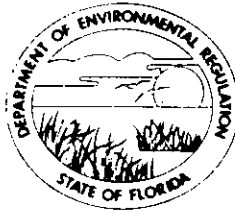


STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB GRAHAM  
GOVERNOR  
VICTORIA J. TSCHINKEL  
SECRETARY

August 16, 1983

Mr. James T. Wilburn, Chief  
Air Management Branch  
Air & Waste Management Division  
U.S. EPA, Region IV  
345 Courtland Street, N.E.  
Atlanta, Georgia 30365

Dear Mr. Wilburn:

RE: Preliminary Determination - AMAX Phosphate, Inc.  
Big Four Mine Phosphate Rock Dryer, PSD-FL-094

Enclosed for your review and comment are the Public Notice and Preliminary Determination for the above referenced federal application from AMAX Phosphate, Inc. to modify a their phosphate rock dryer at the Big Four Mine at Fort Lonesome, Hillsborough County, Florida.

Please inform my office at (904)488-1344 if you have comments or questions regarding this determination.

Sincerely,

*for* *Ch. Thomas*

C. H. Fancy, P.E.  
Deputy Chief  
Bureau of Air Quality  
Management

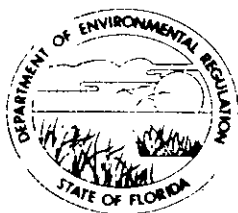
CHF/pa

Enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB GRAHAM  
GOVERNOR

VICTORIA J. TSCHINKEL  
SECRETARY

August 16, 1983

Mr. Ron Fahs  
State A-95 Coordinator  
Florida State Planning and  
Development Clearinghouse  
Office of Planning and Budget  
The Capitol  
Tallahassee, Florida 32301

Dear Mr. Fahs:

RE: Preliminary Determination - AMAX Phosphate, Inc.  
Big Four Mine Phosphate Rock Dryer, PSD-FL-094

I wish to bring to your attention that AMAX Phosphate, Inc. proposes to modify its existing facilities at Fort Lonesome in Hillsborough County, Florida, and that emissions of air pollutants will thereby be increased. The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, has reviewed the proposed construction under Federal Prevention of Significant Deterioration Regulations (40 CFR 52.21) and reached a preliminary determination of approval, with conditions, for this construction.

Please also be aware that the attached Public Notice announcing the preliminary determination, the availability of pertinent information for public scrutiny and the opportunity for public comment will be published in a local newspaper in the near future. This notice has been mailed to you for your information and in accordance with regulatory requirements. You need take no action unless you wish to comment on the proposed construction. If you have any questions, please feel free to call Mr. Bill Thomas or myself at (904)488-1344.

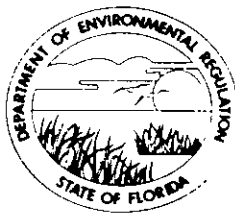
Sincerely,

C. H. Fancy, P.E.  
Deputy Chief  
Bureau of Air Quality  
Management

CHF/pa  
Enclosure

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB GRAHAM  
GOVERNOR  
VICTORIA J. TSCHINKEL  
SECRETARY

August 16, 1983

Ms. Veronica Akin  
Tampa Bay Regional Planning  
Council  
9455 Koger Boulevard  
St. Petersburg, Florida 33702

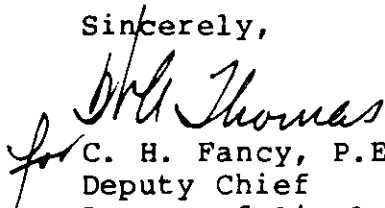
Dear Ms. Akin:

RE: Preliminary Determination - AMAX Phosphate, Inc.  
Big Four Mine Phosphate Rock Dryer, PSD-FL-094

I wish to bring to your attention that AMAX Phosphate, Inc. proposes to modify its existing facilities at Fort Lonesome in Hillsborough County, Florida, and that emissions of air pollutants will thereby be increased. The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, has reviewed the proposed construction under Federal Prevention of Significant Deterioration Regulations (40 CFR 52.21) and reached a preliminary determination of approval, with conditions, for this construction.

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Sincerely,

*for*   
C. H. Fancy, P.E.  
Deputy Chief  
Bureau of Air Quality  
Management

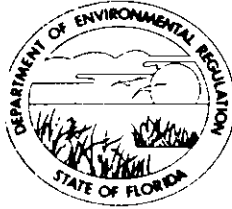
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Enclosure

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB GRAHAM  
GOVERNOR

VICTORIA J. TSCHINKEL  
SECRETARY

August 16, 1983

Hillsborough County Board of  
County Commissioners  
Post Office Box 1110  
Tampa, Florida 33601

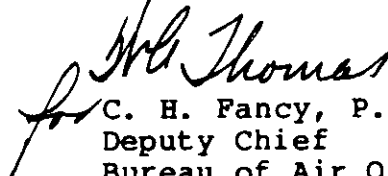
Dear Commissioners:

RE: Preliminary Determination - AMAX Phosphate, Inc.  
Big Four Mine Phosphate Rock Dryer, PSD-FL-094

I wish to bring to your attention that AMAX Phosphate, Inc. proposes to modify its existing facilities at Fort Lonesome in Hillsborough County, Florida, and that emissions of air pollutants will thereby be increased. The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, has reviewed the proposed construction under Federal Prevention of Significant Deterioration Regulations (40 CFR 52.21) and reached a preliminary determination of approval, with conditions, for this construction.

Please also be aware that the attached Public Notice announcing the preliminary determination, the availability of pertinent information for public scrutiny and the opportunity for public comment will be published in a local newspaper in the near future. This notice has been mailed to you for your information and in accordance with regulatory requirements. You need take no action unless you wish to comment on the proposed construction. If you have any questions, please feel free to call Mr. Bill Thomas or myself at (904)488-1344.

Sincerely,

  
C. H. Fancy, P.E.  
Deputy Chief  
Bureau of Air Quality  
Management

CHF/pa

Enclosure

NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to AMAX Phosphate, Inc. that will allow the Company to burn alternate fuels in the existing phosphate rock dryer and increase the hours of operation of their Big Four Phosphate Mine that is located near the intersection of State Road 674 and Bethlehem Road in Fort Lonesome, Hillsborough County, Florida. No major physical change in the process or control equipment is required for these modifications. The modifications will increase the emissions of air pollutants from the plants, in tons per year, by the following amounts.

Particulate	Sulfur Dioxide	Nitrogen Oxides
42.8	214.4	57.1

The proposed modification has been reviewed by the Florida Department of Environmental Regulation under Chapter 403, Florida Statutes, and federal regulation 40 CFR 52.21, Prevention of Significant Deterioration. A Best Available Control Technology determination was required for these modifications.

Emissions from the modified facility will not impact the Hillsborough County particulate matter nonattainment area by a significant amount nor exceed the allowable increment consumption or cause an ambient air quality violation in other areas. The maximum percent of allowable PSD increment consumed will be as follows:

<u>Pollutant and Time Average</u>	<u>Percent Consumed</u>
SO <sub>2</sub>	
Three-hour	34
24-hour	70
Annual	35
PM	
24-hour	46
Annual	16

A person who is substantially affected by the department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Chapter 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

The Technical Evaluation and Preliminary Determination for the proposed projects is available for public inspection during normal business hours at the following locations:

Department of Environmental Regulation  
BAQM  
2600 Blair Stone Road  
Tallahassee, Florida 32301

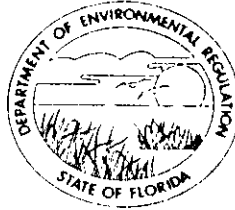
Department of Environmental Regulation  
Southwest District  
7601 Highway 301 N  
Tampa, Florida 33610

Hillsborough County  
Environmental Protection Commission  
1900 9th Avenue  
Tampa, Florida

Any person may send written comments on the proposed action to Mr. Clair Fancy at the department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the department's final determination.

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION

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



BOB GRAHAM  
GOVERNOR

VICTORIA J. TSCHINKEL  
SECRETARY

August 12, 1983

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. S. R. Sandrik  
Plant Manager  
AMAX Phosphate, Inc.  
Post Office Box 508  
Bradley, Florida 33835

Dear Mr. Sandrik:

RE: Preliminary Determination - AMAX Phosphate, Inc.  
Big Four Mine Phosphate Rock Dryer, Hillsborough County  
State Permit No. AC 29-65834, Federal Permit No. PSD-FL-094

The Florida Department of Environmental Regulation, under the authority delegated by the U.S. Environmental Protection Agency, Region IV, has reviewed your application to modify the referenced source under the provisions of the Prevention of Significant Deterioration Regulations (40 CFR 52.21) and has made a preliminary determination of approval with conditions. Please find enclosed one copy of the Preliminary Determination and proposed state and federal permits.

Before final action can be taken on your proposed permit, you are required by Florida Administrative Code Rule 17-1.62(3) to publish the attached Notice of Proposed Agency Action in the legal advertising section of a newspaper of general circulation in Hillsborough County no later than fourteen days after receipt of this letter. The department must be provided with proof of publication within seven days of the date the notice is published. Failure to publish the notice may be grounds for denial of the permit.

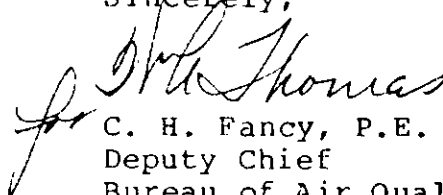
Mr. S. R. Sandrik  
August 12, 1983  
Page Two

A copy of the Preliminary Determination and your application will be open to public review and comment for a period of 30 days after publication of the notice. The public can also request a public hearing to review and discuss specific issues. At the end of this period, the department will evaluate the comments received and make a final determination regarding the proposed construction.

The Preliminary Determination and proposed permit constitutes a proposed action of the department and is subject to administrative hearing under the provisions of Chapter 120, Florida Statutes, if requested within fourteen days from receipt of this letter. Any petition for hearing must comply with the requirements of Florida Administrative Code Rule 28-5.201 and be filed with the Office of General Counsel, Florida Department of Environmental Regulation, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32301. Failure to file a request for hearing within fourteen days shall constitute a waiver of your right to a hearing. Filing is deemed complete upon receipt by the Office of General Counsel.

Please submit, in writing, any comments which you wish to have considered concerning the department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management.

Sincerely,



C. H. Fancy, P.E.  
Deputy Chief  
Bureau of Air Quality  
Management

CHF/WH/pa

Attachments

cc: Dr. John B. Koogler, P.E., Sholtes and Koogler  
Environmental Consultants  
Mr. Dan Williams, DER Southwest District  
Mr. Iwan Choronenko, Hillsborough County Environmental  
Protection Commission



P 408 530 380

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—  
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to S. R. Sandrik	
Street and No.	
P.O., State and ZIP Code	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date 8/12/83	

PS Form 3800, Feb. 1982

PS Form 3811, Jan. 1979

1. SENDER: Complete items 1, 2, and 3. Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one.)

Show to whom and date delivered.....¢

Show to whom, date and address of delivery.....¢

RESTRICTED DELIVERY, Show to whom and date delivered.....¢

RESTRICTED DELIVERY, Show to whom, date, and address of delivery. \$

(CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:  
Mr. S. R. Sandrik  
Post Office Box 508  
Bradley, FL 33835

3. ARTICLE DESCRIPTION:  
REGISTERED NO. CERTIFIED NO. INSURED NO.  
P408530380

(Always obtain signature of addressee or agent)

I have received the article described above.  
SIGNATURE  Addressee  Authorized agent

4. DATE OF DELIVERY  
8-16-83

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

POSTMARK  
BRADLEY  
AUG 16 1983  
CLERK'S INITIALS  
JON

☆GPO : 1979-300-459

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

Technical Evaluation  
and  
Preliminary Determination

AMAX Phosphate, Inc.  
Hillsborough County, Florida  
Big Four Mine Phosphate Rock Dryer

Proposed Permit Numbers:

Federal: PSD-FL-094

State: AC 29-65834

Florida Department of Environmental Regulation  
Bureau of Air Quality Management  
Central Air Permitting

August 11, 1983

Technical Evaluation and Preliminary Determination  
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NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to AMAX Phosphate, Inc. that will allow the Company to burn alternate fuels in the existing phosphate rock dryer and increase the hours of operation of their Big Four Phosphate Mine that is located near the intersection of State Road 674 and Bethlehem Road in Fort Lonesome, Hillsborough County, Florida. No major physical change in the process or control equipment is required for these modifications. The modifications will increase the emissions of air pollutants from the plants, in tons per year, by the following amounts.

Particulate	Sulfur Dioxide	Nitrogen Oxides
42.8	214.4	57.1

The proposed modification has been reviewed by the Florida Department of Environmental Regulation under Chapter 403, Florida Statutes, and federal regulation 40 CFR 52.21, Prevention of Significant Deterioration. A Best Available Control Technology determination was required for these modifications.

Emissions from the modified facility will not impact the Hillsborough County particulate matter nonattainment area by a significant amount nor exceed the allowable increment consumption or cause an ambient air quality violation in other areas. The maximum percent of allowable PSD increment consumed will be as follows:

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SO <sub>2</sub>	
Three-hour	34
24-hour	70
Annual	35
PM	
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A person who is substantially affected by the department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Chapter 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

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BAQM  
2600 Blair Stone Road  
Tallahassee, Florida 32301

Department of Environmental Regulation  
Southwest District  
7601 Highway 301 N  
Tampa, Florida 33610

Hillsborough County  
Environmental Protection Commission  
1900 9th Avenue  
Tampa, Florida

Any person may send written comments on the proposed action to Mr. Clair Fancy at the department's Tallahassee address. All comments mailed within 30 days of the publication of this notice will be considered in the department's final determination.

RULES OF THE ADMINISTRATIVE COMMISSION  
MODEL RULES OF PROCEDURE  
CHAPTER 28-5  
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

- (1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.
- (2) All petitions filed under these rules should contain:
  - (a) The name and address of each agency affected and each agency's file or identification number, if known;
  - (b) The name and address of the petitioner or petitioners;
  - (c) All disputed issues of material fact. If there are none, the petition must so indicate;
  - (d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;
  - (e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;
  - (f) A demand for the relief to which the petitioner deems himself entitled; and
  - (g) Such other information which the petitioner contends is material.

## I. Project Description

### A. Applicant

AMAX Phosphate, Inc.  
Suite 600  
402 S. Kentucky Avenue  
Lakeland, Florida 33801

### B. Project and Location

AMAX Phosphate, Inc. is operating a 300 TPH fluid-bed phosphate rock dryer and associated dry rock storage and handling equipment at their Big Four Mine located near the intersection of State Road 674 and Bethlehem Road, Fort Lonesome, Hillsborough County, Florida. the dryer is now permitted to burn No. 6 fuel oil with 0.7 percent sulfur (maximum) and is being operated 7,488 hours per year.

The Company has applied for a modification to their permit to operate the dryer which will allow them to burn oil or a coal-oil-water mix fuel (COWM) containing up to 2.5 percent sulfur by weight. They also want to increase the hours of operation of the facility from 7,488 to 8,760 hours per year (full time).

These changes will result in significant net emission increases of particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>) from the facility.

### C. Process and Controls

The moisture content of 300 TPH wet phosphate rock from the beneficiation plant is reduced from approximately 14 percent to 2.5 percent in a Heyl Patterson fluid bed dryer. The pollution from the dryer is controlled by a Peabody emission control system consisting of a twin cyclone and a wet impingement scrubber with a demisting section. Sulfur dioxide, produced from burning fuel containing sulfur, is also absorbed in the scrubber and the phosphate rock product. The fuel oil, with a maximum of 0.7 percent sulfur, that is presently burned in the dryer will be replaced with No. 6 fuel oil or COWM with a maximum of 2.5 percent sulfur content. This will result in a significant net emission increase of particulate matter (PM), sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) and an insignificant increase of carbon monoxide (CO) and hydrocarbons (VOC) from the dryer.

Other sources of air pollution at this facility are a dry rock shipping facility, dry rock storage silos and a process boiler. No physical changes are proposed to these processes or control equipment. The increased production and hours of

operation will result in an increase in particulate matter emissions from the dry rock shipping facility and dry rock storage silos. The process boiler will continue to burn No. 5 fuel oil with a maximum of 0.7 percent sulfur content.

The increased production approved for the facility could result in additional truck traffic hauling fuel and rail traffic hauling phosphate rock. A slight increase in fugitive dust from this activity is expected to occur.

The alternate fuels, No. 6 fuel oil and COWM, will be handled in the same manner as the fuel currently in use. There will be no change in the emissions related to handling the alternate fuels.

## II. Rule Applicability

### A. Federal Regulations

The proposed project, use of alternate fuels in an existing phosphate rock dryer, and increased hours of operation is subject to preconstruction review under federal prevention of significant deterioration (PSD) regulations, Section 52.21 of Title 40 of the Code of Federal Regulations (40 CFR 52.21) as amended in the Federal Register of August 7, 1980 (45 FR 52676). Specifically, the phosphate rock dryer to be modified is a major stationary source (40 CFR 52.21(b)(1)) located in an area designated in 40 CFR 81.310 as unclassifiable for the criteria pollutant sulfur dioxide, nonattainment for ozone, and attainment for the remaining criteria pollutants. It is in the area of influence of the Hillsborough County particulate matter nonattainment area. Use of the alternate fuels will result in significant net emission increases of particulate matter, sulfur dioxide and nitrogen oxides, thereby rendering it a major modification (40 CFR 52.21(b)(2)) subject to PSD review (40 CFR 52.21(i)).

The source is also subject to 40 CFR 60, Subpart NN - Standard of Performance for Phosphate Rock Plants. The increase in emissions of other criteria pollutants are below the significance levels.

Full PSD review is required for each pollutant for which a significant net emissions increase would occur. For these modifications, the review is required for particulate matter, sulfur dioxide and nitrogen oxides. The review consists of a determination of best available control technology (BACT) and an analysis of the air quality impact of the increased emissions. The review also includes an analysis of the impact of the proposed project on soils, vegetation, visibility and the air quality impacts resulting from associated commercial, residential and industrial growth.



## B. State Regulations

The proposed project, modifications to an existing phosphate rock dryer (use of alternate fuels and increased hours of operation) and associated storage and shipping equipment (increased hours of operation) is subject to preconstruction review under the provisions of Chapter 403, FS, and Chapter 17-2, FAC.

The plant site is in an area designated "unclassifiable" for the criteria pollutant sulfur dioxide (17-2.430), attainment for particulate matter and nitrogen oxides (17-2.420), and nonattainment for ozone (17-2.410(1)). It is in the area of influence of the Hillsborough County particulate matter nonattainment area (17-2.410(2)).

The plant is a major emitting facility for particulate matter, sulfur dioxide and nitrogen oxides as defined in Chapter 17-2 because the potential emissions of each of these criteria pollutants exceeds 100 TPY.

The project is subject to the provisions of Subsection 17-2.500, Prevention of Significant Deterioration (PSD), because the modifications will result in increased emissions of particulate matter, sulfur dioxide and nitrogen oxides above the significant levels listed in Table 500-2, Regulated Air Pollutants - Significant Emission Rates.

PSD requires the use of Best Available Control Technology (BACT), determination of the ambient air impact and preconstruction air quality monitoring and analysis. Monitoring for nitrogen oxides was not required because the applicant demonstrated that the impact of the increased nitrogen oxides emissions is less than the established de minimus level for this pollutant given in Table 500-3, De Minimus Ambient Impacts.

The project is exempt from New Source Review for the ozone nonattainment area, 17-2.510, because the increase in volatile organic compound emissions is less than the significant net emission increase (17-2.510(2)(d)4.).

## III. Control Technology Review

### A. Particulate Matter

PM emissions from the dryer are controlled by a Peabody Engineering Company, Type M160, impingement scrubber. This scrubber can consistently reduce the PM emissions to 0.045 grains per standard cubic foot. This concentration is equivalent of NSPS for phosphate rock dryers, 0.06 lbs PM/ton feed. No physical modifications to the scrubber system are planned to control PM.

The fluid bed phosphate rock dryer was originally permitted to emit 0.03 grains per standard cubic foot of PM. Tests by the Company showed the source could not consistently meet this standard. Actual emission varied from 0.027 to 0.055 grains/SCF. Prior to this application, the Company was consulting with the Southwest District office to obtain relief from the current PM standard. In the meantime, EPA adopted Subpart NN - Standards of Performance for Phosphate Rock Plants which established 0.06 lb/ton PM and 10 percent opacity as the standard for new and modified sources. The company believes this is a more realistic standard for their dryer scrubber. The potential for the greatest PM emissions will occur when the unit is burning COWM fuel because of its higher ash content. The Department believes an emission of 0.06 lb PM/ton feed, as proposed by the company, is an acceptable standard for this source.

The dry rock silo and dry rock unloading use separate impingement scrubber control systems to reduce the emissions of PM to 2.06 and 5.96 lbs/hr, respectively. This is equivalent to 0.03 grains/CF. The modification will not result in any change of the hourly emission rate from either source although the annual emissions will increase because of the increased hours of operation of these sources.

#### B. Sulfur Dioxide

The dryer is currently permitted to burn No. 6 fuel oil with a maximum of 0.7 percent sulfur. This is equivalent to 0.76 pounds of SO<sub>2</sub> per million BTU of heat input (MMBTU) if all the SO<sub>2</sub> formed when the fuel is burned is emitted to the atmosphere. Although burning No. 6 fuel oil or COWM with 2.5 percent sulfur content as requested by the company has the potential to emit 2.8 and 3.4 lbs SO<sub>2</sub>/MMBTU, respectively, the company has compiled data showing absorption by the phosphate rock being dried and the scrubber water will reduce the SO<sub>2</sub> emission by 60-65 percent to below 1.1 lbs SO<sub>2</sub> MMBTU.

This emission of 1.1 lb SO<sub>2</sub>/MMBTU is equivalent to burning No. 6 fuel oil with a sulfur content of approximately 1.0 percent. The result is that the SO<sub>2</sub> emissions from the dryer, while burning high sulfur fuel oil or COWM, will be equivalent to that which would be expected from a source using low sulfur fuel oil. No new equipment or modifications to existing equipment are planned for the control of SO<sub>2</sub>.

### C. Nitrogen Oxides

Presently, the fluid bed dryer is emitting 26.3 lbs NO<sub>x</sub>/hr (98.5 TPY) or 0.22 lbs/MMBTU while burning No. 6 fuel oil with 0.7 percent sulfur content. The hourly emission rate of NO<sub>x</sub> will not increase when No. 6 fuel oil with 2.5 percent sulfur is burned in the dryer. Burning COWM fuel in the dryer will increase NO<sub>x</sub> emissions to 35.5 lbs/hr (155.6 TPY) or 0.30 lbs/MMBTU.

The drying process requires a large volume of excess air to be used to remove the moisture from the phosphate rock. The fuel is burned with 50 percent excess air and then additional air is added, resulting in up to 500 percent excess air in the dryer. This additional air is comparable to the principle of low NO<sub>x</sub> burner used in boilers. The water in COWM fuel will hold down peak flame temperatures which should also help reduce NO<sub>x</sub> emissions. The company is unable to significantly change dryer operation procedures and the department is not aware of any other procedures or control equipment that are feasible to use on this source to reduce NO<sub>x</sub> emissions. Thus, the company's proposal to continue operating the dryer by their normal procedures is acceptable to the department.

#### IV. Emissions

The current emissions and the emissions after modifications proposed by the company are summarized in the following table.

Source	Maximum Pollutant Emission Rates					
	Particulate		Sulfur Dioxide		Nitrogen Oxides	
	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TYP
Phos. Rock Dryer*						
Present	10.3	38.5	94.6	354.1	26.3	98.5
Proposed-Oil	18.0	78.8	137.5	568.5	26.3	115.3
-COWM	18.0	78.8	137.5	568.5	35.5	155.6
Max Increase	7.7	40.3	42.9	214.4	9.2	57.1
Dry Rock Storage						
Present	2.06	7.7				
Proposed	2.06	9.0				
Max. Increase	0	1.3				
Dry Rock Loadout						
Present	5.96	7.5				
Proposed	5.96	8.7				
Max. Increase	0	1.2				
Traffic						
Max. Increase		<0.1				
Boiler						
Total Increase		42.8		214.4		57.1

\* CO emissions also increase by 3.9 TPY to a maximum of 19.5 TPY when COWM is burned. HC emission increase by 1.9 TPY to 5.0 TPY when COWM is burned. There is no change in CO or HC emission when No. 6 fuel oil is burned.

An air quality analysis is required for SO<sub>2</sub>, PM and NO<sub>x</sub>, pollutants for which a significant increase in annual emissions has been determined. This analysis consists of:

- ° An analysis of existing air quality;
- ° A PSD increment analysis (SO<sub>2</sub> and PM only);
- ° A National and Florida Ambient Air Quality Standards (AAQS) analysis;
- ° An analysis of impacts on soils, vegetation, and visibility and of growth-related air quality impacts; and
- ° A "good engineering" practice (GEP) stack height evaluation.

The analysis of existing air quality generally relies on preconstruction ambient air monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analyses depend on air quality modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the department has reasonable assurance that the proposed Amax Phosphate Big Four Mine modification, as described in this permit and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any PSD increment or ambient air quality standard. A discussion of the modeling methodology and required analyses follows.

#### A. Modeling Methodology

Four EPA-approved atmospheric dispersion models were used to predict ground-level pollutant concentrations. The Single-Source (CRSTER) model, the PTMTPW model, and the Industrial Source Complex Short-Term (ISCST) model were used for short-term (24-hour average or less) analysis. The Industrial Source Complex Long-Term (ISCLT) model was used to predict annual mean concentrations.

CRSTER was used first to establish the meteorological conditions resulting in the highest, second-high impacts over a field of receptors. The PTMTPW model or the ISCLT model was then run for these days of critical meteorology to further refine the results using all possible sources which could significantly interact with the facility, along with a finer receptor grid spacing (0.1 km). A coarser receptor spacing (1.0 km) was used for the annual average calculations with ISCLT because of the more smoothly varying concentration field resulting from a long-term average.

Ground-level concentrations were calculated at receptors located no closer to the sources than the plant boundary. This

boundary precludes the general public access to plant property. The closest receptor used was located 1.1 kilometers to the east. Thus maximum ground-level impacts were not necessarily determined.

The surface and upper-air meteorological data used in the models were National Weather Service (NWS) data collected at Tampa, Florida for the period 1970-1974.

Stack parameters and emission rates used in evaluating the proposed modification are given in Tables 1 and 2.

#### B. Analysis of Existing Air Quality

Under the state and federal regulations the applicant is required to submit preconstruction monitoring data for all pollutants for which a significant increase in annual emissions is proposed and for which an ambient air quality standard exists. An exemption to this requirement may be obtained if the maximum air quality impact of the net emissions increase is less than a specified de minimus value. For the applicable pollutants of this modification these values are: SO<sub>2</sub> - 13 ug/m<sup>3</sup>, 24-hour average; PM - 10 ug/m<sup>3</sup>, 24-hour average; and NO<sub>2</sub> - 14 ug/m<sup>3</sup>, annual average. The impacts of both PM and NO<sub>2</sub> meet the exemption criteria and thus preconstruction monitoring is not required for these pollutants.

The applicant elected to use existing monitoring data to comply with the regulations for SO<sub>2</sub>. A continuous SO<sub>2</sub> monitor (used in another PSD application, Brewster Phosphates) located five miles southwest of the AMAX plant site collected four months of data between 1 October 1981 and 31 January 1982. These data were used to establish existing SO<sub>2</sub> ambient levels in the surrounding area. The four month average SO<sub>2</sub> concentration was 3.8 ug/m<sup>3</sup>. The highest 24-hour value was 35 ug/m<sup>3</sup> and the highest 3-hour value was 112 ug/m<sup>3</sup>. A concentration of zero was measured 76 percent of time.

#### C. PSD Increment Analysis

The AMAX facility is located in an area where the Class II PSD increments apply. The nearest Class I area is the Chassahowitzka National Wilderness Area located 116 kilometers to the north-northwest. A PSD analysis is required for both SO<sub>2</sub> and PM in the Class II area. No analysis is required for the Class I area.

All air pollution sources located at the Big Four mine are increment consuming because the facility is major and was permitted and built after January 6, 1975. In addition, all significant increment consuming sources from other facilities in the surrounding region were included in the analysis.

The results of the Class II modeling analysis are contained in the following table.

Pollutant and Time Average	Class II Increment (ug/m <sup>3</sup> )	Predicted Increase (ug/m <sup>3</sup> )	Percent Consumed
<b>SO<sub>2</sub></b>			
Three-hour (1)	512	173	34
24-hour (1)	91	64	70
Annual	20	7	35
<b>PM</b>			
24-hour (1)	37	17	46
Annual	19	3	16

(1) Not to be exceeded more than once per year.

No violation of a PSD increment is predicted as a result of the proposed modification at the AMAX facility.

#### D. AAQS Analysis

An AAQS analysis is required for all pollutants for which a significant increase in annual emissions is proposed. The analysis includes an evaluation of the background concentrations of the subject pollutants and a modeling evaluation of all sources of those pollutants at both the modified facility and any surrounding facilities which could impact the area. The AMAX pollutants for which this section is applicable are SO<sub>2</sub>, PM, and NO<sub>2</sub>.

Background values have been proposed by the applicant of 0 ug/m<sup>3</sup> for SO<sub>2</sub> for all averaging times; 30 ug/m<sup>3</sup>, annual average, and 88 ug/m<sup>3</sup> 24-hour average, for PM; and 0 ug/m<sup>3</sup>, annual average, for NO<sub>2</sub>. The SO<sub>2</sub> background value represents the measured concentration when no sources of SO<sub>2</sub> are impacting the area. The PM background represents measured annual averages at monitors in the surrounding region. The short-term PM background was statistically determined using the annual average and the geometric standard deviation of each of these monitors. It represents a predicted second-highest concentration. The NO<sub>2</sub> background concentration has been arbitrarily chosen. The NO<sub>2</sub> impact as a result of the AMAX modification is so small that the choice of a background concentration is not important.

All significant sources of SO<sub>2</sub> and PM in the region were included in the modeling analysis. The maximum predicted ground-level concentrations (all modeled sources plus background) near the AMAX facility, off plant property, are shown in the following table.

Pollutant and Time Average	Florida AAQS (ug/m <sup>3</sup> )	National AAQS (ug/m <sup>3</sup> )	Predicted Impact (ug/m <sup>3</sup> )
SO <sub>2</sub>			
Three-hour(1)	1300	1300(2)	343(3)
24-hour(1)	260	365	99(3)
Annual	60	80	35
PM			
24-hour(1)	150	260	109(3)
Annual	60	75	45
NO <sub>2</sub>			
Annual	100	100	0.4

- (1) Not to be exceeded more than once per year.
- (2) Secondary standard.
- (3) Highest, second-high concentration.

The nearest particulate matter and sulfur dioxide nonattainment areas are 28 and 79 kilometers away, respectively. As demonstrated through modeling, emission increases from the proposed modification at AMAX would not significantly impact either nonattainment area.

#### E. Analysis of Impacts on Soils, Vegetation, and Visibility and Growth-Related Air Quality Impacts

The maximum ground-level concentrations predicted to occur as a result of emissions from the AMAX facility proposed to be modified are below the applicable National and Florida AAQS for SO<sub>2</sub>, PM, and NO<sub>2</sub>. In addition these maximum concentrations are less than the secondary standards designed to protect public welfare-related values. Therefore, no adverse impact on soils and vegetation are expected.

The nearest Class I area is located 116 km from the AMAX facility. At this distance no significant impact on visibility



is expected as a result of increased emissions from the AMAX modifications.

No growth-related air quality impacts are expected due to the modifications.

#### F. GEP Stack Height Evaluation

Regulations published by the EPA in the Federal Register of 8 February 1982 define GEP stack height as the highest of :

1. 65 meters; or
2. The maximum nearby building height plus 1.5 times the building height or width, whichever is less.

While the actual stack height employed can exceed this height, the stack height used in modeling to determine compliance with the AAQS and PSD increments cannot. All stacks at the AMAX facility are less than the GEP limit of 65 meters.

#### VI. Conclusion

Based on a review of the data submitted by AMAX Phosphate, Inc., the department has concluded that the emissions while burning the proposed alternate fuels in the phosphate rock dryer at the Big Four Mine can comply with all applicable county, state and federal regulations. The permitted emissions from the dryer will not cause any violation of the National Ambient Air Quality Standard or PSD increments. The modifications will not cause any adverse impact on soils, vegetation and visibility.

Therefore, the department proposes to issue AMAX Phosphate, Inc. a construction permit that will authorize the use of the proposed alternate fuels and increase the hours of operation of the facility. The General and Specific Conditions in the proposed state permits (see Appendix B) will assure compliance with all applicable air pollution control regulations.

The proposed federal permit to construct is similar to the state permit. See Appendix C.

## Appendix C

### FEDERAL PSD PERMIT PSD-FL-094

FDER proposes a preliminary determination of approval with conditions for the project (modifications to burn alternate fuel in an existing phosphate rock dryer and increase the hours of operation for the source) requested by AMAX Phosphate, Inc. in their federal application for permit to construct that was dated January, 1983.

Specific conditions listed in the draft state permit (AC 29-65834) are adopted as specific conditions for the draft federal permit, PSD-FL-094, for this source.

# AMAX Chemical Corporation

A SUBSIDIARY OF AMAX INC.

402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801 • (813) 687-2561

May 31, 1983

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

DER  
JUN 08 1983  
BAQM

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

Dear Mr. Fancy:

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

## 1. Property Boundaries

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

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

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

Letter to Mr. C. H. Fancy  
May 31, 1983  
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the property is subject to arrest and prosecution.  
(Photographs of the security systems have been attached for  
your information.)

2. Short-Term Air Quality Modeling  
Dr. John Koogler has provided a detailed response to this  
question in his attached letters.
3. Annual Wind Speed/Wind Direction Distributions for Long-Term  
Air Quality Monitoring  
Dr. John Koogler has provided a detailed response to this  
question in his attached letters.
4. Phosphate Rock Dryer Heat Input Rate  
Dr. John Koogler has provided a detailed response to this  
question in his attached letters.
5. Reasons for the Use of Alternate Fuels  
AMAX is proposing to convert to alternate fuels because: (1)  
coal-oil mix fuel is cheaper than oil for any given sulfur  
or heat content; (2) low sulfur residual oil is dispropor-  
tionately expensive, particularly when considering the sul-  
fur dioxide removal efficiency of the Big Four impingement  
scrubber; and (3) the proposed alternate fuels are more  
likely to be readily available at a more stable price than  
low sulfur oil.

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

Throughout the past decade, low sulfur oil has consistently  
been more expensive, less readily available, and more sub-  
ject to upward price pressures than higher sulfur oil.  
Current price quotations provide an excellent example. Even  
though oil is in surplus and prices are depressed compared  
to 12 or 24 months ago, low sulfur fuel prices are still

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approximately 8 percent more expensive. More importantly, during this period, low sulfur oil prices have dropped by 3 percent compared to 9 percent for higher sulfur oil during the same period.

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

#### 6. Cost and Availability of Alternate Fuels

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

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

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

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

7. Nitrogen Oxide Emissions Data

Dr. John Koogler has provided a detailed response to this question in his attached letter.

Response to Hillsborough County Environmental Protection Commission Letter:

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

1. Secondary Particulate Matter Emissions

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

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

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

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

2. Rail Traffic

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

3. Receptor Locations

Dr. John Koogler has provided a detailed response to this comment in his attached letter.

4. Additional Sulfur Dioxide Sources

Dr. John Koogler has provided a detailed response to this comment in his attached letter.

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

Dr. John Koogler has provided a detailed response to this comment in his attached letter.

6. Emission Limitations

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

Letter to Mr. C. H. Fancy  
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Page Six

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

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

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

7. Sulfur Dioxide Removal Efficiency

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

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



Letter to Mr. C. H. Fancy  
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2.5% reported. This higher sulfur content was discovered in a subsequent point source test performed on September 4, 1981, and it was found that the SO<sub>2</sub> loading to the scrubber was 134% of the highest inlet value available.

When the efficiencies of the August 27, 1981, test were re-calculated using the revised fuel sulfur data, the SO<sub>2</sub> removal efficiency of this system averaged 60.1%.

8. Short-Term Air Quality Monitoring

Dr. John Koogler has provided a detailed response to this comment on page 1 of his attached letter.

9. Wind Instrument Elevation

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

10. & 11. Meteorological Input Data

Dr. Koogler has provided a response to these comments on page 6 of his attached letter.

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

Sincerely,



Fred G. Mullins, III  
Regulatory Compliance Manager

FGM/ko

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



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SKEC 144-82-02

May 27, 1983

DER

JUN 08 1983

BAQM

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

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

Dear Mr. Fancy:

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

1. Property Boundaries

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

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

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

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

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

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

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

4. Phosphate Rock Dryer Heat Input Rate

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

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

5. Reasons for Use of Alternative Fuels

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

6. Cost and Availability of Alternative Fuels

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

#### 7. Sulfur Dioxide Removal Efficiency

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

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

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

#### 8. Nitrogen Oxide Emission Data

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

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

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

Response to Hillsborough County Environmental Protection Commission  
Comments

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

1. Secondary Particulate Matter Emissions

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

2. Rail Traffic

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

3. Receptor Locations

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

4. Additional Sulfur Dioxide Sources

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

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

A letter dated October 30, 1982 from Sholtes & Koogler, Environmental Consultants, Inc. to AMAX was forwarded to the Department in November, 1982. This letter described the impact of particulate matter emissions from the AMAX Big Four facility on the Hillsborough County Particulate Matter Non-Attainment Area. In this letter, the results

of two sets of particulate matter emission rates were addressed. One set of conditions was entitled "Present Actual Emissions". The emission rates used to represent this condition were:

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

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

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

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

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

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

#### 6. Emission Limitations

AMAX Chemical Corporation has responded to this comment in detail.

#### 7. Sulfur Dioxide Removal Efficiency

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

#### 8. Short-Term Air Quality Modeling

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

9. Wind Instrument Elevation

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

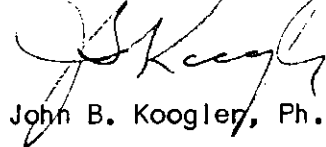
10 & 11. Meteorological Input Data

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

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

Very truly yours,

SHOLTES & KOOGLER,  
ENVIRONMENTAL CONSULTANTS, INC.



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

JBK:ldh  
Attachments

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

ATTACHMENT 1  
REVISED AIR QUALITY REVIEW



TABLE 6-2

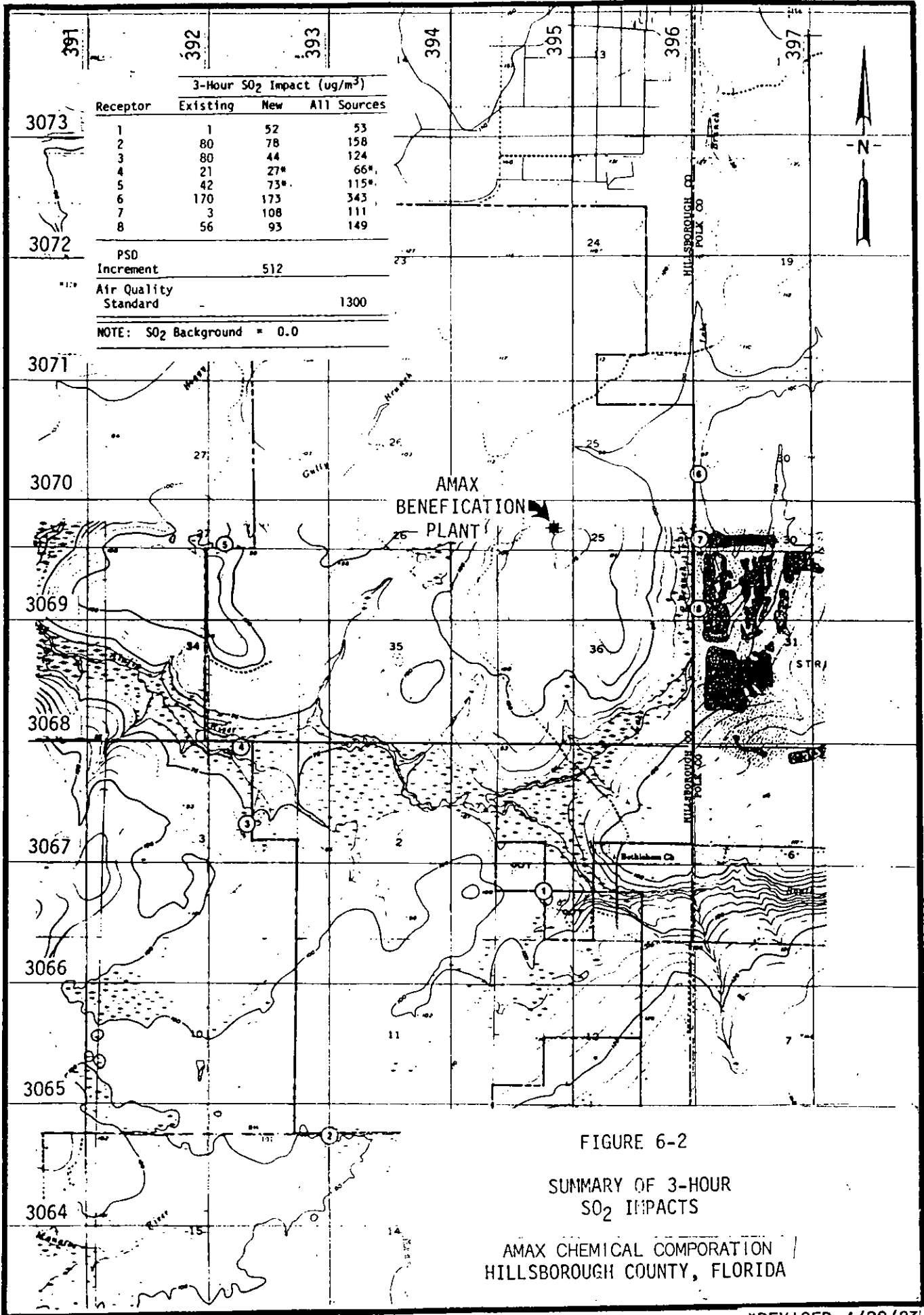
SUMMARY OF AIR QUALITY REVIEW

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

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

- (1) Includes a background of 30 ug/m<sup>3</sup>  
 (2) Includes a background of 88 ug/m<sup>3</sup>  
 (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.



391  
3073  
3072  
3071  
3070  
3069  
3068  
3067  
3066  
3065  
3064

Receptor	3-Hour SO <sub>2</sub> Impact (ug/m <sup>3</sup> )		
	Existing	New	All Sources
1	1	52	53
2	80	78	158
3	80	44	124
4	21	27*	66*
5	42	73*	115*
6	170	173	343
7	3	108	111
8	56	93	149

PSD Increment	512
Air Quality Standard	1300

NOTE: SO<sub>2</sub> Background = 0.0

AMAX  
BENEFICATION  
PLANT

FIGURE 6-2

SUMMARY OF 3-HOUR  
SO<sub>2</sub> IMPACTS

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

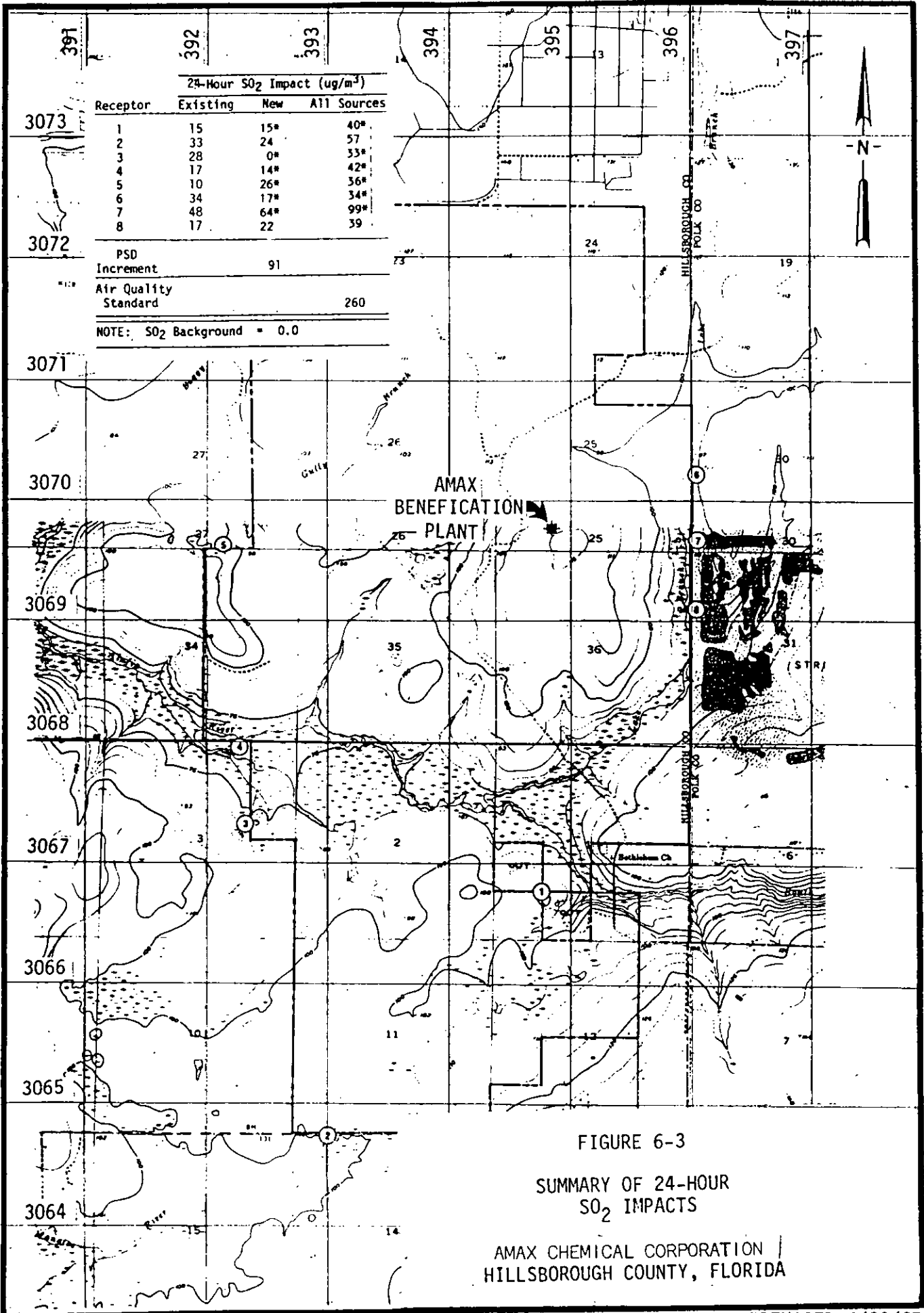


FIGURE 6-3

SUMMARY OF 24-HOUR  
SO<sub>2</sub> IMPACTS

AMAX CHEMICAL CORPORATION  
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. 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

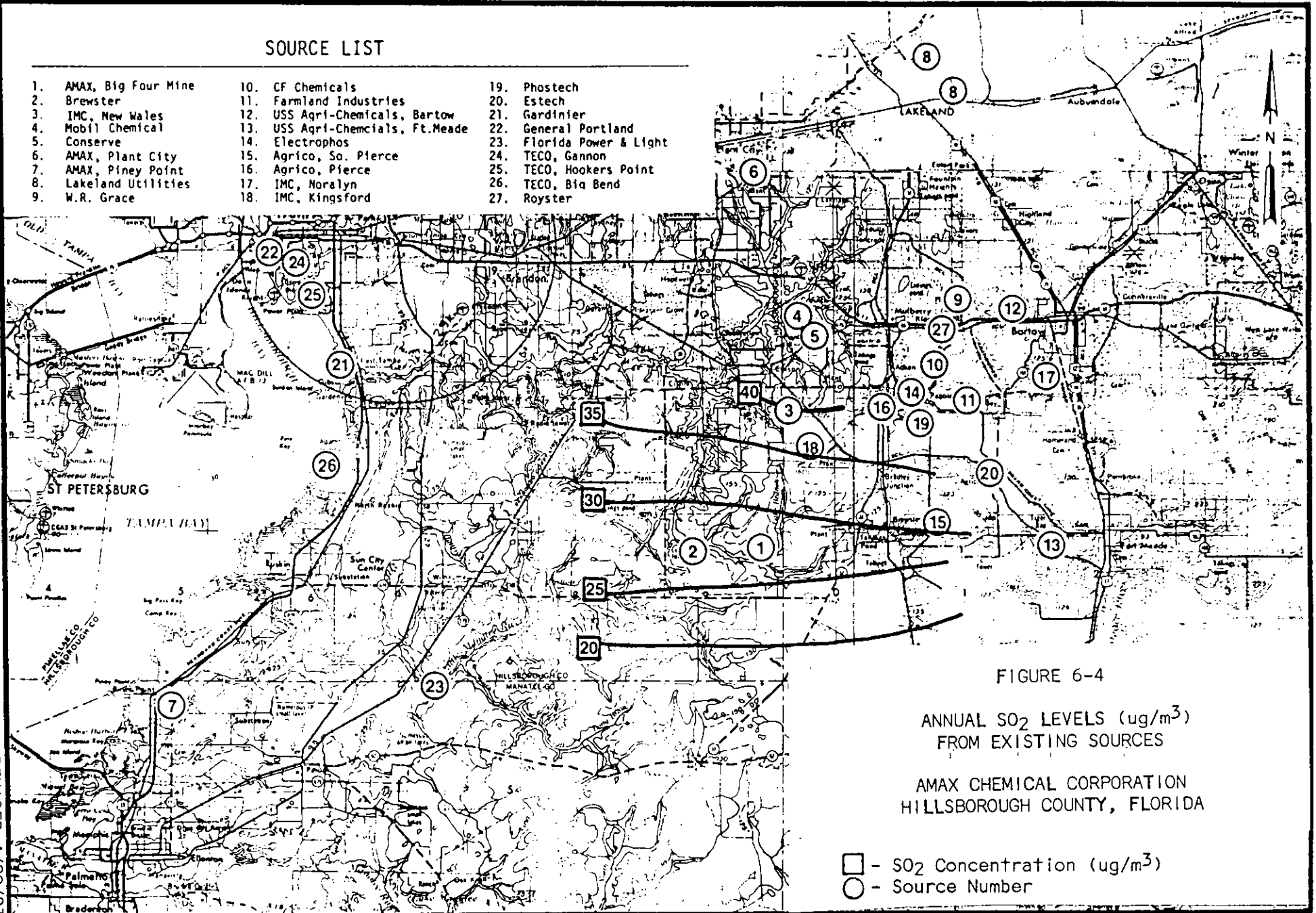


FIGURE 6-4

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM EXISTING SOURCES

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - 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. 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, Bio Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

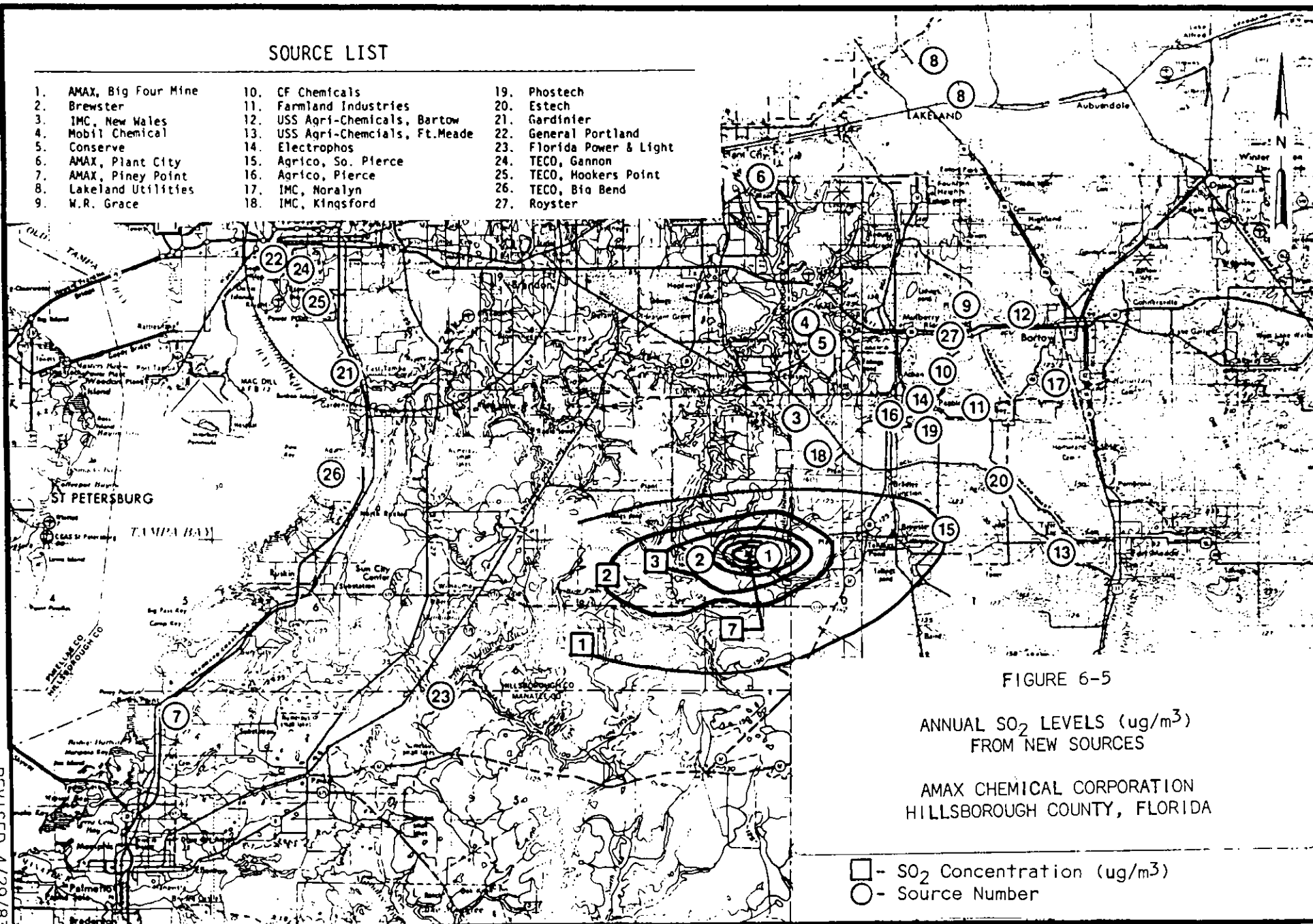


FIGURE 6-5

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM NEW SOURCES

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

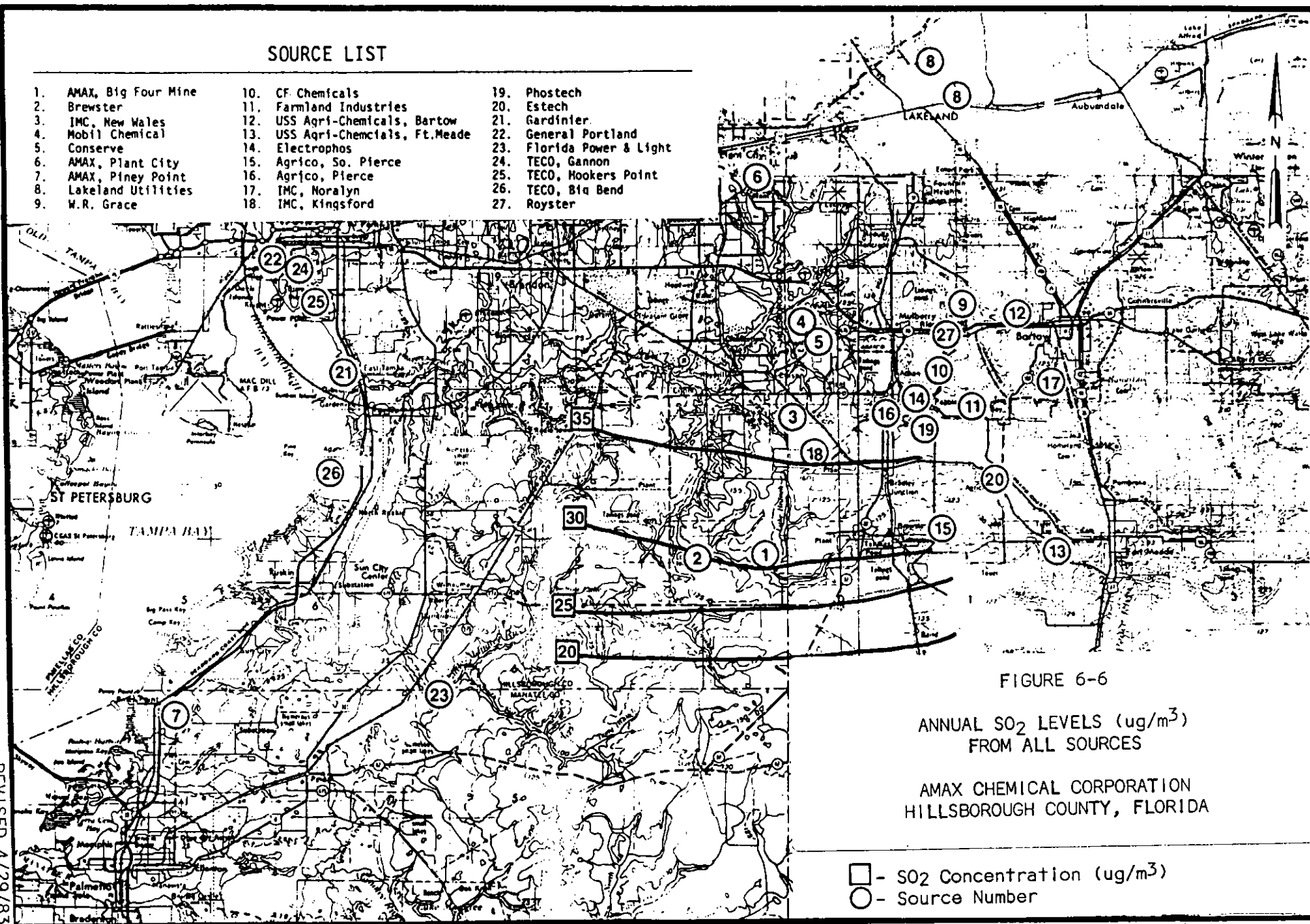


FIGURE 6-6

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM ALL SOURCES

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - Source Number

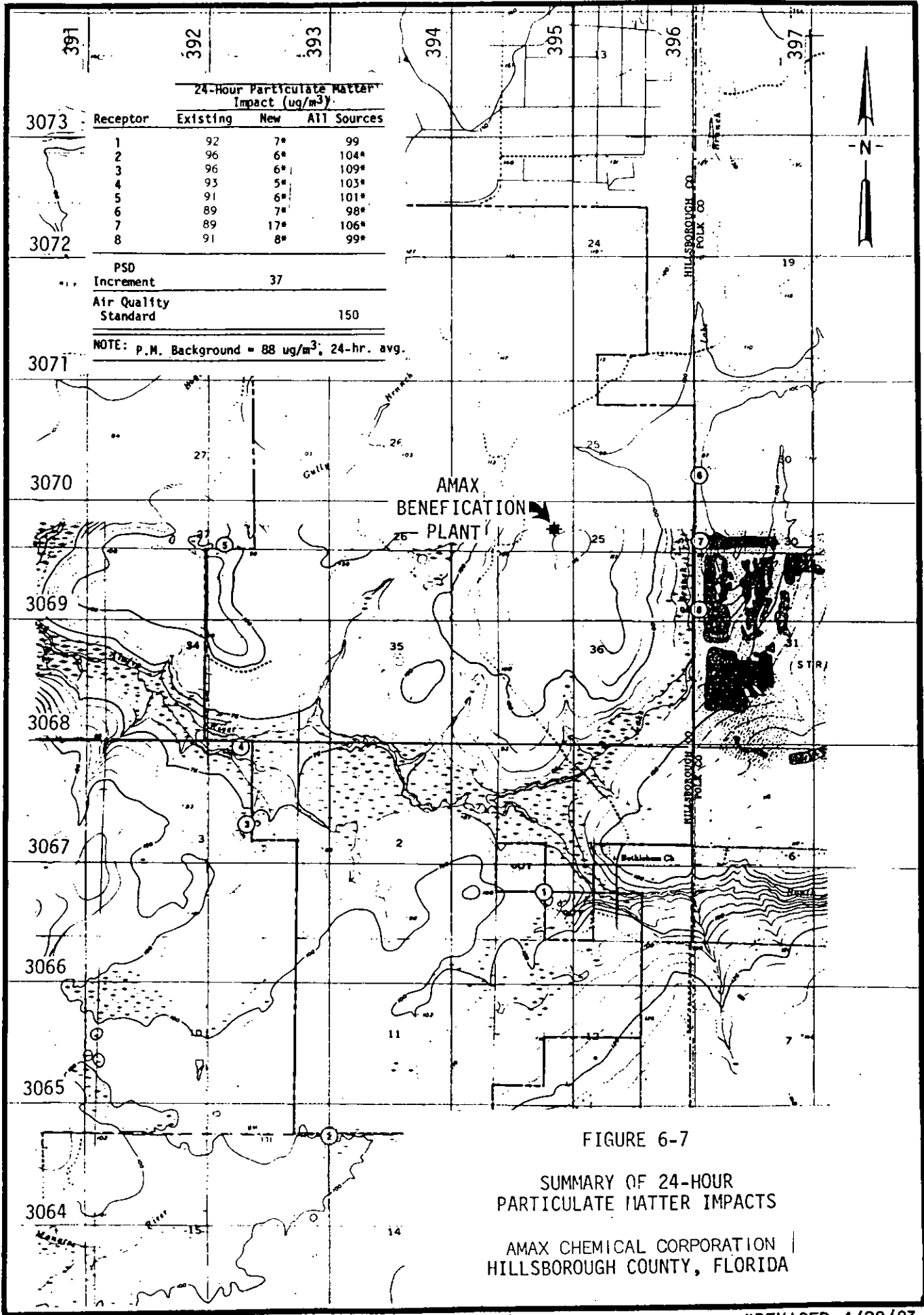


FIGURE 6-7  
 SUMMARY OF 24-HOUR  
 PARTICULATE MATTER IMPACTS  
 AMAX CHEMICAL CORPORATION |  
 HILLSBOROUGH COUNTY, FLORIDA

## 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               |

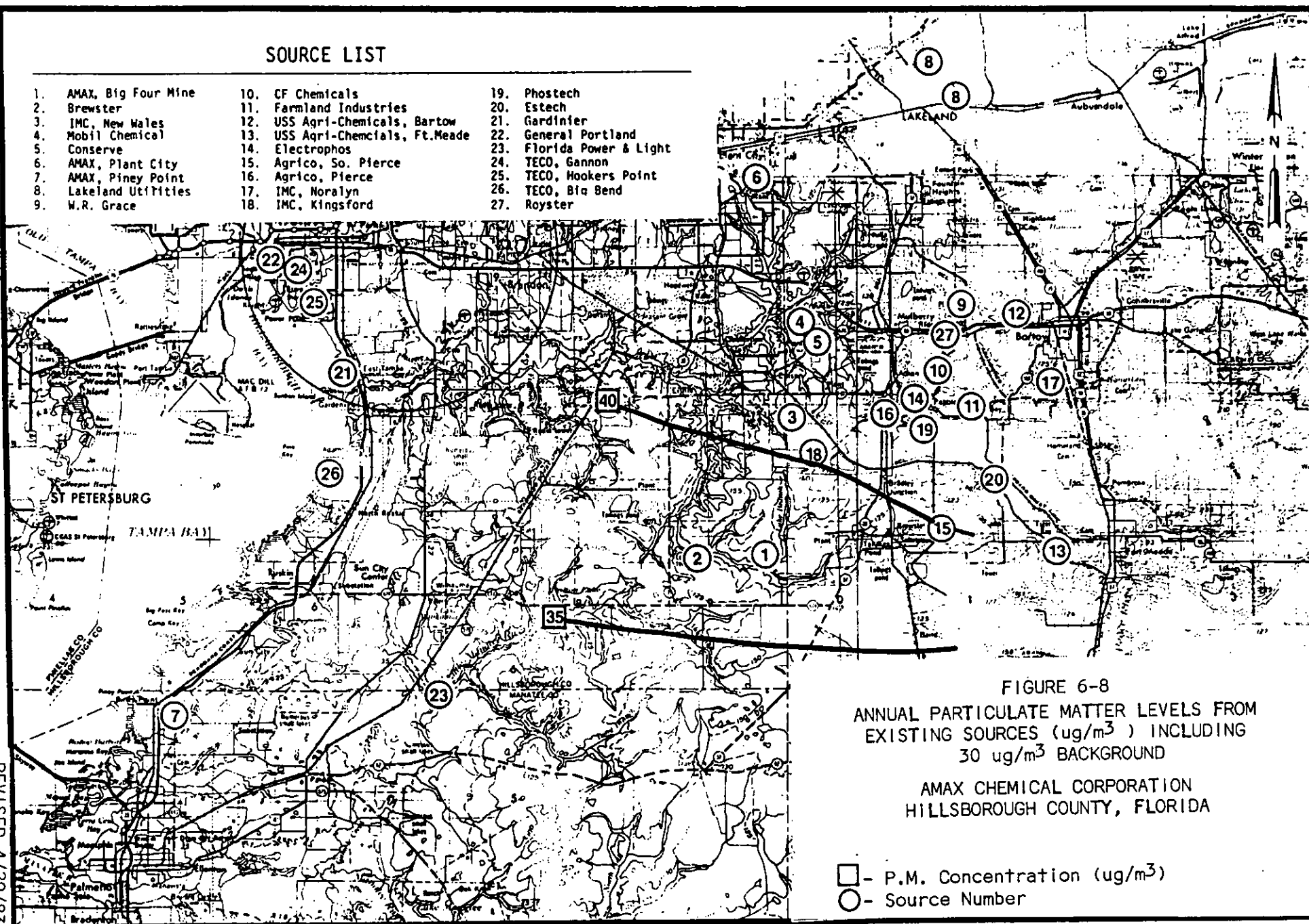


FIGURE 6-8  
ANNUAL PARTICULATE MATTER LEVELS FROM  
EXISTING SOURCES ( $\mu\text{g}/\text{m}^3$ ) INCLUDING  
30  $\mu\text{g}/\text{m}^3$  BACKGROUND

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

- - P.M. Concentration ( $\mu\text{g}/\text{m}^3$ )
- - 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. 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, Bio Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

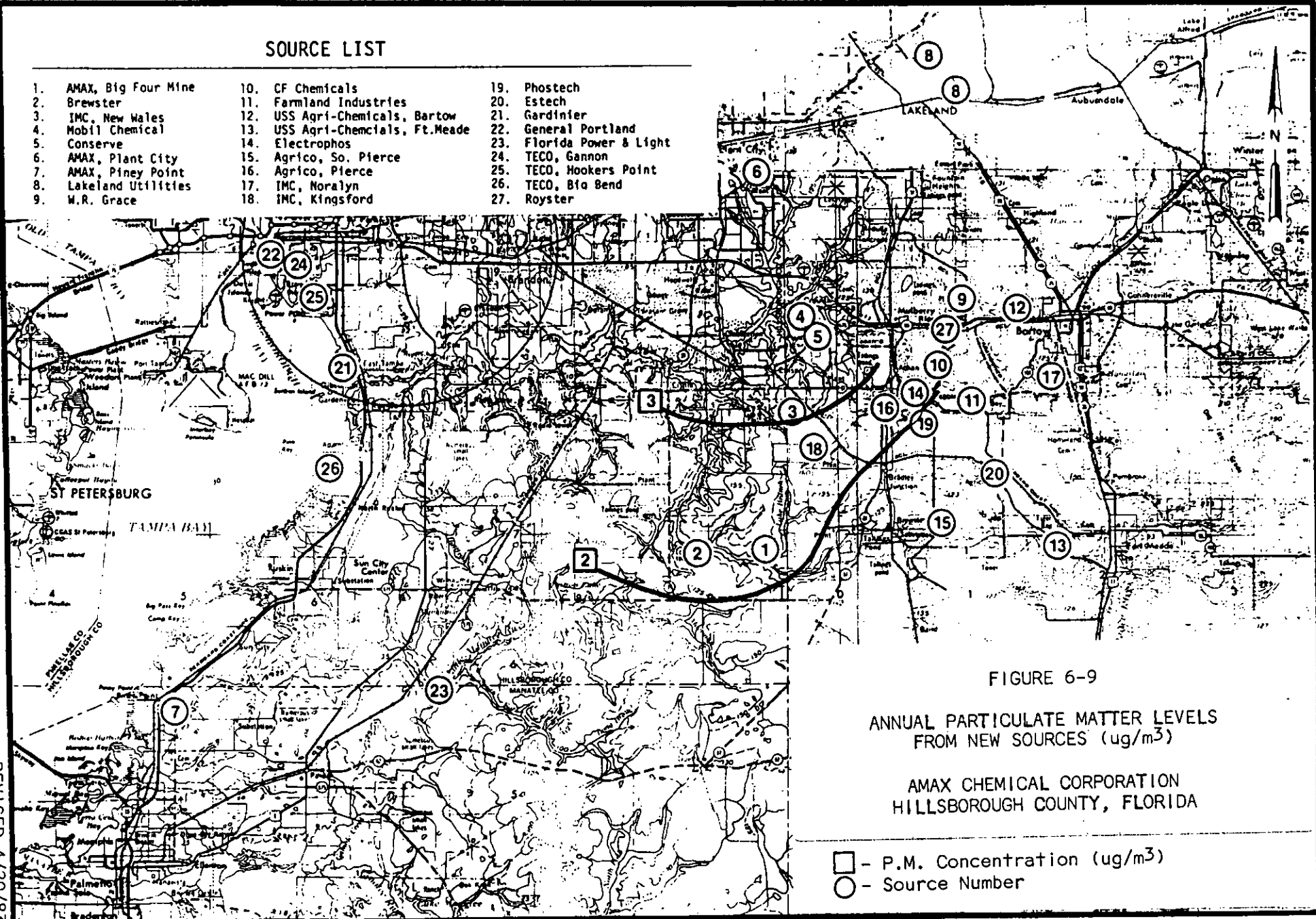


FIGURE 6-9

ANNUAL PARTICULATE MATTER LEVELS  
FROM NEW SOURCES ( $\mu\text{g}/\text{m}^3$ )

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

- - P.M. Concentration ( $\mu\text{g}/\text{m}^3$ )
- - 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

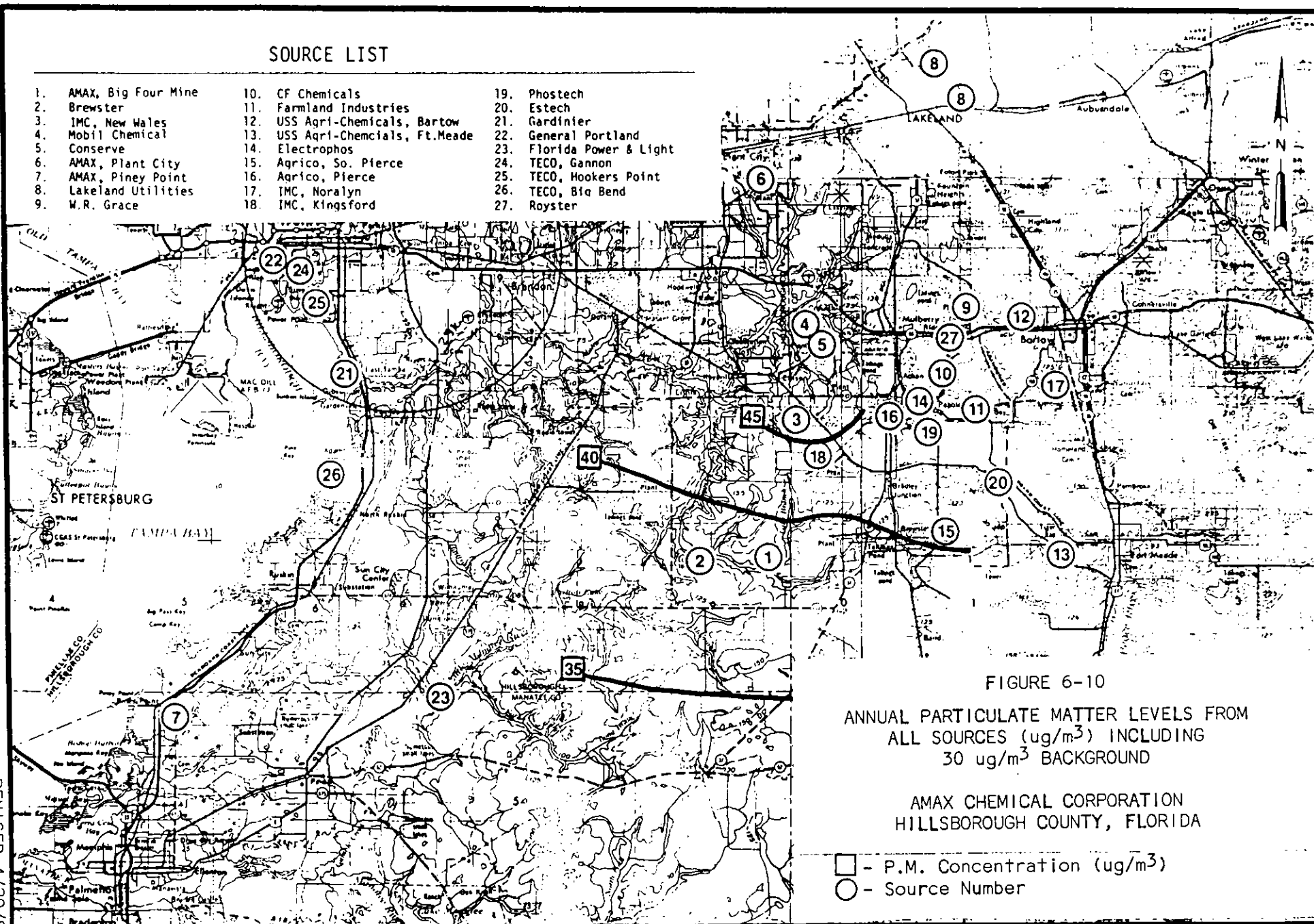


FIGURE 6-10

ANNUAL PARTICULATE MATTER LEVELS FROM  
ALL SOURCES ( $\mu\text{g}/\text{m}^3$ ) INCLUDING  
30  $\mu\text{g}/\text{m}^3$  BACKGROUND

AMAX CHEMICAL CORPORATION  
HILLSBOROUGH COUNTY, FLORIDA

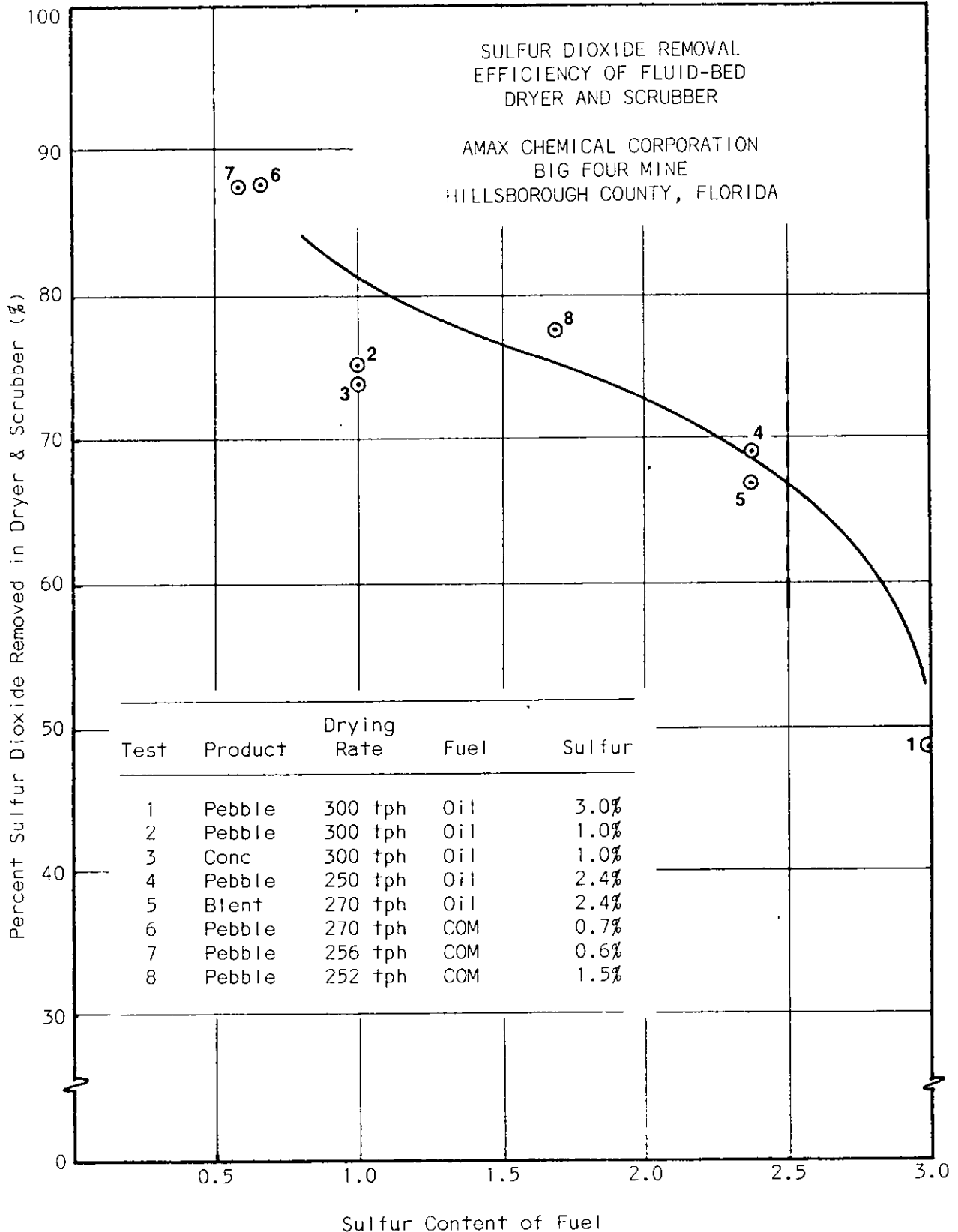
- - P.M. Concentration ( $\mu\text{g}/\text{m}^3$ )
- - Source Number

ATTACHMENT 2

SULFUR DIOXIDE  
REMOVAL EFFICIENCY DATA

SULFUR DIOXIDE REMOVAL  
EFFICIENCY OF FLUID-BED  
DRYER AND SCRUBBER

AMAX CHEMICAL CORPORATION  
BIG FOUR MINE  
HILLSBOROUGH COUNTY, FLORIDA



ATTACHMENT 3

NITROGEN OXIDES  
EMISSION RATE CALCULATIONS

EMISSION RATE CALCULATIONSROCK DRYERPRESENT

## 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

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

$$= 94.58 \text{ lb/hour}$$

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

## NITROGEN OXIDES

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

$$= (45350 \text{ ft}^3/\text{min}) (60 \text{ min/hr}) (81 \times 10^{-6} \frac{\text{ft}^3 \text{NO}_x}{\text{ft}^3}) *$$

$$\times (1/385 \text{ ft}^3 \text{NO}_x/\text{lb-mole}) (46 \text{ lb NO}_x/\text{lb-mole}) *$$

$$= 26.33 \text{ lb/hr} *$$

$$\times 7488/2000 *$$

$$= 98.5 \text{ tpy} *$$

## CARBON MONOXIDE

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

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

$$\times (5/1000 \text{ lb CO/gal})$$

$$= 4.18 \text{ lb/hour}$$

$$\times 7488/2000$$

$$= 15.6 \text{ tpy}$$

## HYDROCARBONS

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

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

$$= 0.84 \text{ lb/hour}$$

$$\times 7488/2000$$

$$= 3.1 \text{ tpy}$$



### NITROGEN OXIDES

For fuel oil combustion an NO<sub>x</sub> stack gas concentration of 81 ppm was assumed (PSD-FL-088; Brewster). For coal combustion this concentration was increased by a factor equal to the AP-42 coal NO<sub>x</sub> emission factor divided by the AP-42 oil NO<sub>x</sub> emission factor. For COM the NO<sub>x</sub> emission factor was calculated as:

$$(Oil\ NO_x\ Factor)(0.45) + (Coal\ NO_x\ Factor)(0.55)$$

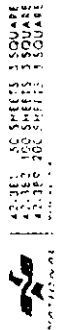
$$\begin{aligned} NO_x\ from\ Coal - AP-42 &= 18\ lb / ton \\ &\times (1/2000\ lb/ton) \times (1/13350\ BTU/lb) (10^6) \\ &= 0.67\ lb\ NO_x / 10^6\ BTU \end{aligned}$$

$$\begin{aligned} NO_x\ from\ Oil - AP-42 &= 60\ lb / 1000\ gal \\ &\times (1/1000) \times (1/147040\ BTU/gal) (10^6) \\ &= 0.41\ lb\ NO_x / 10^6\ BTU \end{aligned}$$

$$\begin{aligned} NO_x\ emissions\ from\ Oil\ (same\ as\ present) &= 26.33\ lb/hr \end{aligned}$$

$$\begin{aligned} NO_x\ emissions\ from\ Coal\ (by\ ratio) &= 26.33\ (0.67 / 0.41) \\ &= 43.04\ lb/hr \end{aligned}$$

$$\begin{aligned} NO_x\ emissions\ from\ COM &= 26.33\ (0.45) + 43.04\ (0.55) \\ &= 35.52\ lb/hr \\ &\times 8760 / 2000 \\ &= 155.6\ tpy \end{aligned}$$



AC 29-65834



D. 13. 10  
FEB 8 1983  
NORTHWEST DISTRICT  
TAMPA

STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL REGULATION  
APPLICATION TO OPERATE/CONSTRUCT  
AIR POLLUTION SOURCES

12/10/82  
12/27/82  
1/27/83

SOURCE TYPE: Air Pollution  New<sup>1</sup>  Existing<sup>1</sup> (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: S. R. Sandrik  
S. R. Sandrik, Plant Manager  
Name and Title (Please Type)  
Date: \_\_\_\_\_ Telephone No. (813) 688-1130

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

This is to certify that the engineering features of this pollution control project have been ~~designed~~/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

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

(Affix Seal)

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

<sup>1</sup>See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)



**SECTION II: GENERAL PROJECT INFORMATION**

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

SEE ATTACHMENT (Page 2A)

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

Start of Construction Not Applicable Completion of Construction Not Applicable

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

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

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

The Big Four Mine phosphate rock dryer is currently operating under FDER

Permit No. A029-22821, which was issued on September 20, 1979 and expires on August 15, 1984.

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

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

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

1. Is this source in a non-attainment area for a particular pollutant?

YES

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

Not Applicable

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

Not Applicable

c. If yes, list non-attainment pollutants.

Ozone and Volatile Organic Carbons

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

YES

3. Does the State "Prevention of Significant Deterioration" (PSD) requirements apply to this source? If yes, see Sections VI and VII.

YES

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

YES

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source?

NO

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

## SECTION II: General Project Information (Continued)

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

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

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

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

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

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

- 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 <sup>1</sup>		Allowed Emission <sup>2</sup> Rate per Ch. 17-2, F.A.C.	Allowable <sup>3</sup> Emission lbs/hr	Potential Emission <sup>4</sup>		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 <sub>2</sub>	129.8	568.5	1.10 lbs/MM BTU	129.8	373	1634	D
NO <sub>x</sub>	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 <sup>5</sup> Size Collected (in microns)	Basis for Efficiency (Sec. V, It <sup>5</sup> )
Peabody Engineering Co.	Particulate	+97%	Not Applicable	Test Data
Impingement Scrubber, Type M160, Size 88	Sulfur Dioxide	48-78%	Not Applicable	Test Data

<sup>1</sup>See Section V, Item 2.

<sup>2</sup>Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. - 0.1 pounds per million BTU heat input)

<sup>3</sup>Calculated from operating rate and applicable standard

<sup>4</sup>Emission, if source operated without control (See Section V, Item 3)

<sup>5</sup>If Applicable

E. Fuels

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 °F

\*These values are typical values and may vary as much as  $\pm 10\%$ .

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) <sup>3</sup>	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: \_\_\_\_\_ ft. Stack Diameter \_\_\_\_\_ Stack Temp. \_\_\_\_\_

Gas Flow Rate: \_\_\_\_\_ ACFM \_\_\_\_\_ DSCFM\* Velocity \_\_\_\_\_ FPS

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

Type of pollution control device:  Cyclone  Wet Scrubber  Afterburner  Other (specify) \_\_\_\_\_

Brief description of operating characteristics of control devices: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

**SECTION V: SUPPLEMENTAL REQUIREMENTS**

Please provide the following supplements where required for this application.

1. Total process input rate and product weight – show derivation. See Attachment A
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. See Attachments B and C
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test). See Attachment C
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, etc.). (See Sect. IIA and IIID for existing scrubber information)
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3, and 5 should be consistent: actual emissions = potential (1-efficiency). (See Sect. IIID for test data)
6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained. See Attachment D
7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map). See Attachment E
8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram. See Attachment F



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 <sup>o</sup> F	Lbs./Hr.	Grains/DSCF	Lbs./Hr.
1	55,028	123	15.50	.0328	25.11
2	54,319	123	14.11	.0302	28.69
3	55,164	126	22.85	.0482	38.23
Avg.	54,837	124	17.49	.0371	30.68

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

*George Townsend*  
George Townsend

GT/rit

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



FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED 0.24 Chlorine

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

OIL USED

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

COM

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

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>550</u>
130	<u>11,450</u>	240	<u>195</u>

Percentages are by weight

4,140 Gallons

Name William R. Brown  
Position Quality Control Tech

## EMISSION RATE CALCULATIONS

PROPOSED ACTUAL

## 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

$$\begin{aligned}
 &= (115 \times 10^6 \text{ BTU/hr})(1/149500 \text{ BTU/gal})(8.08 \text{ lb/gal}) \\
 &\quad \times (0.007 \times 2 \text{ lb SO}_2/\text{lb fuel})
 \end{aligned}$$

$$= 87.0 \text{ lb/hr}$$

< 129.8 lb/hr; therefore no SO<sub>2</sub> sorption is necessary to meet the proposed emission limiting standard

Uncontrolled with 2.5% Sulfur fuel oil

$$\begin{aligned}
 &= (118 \times 10^6 \text{ BTU/hr})(1/147095 \text{ BTU/gal})(8.29 \text{ lb/gal}) \\
 &\quad \times (0.025 \times 2 \text{ lb SO}_2/\text{lb fuel})
 \end{aligned}$$

$$= 332.6 \text{ lb/hr}$$

Absorption necessary to meet proposed std

$$= (332.6 - 129.8) \times 100 / 332.6$$

$$= 61.0\%$$

Uncontrolled with 2.00% Sulfur COM

$$\begin{aligned}
 &= (109 \times 10^6 \text{ BTU/hr})(1/135876 \text{ BTU/gal})(9.3 \text{ lb/gal}) \\
 &\quad \times (0.025 \times 2 \text{ lb SO}_2/\text{lb fuel})
 \end{aligned}$$

$$= 373.0 \text{ lb/hr}$$

Absorption necessary to meet proposed std

$$= (373.0 - 129.8) \times 100 / 373.0$$

$$= 65.2\%$$

### NITROGEN OXIDES

For fuel oil combustion an NO<sub>x</sub> 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<sub>x</sub> emission factor divided by the AP-42 oil NO<sub>x</sub> emission factor. For COM the NO<sub>x</sub> emission factor was calculated as:

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

$$\begin{aligned} NO_x\ from\ Coal - AP-42 &= 18\ lb / ton \\ &\times (1/2000\ lb/ton) \times (1/13350\ BTU/lb) (10^6) \\ &= 0.67\ lb\ NO_x / 10^6\ BTU \end{aligned}$$

$$\begin{aligned} NO_x\ from\ Oil - AP-42 &= 60\ lb / 1000\ gal \\ &\times (1/1000) (1/147040\ BTU/gal) (10^6) \\ &= 0.41\ lb\ NO_x / 10^6\ BTU \end{aligned}$$

$$\begin{aligned} NO_x\ emissions\ from\ Oil\ (same\ as\ present) &= 19.83\ lb/hr \end{aligned}$$

$$\begin{aligned} NO_x\ emissions\ from\ Coal\ (by\ ratio) &= 19.83 (0.67 / 0.41) \\ &= 32.41\ lb/hr \end{aligned}$$

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





## CARBON MONOXIDE

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

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

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

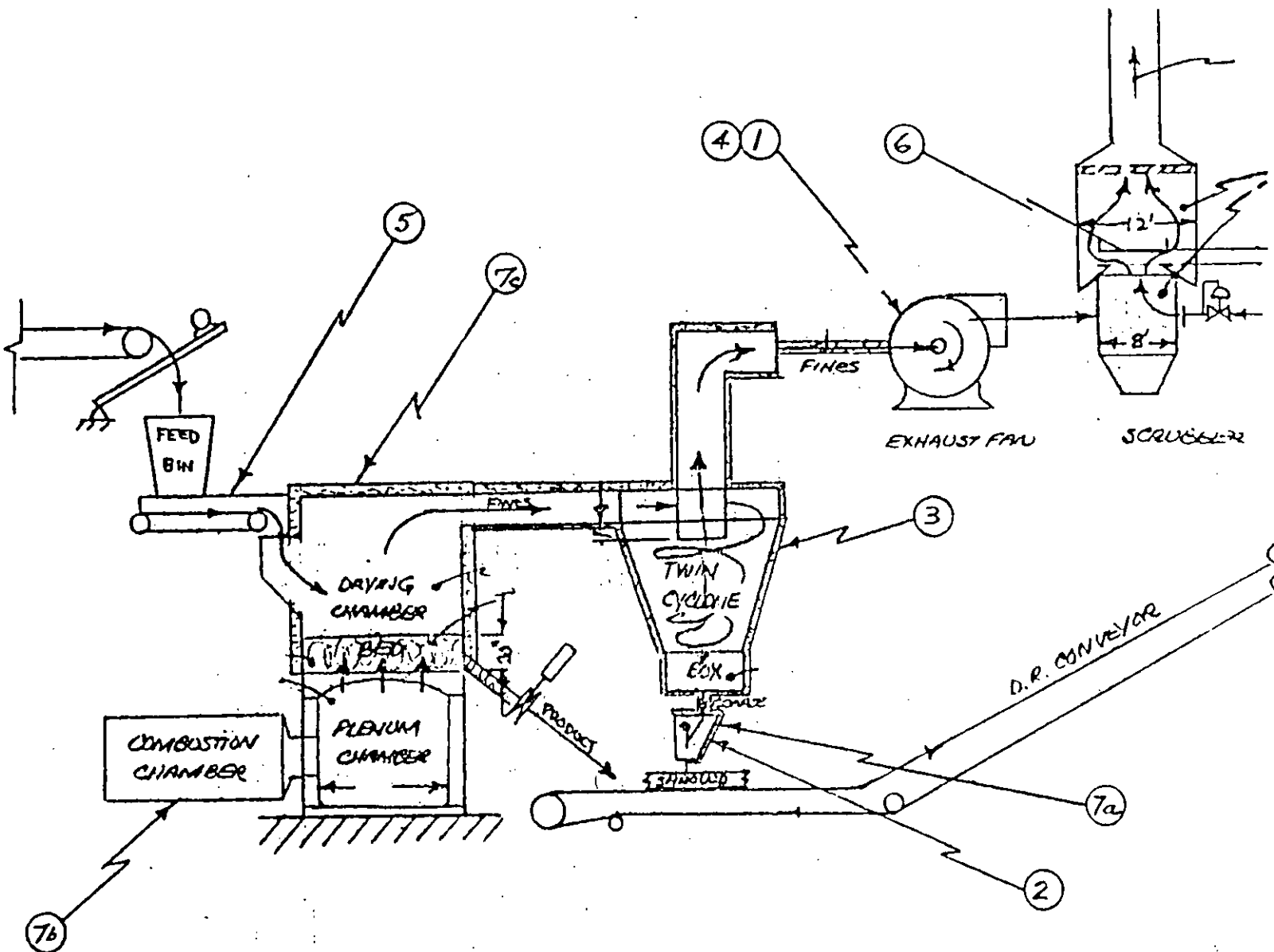
## HYDROCARBONS

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

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

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

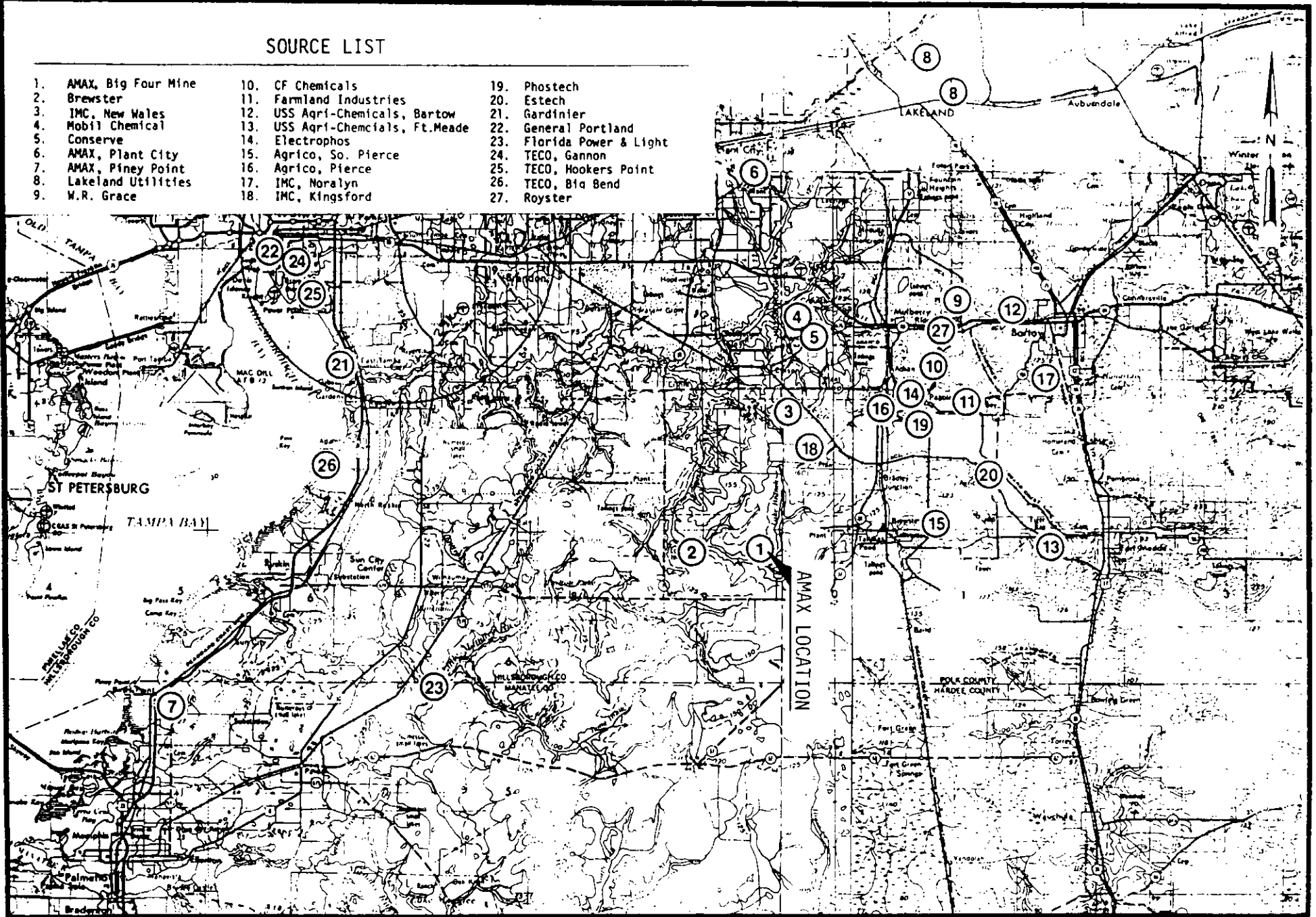


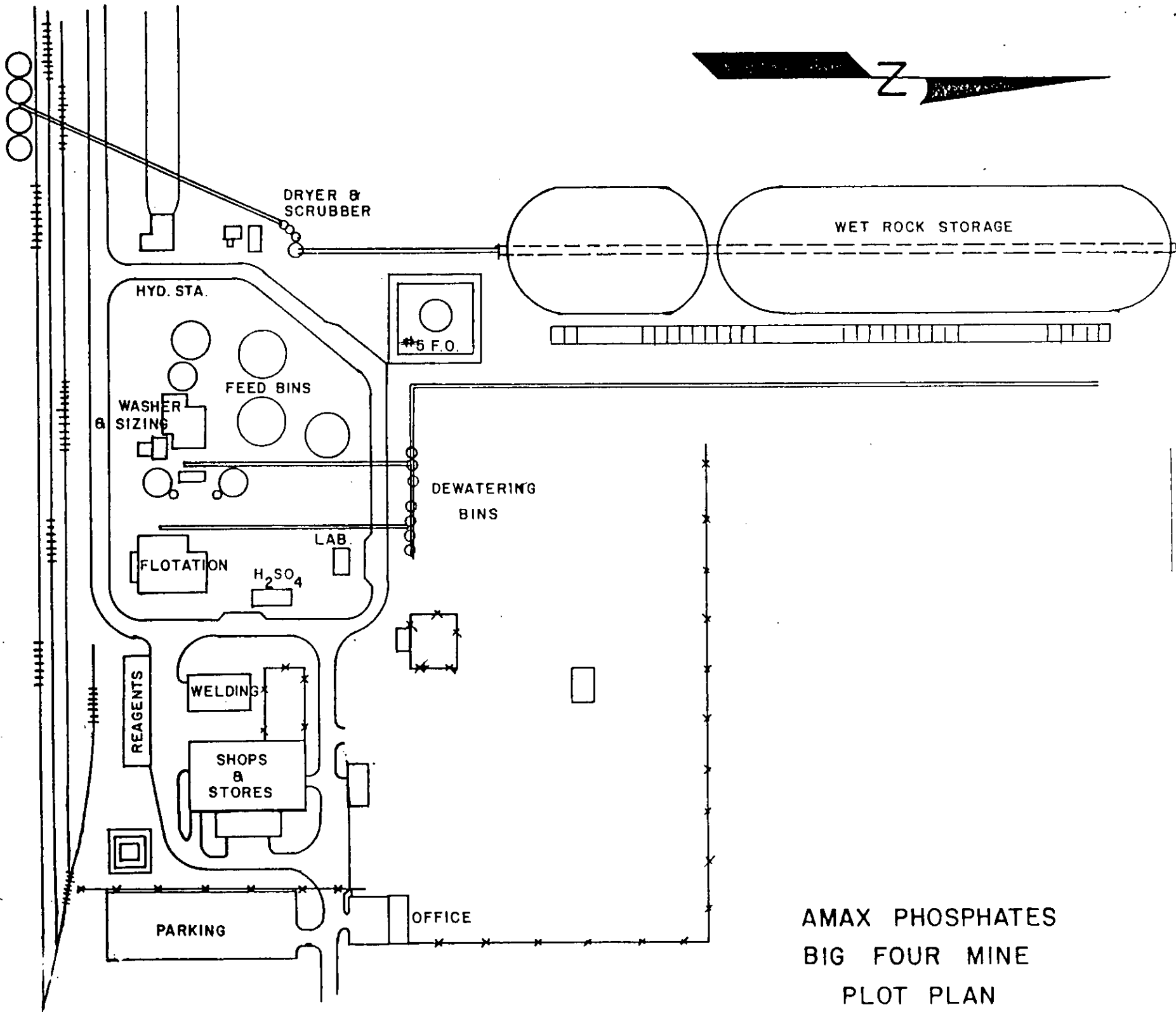


SCHMATIC DRYER ARRANGEMENT

## 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. 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |





AMAX PHOSPHATES  
 BIG FOUR MINE  
 PLOT PLAN

*Need by Friday*  
8/12/93  
DUPLICATING JOB SHEET *by 2:00 p.m.*

COST CENTER 300402  
DATE 8/11/93 PHONE 8-1344  
REQUESTED BY Patty Adams  
NO. PAGES 187 NO. COPIES 10

JOB DESCRIPTION AMAX permit

SPECIAL INSTRUCTIONS \_\_\_\_\_

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> ONE SIDE COPY | <input checked="" type="checkbox"/> COVER STOCK | <input type="checkbox"/> STAPLE          |
| <input type="checkbox"/> TWO SIDE COPY            | <input type="checkbox"/> COLOR STOCK            | <input type="checkbox"/> DO NOT          |
| <input checked="" type="checkbox"/> LETTER SIZE   | <input type="checkbox"/> CARBONLESS             | STAPLE                                   |
| <input type="checkbox"/> LEGAL SIZE               | <input checked="" type="checkbox"/> COLLATE     | <input checked="" type="checkbox"/> BIND |
| <input type="checkbox"/> REDUCE TO 8½ x 11        | <input type="checkbox"/> REDUCE TO              | <input type="checkbox"/> GLUE            |
- 2 PER PAGE

D.F.R.

FEB 3 1983

SOUTHWEST DISTRICT  
TAMPA

APPLICATION FOR STATE AND FEDERAL  
PSD APPROVAL

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

VOLUME I

JANUARY, 1983

SHOLTES & KOOGLER  
ENVIRONMENTAL CONSULTANTS, INC.  
1213 NW 6TH STREET  
GAINESVILLE, FLORIDA 32601  
(904) 377-5822

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2-15-83

Asked Fred Mullins to justify 0.06 lb PM / T feed  
and provide cost data on fuels.

2 - -83

Told him to take look at NO<sub>x</sub> emissions proposed.  
I think they are wrong. (low)

2-23-83

Told dryer burns no 5 + no 6 oil with 0.7% S.  
Permitted for no 6.

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)

*Permitted Sulfur Dioxide Emission Rate = 0.0392 / 40,000 SCFM = 0.000955 #/SCF = 10.29 #/HR*

*Permitted Particulate Matter Emission Rate = 0.03 / 40,000 SCFM = 0.00075 #/SCF = 7.00 #/HR*

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.

*Permitted to use No. 5  
HAVE BURNED NO. 5 ALSO  
(118 AVG)*

*THESE  
ACTUAL LESS*

$$\text{Current } SO_2 \text{ EMISSION} = 125 \times 10^6 \frac{\text{BTU}}{\text{hr}} \times \frac{0.76 \# \text{ } SO_2}{10^6 \text{ BTU}} = 95 \frac{\# \text{ } SO_2}{\text{hr}}$$

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.

*125 million BTU/hr max*  
*115 x 10<sup>6</sup> BTU/hr*  
*used in calculations*  
*avg*

*Projected SO<sub>2</sub> Emission = 125 x 10<sup>6</sup> BTU/hr x 1.1 # SO<sub>2</sub> / 10<sup>6</sup> BTU = 137.5 # SO<sub>2</sub> / hr*  
*ANNUAL INCREASE = 94.6 x 7488 / 2000 - 138 x 8760 / 2000 = 250 TPY (1.1)*

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

PM

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.

NO<sub>x</sub>

$$\text{TPY NO}_x = \frac{(26.7)(8760)}{2000} = 116.9 \text{ TPY}$$

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.

NOW  
NOX - 84TPY  
CO - 18TPY  
HC - 4TPY

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.

MODIF,  
INCREASE SO<sub>2</sub> - 214TPY  
PM - 40  
NOX - 43  
CO - 4  
HC - 3

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 <sub>2</sub>	NO <sub>x</sub>	CO	HC
<hr/>					
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 TPY				
<hr/>					
Total Increase	42.8	214.4	43.0	3.9	1.9
<hr/>					
Significant Increase	25	40	40	100	40
<hr/>					

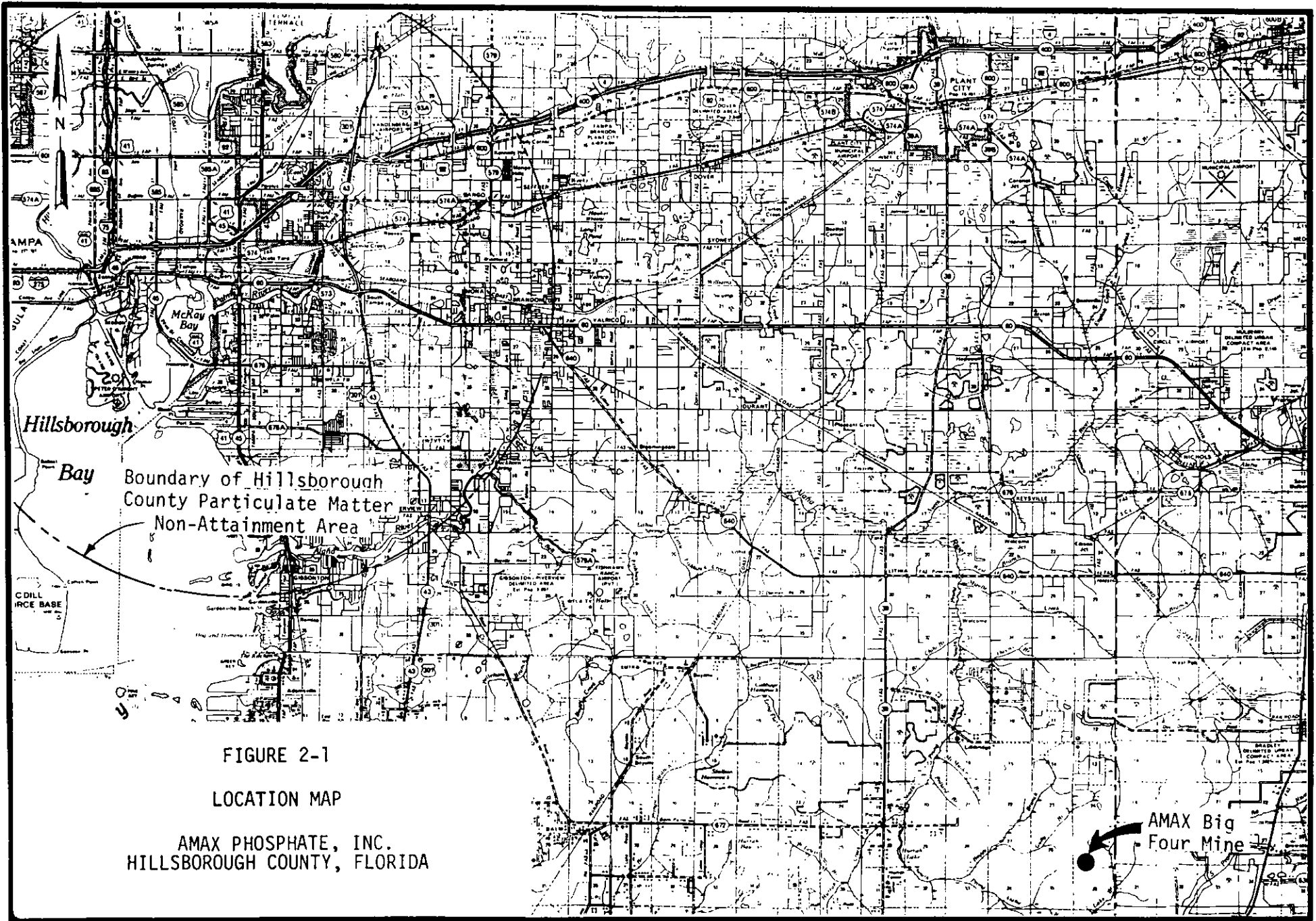


FIGURE 2-1  
 LOCATION MAP  
 AMAX PHOSPHATE, INC.  
 HILLSBOROUGH COUNTY, FLORIDA

2-11

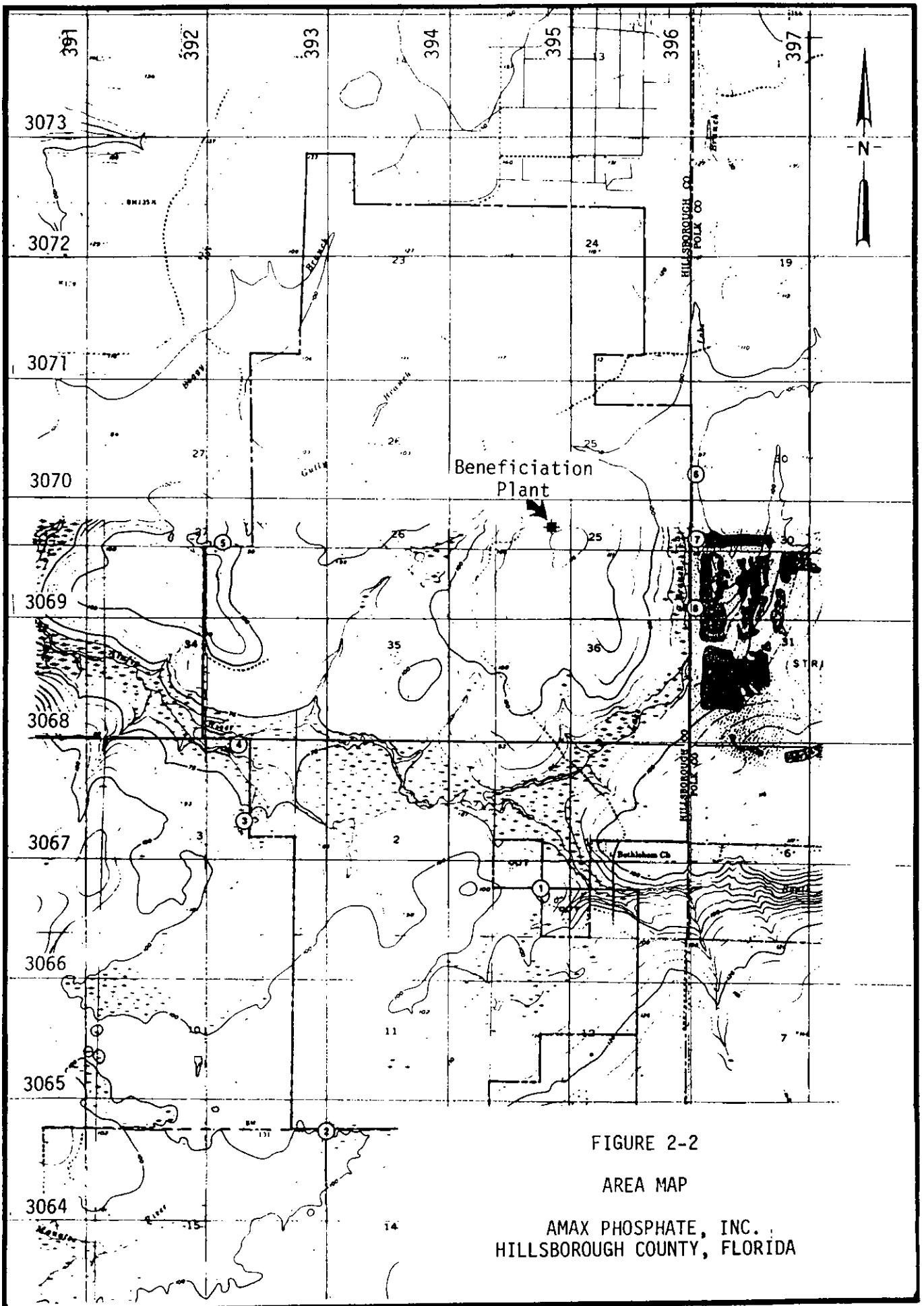


FIGURE 2-2

AREA MAP

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

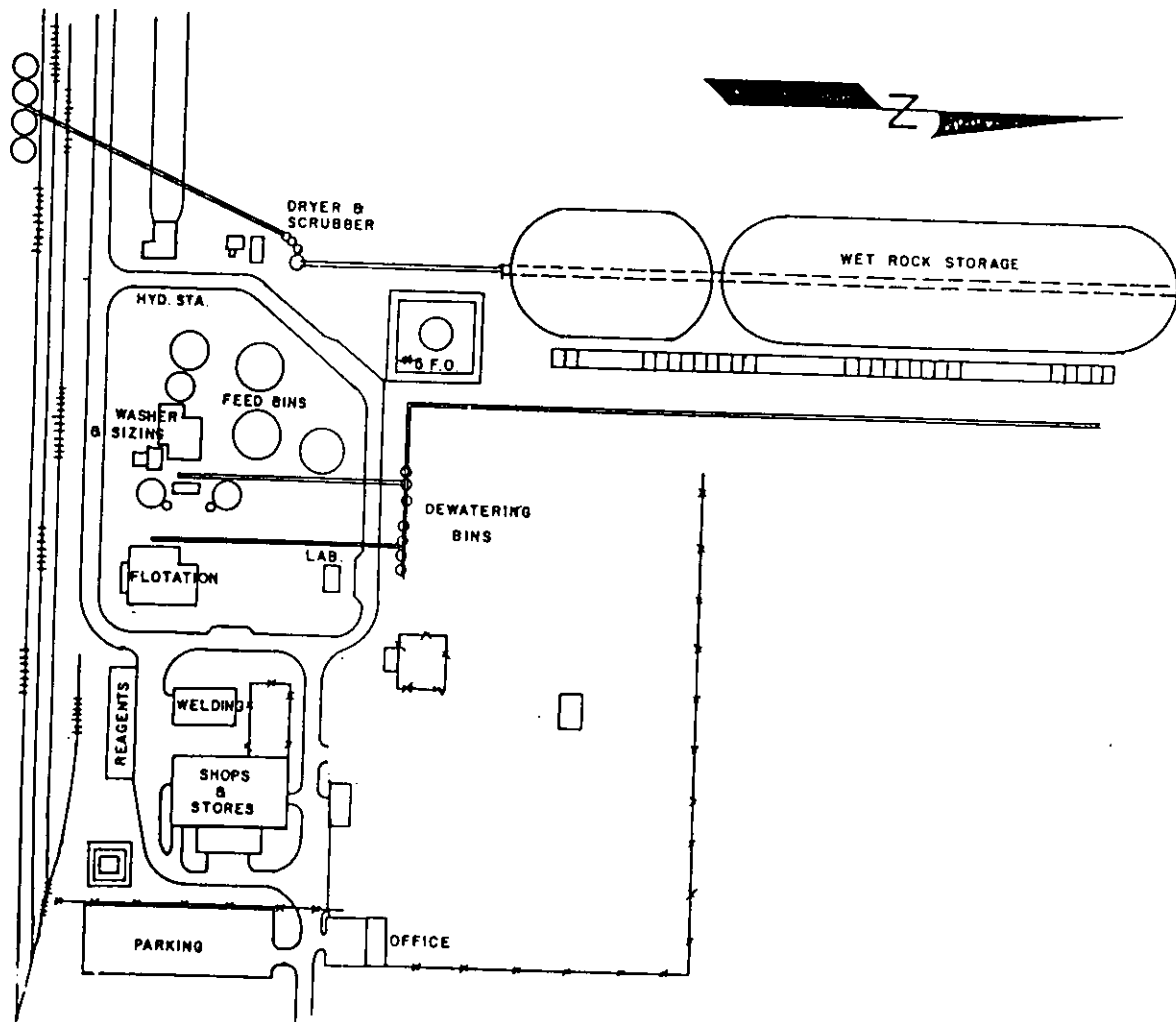


FIGURE 2-3

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)  
 SO<sub>2</sub> = 94.58 lb/hr (0.757 lb/10<sup>6</sup> BTU)
- 2. Rock Storage - Permitted for 267 ton/hr dried rock and 7488 hours per year  
 Particulate Matter = 2.06 lb/hr  
 = 7.7 tons/year
- 3. Rock Loading - Permitted for 800 tons/hour. 2500 hr/yr are required to load-out all dried rock  
 Particulate Matter = 5.96 lb/hour  
 = 7.5 tons/year
- 4. Boiler - No change

### PROPOSED

- 1. Rock Dryer - To be permitted for 300 ton/hr, wet rock (267 tons/hr, dried rock) and 8760 hours per year.  
 Part. Matter = 18.00 lb/hr (0.06 lb/ton wet rock)  
 SO<sub>2</sub> = 129.8 lb/hr (1.1 lb/10<sup>6</sup> BTU) ← AUG
- 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 CALCULATIONSROCK DRYERPRESENT

## PARTICULATE MATTER

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

$$\times 7488/2000$$

$$= 38.5 \text{ tpy}$$

## SULFUR DIOXIDE

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

$$= 94.58 \text{ lb/hour}$$

$$\times 7488/2000$$

$$= 354.1 \text{ tpy}$$

## NITROGEN OXIDES

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

$$= (45350 \text{ ft}^3/\text{min}) (60 \text{ min/hr}) (61 \times 10^{-6} \frac{\text{ft}^3 \text{ NO}_x}{\text{ft}^3})$$

$$\times (1/385 \text{ ft}^3 \text{ NO}_x/\text{lb-mole}) (46 \text{ lb NO}_x/\text{lb-mole})$$

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

$$\times 7488/2000$$

$$= 74.2 \text{ tpy}$$

## CARBON MONOXIDE

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

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

$$\times (5/1000 \text{ lb CO/gal})$$

$$= 4.18 \text{ lb/hour}$$

$$\times 7488/2000$$

$$= 15.6 \text{ tpy}$$

NOW  
4.18 #/hr CO  
NOW  
15.6 TPY CO

## HYDROCARBONS

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

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

$$= 0.84 \text{ lb/hour}$$

$$\times 7488/2000$$

$$= 3.1 \text{ tpy}$$

NOW  
0.84 #/hr HC  
NOW  
3.1 Tpy

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

Uncontrolled with 2.25% Sulfur fuel oil  
 $= (118 \times 10^6 \text{ BTU/hr})(1/147095 \text{ BTU/gal})(8.29 \text{ lb/gal})$   
 $\times (0.0225 \times 2 \text{ lb SO}_2/\text{lb fuel})$   
 $= 299.3 \text{ lb/hr}$

Absorption necessary to meet proposed std  
 $= (299.3 - 129.8) \times 100 / 299.3$   
 $= 56.6\%$

Uncontrolled with 2.00% Sulfur COM  
 $= (109 \times 10^6 \text{ BTU/hr})(1/135876 \text{ BTU/gal})(9.3 \text{ lb/gal})$   
 $\times (0.02 \times 2 \text{ lb SO}_2/\text{lb fuel})$   
 $= 298.4 \text{ lb/hr}$

Absorption necessary to meet proposed std  
 $= (298.4 - 129.8) \times 100 / 298.4$   
 $= 56.5\%$

APPLIC  
for  
2.5%  
  
APPLIC  
for  
2.5%



## NITROGEN OXIDES

For fuel oil combustion an  $\text{NO}_x$  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  $\text{NO}_x$  emission factor divided by the AP-42 oil  $\text{NO}_x$  emission factor. For COM the  $\text{NO}_x$  emission factor was calculated as:

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

$\text{NO}_x$  from Coal - AP-42

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

$\text{NO}_x$  from Oil - AP-42

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

$\text{NO}_x$  emissions from Oil (same as present)

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

$\text{NO}_x$  emissions from Coal (by ratio)

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

$\text{NO}_x$  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.

*Dry Rock silos  
8,000 ACFM  
2.06 #PM/hr  
0.03 gr/SCF  
Impingement scrubber  
control system*

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.

*Dry Rock Loading  
23,000 ACFM  
5.96 #PM/hr  
0.03 gr/SCF  
Impingement  
scrubber  
control  
system*

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.

65,000 ACFM  
46,800 SCFM  
(NOW) 0.03 gr/SCF  
(NOW) 10.29 lb/hr  
(NOW) 0.034 lb/ton FEED

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.

PROPOSED  
NSPS

$$PM\ emission = \frac{0.045\ \cancel{grains}}{SCF} \times \frac{\cancel{\#}}{7000\ \cancel{gr}} \times \frac{40,000\ SCF}{\cancel{\#}} \times \frac{60\ \cancel{min}}{hr} = 15.43\ \# / hr$$

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<sub>x</sub>" burner used in boilers. Additionally, the water present in the coal-oil-water mix fuel will function to reduce peak flame temperatures much as steam atomization functions to reduce peak flame temperatures and, hence, reduce nitrogen oxides emissions in boilers.

Because of the nature of the drying operation and the characteristics of the coal-oil-water mix fuel further modifications of the burner to reduce nitrogen oxides emissions, such as by reducing primary combustion air, is not feasible. Flue gas recirculation is likewise not feasible because of

the high excess air rate used in the dryer. The high excess air rate results in a flue gas oxygen content not significantly lower than that of air, hence, no significant oxygen reduction would be achieved by flue gas recirculation.

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

#### 4.0 EXISTING AIR QUALITY DATA

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

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

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

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

To summarize the sulfur dioxide monitoring data, the four month average sulfur dioxide concentration was 3.8 micrograms per cubic meter. The highest 24-hour concentration measured during the four month period was 35 micrograms per cubic meter compared with a 24-hour sulfur dioxide standard of 260 micrograms per cubic meter. The highest three-hour sulfur dioxide concentration measured was 112 micrograms per cubic meter compared with a three-hour ambient standard of 1300 micrograms per cubic meter. A concentration of zero was measured 76 percent of the time

during the four month period; indicating that the background sulfur dioxide concentration in the area is zero. The SAROAD sheets containing the sulfur dioxide monitoring data are included in Appendix 4A-1.

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

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



APPENDIX 4A-1  
AMBIENT SULFUR DIOXIDE  
MONITORING DATA













This is an EPA SAROAD Format

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

DEPARTMENT OF ENVIRONMENTAL REGULATION - AIR QUALITY INPUT FORM HOURLY DATA

AGENCY <b>BREWSTER PHOSPHATES</b>	PARAMETER OBSERVED <b>Sulfur Dioxide</b>	METHOD <b>Flame Photometric</b>	STATE <b>1</b>	AREA <b>101800097</b>	SITE <b>J</b>	AGENCY <b>05</b>	PROJECT <b>1</b>	TIME <b>82</b>	YEAR <b>01</b>	MONTH <b>01</b>
SITE ADDRESS <b>HISCOCK RD.</b>	CITY NAME <b>FT. LONESOME, FL.</b>	PROJECT <b>Air Monitoring</b>	TIME INTERVAL OF OBS <b>One (1) Hour</b>		UNITS OF OBS. <b>P.P.M.</b>		PARAMETER CODE <b>42401</b>	METHOD <b>16</b>	UNITS <b>07</b>	DF <b>3</b>

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											
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1	3	1	2											
1	4	0	0											
1	4	1	2											
1	5	0	0											
1	5	1	2											
1	6	0	0											





## 5.0 SITE METEOROLOGY

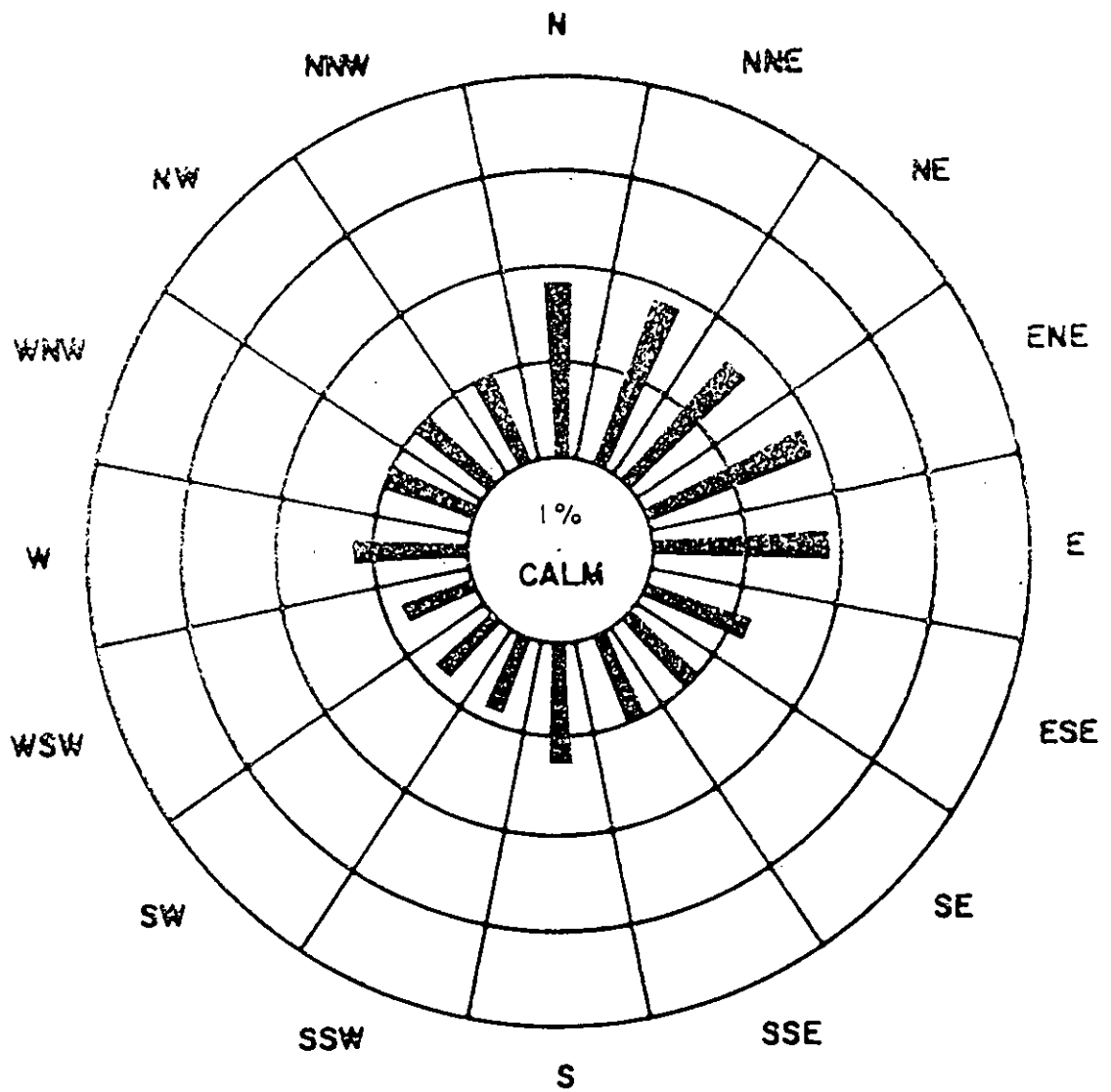
The AMAX Big Four Mine site is located in west-central Florida, approximately 40 kilometers southeast of Tampa and 40 kilometers east of the Gulf Coast. Meteorological data from Tampa for the period 1970 through 1974 were used in the preparation of this PSD application. Annually, the prevailing site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

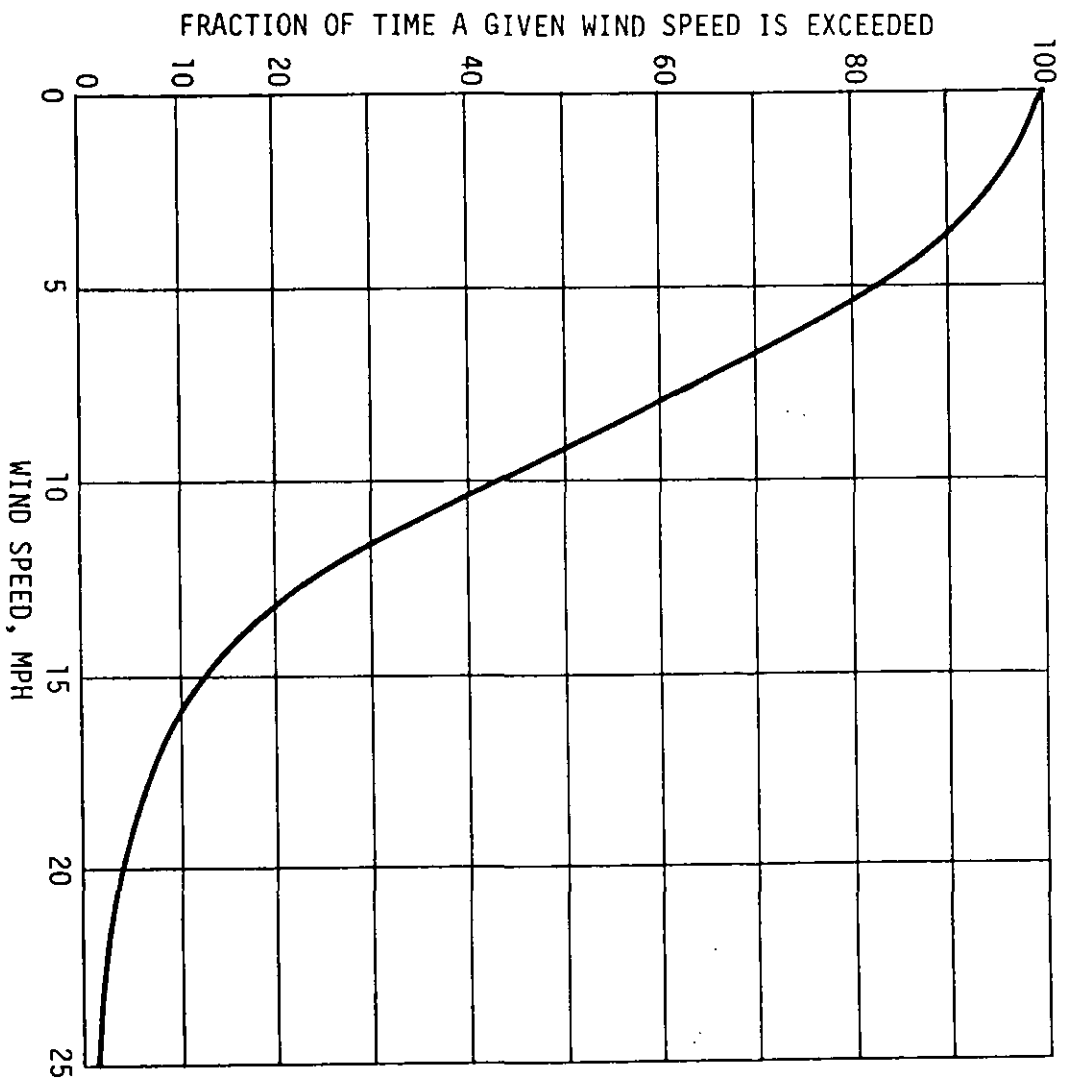


FIGURE 5-2  
 WIND SPEED DISTRIBUTION  
 FOR TAMPA, FLORIDA

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 <sup>3</sup> )	Class II PSD Increment (ug/m <sup>3</sup> )	Class I PSD Increment (ug/m <sup>3</sup> )	Significant Impact Levels (ug/m <sup>3</sup> )
<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 <sup>3</sup> )		
	CLASS II AREAS		
	Max. Impact New Sources	Max. Impact Existing Sources	Max. Impact All Sources
Particulate Matter			
Annual <sup>(4)</sup>	2	38	40 <sup>(1)</sup>
24-Hour	17	96	106 <sup>(2)</sup>
Sulfur Dioxide <sup>(3)</sup>			
Annual <sup>(4)</sup>	4	40	40
24-Hour	48	71	119
3-Hour	173	170	343
Nitrogen Oxides			
Annual	0.3	---	---

- (1) Includes a background of 30 ug/m<sup>3</sup>  
 (2) Includes a background of 88 ug/m<sup>3</sup>  
 (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               |

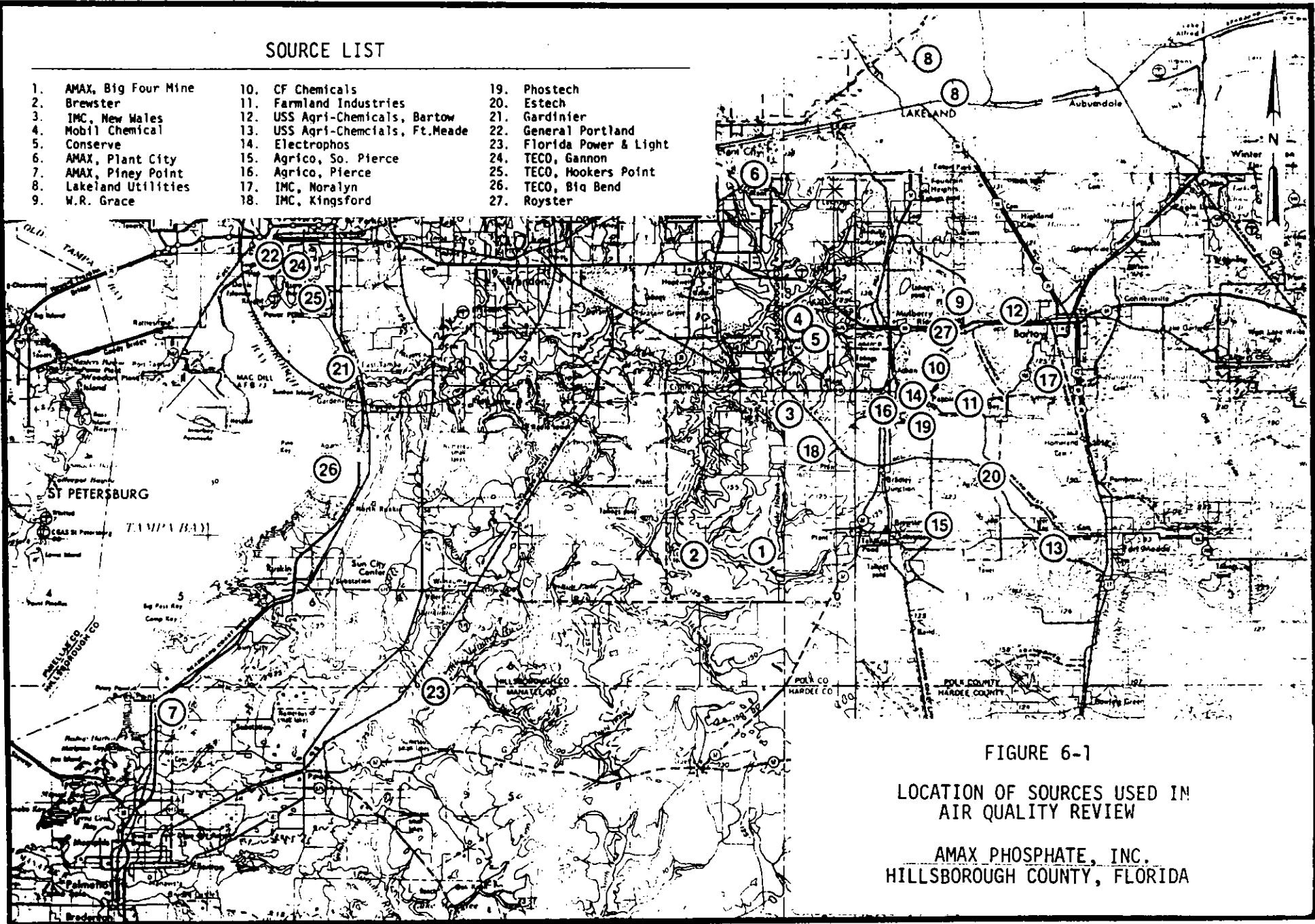


FIGURE 6-1

LOCATION OF SOURCES USED IN  
AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

6-14

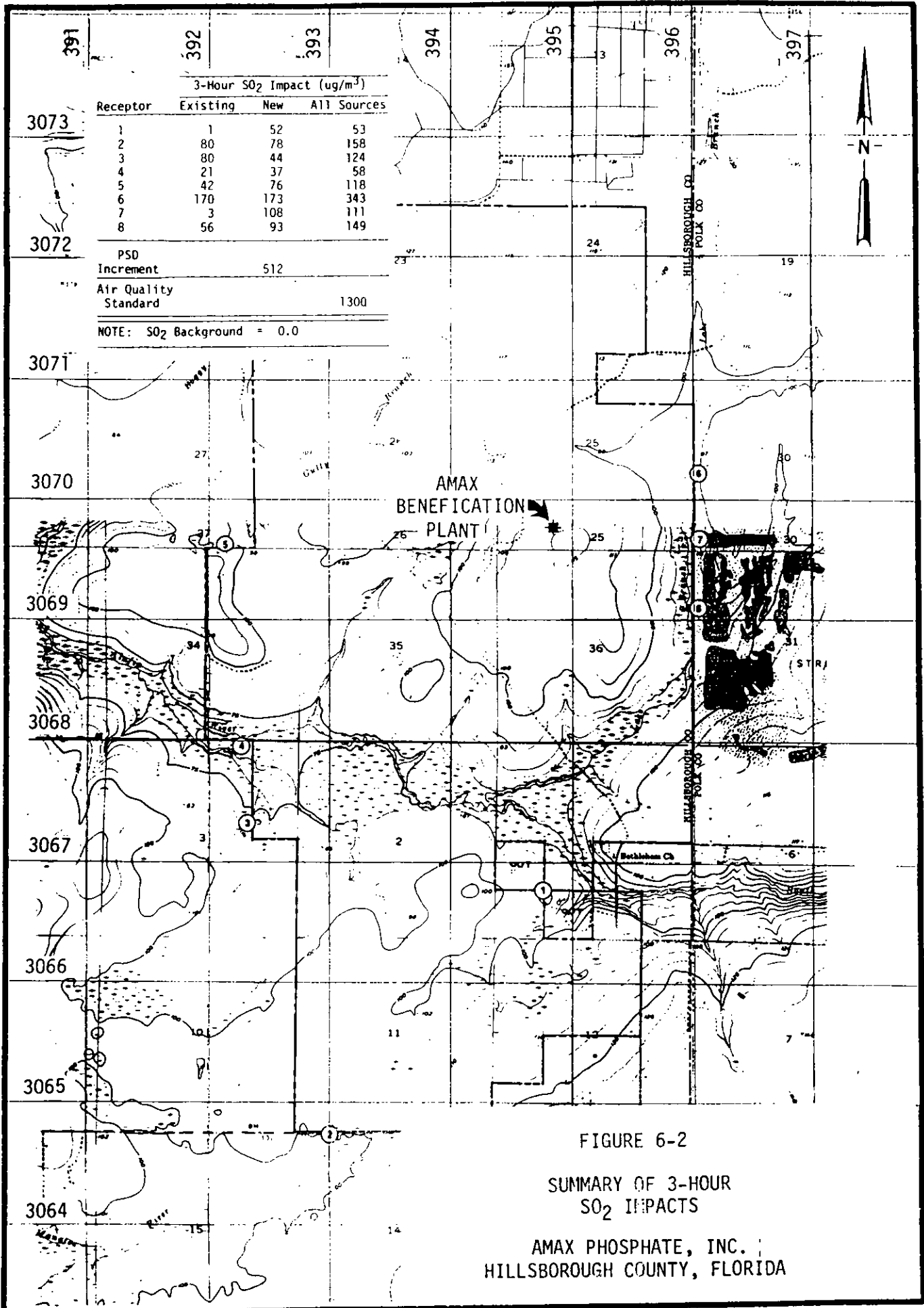


FIGURE 6-2

SUMMARY OF 3-HOUR  
SO<sub>2</sub> IMPACTS

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

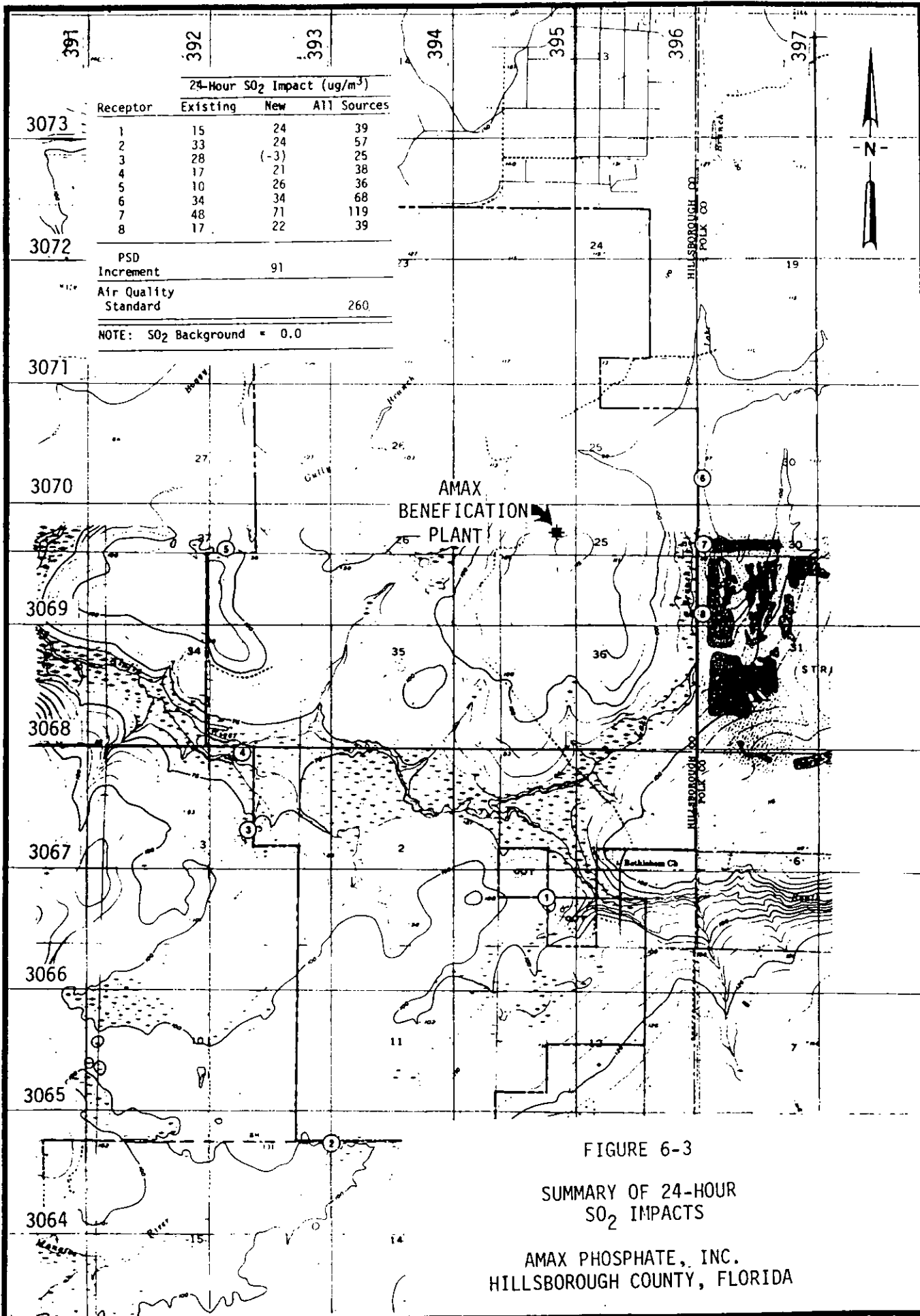


FIGURE 6-3  
 SUMMARY OF 24-HOUR  
 SO<sub>2</sub> IMPACTS  
 AMAX PHOSPHATE, INC.  
 HILLSBOROUGH COUNTY, FLORIDA

### 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               |

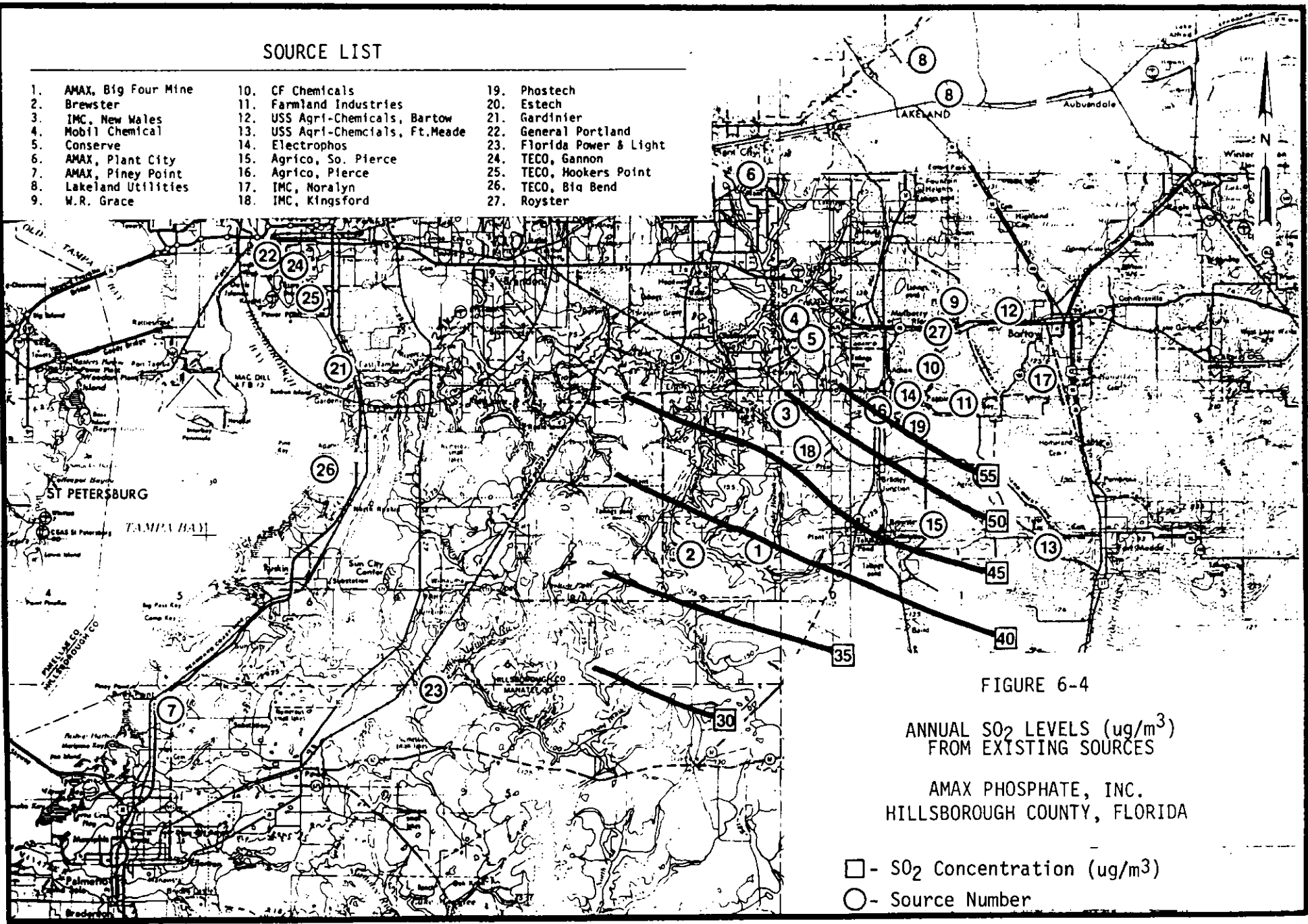


FIGURE 6-4

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM EXISTING SOURCES

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - Source Number

6-17

### 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, Moralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

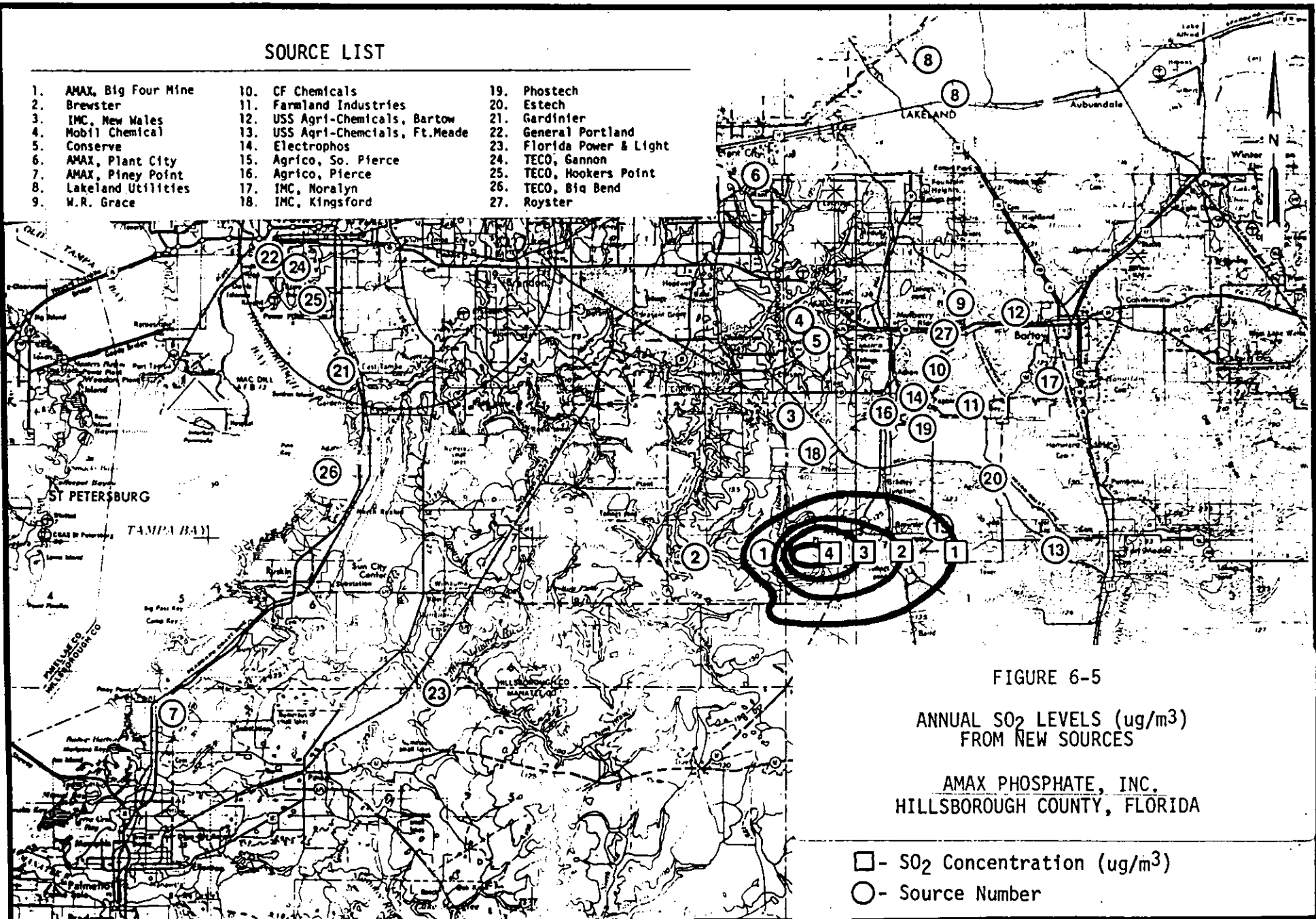


FIGURE 6-5

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM NEW SOURCES

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - Source Number

6-18

### 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, Bio Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

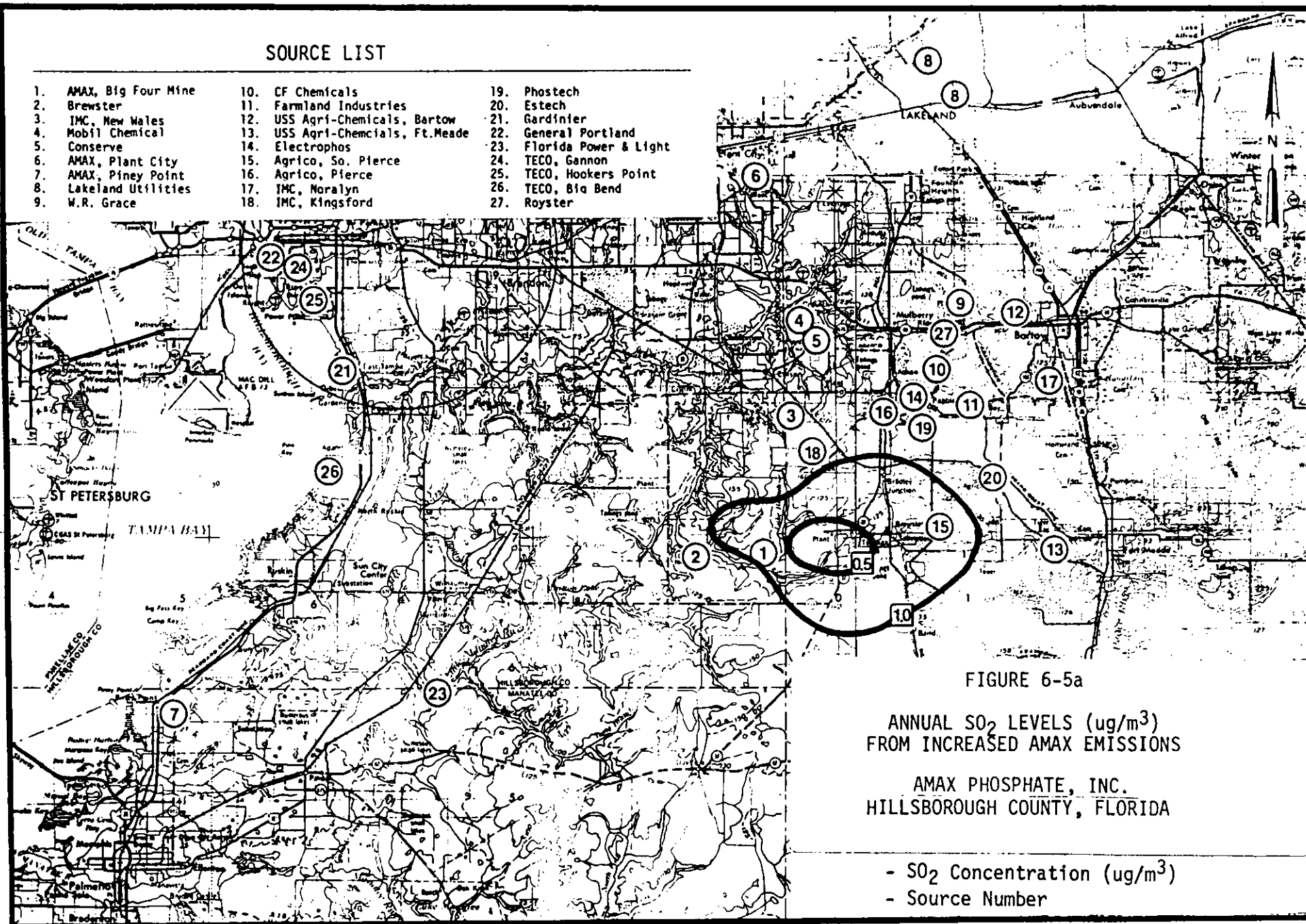


FIGURE 6-5a

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM INCREASED AMAX EMISSIONS

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

- SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- Source Number



### SOURCE LIST

- |                        |                                   |                           |
|------------------------|-----------------------------------|---------------------------|
| 1. AMAX, Big Four Mine | 10. CF Chemicals                  | 19. Postech               |
| 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

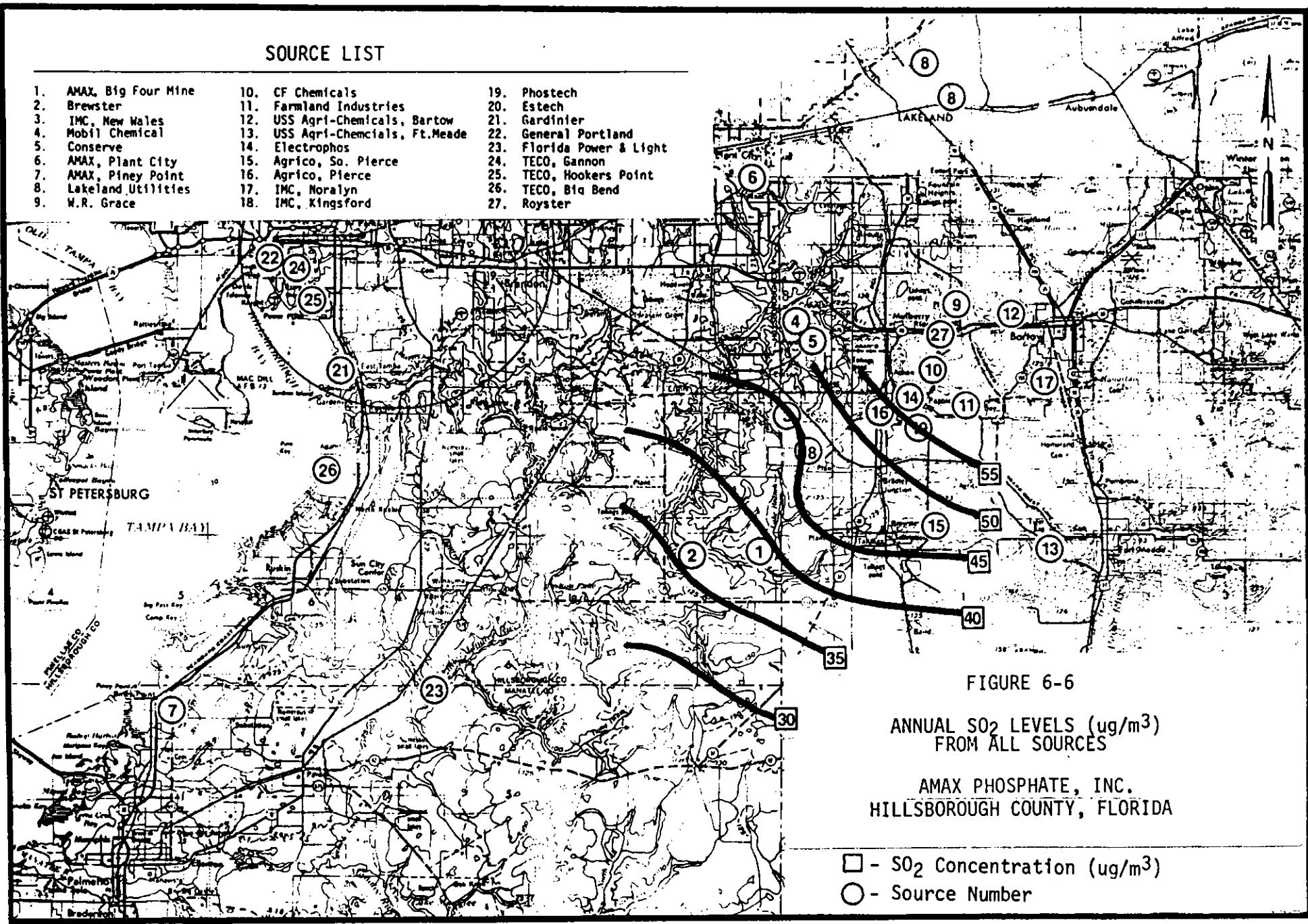


FIGURE 6-6

ANNUAL SO<sub>2</sub> LEVELS (ug/m<sup>3</sup>)  
FROM ALL SOURCES

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

- - SO<sub>2</sub> Concentration (ug/m<sup>3</sup>)
- - Source Number

6-201

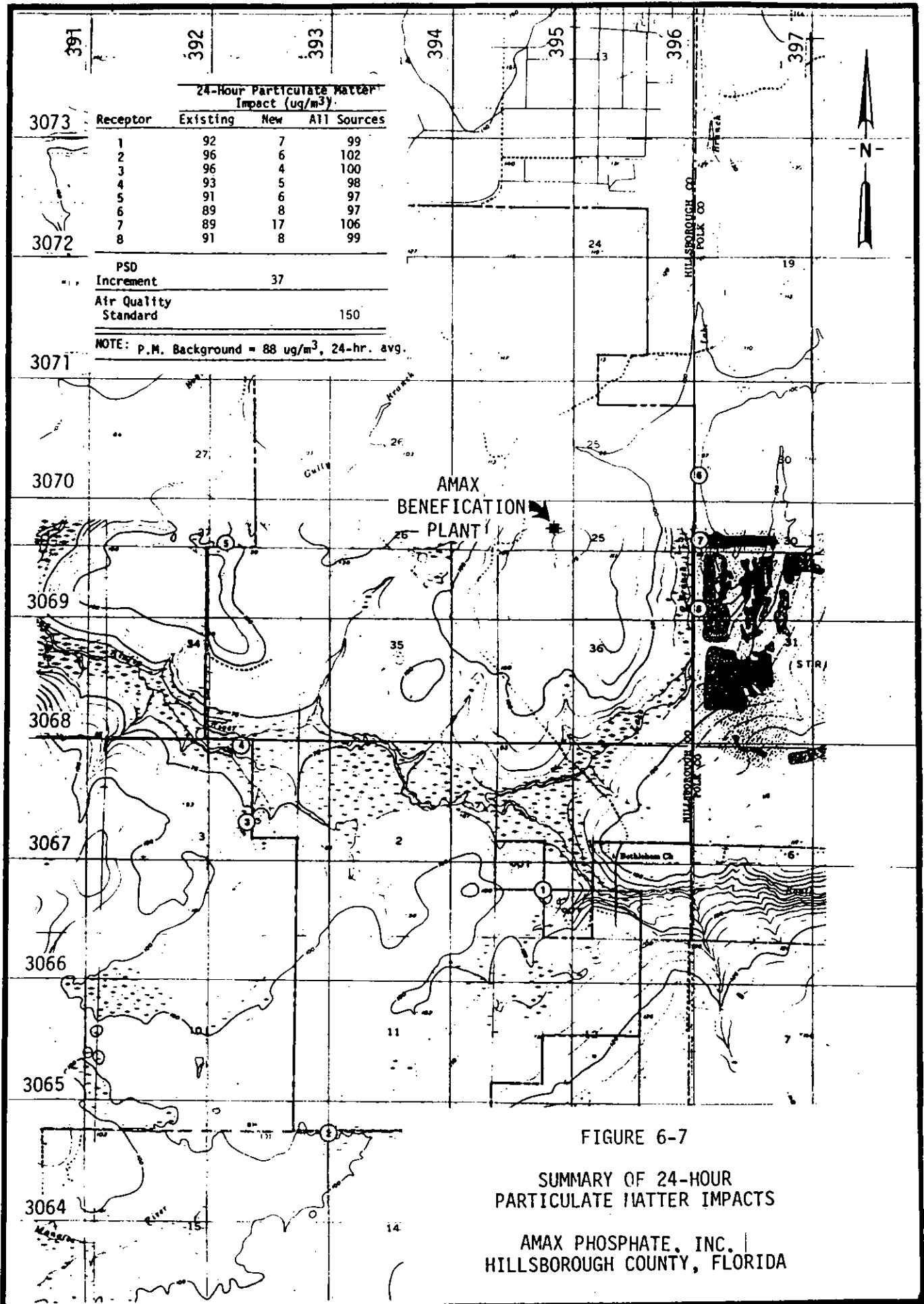


FIGURE 6-7  
 SUMMARY OF 24-HOUR  
 PARTICULATE MATTER IMPACTS  
 AMAX PHOSPHATE, INC.  
 HILLSBOROUGH COUNTY, FLORIDA

### 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. 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               |

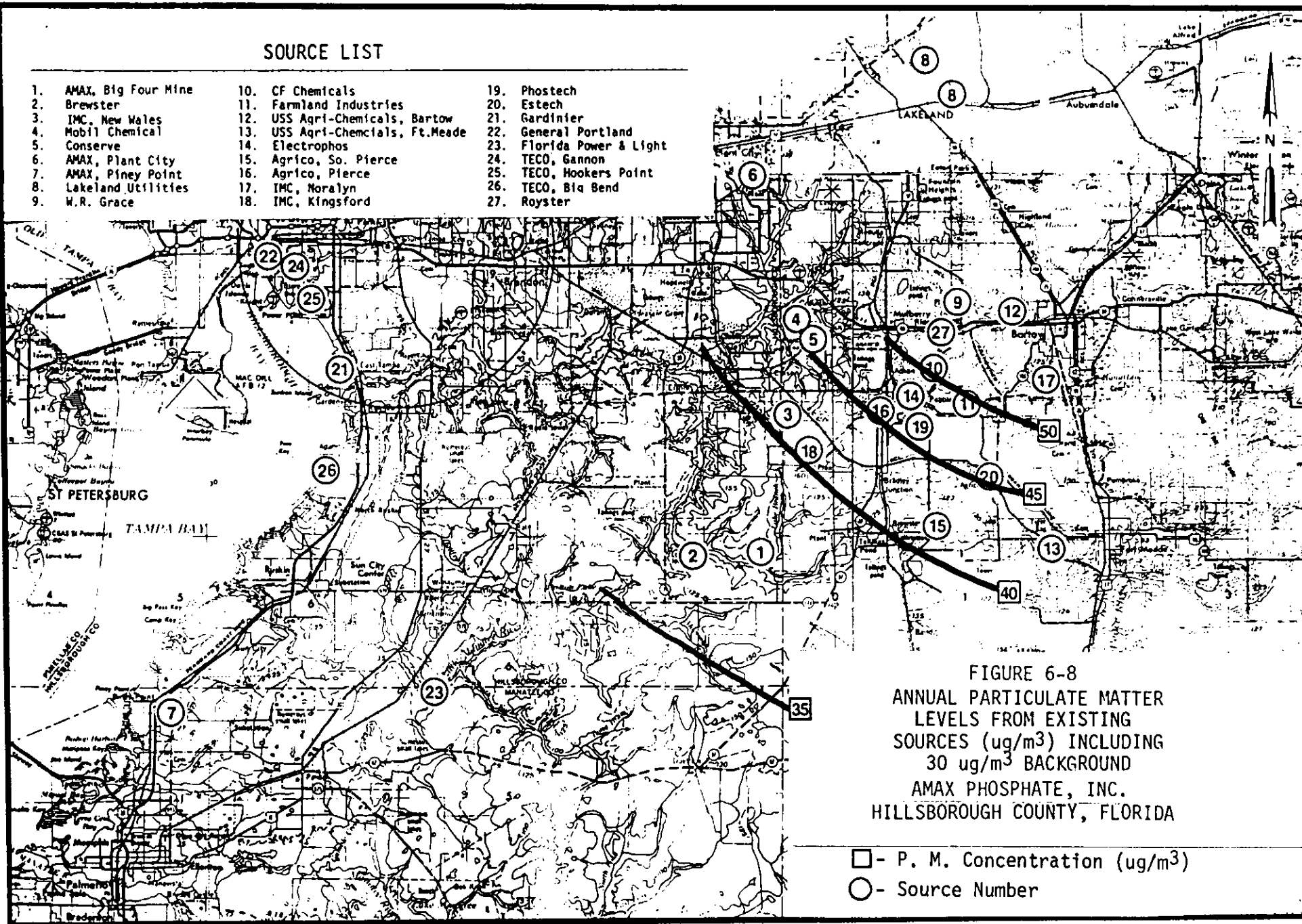


FIGURE 6-8  
ANNUAL PARTICULATE MATTER  
LEVELS FROM EXISTING  
SOURCES ( $\mu\text{g}/\text{m}^3$ ) INCLUDING  
30  $\mu\text{g}/\text{m}^3$  BACKGROUND  
AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

- - P. M. Concentration ( $\mu\text{g}/\text{m}^3$ )
- - 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, Noralyn                  | 26. TECO, Big Bend        |
| 9. W.R. Grace          | 18. IMC, Kingsford                | 27. Royster               |

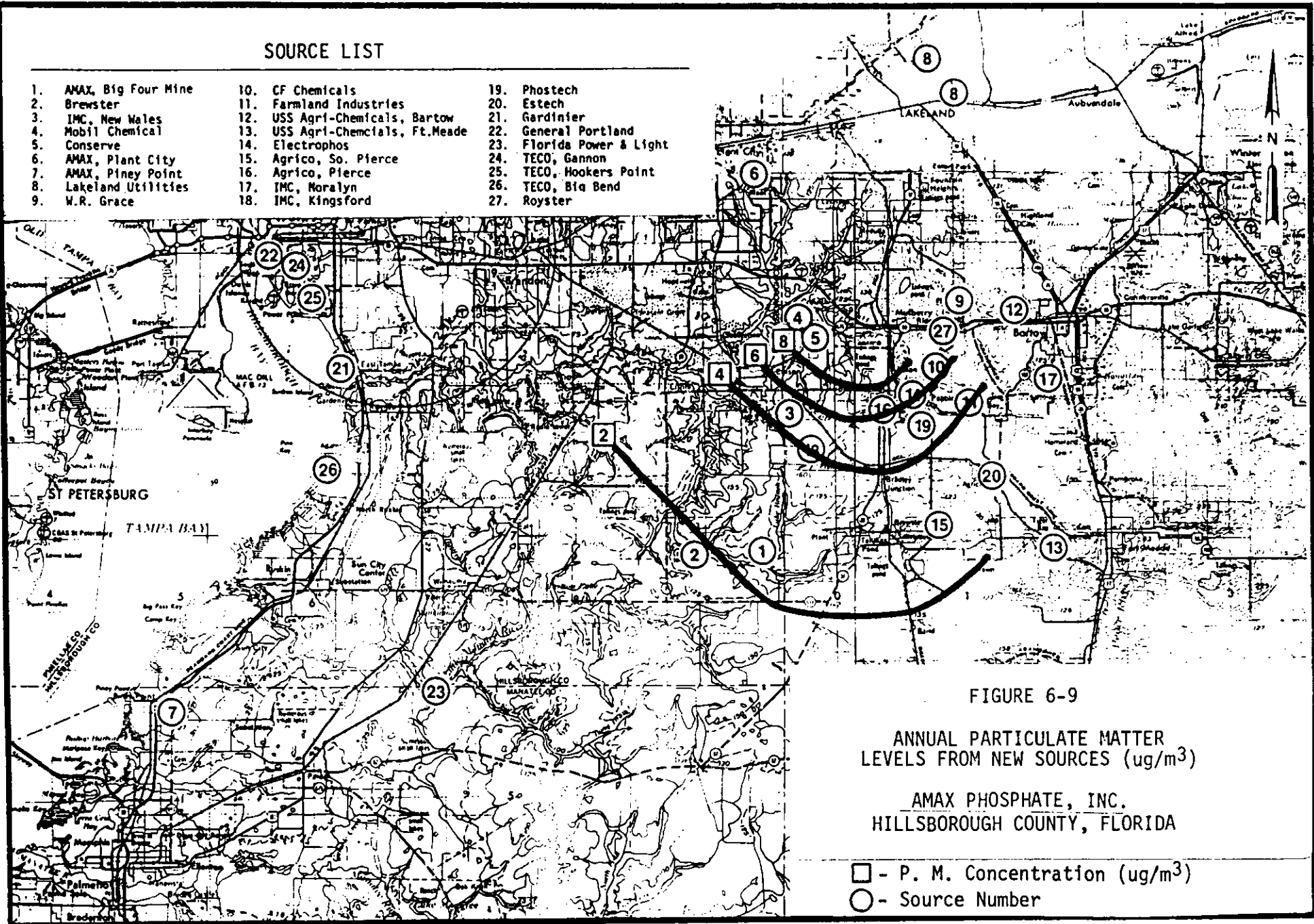


FIGURE 6-9

ANNUAL PARTICULATE MATTER  
LEVELS FROM NEW SOURCES ( $\mu\text{g}/\text{m}^3$ )

AMAX PHOSPHATE, INC.,  
HILLSBOROUGH COUNTY, FLORIDA

- - P. M. Concentration ( $\mu\text{g}/\text{m}^3$ )
- - 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. 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               |

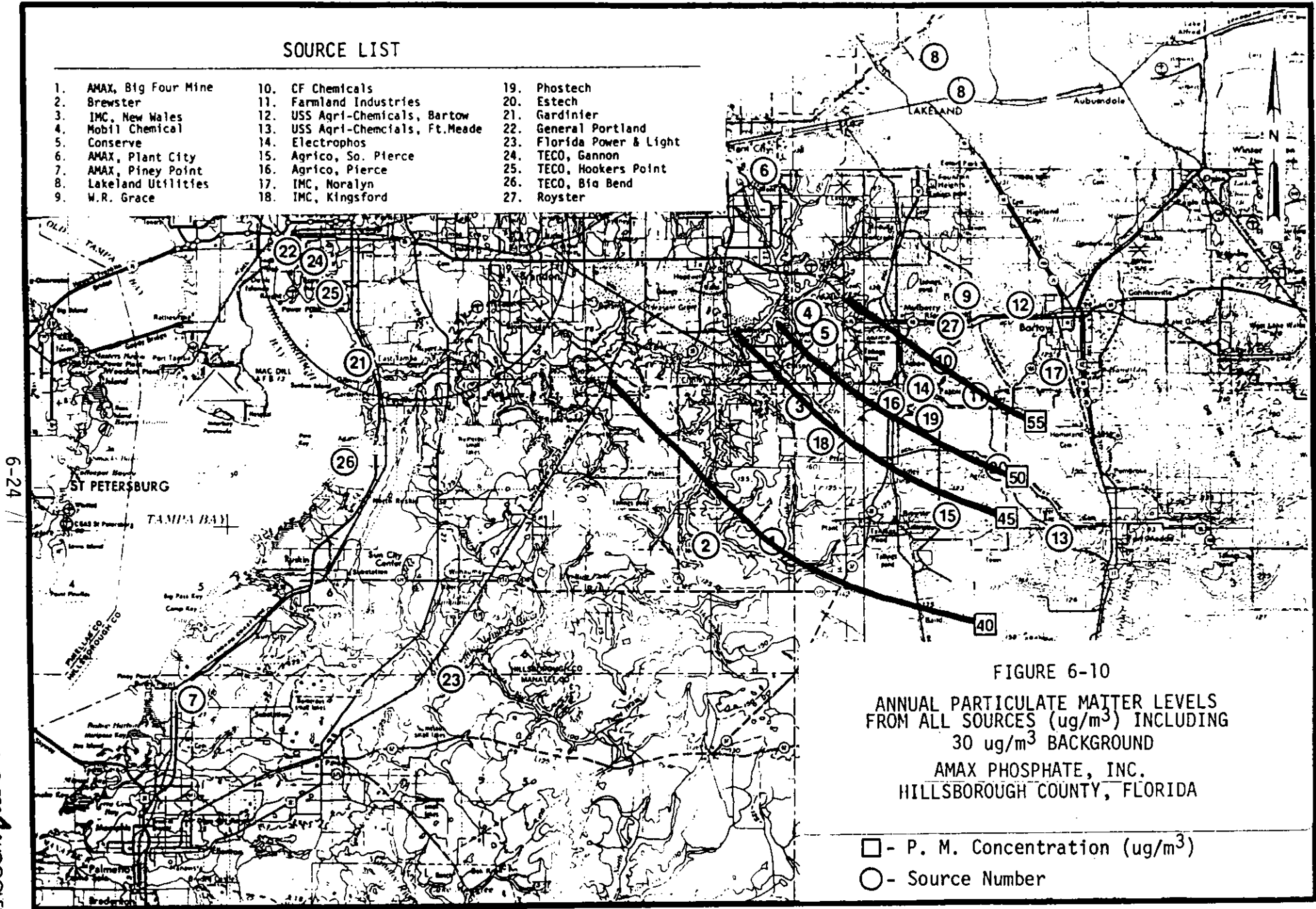


FIGURE 6-10

ANNUAL PARTICULATE MATTER LEVELS  
FROM ALL SOURCES ( $\mu\text{g}/\text{m}^3$ ) INCLUDING  
30  $\mu\text{g}/\text{m}^3$  BACKGROUND

AMAX PHOSPHATE, INC.  
HILLSBOROUGH COUNTY, FLORIDA

□ - P. M. Concentration ( $\mu\text{g}/\text{m}^3$ )

○ - Source Number

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

STACK PARAMETERS AND EMISSION RATES  
For All Sources Used in Air Quality Review

Source	Emission PM (G/Sec)	Rates SO2 (G/Sec)	Stack Height (M)	Stack Diam. (M)	Stack Velocity (MPS)	Gas Temp. (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

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AMX 7 PP GROUND ROCK UNLOADING	1.85	0.00	22.80	0.30	5.80	315.0	348.500	3057.300
AMX 7 PP QUICK LIME STG	1.42	0.00	23.70	0.10	9.00	315.0	348.500	3057.300
AMX 7 AMAX Piney Point	0.00	37.80	61.00	1.90	13.40	322.0	348.500	3057.300
LKU 8 * Lakeland Utils Composite	6.03	0.00	47.70	2.70	15.10	405.0	409.200	3106.200
LKU 8 * Lakeland Utils Composite	17.45	0.00	60.30	4.00	15.70	371.0	409.200	3106.200
LKU 8 LARSEN 7	0.00	7.52	50.30	3.10	3.40	422.0	409.200	3102.800
LKU 8 MC INTOSH 1	0.00	139.00	47.70	2.70	15.10	405.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES.#1	0.00	393.60	76.20	4.90	19.70	354.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES #2	0.00	21.20	47.70	3.10	11.70	389.0	408.500	3105.800
WRG 9 Dry Mill - Rock Dryers 29004	7.56	0.00	15.20	2.10	8.60	330.0	409.610	3085.860
WRG 9 Dry Mill - Rock Sts 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



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FAR 11 3 53 03 FARMLAND	0.00	57.70	30.50	1.40	26.50	319.0	409.500	3079.500
FAR 11 2 53 26 FARMLAND	0.00	2.30	14.00	1.20	12.70	444.0	409.500	3079.500
USS 12 Bartow - Rock Dryers (2)	5.04	0.00	17.00	1.80	13.30	342.0	413.300	3086.500
USS 12 Bartow - Rock Silo	5.04	0.00	20.00	1.50	9.40	315.0	413.300	3086.500
USS 12 Bartow - DAP Loading	5.04	0.00	24.00	0.60	48.50	315.0	413.300	3086.500
USS 12 Bartow - DAP Dryer	5.92	0.00	40.00	2.10	15.00	315.0	413.300	3086.500
USS 12 Bartow - Rock Grindings	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 Grindings	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 Electro Phos	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

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PTI 19 Phostech	0.00	2.84	27.40	1.00	29.00	322.0	405.200	3078.500
EST 20 * EsTech Composite	7.31	0.00	17.60	1.80	13.10	332.0	411.500	3074.200
EST 20 Estech SAP	0.00	32.20	30.80	2.10	3.90	358.0	411.500	3074.200
EST 20 Estech Dryer	0.00	51.50	18.50	3.00	7.00	340.0	411.500	3074.200
GAR 21 * Gardinier Composite	66.80	413.60	29.40	2.10	9.10	333.0	363.400	3082.400
GAR 21 * Gardinier Composite	66.80	-210.26	36.50	2.00	11.80	344.0	363.400	3082.400
GPI 22 * Gen'l Portland Composite	59.00	101.00	44.30	4.72	6.60	473.0	358.000	3090.600
FPL 23 * FPL Manatee Composite	133.30	1465.80	152.10	7.90	20.70	425.0	367.100	3053.800
TEC 24 Gannon 1	15.80	174.20	93.30	3.70	22.50	438.0	360.000	3087.500
TEC 24 Gannon 2	15.80	174.20	93.30	3.10	32.40	438.0	360.000	3087.500
TEC 24 Gannon 3	18.00	198.20	93.30	3.20	35.40	427.0	360.000	3087.500
TEC 24 Gannon 4	23.60	260.00	93.30	2.90	24.60	443.0	360.000	3087.500
TEC 24 Gannon 5	28.80	316.60	93.30	4.50	20.70	415.0	360.000	3087.500
TEC 24 Gannon 6	47.80	526.40	93.30	5.40	23.40	415.0	360.000	3087.500
TEC 25 Hookers Pt. 1	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 2	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 3	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 4	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 5	7.70	84.50	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 6	9.80	107.80	85.40	2.90	17.90	436.0	358.000	3091.000
TEC 26 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.