN OXIDES

For fuel oil combustion an NO_x stack gas concentration of 81 ppm was assumed (PSD-FL-088; Brewster). *
For coal combustion this concentration was increased by a factor equal to the AP-42 coal NO_x emission factor divided by the AP-42 oil NO_x emission factor. For COM the NO_x emission factor was calculated as:

(Oil NO_x factor)(0.45) + (Coal NO_x factor)(0.55)

NO_x from Coal - AP-42

= 18 lb/ton × (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)

= 0.67 lb NO_x/10^6 BTU

NO_x from Oil - AP-42

= 60 lb/1000 gal × (1/1000)(1/147040 BTU/gal)(10^6)

= 0.41 lb NO_x/10^6 BTU

NO_x emissions from Oil (same as present)

= 26.33 lb/hr *

NO_x emissions from Coal (by ratio)

= 26.33 (0.67/0.41) *

= 43.04 lb/hr *

NO_x emissions from COM

= 26.33 (0.45) + 43.04 (0.55) *

= 35.52 lb/hr *

× 8760/2000

= 155.6 tpy *

* Revised 4/28/83