



DEPT. OF ENV. REG. 12/27/82

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 New¹ Existing¹ (New for PSD purposes)

APPLICATION TYPE: Construction Operation 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: [Signature]

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: [Signature]

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

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

(Affix Seal)

¹See 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 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? | <u>YES</u> |
| a. If yes, has "offset" been applied? | <u>Not Applicable</u> |
| b. If yes, has "Lowest Achievable Emission Rate" been applied? | <u>Not Applicable</u> |
| c. If yes, list non-attainment pollutants. | |
| <u>Ozone and Volatile Organic Carbons</u> | |
| 2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. | <u>YES</u> |
| 3. Does the State "Prevention of Significant Deterioration" (PSD) requirements apply to this source? If yes, see Sections VI and VII. | <u>YES</u> |
| 4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? | <u>YES</u> |
| 5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? | <u>NO</u> |

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)

- Total Process Input Rate (lbs/hr): 600,000 (including 10-15% moisture)
- 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
NO _x	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)

D. Control Devices: (See Section V, Item 4) These numbers represent average, the max would be 1500 lbs/hr or 5616 tons/year.

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, Type M160, Size 88	Sulfur Dioxide	48-78%	Not Applicable	Test Data

¹See Section V, Item 2.

²Reference 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)

³Calculated from operating rate and applicable standard

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

⁵If Applicable

E. Fuels $19.9 \times 42 = 835.8 \text{ gal}$
 $(157)(.7) (835.8) = 91.85 \frac{\text{\#SO}_2}{\text{hr}} = .73 \frac{\text{\#SO}_2}{10^6 \text{ BTU}}$
 $\frac{1000}{125 \times 10^6}$

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 °F 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 8" 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 8" 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 8" 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?
 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 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.

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" empirical 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:

$$\begin{aligned} &7.93 \text{ GPM firing rate} \times 9.3 \text{ lbs/gallon Density} = 73.75 \text{ lbs/min.} \\ &\times 60 \text{ min/hr} = 4,425 \text{ lbs/hour} \times 14,704 \text{ BTU/lb heat Content} \\ &= 65,064,318 \text{ BTU/hour heat input.} \end{aligned}$$

$$65.06 \text{ MMBTU/hr} \times 1.1 \text{ lbs SO}_2\text{/MMBTU input}$$

$$71.57 \text{ lbs SO}_2\text{/hour allowable emissions}$$

$$\text{Actual Emissions} = 30.8 \text{ lbs/hour SO}_2$$

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:

$$0.06 \text{ lbs of particulate/ton of rock input} \times 300 \text{ tons/hour phosphate rock input} = 18.0 \text{ lbs/hour allowable particulate emissions.}$$

$$\text{Actual Emissions} = 17.49 \text{ lbs/hr particulate.}$$

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:

Run	Stack Conditions		Particulate Emissions		Sulfur Dioxide Emissions
	DSCFM	Temp ^o 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

GT/rit

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



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.: 9.9
Flash: 257°F
Viscosity (@ 122°F): 16,500 cps
Chlorine 0.11

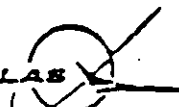
Percentages are by weight

4,140 Gallons

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	<u>100,000+</u>	140	<u>8,410</u>
60	<u>100,000+</u>	150	<u>6320</u>
70	<u>100,000+</u>	160	<u>3950</u>
80	<u>80,000</u>	170	<u>1440</u>
90	<u>56,000</u>	180	<u>810</u>
100	<u>42,000</u>	190	<u>600</u>
110	<u>33,600</u>	200	<u>475</u>
120	<u>18,800</u>	220	<u>590</u>
130	<u>11,450</u>	240	<u>195</u>

Name William R. Brown
Position Quality Control Dept



EMISSION RATE CALCULATIONS

Basis: 125×10^6 heat input/hr

PROPOSED ACTUAL

PARTICULATE MATTER

$$= 300 \text{ tons/hr} \times 0.06 \text{ lb/ton}$$

$$= 18.00 \text{ lb/hr}$$

$$\times 8760/2000$$

$$= 78.8 \text{ tpy}$$

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT

$$= (1.1 \text{ lb SO}_2/10^6 \text{ BTU})(118 \times 10^6 \text{ BTU/hr})$$

$$= 129.80 \text{ lb/hr}$$

$$\times 8760/2000$$

$$= 568.5 \text{ tpy}$$

$$\frac{1.1 \text{ #SO}_2/10^6 \text{ Btu} \times 125 \times 10^6}{1000}$$

$$137.5 \text{ #SO}_2/\text{hr}$$

$$602.25 \text{ TPY}$$

$$\frac{(157)(.7)(19.9)(42)}{1000} = 91.8 \text{ #SO}_2/\text{hr}$$

Uncontrolled with 0.7% Sulfur fuel oil
 $= (118 \times 10^6 \text{ BTU/hr})(1/149500 \text{ BTU/gal})(8.08 \text{ lb/gal})$
 $\times (0.007 \times 2 \text{ lb SO}_2/\text{lb fuel})$
 $= 87.0 \text{ lb/hr}$
 $< 129.8 \text{ lb/hr}$; therefore no SO₂ sorption is necessary to meet the proposed emission limiting standard

$$\frac{(157)(2.5)(19.9)(42)}{1000} = 328 \text{ #SO}_2/\text{hr}$$

Uncontrolled with 2.5% Sulfur fuel oil
 $= (118 \times 10^6 \text{ BTU/hr})(1/147095 \text{ BTU/gal})(8.29 \text{ lb/gal})$
 $\times (0.025 \times 2 \text{ lb SO}_2/\text{lb fuel})$
 $= 332.6 \text{ lb/hr}$
 Absorption necessary to meet proposed std
 $= (332.6 - 129.8) \times 100 / 332.6$
 $= 61.0\%$

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

$$\frac{125 \times 10^6}{14.704} = 8500 \text{ #com/hr}$$

Uncontrolled with 2.50% Sulfur COM
 $= (109 \times 10^6 \text{ BTU/hr})(1/135876 \text{ BTU/gal})(9.3 \text{ lb/gal})$
 $\times (0.025 \times 2 \text{ lb SO}_2/\text{lb fuel})$
 $= 373.0 \text{ lb/hr}$
 Absorption necessary to meet proposed std
 $= (373.0 - 129.8) \times 100 / 373.0$
 $= 65.2\% \checkmark$

COM 40% Coal - 10% water - 50% oil

$$8500 \times .4 = 3400 \text{ # Coal}$$

$$8500 \times .5 = 4250 \text{ # oil}$$

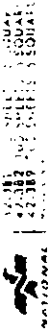
AP-42 (2.5% S)

$$\text{Coal} - \frac{39(2.5)}{\text{Ton}} \cdot 1.7 = 165.75 \text{ #SO}_2$$

$$\text{oil} - \frac{157(2.5)(525)}{1000} = 206.06 \text{ #SO}_2$$

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

$$371.81 \text{ #SO}_2 \text{ TOTAL}$$



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:

$$(\text{Oil } \text{NO}_x \text{ factor})(0.45) + (\text{Coal } \text{NO}_x \text{ factor})(0.55)$$

NO_x from Coal - AP-42

$$= 18 \text{ lb/ton}$$

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

$$= 0.67 \text{ lb } \text{NO}_x / 10^6 \text{ BTU}$$

NO_x from Oil - AP-42

$$= 60 \text{ lb/1000 gal}$$

$$\times (1/1000) (1/147040 \text{ BTU/gal}) (10^6)$$

$$= 0.41 \text{ lb } \text{NO}_x / 10^6 \text{ BTU}$$

NO_x emissions from Oil (same as present)

$$= 19.83 \text{ lb/hr}$$

NO_x emissions from Coal (by ratio)

$$= 19.83 (0.67 / 0.41)$$

$$= 32.41 \text{ lb/hr}$$

NO_x emissions from COM

$$= 19.83 (0.45) + 32.41 (0.55)$$

$$= 26.75 \text{ lb/hr}$$

$$\times 8760 / 2000$$

$$= 117.2 \text{ tpy}$$

CARBON MONOXIDE

$$\begin{aligned} \text{CO from Coal - AP-42} \\ &= 1 \text{ lb/ton} \\ &\quad \times (1/2000 \text{ lb/ton}) (1/13350 \text{ BTU/lb}) (10^6) \\ &= 0.037 \text{ lb CO} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{CO from Oil - AP-42 (Same as present)} \\ &= 4.18 \text{ lb/hr} @ 125 \times 10^6 \text{ BTU/hr} \\ &= 0.033 \text{ lb CO} / 10^6 \text{ BTU} \end{aligned}$$

CO emissions from COM

$$\begin{aligned} &= 4.18(0.45) + 4.18(0.037/0.033)(0.55) \\ &= 4.46 \text{ lb/hr} \\ &\quad \times 8760/2000 \\ &= 19.5 \text{ tpy} \end{aligned}$$

HYDROCARBONS

$$\begin{aligned} \text{HC from Coal - AP-42} \\ &= 0.3 \text{ lb/ton} \\ &\quad \times (1/2000 \text{ lb/ton}) (13350 \text{ BTU/lb}) (10^6) \\ &= 0.011 \text{ lb HC} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{HC from Oil - AP-42 (Same as present)} \\ &= 0.84 \text{ lb/hr} @ 125 \times 10^6 \text{ BTU/hr} \\ &= 0.007 \text{ lb HC} / 10^6 \text{ BTU} \end{aligned}$$

HC emissions from COM

$$\begin{aligned} &= 0.84(0.45) + 0.84(0.011/0.007)(0.55) \\ &= 1.14 \text{ lb/hr} \\ &\quad \times 8760/2000 \\ &= 5.0 \text{ tpy} \end{aligned}$$

PROPOSED Uncontrolled

PARTICULATE MATTER - Based on 97% efficiency determined by test data

$$\begin{aligned}
 &= 18.00 (1/[1-0.97]) \\
 &= 600 \text{ lb/hr (average)} \\
 &\quad \times 8760/2000 \\
 &= 2626 \text{ tpy}
 \end{aligned}$$

SULFUR DIOXIDE

$$\begin{aligned}
 &= 373.06/\text{hr} - \text{from previous section} \\
 &\quad \times 8760/2000 \\
 &= 1634 \text{ tpy}
 \end{aligned}$$

NO_x

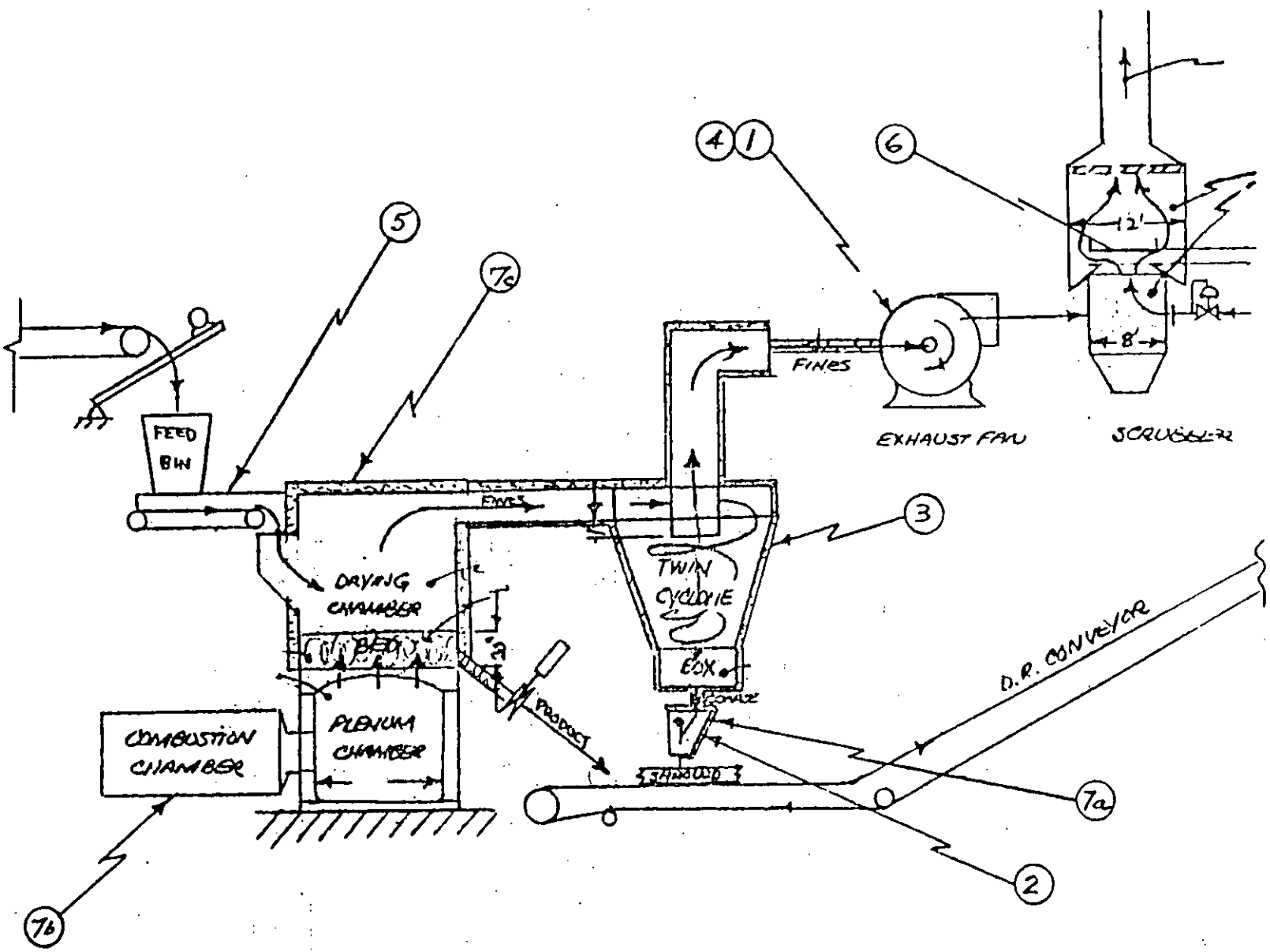
$$\begin{aligned}
 &= 26.7 \text{ lb/hr and } 117.2 \text{ tpy} \\
 &\quad (\text{same as Actual})
 \end{aligned}$$

CO

$$\begin{aligned}
 &= 4.5 \text{ lb/hr and } 19.5 \text{ tpy} \\
 &\quad (\text{same as Actual})
 \end{aligned}$$

HC

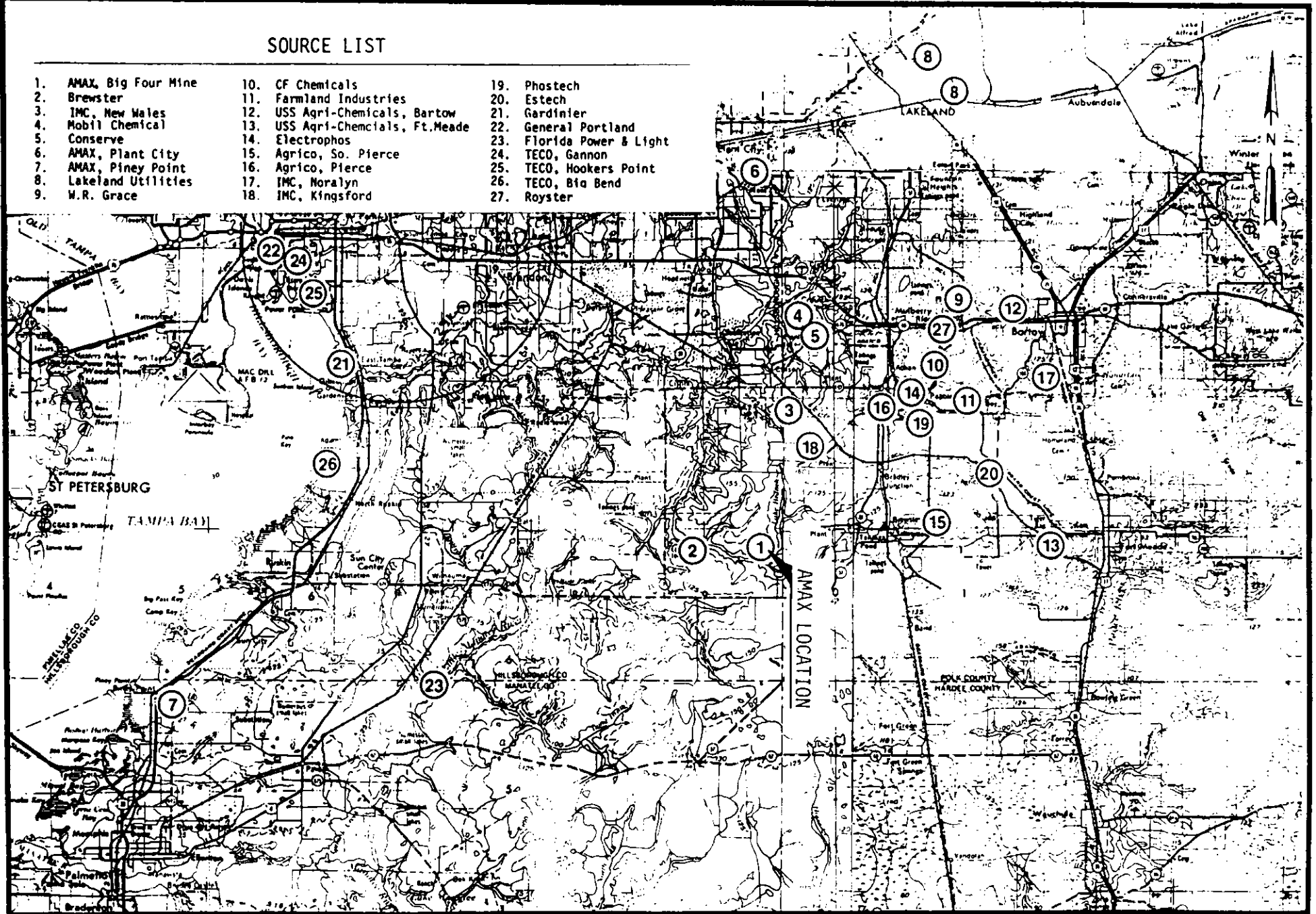
$$\begin{aligned}
 &= 1.1 \text{ lb/hr and } 5.0 \text{ tpy} \\
 &\quad (\text{same as Actual})
 \end{aligned}$$

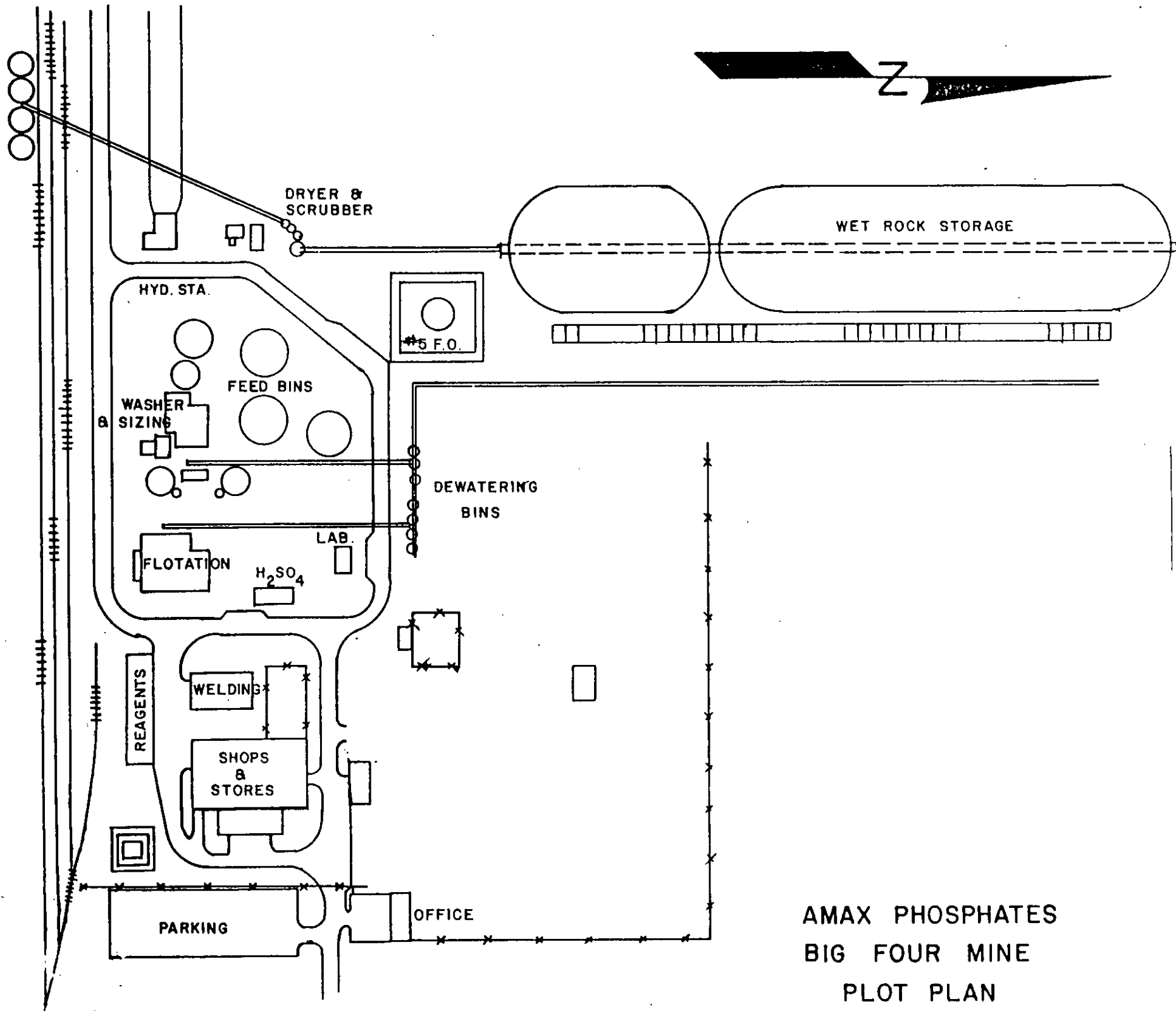


SCHMATIC DRYER ARRANGEMENT

SOURCE LIST

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





AMAX PHOSPHATES
 BIG FOUR MINE
 PLOT PLAN



APPLICATION FOR STATE AND FEDERAL
PSD APPROVAL

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

VOLUME I

JANUARY 1983



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SHOLTES & KOOGLER
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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.

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)

$$\frac{40,000 \times 0.03}{7000} \times 60 = 10.28$$

.034

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	NO _x	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
<hr/>					
Dry Rock Storage					
Present	7.7				
Proposed	9.0				
Max. Increase	1.3				
<hr/>					
Dry Rock Loadout					
Present	7.5				
Proposed	8.7				
Max. Increase	1.2				
<hr/>					
Boiler	N O C H A N G E				
<hr/>					
Traffic	A L L C H A N G E S < 0.1 T P Y				
<hr/>					
Total Increase	42.8	214.4	43.0	3.9	1.9
<hr/>					
Significant Increase	25	40	40	100	40
<hr/>					

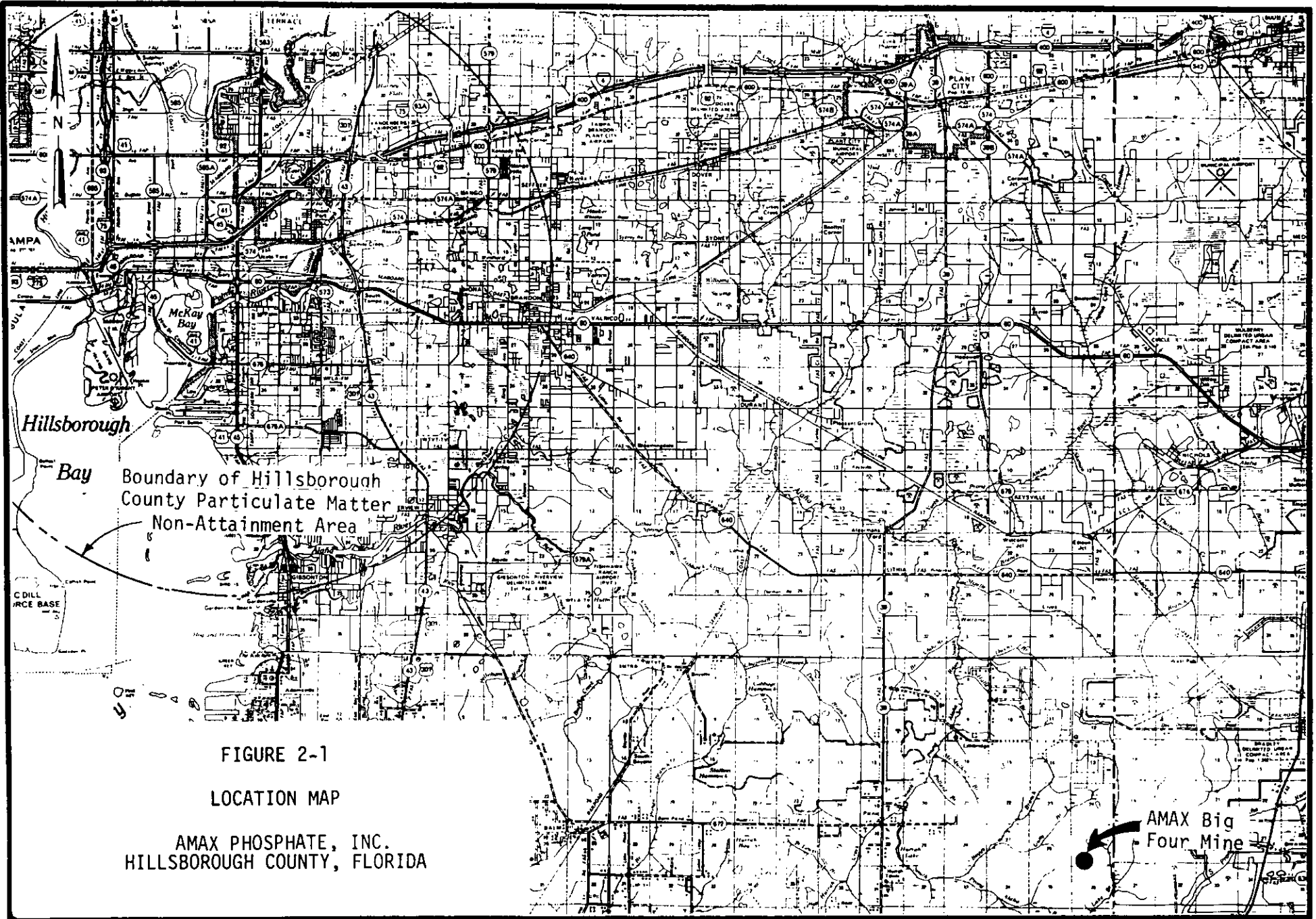


FIGURE 2-1
 LOCATION MAP
 AMAX PHOSPHATE, INC.
 HILLSBOROUGH COUNTY, FLORIDA

2-11

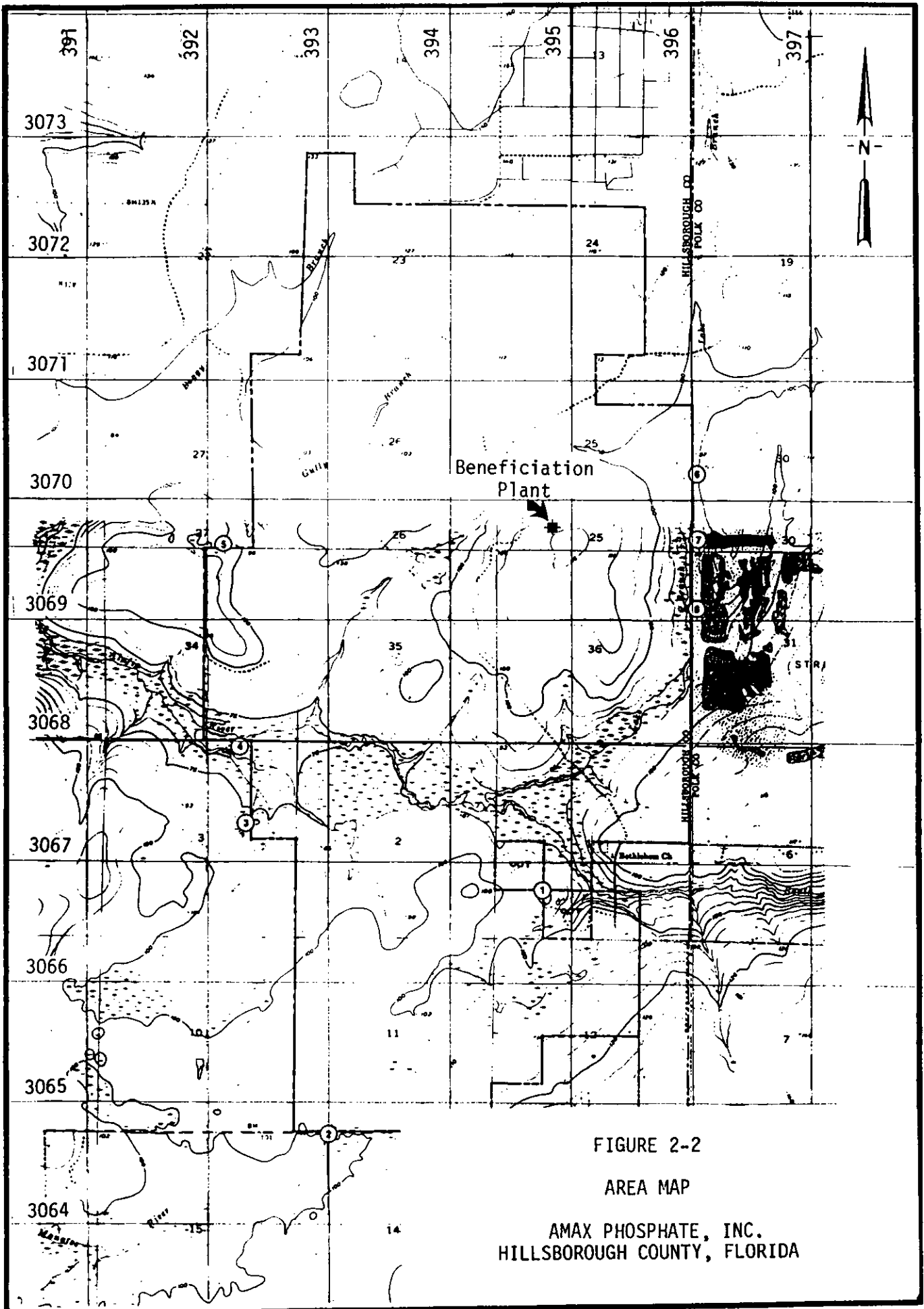


FIGURE 2-2

AREA MAP

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

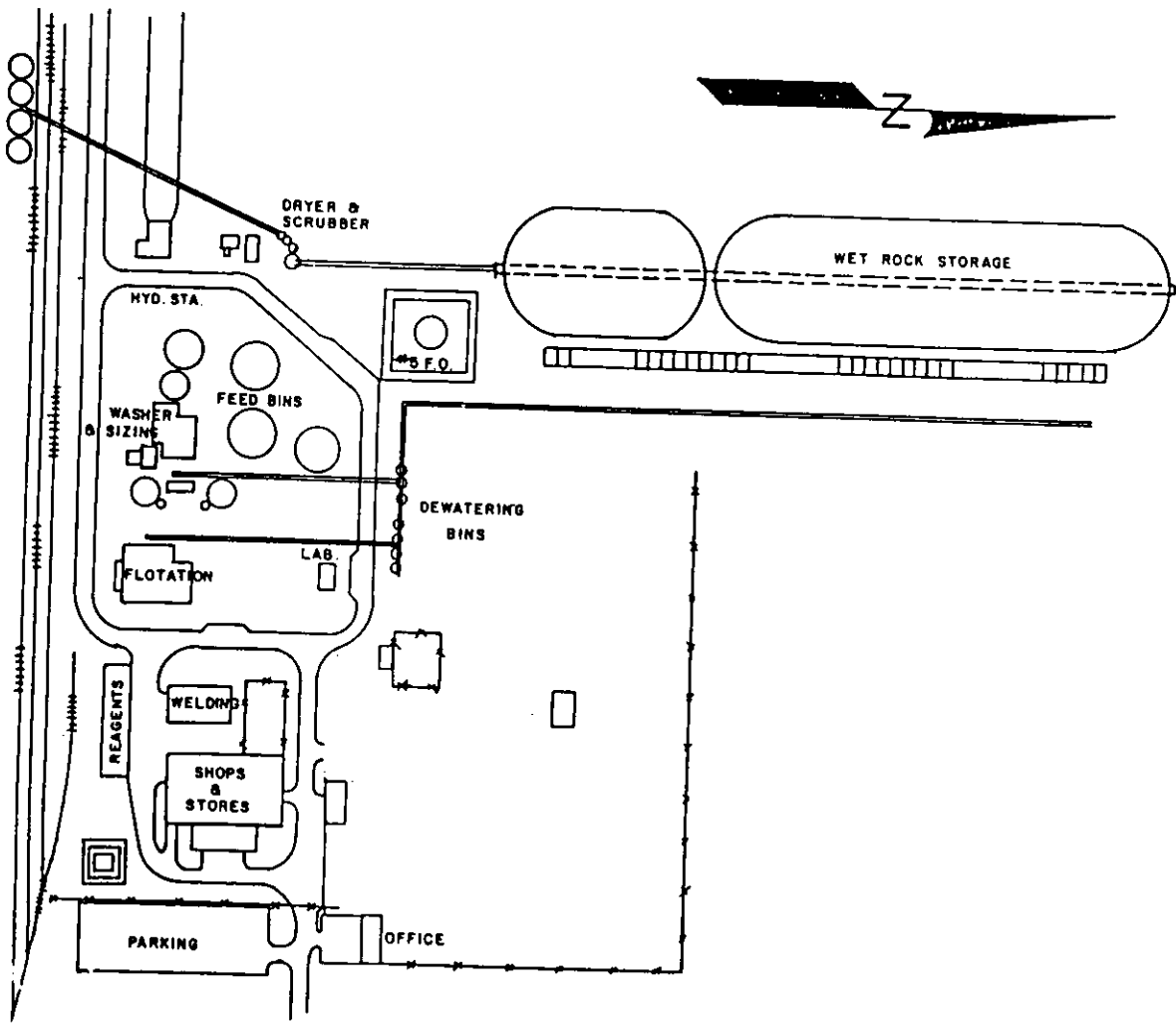


FIGURE 2-3

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)
 SO₂ = 94.58 lb/hr (0.757 lb/10⁶ 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)
 SO₂ = 129.8 lb/hr (1.1 lb/10⁶ 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)

$$\begin{aligned} & \times 7488/2000 \\ & = 38.5 \text{ tpy} \end{aligned}$$

SULFUR DIOXIDE

$$\begin{aligned} & = (125 \times 10^6 \text{ BTU/hr}) (1/18502 \text{ BTU/lb}) (0.007) \times 2 \frac{\text{lb SO}_2}{\text{lb oil}} \\ & = 94.58 \text{ lb/hour} \end{aligned}$$

$$\begin{aligned} & \times 7488/2000 \\ & = 354.1 \text{ tpy} \end{aligned}$$

NITROGEN OXIDES

Based on a flow of 45350 scfm (actual) and a concentration of 61 ppm (see PSD-FL-008; Brewster)

$$\begin{aligned} & = (45350 \text{ ft}^3/\text{min}) (60 \text{ min/hr}) (61 \times 10^{-6} \frac{\text{ft}^3 \text{NO}_x}{\text{ft}^3}) \\ & \quad \times (1/385 \text{ ft}^3 \text{NO}_x/\text{lb-mole}) (46 \text{ lb NO}_x/\text{lb-mole}) \end{aligned}$$

$$\begin{aligned} & = 19.83 \text{ lb/hr} \\ & \quad \times 7488/2000 \\ & = 74.2 \text{ tpy} \end{aligned}$$

CARBON MONOXIDE

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

$$\begin{aligned} & = (125 \times 10^6 \text{ BTU/hr}) (1/149500 \text{ BTU/gal}) \\ & \quad \times (5/1000 \text{ lb CO/gal}) \end{aligned}$$

$$\begin{aligned} & = 4.18 \text{ lb/hour} \\ & \quad \times 7488/2000 \\ & = 15.6 \text{ tpy} \end{aligned}$$

HYDROCARBONS

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

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

$$\begin{aligned} & = 0.84 \text{ lb/hour} \\ & \quad \times 7488/2000 \\ & = 3.1 \text{ tpy} \end{aligned}$$

ROCK DRYER (CONT.)PROPOSED

PARTICULATE MATTER

$$\begin{aligned}
 &= 300 \text{ tons/hr} \times 0.06 \text{ lb/ton} \\
 &= 18.00 \text{ lb/hr} \\
 &\quad \times 8760/2000 \\
 &= 78.8 \text{ tpy}
 \end{aligned}$$

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT

$$\begin{aligned}
 &= (1.1 \text{ lb SO}_2/10^6 \text{ BTU}) (118 \times 10^6 \text{ BTU/hr}) \\
 &= 129.80 \text{ lb/hr} \\
 &\quad \times 8760/2000 \\
 &= 568.5 \text{ tpy}
 \end{aligned}$$

Uncontrolled with 0.7% Sulfur fuel oil

$$\begin{aligned}
 &= (115 \times 10^6 \text{ BTU/hr}) (1/149500 \text{ BTU/gal}) (8.08 \text{ lb/gal}) \\
 &\quad \times (0.007 \times 2 \text{ lb SO}_2/\text{lb fuel}) \\
 &= 87.0 \text{ lb/hr} \\
 &< 129.8 \text{ lb/hr}; \text{ therefore no SO}_2 \text{ sorption} \\
 &\quad \text{is necessary to meet the proposed} \\
 &\quad \text{emission limiting standard}
 \end{aligned}$$

Uncontrolled with 2.25% Sulfur fuel oil

$$\begin{aligned}
 &= (118 \times 10^6 \text{ BTU/hr}) (1/147095 \text{ BTU/gal}) (8.29 \text{ lb/gal}) \\
 &\quad \times (0.0225 \times 2 \text{ lb SO}_2/\text{lb fuel}) \\
 &= 299.3 \text{ lb/hr} \\
 &\quad \text{Absorption necessary to meet proposed std.} \\
 &= (299.3 - 129.8) \times 100 / 299.3 \\
 &= 56.6\%
 \end{aligned}$$

Uncontrolled with 2.00% Sulfur COM

$$\begin{aligned}
 &= (109 \times 10^6 \text{ BTU/hr}) (1/135876 \text{ BTU/gal}) (9.7 \text{ lb/gal}) \\
 &\quad \times (0.02 \times 2 \text{ lb SO}_2/\text{lb fuel}) \\
 &= 298.4 \text{ lb/hr} \\
 &\quad \text{Absorption necessary to meet proposed std.} \\
 &= (298.4 - 129.8) \times 100 / 298.4 \\
 &= 56.5\%
 \end{aligned}$$

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:

$$(\text{Oil } \text{NO}_x \text{ factor})(0.45) + (\text{Coal } \text{NO}_x \text{ factor})(0.55)$$

NO_x from Coal - AP-42

$$\begin{aligned} &= 18 \text{ lb / ton} \\ &\quad \times (1/2000 \text{ lb/ton}) (1/13350 \text{ BTU/lb}) (10^6) \\ &= 0.67 \text{ lb } \text{NO}_x / 10^6 \text{ BTU} \end{aligned}$$

NO_x from Oil - AP-42

$$\begin{aligned} &= 60 \text{ lb / 1000 gal} \\ &\quad \times (1/1000) (1/147040 \text{ BTU/gal}) (10^6) \\ &= 0.41 \text{ lb } \text{NO}_x / 10^6 \text{ BTU} \end{aligned}$$

NO_x emissions from Oil (same as present)

$$= 19.83 \text{ lb / hr}$$

NO_x emissions from Coal (by ratio)

$$\begin{aligned} &= 19.83 (0.67 / 0.41) \\ &= 32.41 \text{ lb / hr} \end{aligned}$$

NO_x emissions from COM

$$\begin{aligned} &= 19.83 (0.45) + 32.41 (0.55) \\ &= 26.75 \text{ lb / hr} \\ &\quad \times 8760 / 2000 \\ &= 117.2 \text{ tpy} \end{aligned}$$

CARBON MONOXIDE

$$\begin{aligned} \text{CO from Coal - AP-42} \\ &= 1 \text{ lb/ton} \\ &\quad \times (1/2000 \text{ lb/ton}) (1/13350 \text{ BTU/lb}) (10^6) \\ &= 0.037 \text{ lb CO} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{CO from Oil - AP-42 (Same as present)} \\ &= 4.18 \text{ lb/hr @ } 125 \times 10^6 \text{ BTU/hr} \\ &= 0.033 \text{ lb CO} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{CO emissions from COM} \\ &= 4.18 (0.45) + 4.18 (0.037 / 0.033) (0.55) \\ &= 4.46 \text{ lb/hr} \\ &\quad \times 8760 / 2000 \\ &= 19.5 \text{ tpy} \end{aligned}$$

HYDROCARBONS

$$\begin{aligned} \text{HC from Coal - AP-42} \\ &= 0.3 \text{ lb/ton} \\ &\quad \times (1/2000 \text{ lb/ton}) (13350 \text{ BTU/lb}) (10^6) \\ &= 0.011 \text{ lb HC} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{HC from Oil - AP-42 (Same as present)} \\ &= 0.84 \text{ lb/hr @ } 125 \times 10^6 \text{ BTU/hr} \\ &= 0.007 \text{ lb HC} / 10^6 \text{ BTU} \end{aligned}$$

$$\begin{aligned} \text{HC emissions from COM} \\ &= 0.84 (0.45) + 0.84 (0.011 / 0.007) (0.55) \\ &= 1.14 \text{ lb/hr} \\ &\quad \times 8760 / 2000 \\ &= 5.0 \text{ tpy} \end{aligned}$$

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 NO_x" 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

DEPARTMENT OF ENVIRONMENTAL REGULATION - AIR QUALITY INPUT FORM HOURLY DATA

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

AGENCY BREWSTER PHOSPHATES	PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric	STATE 1	AREA 101800097	SITE J	AGENCY 05	PROJECT 1	TIME 81	YEAR 10	MONTH 10
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.	PARAMETER CODE 42401	METHOD 16	UNITS 07	DP 3		

DAY	ST	HR	RDG 1	RDG 2	RDG 3	RDG 4	RDG 5	RDG 6	RDG 7	RDG 8	RDG 9	RDG 10	RDG 11	RDG 12
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
0	1	0	0											
0	1	1	2											
0	2	0	0											
0	2	1	2											
0	3	0	0											
0	3	1	2											
0	4	0	0											
0	4	1	2											
0	5	0	0											
0	5	1	2											
0	6	0	0											
0	6	1	2											
0	7	0	0											
0	7	1	2											
0	8	0	0											
0	8	1	2											
0	9	0	0											
0	9	1	2											
1	0	0	0											
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1	1	1	2											
1	2	0	0											
1	2	1	2											
1	3	0	0											
1	3	1	2											
1	4	0	0											
1	4	1	2											
1	5	0	0											
1	5	1	2											
1	6	0	0											

This is an EPA SAROAD Format

DEPARTMENT OF ENVIRONMENTAL REGULATION - AIR QUALITY INPUT FORM HOURLY DATA

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

AGENCY BREWSTER PHOSPHATES	PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric	STATE 1	AREA 101800097	SITE 7	AGENCY J	PROJECT 05	TIME 1	YEAR 81	MONTH 11
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.		PARAMETER CODE 42401	METHOD 16	UNITS 07	DP 3

DAY	ST	HR	RDG 1	RDG 2	RDG 3	RDG 4	RDG 5	RDG 6	RDG 7	RDG 8	RDG 9	RDG 10	RDG 11	RDG 12
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
0	1	0	0											
0	1	1	2											
0	2	0	0											
0	2	1	2											
0	3	0	0											
0	3	1	2											
0	4	0	0											
0	4	1	2											
0	5	0	0											
0	5	1	2											
0	6	0	0											
0	6	1	2											
0	7	0	0											
0	7	1	2											
0	8	0	0											
0	8	1	2											
0	9	0	0											
0	9	1	2											
1	0	0	0											
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1	3	0	0											
1	3	1	2											
1	4	0	0											
1	4	1	2											
1	5	0	0											
1	5	1	2											
1	6	0	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 BREWSTER PHOSPHATES	PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric	STATE 1	AREA 101800097	SITE J	AGENCY 05	PROJECT 1	TIME 81	YEAR 11	MONTH 11
SITE ADDRESS Hiscock Rd.	CITY NAME FT. LONGSBOROUGH, FL	PROJECT Air Monitoring	TIME INTERVAL OF OBS One (1) Hour	UNITS OF OBS. P.P.M.	PARAMETER CODE 42401	METHOD 16	UNITS 07	DP 3		

DAY	ST	HR	RDG 1	RDG 2	RDG 3	RDG 4	RDG 5	RDG 6	RDG 7	RDG 8	RDG 9	RDG 10	RDG 11	RDG 12
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	6	1	2			0			0					0
1	7	0	0			0			0					0
1	7	1	2			1	1		1	0				0
1	8	0	0			0			0					0
1	8	1	2			0			0					0
1	9	0	0			0			0					0
1	9	1	2			0			0					0
2	0	0	0			0			0					0
2	0	1	2			0			0					0
2	1	0	0			0			0					0
2	1	1	2			0			0					0
2	2	0	0			0			0					0
2	2	1	2			0			0					0
2	3	0	0			0			0					0
2	3	1	2			5			0					0
2	4	0	0			0			0					0
2	4	1	2			3			0					0
2	5	0	0			0			0					0
2	5	1	2			0			0					0
2	6	0	0			0			0					0
2	6	1	2			0			0					0
2	7	0	0			0			0					0
2	7	1	2			0			0					0
2	8	0	0			0			0					0
2	8	1	2			3			2					0
2	9	0	0			0			0					0
2	9	1	2			2			0					0
3	0	0	0			0			0					0
3	0	1	2			0			0					0

This is an EPA SARDAD Format

DEPARTMENT OF ENVIRONMENTAL REGULATION - AIR QUALITY INPUT FORM HOURLY DATA

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

AGENCY BREWSTER PHOSPHATES		PARAMETER OBSERVED Sulfur Dioxide		METHOD Flame Photometric		STATE 1		AREA 101800097		SITE 7		AGENCY J		PROJECT 05		TIME 1		YEAR 82		MONTH 01			
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.		PARAMETER CODE 42401				METHOD 16		UNITS 07		DP 3	

DAY	ST	HR	RDG 1	RDG 2	RDG 3	RDG 4	RDG 5	RDG 6	RDG 7	RDG 8	RDG 9	RDG 10	RDG 11	RDG 12
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
0	1	0	0			0			0					0
0	1	1	2			0			2					0
0	2	0	0			0			0					0
0	2	1	2			0			0					0
0	3	0	0			0			0					0
0	3	1	2			0			0					0
0	4	0	0			0			0					0
0	4	1	2			0			9					0
0	5	0	0			0			0					0
0	5	1	2			6			3					0
0	6	0	0			0			0					0
0	6	1	2			0			0					0
0	7	0	0			0			0					0
0	7	1	2			0			0					0
0	8	0	0			0			0					0
0	8	1	2			0			0					0
0	9	0	0			0			3					0
0	9	1	2			29			20					0
1	0	0	0			0			0					0
1	0	1	2			1			0					0
1	1	0	0			0			0					0
1	1	1	2			0			0					0
1	2	0	0			0			0					0
1	2	1	2			0			0					0
1	3	0	0			0			0					0
1	3	1	2			1			0					0
1	4	0	0			0			0					0
1	4	1	2			2			1					0
1	5	0	0			0			0					0
1	5	1	2			0			8					0
1	6	0	0			0			0					0

5.0 SITE METEOROLOGY

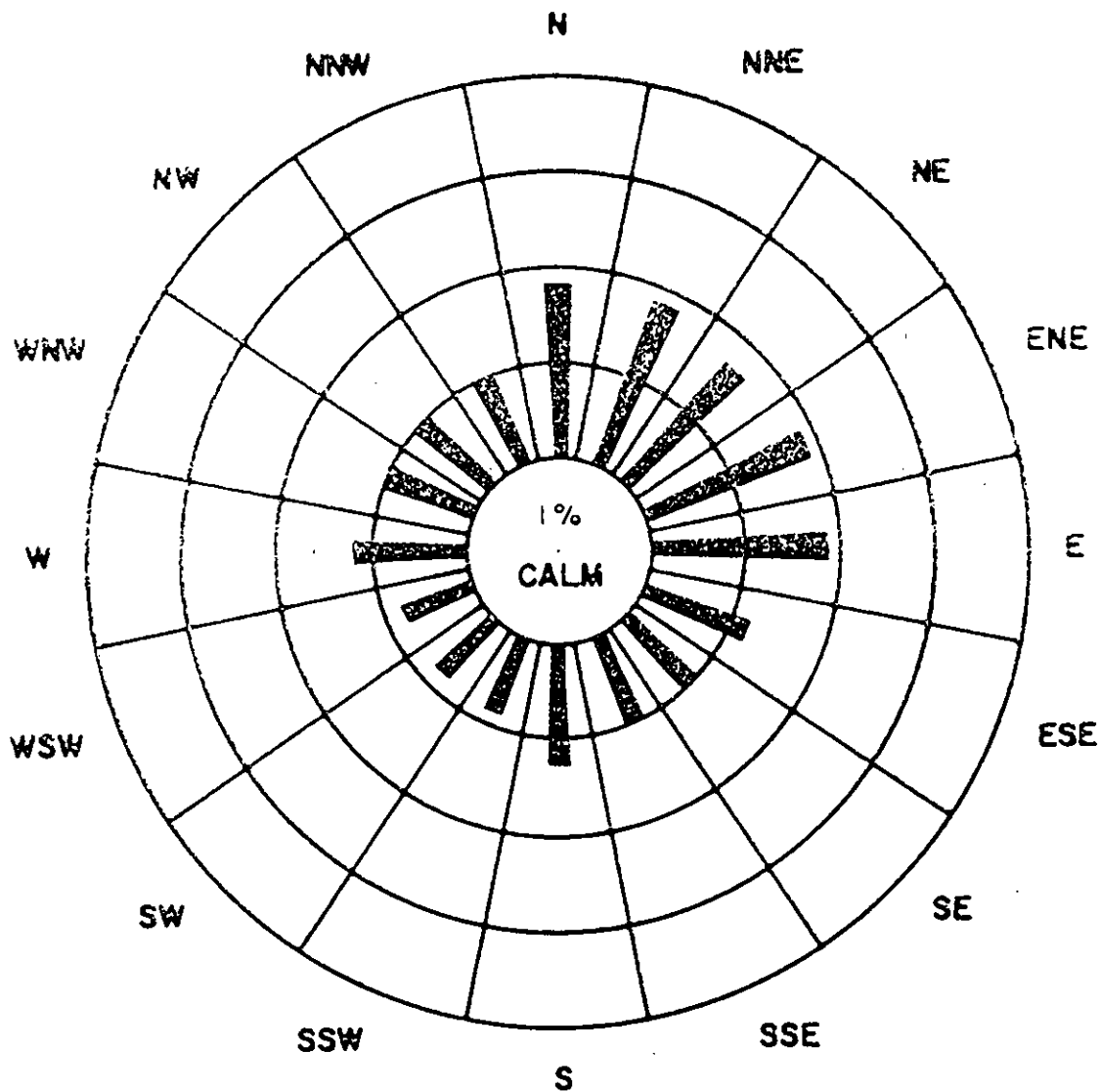
The AMAX Big Four Mine site is located in west-central Florida, approximately 40 kilometers southeast of Tampa and 40 kilometers east of the Gulf Coast. Meteorological data from Tampa for the period 1970 through 1974 were used in the preparation of this PSD application. Annually, the prevailing site 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 turbulence 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

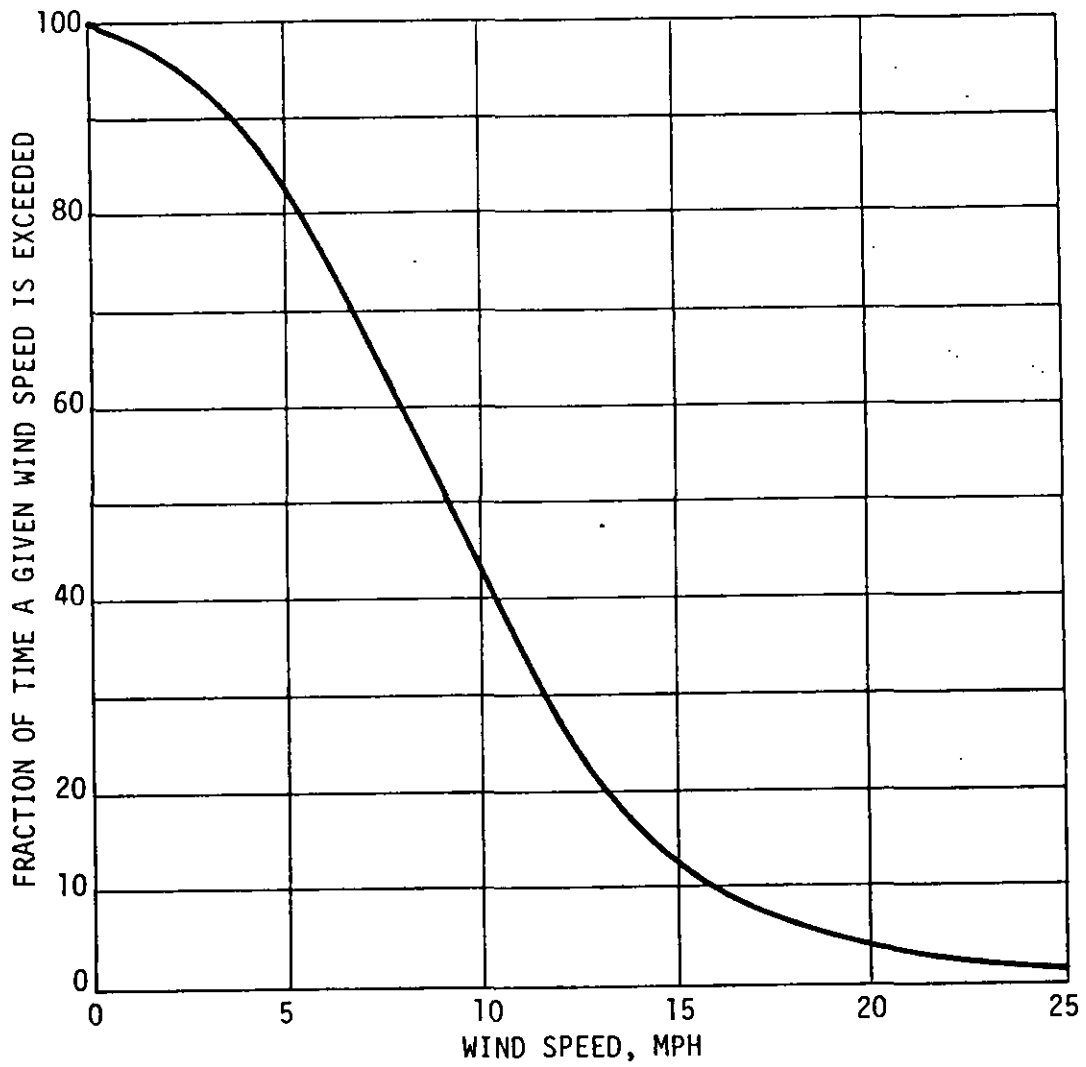


FIGURE 5-2

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 emanate 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)
<u>Sulfur Dioxide</u>				
Annual	60	20	2	1
24-Hour	260	91	5	5
3-Hour	1300	512	25	25
<u>Particulate Matter</u>				
Annual	60	19	5	1
24-Hour	150	37	10	5
<u>Nitrogen Oxides</u>				
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/m³
- (2) Includes a background of 88 ug/m³
- (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.

SOURCE LIST

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

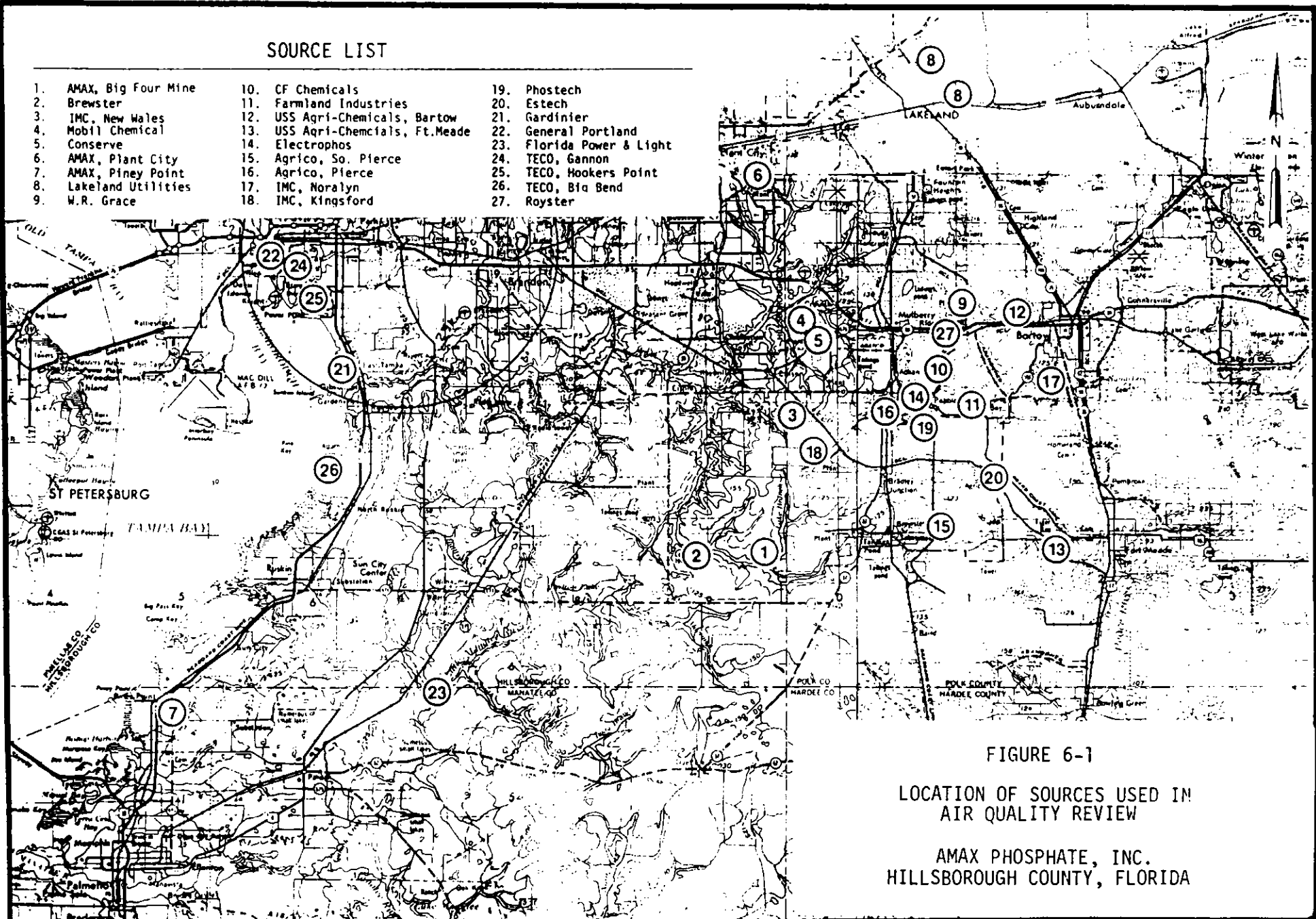


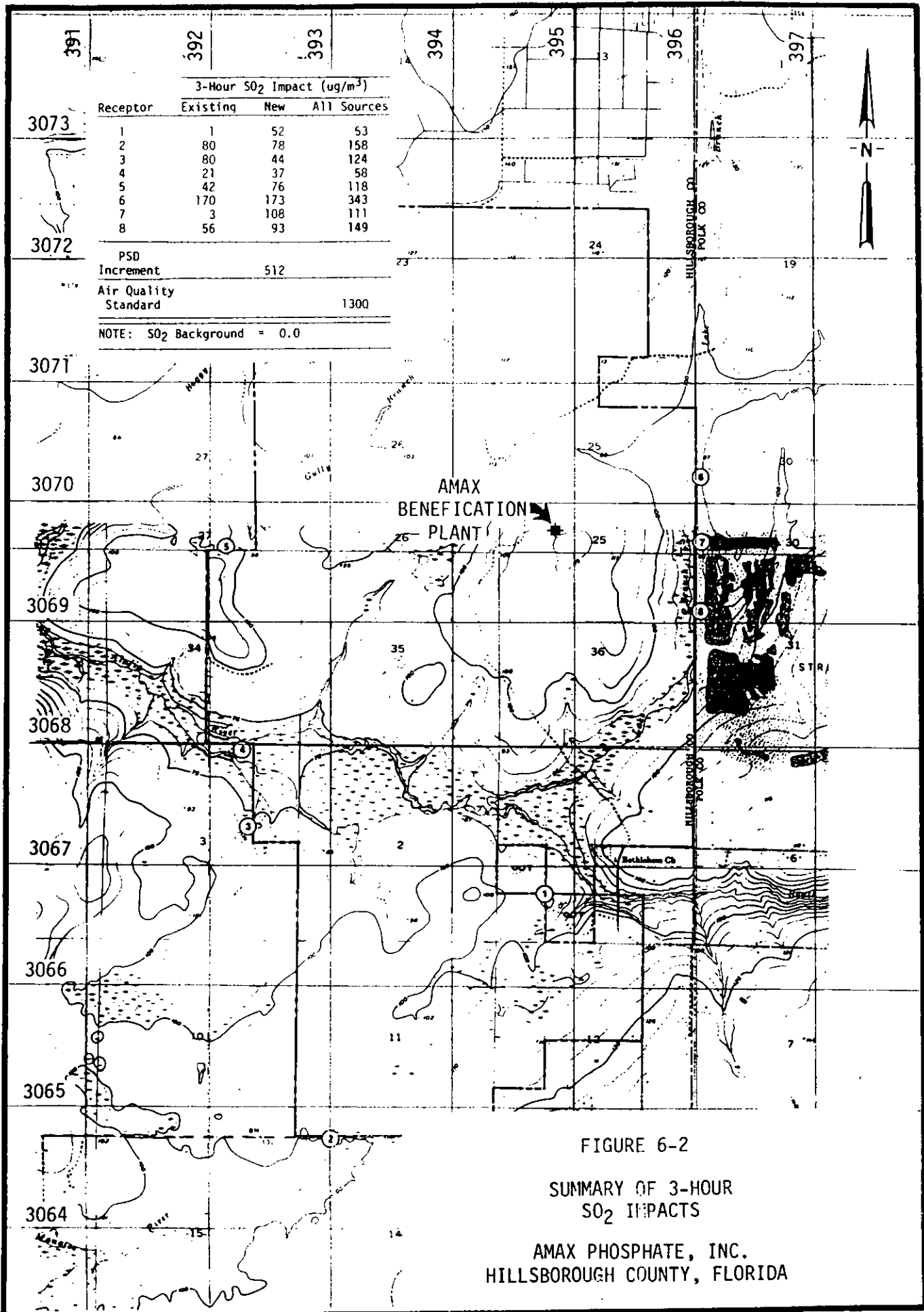
FIGURE 6-1

LOCATION OF SOURCES USED IN
AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

6-14

SPOTIS
KOOGLER



Receptor	3-Hour SO ₂ Impact (ug/m ³)		
	Existing	New	All Sources
3073			
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
3072	PSD Increment 512		
	Air Quality Standard 1300		
NOTE: SO ₂ Background = 0.0			

FIGURE 6-2
 SUMMARY OF 3-HOUR
 SO₂ IMPACTS
 AMAX PHOSPHATE, INC.
 HILLSBOROUGH COUNTY, FLORIDA

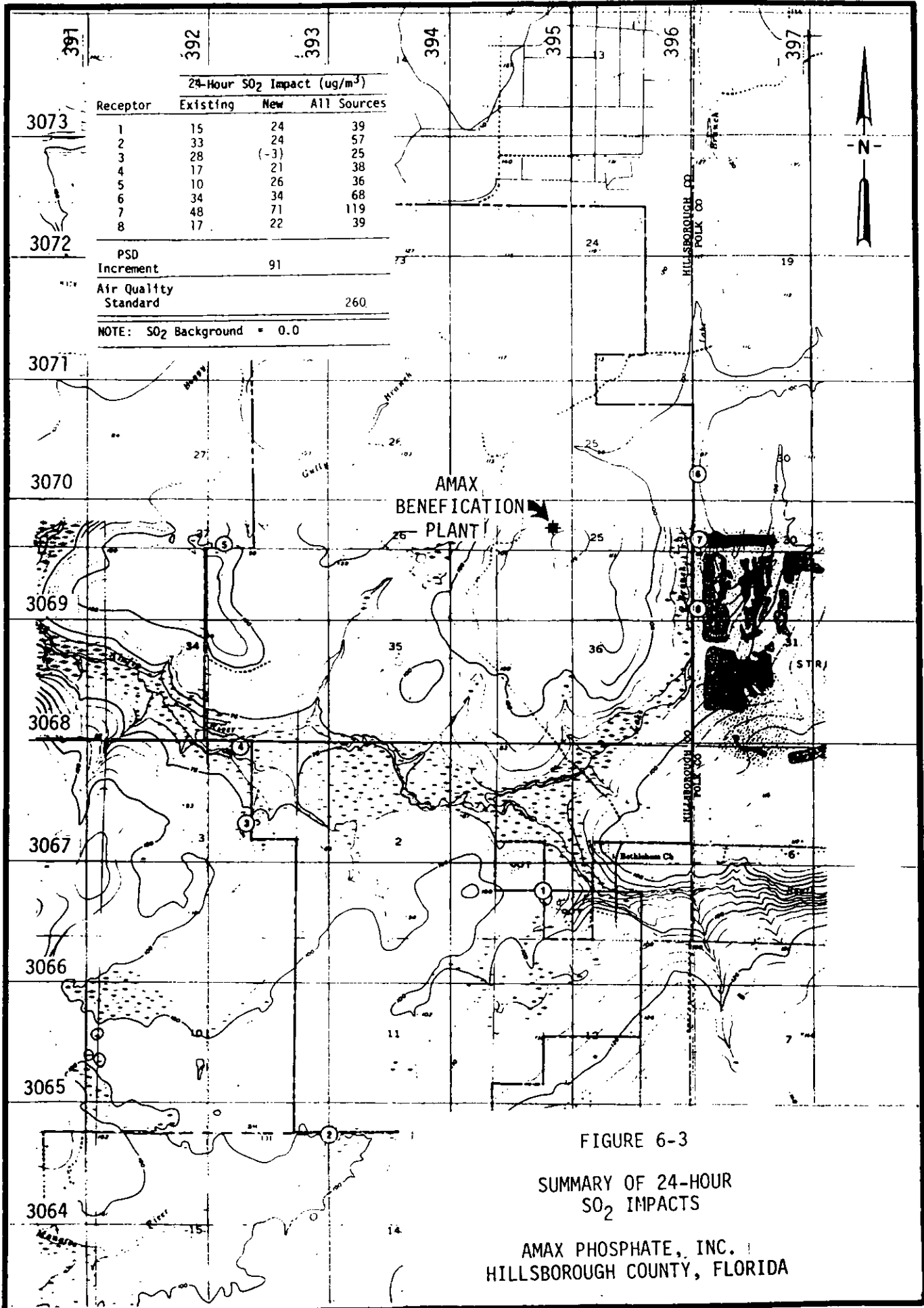


FIGURE 6-3
 SUMMARY OF 24-HOUR
 SO₂ IMPACTS
 AMAX PHOSPHATE, INC.
 HILLSBOROUGH COUNTY, FLORIDA

SOURCE LIST

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

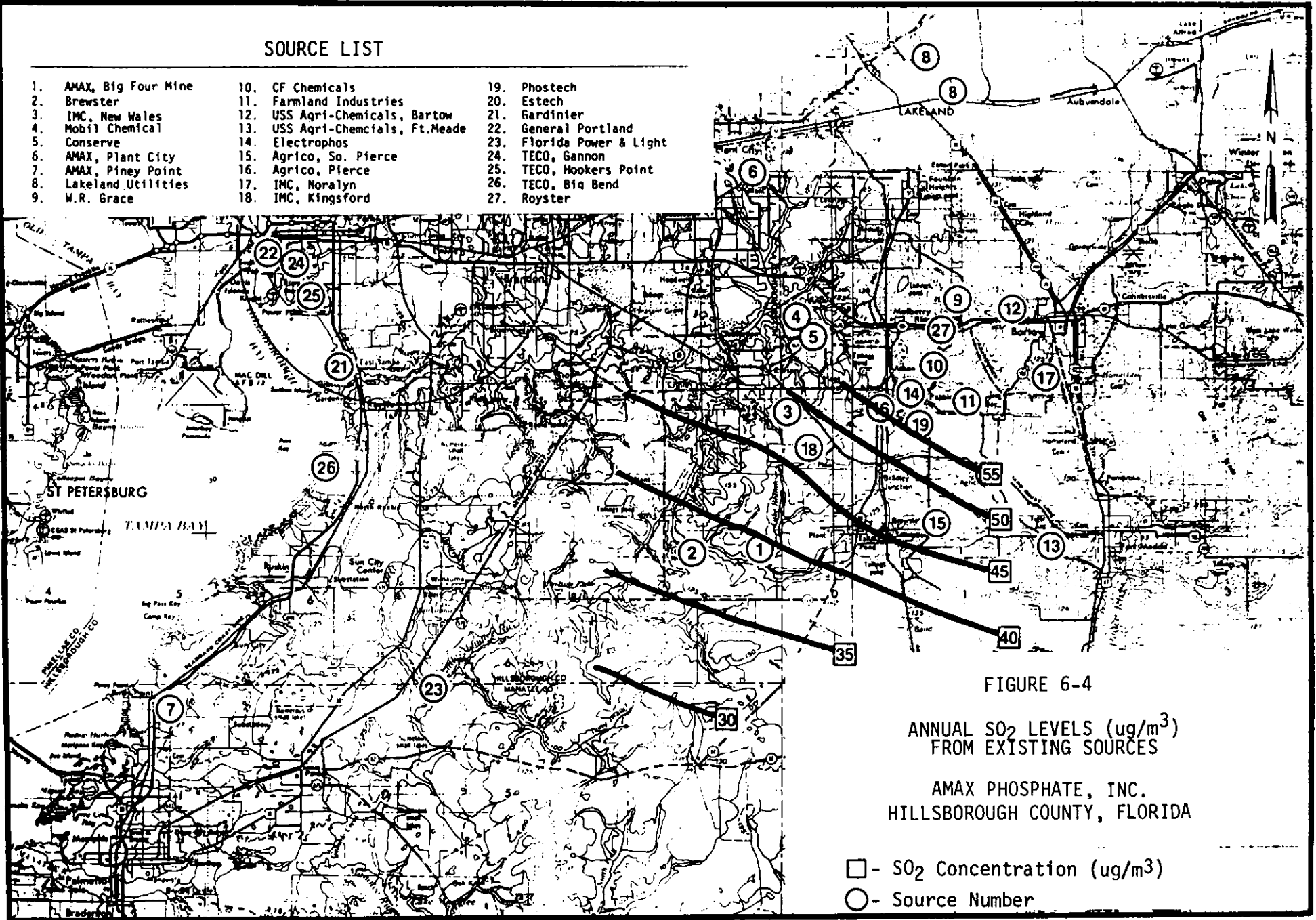


FIGURE 6-4

ANNUAL SO₂ LEVELS (ug/m³)
FROM EXISTING SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

- - SO₂ Concentration (ug/m³)
- - Source Number

6-17

SPOTIS KOOGLER

SOURCE LIST

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

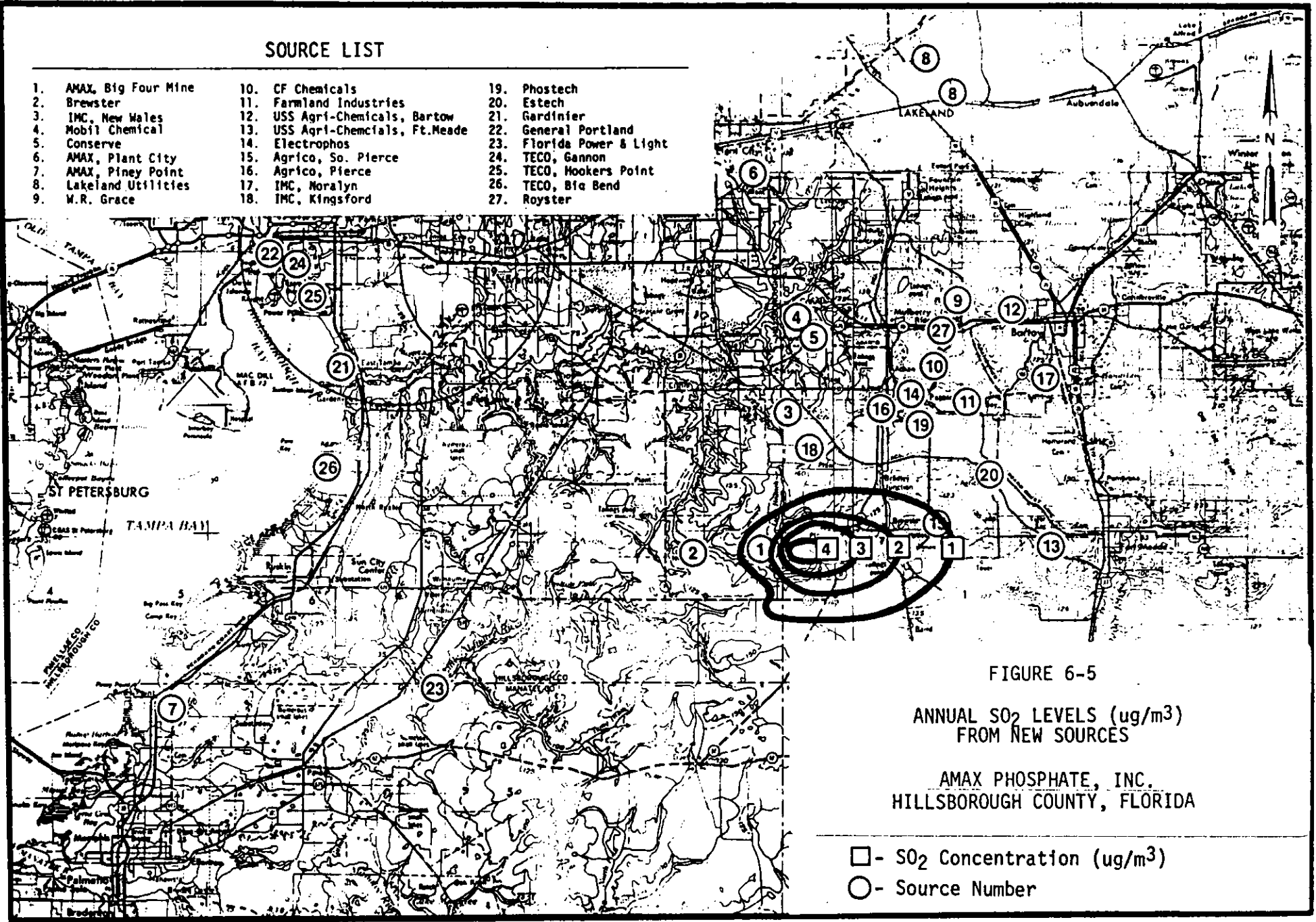


FIGURE 6-5

ANNUAL SO₂ LEVELS (ug/m³)
FROM NEW SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

- - SO₂ Concentration (ug/m³)
- - Source Number

6-18

SPOTIS
KOOGLER

SOURCE LIST

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

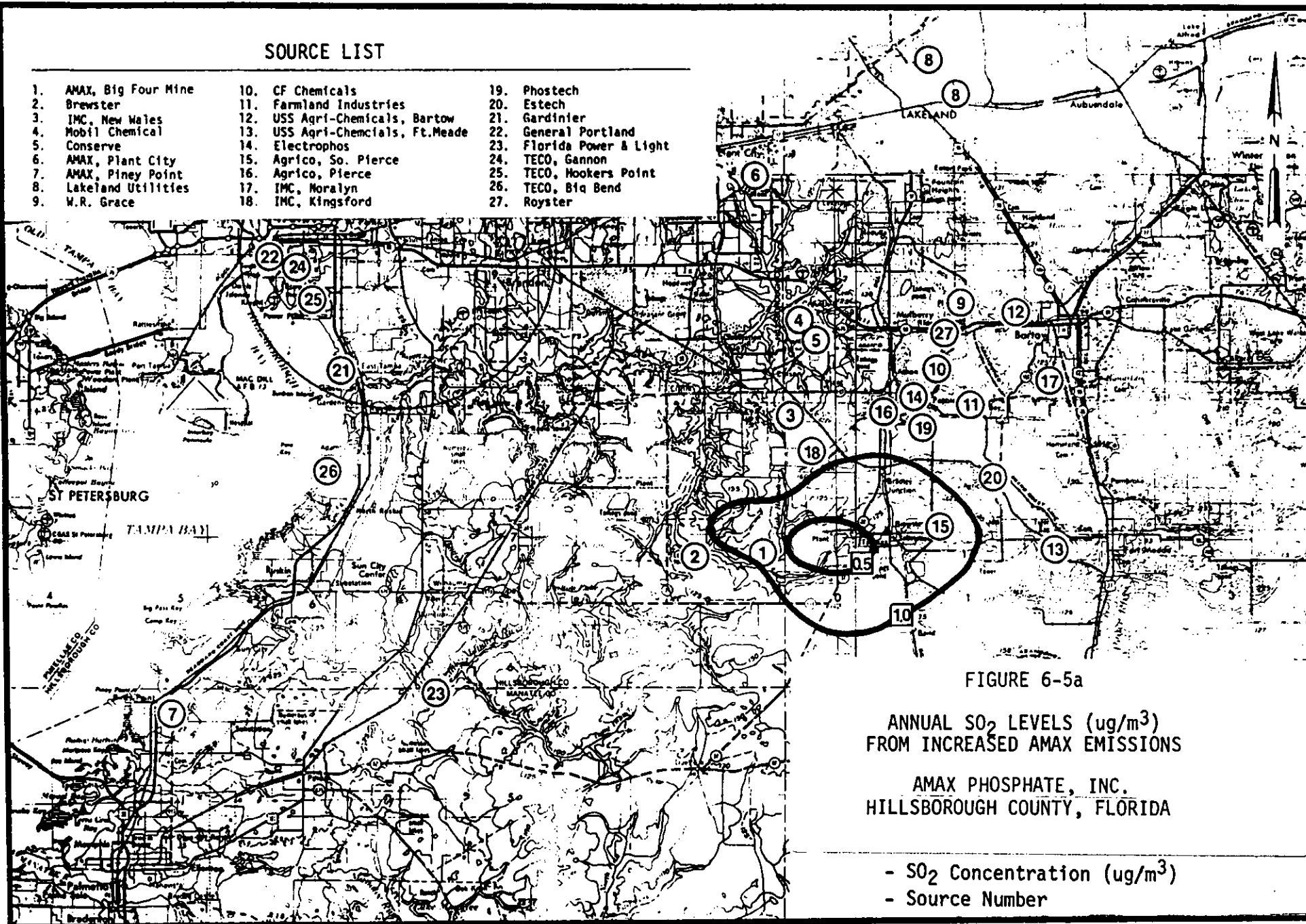


FIGURE 6-5a

ANNUAL SO₂ LEVELS (ug/m³)
FROM INCREASED AMAX EMISSIONS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

- SO₂ Concentration (ug/m³)
- Source Number

SOURCE LIST

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

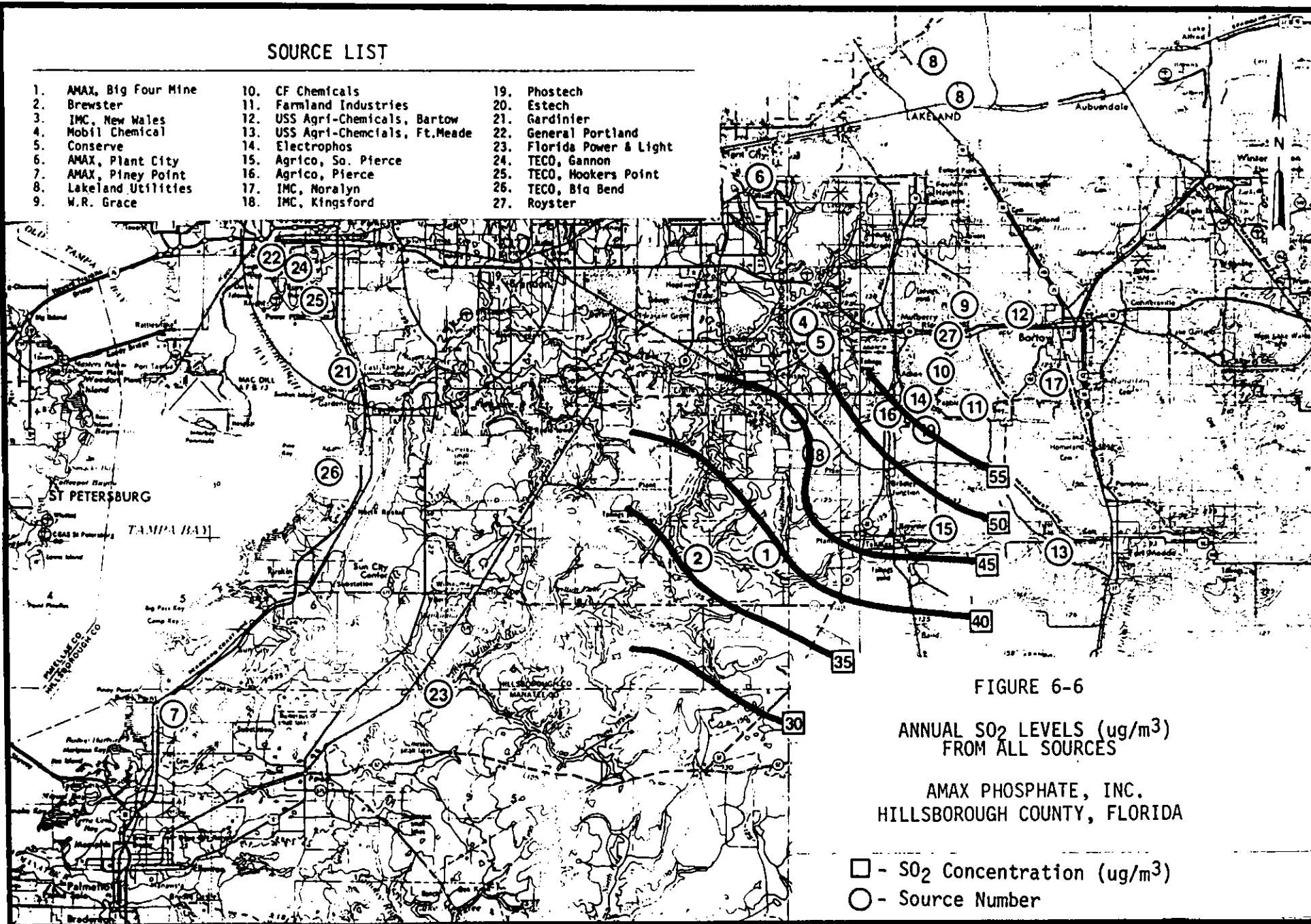


FIGURE 6-6

ANNUAL SO₂ LEVELS (ug/m³)
FROM ALL SOURCES

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

- - SO₂ Concentration (ug/m³)
- - Source Number

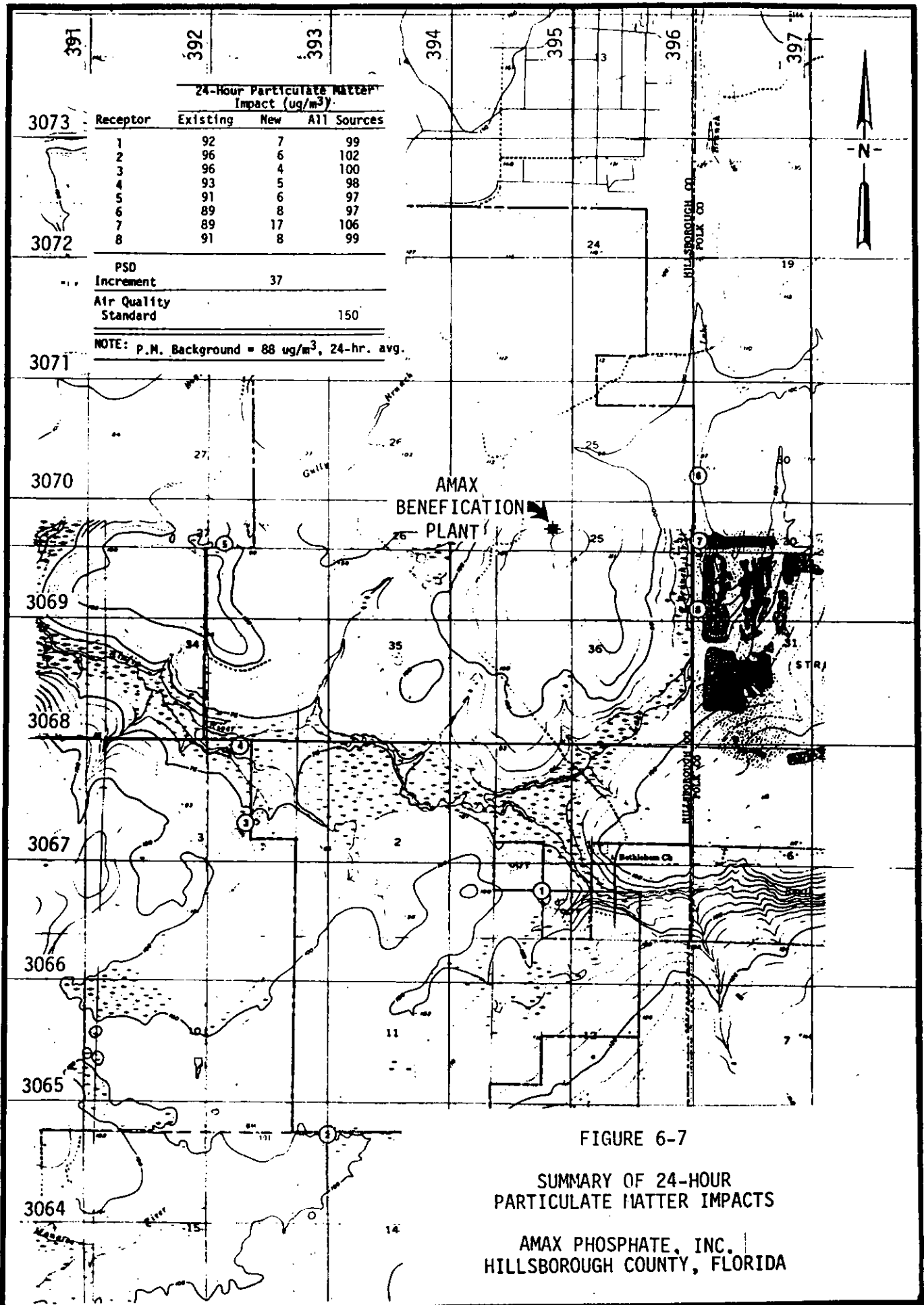
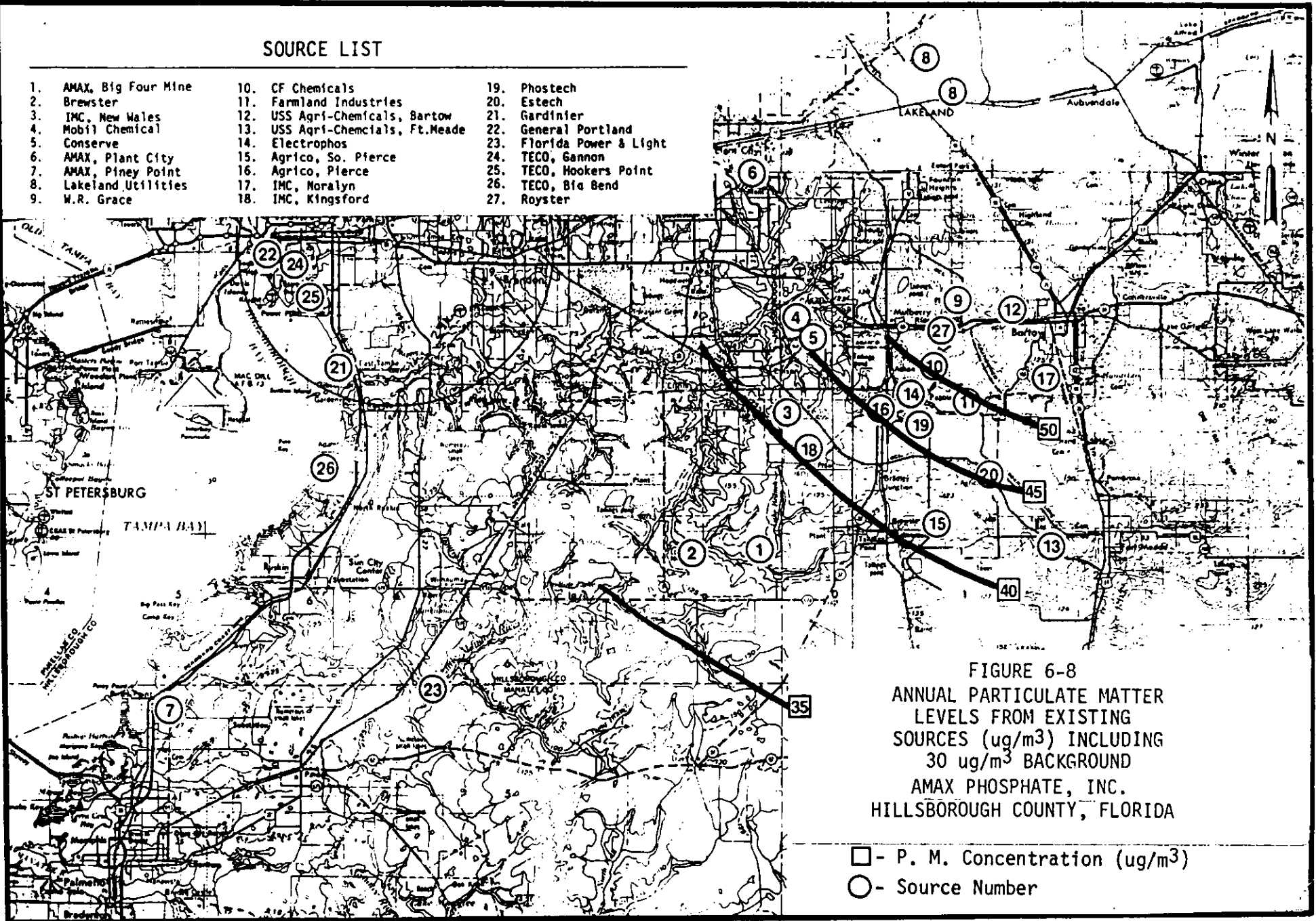


FIGURE 6-7
 SUMMARY OF 24-HOUR
 PARTICULATE MATTER IMPACTS
 AMAX PHOSPHATE, INC.
 HILLSBOROUGH COUNTY, FLORIDA

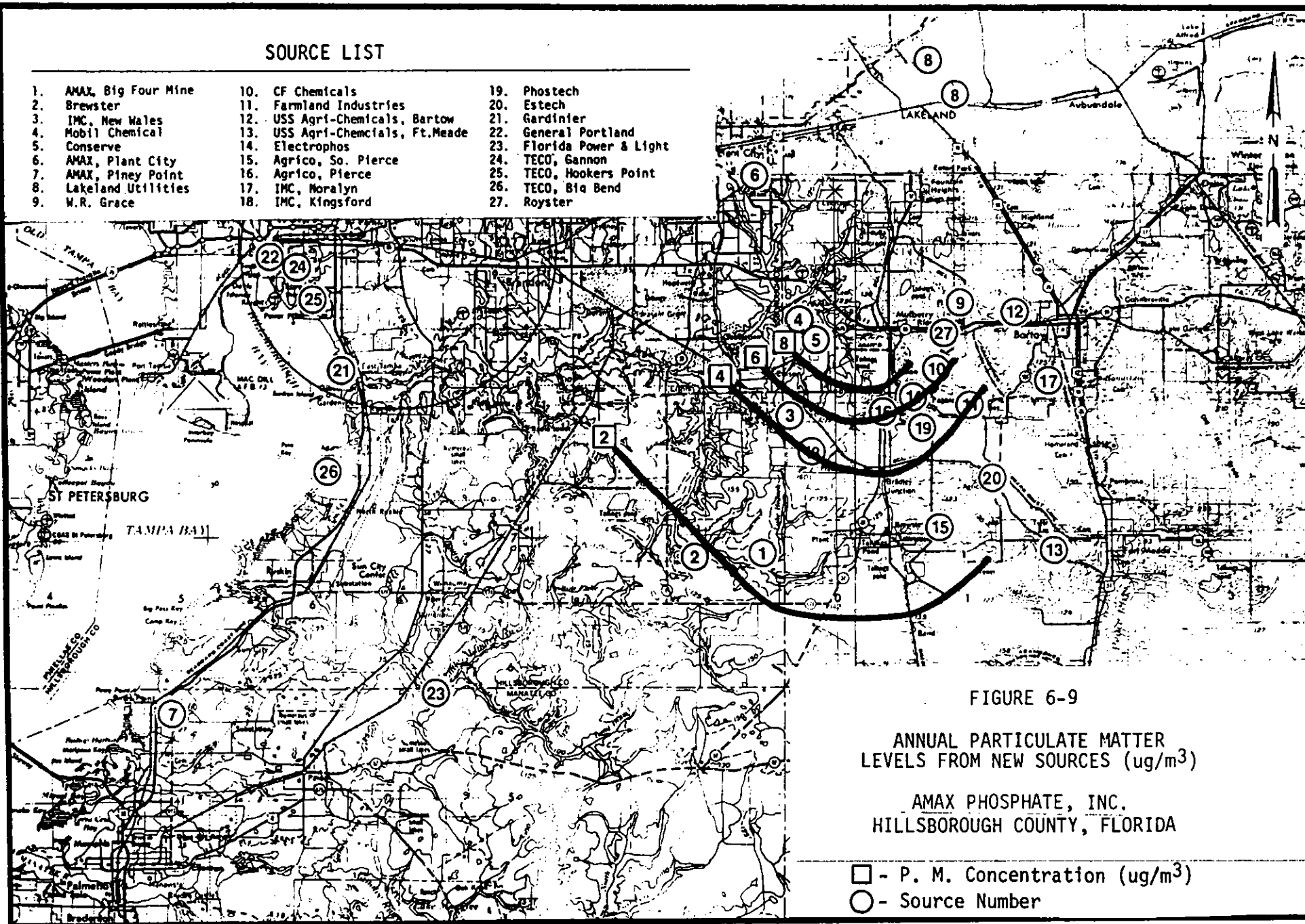
SOURCE LIST

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



SOURCE LIST

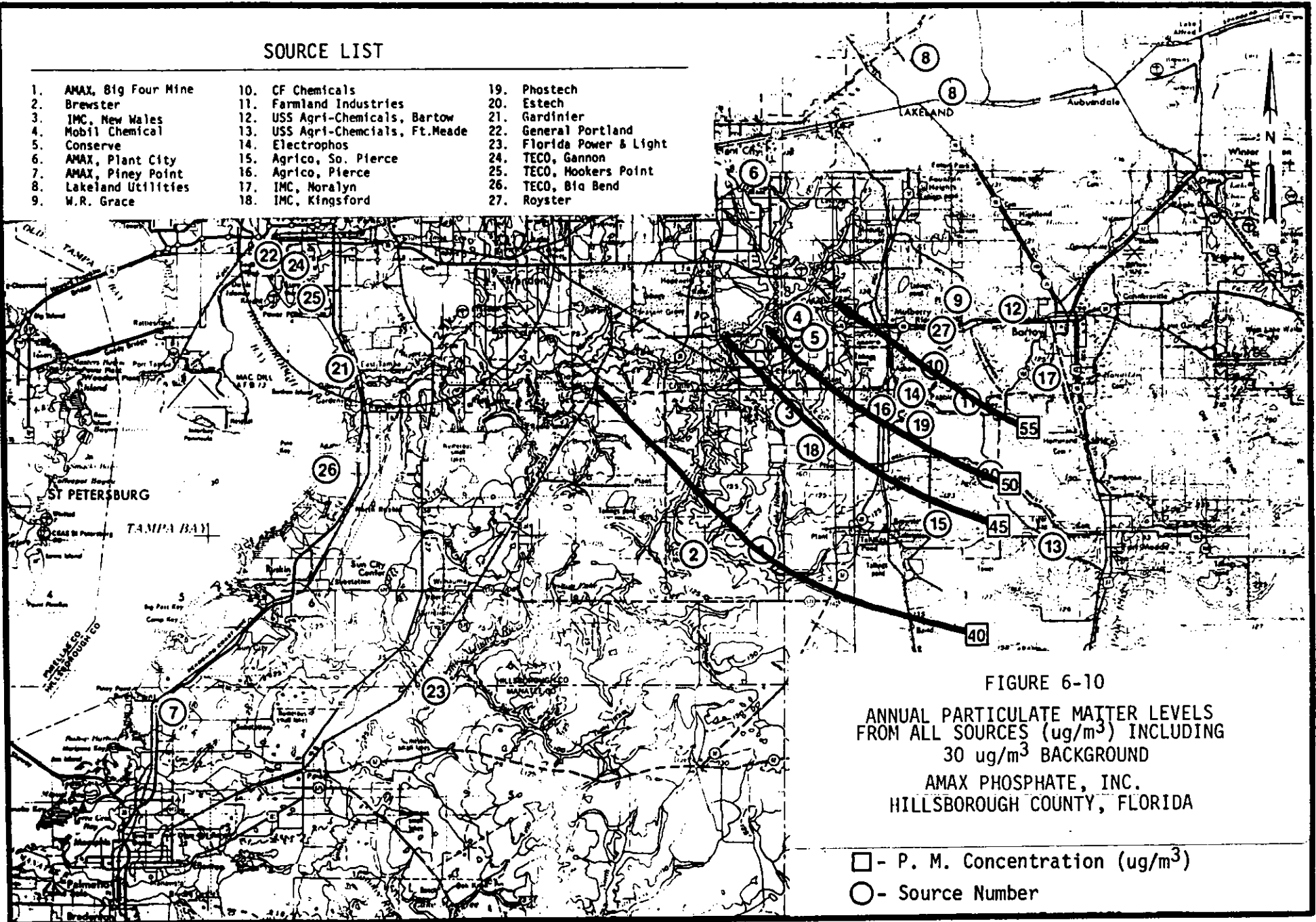
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|------------------------|-----------------------------------|---------------------------|
| 1. AMAX, Big Four Mine | 10. CF Chemicals | 19. Phostech |
| 2. Brewster | 11. Farmland Industries | 20. Estech |
| 3. IMC, New Wales | 12. USS Agri-Chemicals,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



6-23

SOURCE LIST

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



APPENDIX 6A-1

SOURCE DATA

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. (Des K)	X Coord. (km)	Y Coord. (km)
AMX 1 Bis 4 - Rock Shipping	0.75	0.00	10.40	0.96	15.06	314.0	394.900	3069.650
AMX 1 Bis 4 - Rock Storage	0.26	0.00	8.20	0.63	17.03	314.0	394.740	3069.690
AMX 1 Bis 4 - Rock Dryer	2.27	16.35	30.50	1.82	7.26	334.0	394.850	3069.770
AMX 1 Bis 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. (Des 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

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)
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 P1-Rock Grind 25188	4.54	0.00	22.00	0.60	9.60	315.0	409.700	3086.890
WRG 9 Chem P1-Ball Mill 26977	1.51	0.00	25.30	0.40	10.20	331.0	409.810	3086.890
WRG 9 Chem P1-300X GTSP DAP 25191	3.48	0.00	32.80	2.20	12.40	320.0	409.980	3086.810
WRG 9 Chem P1-300Y GTSP&ROP 13210	3.15	0.00	24.40	2.20	12.40	321.0	409.980	3086.830
WRG 9 Chem P1-GTSP Storage 25192	0.63	0.00	32.80	2.10	11.90	315.0	409.670	3086.900
WRG 9 Chem P1-GTSP Shipping 27026	1.26	0.00	28.00	0.80	5.30	315.0	409.900	3086.700
WRG 9 Chem P1-Fert.Plant DAP 06840	3.78	0.00	30.20	2.30	16.00	333.0	409.810	3086.780
WRG 9 Chem P1-DAP #3 24460	3.77	0.00	40.40	2.10	26.50	322.0	409.290	3086.960
WRG 9 Chem P1-ROP Belt 14475	0.50	0.00	14.00	0.60	12.90	315.0	409.810	3086.560
WRG 9 Chem P1-ROP Storage 14674	0.76	0.00	21.30	1.20	12.10	315.0	409.600	3085.900
WRG 9 Chem P1-ROP Shipping 13449	0.63	0.00	27.00	1.00	6.30	315.0	409.600	3055.900
WRG 9 Chem P1-DAP Shipping 32628	3.15	0.00	24.40	0.70	9.50	315.0	409.840	3086.630
WRG 9 Chem P1-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

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. (Des K)	X Coord. (km)	Y Coord. (km)
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 Bashouse	3.78	0.00	20.00	0.16	35.21	395.0	407.500	3071.400
AGR 15 #2 Ball Mill Bashouse	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

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)
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 Bis Bend 1	28.00	2301.50	149.40	7.30	12.90	426.0	361.500	3075.000
TEC 26 Bis Bend 2	25.50	1983.60	149.40	7.30	13.60	405.0	361.500	3075.000
TEC 26 Bis Bend 3	51.80	3370.20	149.40	7.30	10.80	410.0	361.500	3075.000
TEC 26 Bis 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.