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

December 13, 1985

Ms. Patricia A. Brooks
Environmental Assessment Branch
U.S. Environmental Protection Agency
345 Courtland Street
Atlanta, Georgia 30365

Dear Ms. Brooks:

RE: Proposed Pine Level Mine; Amax Chemical Corporation; Revised draft EIS technical information documents covering: Section 3, Air/Meteorology/Noise; Section 4, Geotechnical Resources; Section 5, Radiation; Section 8, Aquatic Ecology; Section 9, Terrestrial Ecology; Section 10, Socioeconomics.

The department has recieved copies of the above drafts. No comments will be submitted at this time on Sections 4, 5, 8, 9 and 10. Comments on the section 3 are as follows:

<u>Section 3. Air/Meteorology/Noise</u>

S.3.34 The emission standards for the phosphate rock dryer will be determined by BACT for any pollutant emitted in quantities greater than the significant emission rates assuming the dryer will represent a major air pollution facility.

S.3.4 This section should eliminate the reference to the Mississippi Chemical Corporation construction permits since IMC has purchased the property.

S.3.5.2 In order to evaluate compliance with regulations after construction, the bubbler method can not be used to determine the sulfer dioxide concentrations in the ambient PSD.

If you have any questions, I can be contacted at 904/488-0130.

Sincerely,

Mickey D. Bryant

Mickey D. Bryant
Administrator, Certification and
Technical Support Section

MDB/jk

cc: Jack D. Doolittle, ESE
Dan A. Williams
Willard Hanks

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION) Willard Hanks	Initial Date
2.	Initial Date
3.	Initial Date
4.	Initial Date

REMARKS:

INFORMATION

	Review & Return
	Review & File
	Initial & Forward

DISPOSITION

	Review & Respond
	Prepare Response
	For My Signature
	For Your Signature
	Let's Discuss
	Set Up Meeting
	Investigate & Report
	Initial & Forward
	Distribute
	Concurrence
	For Processing
	Initial & Return

FROM: Mickey Bryant

DATE 12-13-85

PHONE 8-0130

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

FOR ROUTING TO OTHER THAN THE ADDRESSEE

To: ______ Loctn: ______
To: ______ Loctn: ______
To: ______ Loctn: ______
From: ______ Date: ______

TO: Mickey Bryant

FROM: Willard Hanks wmh

DATE: November 15, 1985

SUBJECT: AMAX Chemical Corporation

BAQM's general comments on AMAX's EIS for the proposed Pine Level Mine are as follows:

Page 3-16/Section 3.34 - Assuming the phosphate rock dryer will be a major air pollution facility, the emission standards will be established by a best available control technology determination (BACT) for any pollutant emitted in qualities greater than the significant emission rates. The standards will be as strict as the applicable new source performance standards (NSPS). Only when BACT or NSPS does not apply will the general emission standards in Chapter 17-2, FAC, apply to this facility.

Page 3-31/Section 3.5.2 - The specified method to determines the sulfur dioxide concentration in the ambient air PSD to comply with the regulations is not the bubbler method.

Page 3-34/Section 3.5.3 - The Department had not adopted an ambient air sampling method for fluoride.

WH/ps

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO 226

ACTION DUE DATE 11 27

1. TO: (NAME, OFFICE, LOCATION)

~~W. Starnes~~

Initial

Date

2. Bill Thomas 11/13

Initial

Date

3.

Initial

Date

4.

Initial

Date

REMARKS:

Draft comments or Send memo saying we don't have any comments. Coordinate with Brown + Fancy Prepare for your Signature

Need to assign for review & get letter to Bryant & get crossed off action item list.

Clair

INFORMATION

☐ Review & Return

☐ Review & File

☐ Initial & Forward

☐

7/16 emissions set by BACT + NSPS. Only if these didn't apply would emission be set by [illegible] as [illegible] emissions. [illegible]

DISPOSITION

☐ Review & Respond

☐ Prepare Response

☐ For My Signature

☐ For Your Signature

☐ Let's Discuss

☐ Set Up Meeting

☐ Investigate & Report

☐ Initial & Forward

☐ Distribute

☐ Concurrence

☐ For Processing

☐ Initial & Return

3-22 [illegible] NOC [illegible]

3-22 [illegible]

3-31 [illegible]

FROM:

Stephen Smallwood

DATE 11-[illegible] 85

PHONE

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION) Steve Smallwood	Initial Date
2.	Initial Date
3.	Initial Date
4.	Initial Date

REMARKS:

Please review + Comment - note deadline.

INFORMATION

- ☐ Review & Return
- ☐ Review & File
- ☐ Initial & Forward
- ☐

DISPOSITION

- ☐ Review & Respond
- ☐ Prepare Response
- ☐ For My Signature
- ☐ For Your Signature
- ☐ Let's Discuss
- ☐ Set Up Meeting
- ☐ Investigate & Report
- ☐ Initial & Forward
- ☐ Distribute
- ☐ Concurrence
- ☐ For Processing
- ☐ Initial & Return

FROM: Mickey Bryant

DATE 10-30-85

PHONE 8-0130

Best Available Copy

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

And/Or To Other Than The Addressee

To: ______ Loctn.: ______
To: ______ Loctn.: ______
To: ______ Loctn.: ______
From: ______ Date: DER
Reply Optional ☐ Reply Required ☐ Info. Only ☐
Date Due: ______ Date Due: NOV 1 1985

BAQM

TO: Dan Williams
Bob Stetler
Catherine Wanat
Landon Ross
Roxane Dow
Rodney DeHan
✓ Steve Smallwood 3
J. P. Subramani
Tim Lynch

FROM: Mickey Bryant MB

DATE: October 31, 1985

SUBJECT: Amax Chemical Corporation; Proposed Pine Level Mine; Revised draft EIS technical information documents covering: Section 3, Air/Meteorology/Noise; Section 4, Geotechnical Resources; Section 5, Radiation; Section 8, Aquatic Ecology; Section 9, Terrestrial Ecology; and Section 10, Socioeconomics.

All or some of the above draft revised sections of the EIS are attached for your review and comment. Please respond by November 29, 1985. If I have not received written comments by December 3, I will assume you do not plan to submit any comments. Thank you for your assistance.

MDB/jk

Attachment

cc: Jack D. Doolittle, ESE
Patricia Brooks, EPA

DRAFT ENVIRONMENTAL IMPACT STATEMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
RESOURCE DOCUMENT (BASELINE SECTION)
SECTION 3
AIR QUALITY/METEOROLOGY/NOISE

AMAX CHEMICAL CORPORATION
PINE LEVEL MINE

Manatee and DeSoto Counties, Florida

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

78-095-0851-0120

October 1985

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3.0 AIR QUALITY/METEOROLOGY/NOISE

3.1 INTRODUCTION

The proposed mine, beneficiation plant, and rock drying facility will be located in the remote southeastern corner of Manatee County and the northwestern portion of DeSoto County. The proposed activities have the potential to contribute to air emissions during the initial construction period as well as during the approximate 30-year life of the mining operation. Construction emissions will consist primarily of fugitive particulate matter. Minor vehicular emissions (carbon monoxide, nitrogen oxides, hydrocarbons, particulate matter, and sulfur dioxide) will also occur.

Operating emissions will be primarily related to the phosphate rock drying and handling operations, but may also include fugitive dust emissions from land clearing and reclamation activities associated with mining. Particulate matter will be the primary contribution to the air emissions. Other pollutants emitted will include sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbons from combustion of fossil fuel, and fluoride emissions generated from the rock drying operation.

PM
SO_2
NO_x

A Plan of Study (POS) for the AMAX Chemical Corporation Environmental Impact Statement (EIS) was approved by U.S. Environmental Protection Agency (EPA), Region IV, in December 1978. This plan did not include an ambient air monitoring program for the Pine Level project since only the mining operations were to be conducted at the Pine Level site, with rock drying to be conducted at the Port Manatee site. Since the Pine Level site area is remote, preconstruction ambient air monitoring was not considered necessary. In February 1980, EPA concluded that ambient air monitoring at the Pine Level site was not necessary to fulfill Prevention of Significant Deterioration (PSD) preconstruction monitoring requirements (Williams, 1980).

An addendum to the POS was prepared in December 1979 in response to changing conditions. AMAX had acquired additional lands at the Pine Level mine site, the mine site was being considered for location of the rock dryer (originally planned for Port Manatee), and revised federal PSD regulations had been proposed (Federal Register, Vol. 44, No. 173, September 5, 1979) which could alter preconstruction ambient air monitoring requirements. In response to these changes and anticipated requirements, AMAX began an ambient air monitoring program at the Pine Level site in March 1979. Additional air quality data were gathered by other private firms commencing in 1977, and this information became available as part of AMAX's acquisition of additional lands.

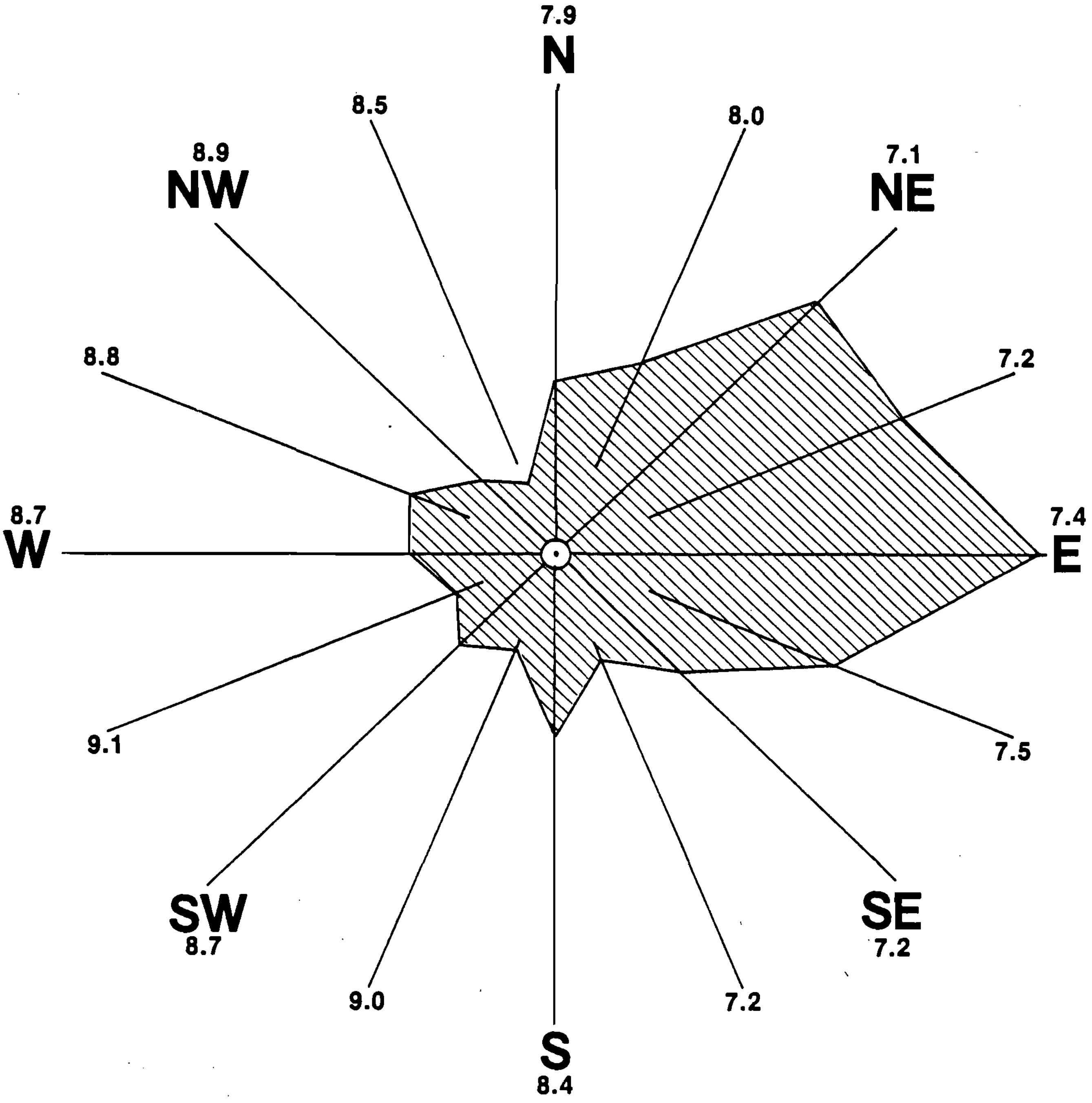
This Air Baseline Section presents a description of the local meteorology of the site area, applicable air quality regulations, existing and known planned emission sources which may impact the site area, and air quality measurements obtained at the AMAX site. Based on the gathered information, estimated baseline air quality levels and the status of air quality levels at the site are presented. Baseline noise levels are also presented and are estimated from available literature.

3.2 METEOROLOGY

Because the proposed AMAX site is located about 25 miles from the Gulf of Mexico, temperature extremes are expected to be less moderate than at coastal locations. During the four warmest months (June through September), the average temperature is 81°F and about 60 percent of the yearly rainfall of 55 inches occurs. During the winter quarter, rainfall decreases, and the ambient temperature decreases to an average of 64°F. Rainfall data representative of the AMAX site are presented in Section 7.1, Climatology.

For the proposed site area, the National Weather Service (NWS) Station at Fort Myers was considered to be the most representative weather station for which long-term wind data were available. This station is located about 40 miles south-southeast of the site, 10 miles from the Gulf of Mexico, and 2 miles from the Caloosahatchee River. Data from other NWS stations, such as Tampa and Orlando, are not expected to be representative of site conditions because of the stations' large distances from the site and relative location with respect to the Gulf of Mexico and Atlantic Ocean. The NWS at Tampa is located about 64 miles to the northwest of the site and on the coast bordering Tampa Bay. The NWS at Orlando is located about 100 miles to the north-northwest of the site, 36 miles from the Atlantic Ocean and more than 80 miles from the Gulf of Mexico.

Figure 3.2-1 shows a five-year averaged wind rose (1969-1973) for Fort Myers, based on 8 observations per day with average wind speeds indicated for each wind direction. The wind rose displays a predominance of winds from the easterly directions, indicating that emitted pollutants will generally travel towards the west, on an annual basis. The highest wind speeds occur, on the average, from the westerly directions. Higher wind speeds increase the dilution of pollutants, but can also increase the potential for downwash of stack plumes and the generation of fugitive particulate matter emissions. The annual average



CALM = 10.0%
AVERAGE WIND SPEEDS SHOWN IN KNOTS.

SCALE: 0 5%

SOURCE: NATIONAL CLIMATIC CENTER, 1979.

Figure 3.2-1
FIVE YEAR AVERAGED ANNUAL WIND ROSE, FORT MYERS, FLORIDA, 1969-1973

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

wind speed at Fort Myers is 7.1 knots (3.7 m/sec), and calm conditions, which are reported when there are no valid wind directions and wind speeds are less than 3 knots, occurred about 10.0 percent on an annual average.

ESE collected ambient wind speed and wind direction data at the AMAX Pine Level site, in conjunction with air quality measurements. The annual and quarterly average wind roses for 1980 are shown in Figures 3.2-2 and 3.2-3, respectively. The wind roses for 1980 are presented because they are based on the most complete valid data set collected for one calendar year. As shown in Figure 3.2-2, the predominant annual average wind directions are from the west-northwest and north-northeast. Winds from the west clockwise through east-northeast are almost evenly distributed, ranging in occurrence from 6.7 to 9.4 percent of the time. Other wind directions generally occur 5 percent or less throughout the year. Calm conditions occurred about 33.5 percent of the time during the year.

Compared with the annual average wind rose from Fort Myers, presented in Figure 3.2-1, the annual average wind direction frequencies at the AMAX site are different with a greater occurrence of wind directions from the west-northwest through north-northwest and a lesser occurrence of east and east-southeast wind directions. This difference of wind direction frequencies between the two sites is partly attributable to the collection of data for different time periods and the greater occurrence of calms at the AMAX site compared to Fort Myers data.

The quarterly wind roses for the AMAX site show that the predominant wind directions are from the north-northeast from January to March, east-northeast and west-northwest from April to June, west from July to September, and north-northeast from October to December. For the periods from January to March and July to September, however, the frequencies of the predominant wind directions are generally not significantly greater than most of the other wind directions.

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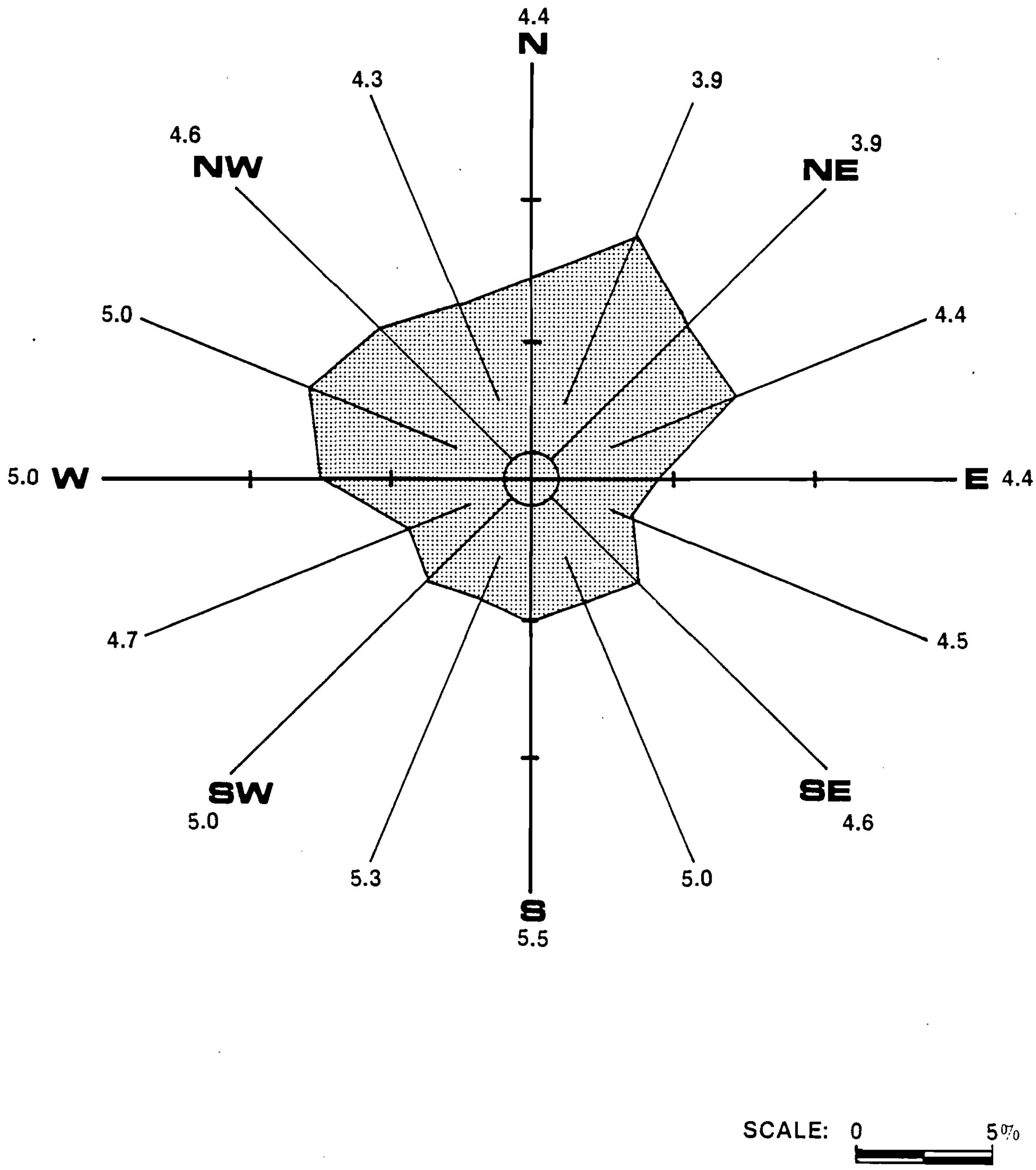


CALM = 33.5%

AVERAGE WIND SPEEDS SHOWN IN KNOTS.

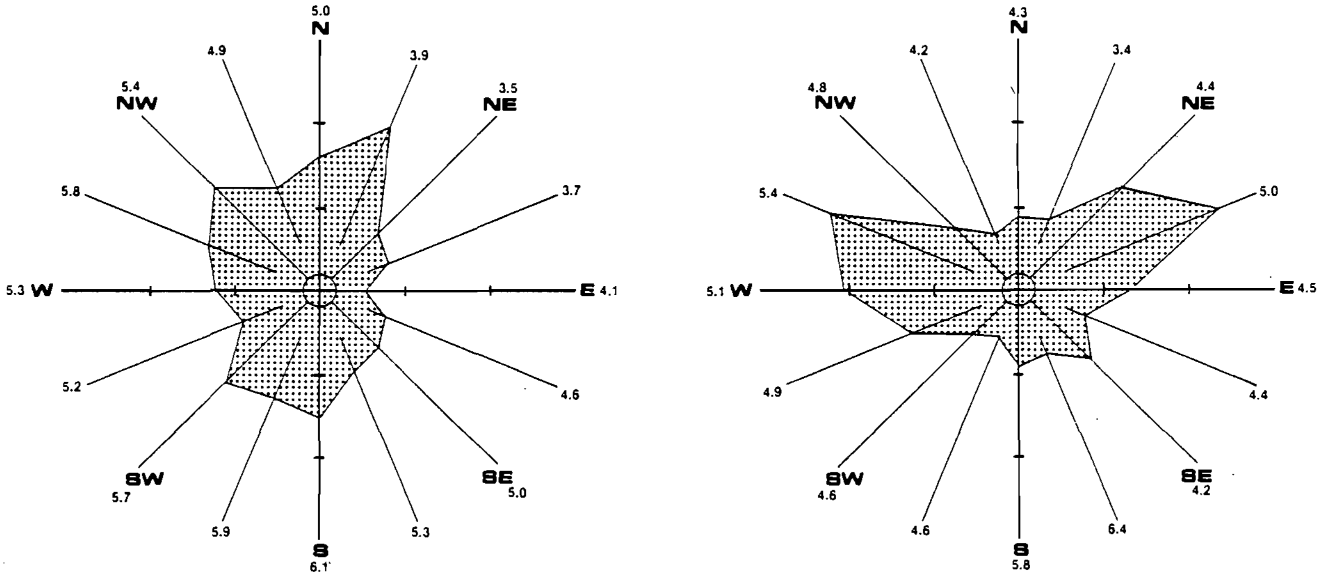
SOURCE: ESE, 1982.

Figure 3.2-2
1980 ANNUAL AVERAGE WIND ROSE AT THE AMAX SITE

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

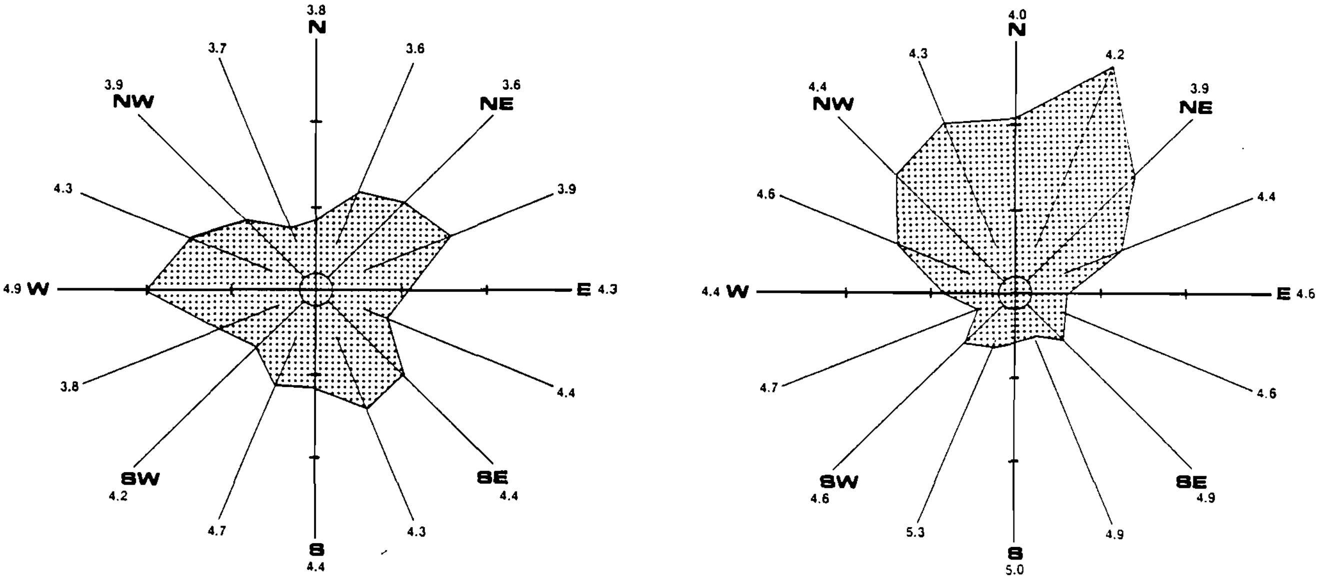
AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

07-22-82



January to March
Calm = 29.9%

April to June
Calm = 35.2%



July to September
Calm = 38.6%

October to December
Calm = 30.7%

SCALE: 0 5%

SOURCE: ESE, 1982.

AVERAGE WIND SPEEDS SHOWN IN KNOTS.

Figure 3.2-3
1980 QUARTERLY AVERAGE WIND ROSES AT THE AMAX SITE

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

Atmospheric stability, as determined by the method of Turner (1964), is a measure of the dispersive capacity of the atmosphere. Stability classes range generally from A to F, with Class A representing the most unstable case, and Class F the most stable. As the atmosphere becomes more unstable, the dispersive capacity of the atmosphere increases, thus greatest dispersion occurs under stability Class A. The relative frequency of occurrence of each stability class, based upon the Fort Myers five-year data (1969-1973), is presented in the following list:

Stability Class	Frequency of Occurrence	
A - Unstable	0.7%	
B - Moderately Unstable	6.6%	
C - Slightly Unstable	14.9%	
D - Neutral	32.5%	77.9%
E,F - Slightly Stable, Stable	45.4%	

As indicated, the neutral and stable stabilities occur most frequently in Fort Myers. Calm conditions occur about 10 percent of the time and occur most frequently for the stable stabilities. Meteorological conditions at the AMAX site are expected to be similar to the conditions experienced at Fort Myers, due to the proximity of the two sites. However, because of the more inland location of the AMAX site, a slight increase in the unstable stability categories (A, B, C) and slightly lower wind speeds would be expected at the site as compared to Fort Myers. The difference in wind speeds between the two sites is shown in the wind roses (Figures 3.2-1 through 3.2-3) where the average wind speed for each wind direction is given. The meteorological data collected at the NWS at Fort Myers is considered to be the most representative, available data for predicting the atmospheric transport and dispersion of emissions from the proposed site using air quality models.

Atmospheric temperature inversions alter the dispersive and mixing capacity of the atmosphere and limit the volume of air into which emitted pollutants can mix. The most frequent inversions occurring at the site are due to the radiative cooling of the surface on clear and calm nights, called nocturnal or radiation inversions. The most severe radiation inversions occur during the fall and winter, but are usually dissolved by surface heating shortly after sunrise.

Other types of inversions that occur at the site are due to frontal systems and subsidence inversions. A frontal system may cause a build-up of pollutant concentrations for a few hours but is experienced infrequently and only during the late fall or winter when cooler air masses invade the state. A subsidence inversion is formed when a stationary high pressure area causes air at high levels to slowly descend, creating an upper air inversion. Unlike nocturnal inversions which are broken up by sunshine, subsidence inversions, as resulting from high pressure areas, may persist for days. A study by Holzworth (1972) showed that occurrences of mixing heights of less than 1,500 meters on at least two to five consecutive days with wind speeds of less than 4.0 meters per second, representative of stagnation conditions, are expected infrequently near the site. These conditions occurred about 9 times over a 5-year period based on data collected at Tampa, the nearest NWS station to the proposed site which was included in the Holzworth study.

3.3 APPLICABLE AIR QUALITY REGULATIONS

3.3.1 AMBIENT AIR QUALITY STANDARDS (AAQS)

Federal and State of Florida AAQS applicable to the proposed project site are shown in Table 3.3-1. Pollutants for which AAQS have been set are termed "criteria" pollutants. Federal AAQS were set by EPA to protect the public health and welfare (i.e., animals, vegetation, soils, materials, etc.) with an adequate margin of safety.

Florida's AAQS are equal to, or in the case of sulfur dioxide, more stringent than the federal AAQS. EPA promulgated secondary annual and

Table 3.3-1. Federal and State of Florida AAQS and Allowable PSD Increments (ug/m^3)

Pollutant	Averaging Time	Federal AAQS Primary Standard	Federal AAQS Secondary Standard	State of Florida AAQS	PSD Increment Class I	PSD Increment Class II	PSD Increment Class III
Suspended Particulate Matter	Annual Geometric Mean	75	60	60	5	19	37
	24-Hour Maximum*	260	150	150	10	37	75
Sulfur Dioxide	Annual Arithmetic Mean	80	N/A	60	2	20	40
	24-Hour Maximum*	365	N/A	260	5	91	182
	3-Hour Maximum*	N/A	1,300	1,300	25	512	700
Carbon Monoxide	8-Hour Maximum*	10,000	10,000	10,000	—	—	—
	1-Hour Maximum*	40,000	40,000	40,000	—	—	—
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	—	—	—
Ozone	1-Hour Maximum†	235	235	235	—	—	—
Lead	Calendar Quarter	1.5	1.5	1.5	—	—	—

* Maximum concentration not to be exceeded more than once per year.

† Maximum concentration not to be exceeded on an average of more than one day per year.

Sources: EPA, 1984 (40 CFR, Part 50).
EPA, 1984 (40 CFR, Part 52).
DER, 1983 (Ch 17-2, FAC).

24-hour sulfur dioxide AAQS in 1971, but revoked these standards in 1973. The State of Florida, however, retained these secondary standards as the state AAQS.

3.3.2 PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The Clean Air Act of the United States was amended in August 1977 to incorporate provisions for PSD. Final PSD regulations were promulgated by EPA on August 7, 1980. The regulations divide areas of the country into Class I (certain national parks and national wilderness areas) and Class II (the remainder of the country). Each class is limited in the pollution increases of sulfur dioxide and particulate matter concentrations which can occur within its boundaries as judged against a defined "baseline" concentration level. These allowable increases are termed "increments" (Table 3.3-1), and are much less than the corresponding AAQS, particularly for Class I areas. Class III areas are provided for under the Clean Air Act, but to date no areas of the country have been redesignated to Class III.

Major new sources and major modifications are required to undergo PSD review, which may include a control technology review, source impact analysis, and continuous ambient air quality monitoring. A new source is termed major if it has the potential to emit 100 tons per year or more of any regulated pollutant and belongs to one of 28 specified source categories, or if it has the potential to emit 250 tons per year or more of any regulated pollutant. Major new sources are required to undergo PSD review for each regulated pollutant emitted in significant amounts (Table 3.3-2).

The proposed AMAX phosphate facility is classified in one of the 28 specified source categories (phosphate rock processing plants), and therefore will be a major new source if the facility emits more than 100 tons per year of any pollutant listed in Table 3.3-2. PSD review will be required for each pollutant emitted in significant amounts. The PSD <u>de minimus</u> air quality impact levels are shown in Table 3.3-2. If

Table 3.3-2. PSD Significant Emission Rates and De Minimis Impact Levels

Pollutant	Regulated Under	Significant Emission Rate (TPY)	De Minimis Air Quality Impact (ug/m^3)
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter	NAAQS, NSPS	25	10, 24-hour
Nitrogen Oxides	NAAQS, NSPS	40	14, Annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40	100 TPY†
Lead	NAAQS	0.6	0.1, 24-hour
Sulfuric Acid Mist	NSPS	7	*
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.04, 1-hour
Asbestos	NESHAP	0.007	*
Beryllium	NESHAP	0.0004	0.0005, 24-hour
Mercury	NESHAP	0.1	0.25, 24-hour
Vinyl Chloride	NESHAP	1	15, 24-hour
Benzene	NESHAP	0	*
Radionuclides	NESHAP	0	*
Inorganic Arsenic	NESHAP	0	*
Any Regulated Pollutant	--	Class I Impact**	

* No ambient measurement method.

† Increase in VOC emissions.

** Any emission rate for a source located within 10 km of a Class I area and causing impacts of 1 ug/m^3, 24-hour average, or greater.

Notes: NAAQS = National Ambient Air Quality Standards.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.

In February 1981, the Ambient Monitoring Guidelines for PSD (EPA-450/4-80-012) were revised to reflect the following changes in the de minimis levels: lead--0.1 ug/m^3, calendar quarter; hydrogen sulfide--0.2 ug/m^3, 1-hour; and beryllium--0.001 ug/m^3, 24-hour. These revisions have not been published in the Federal Register or incorporated into the Code of Federal Regulations.

Sources: EPA, 1984 (40 CFR 52.21).
DER, 1983 (Ch 17-2, FAC).

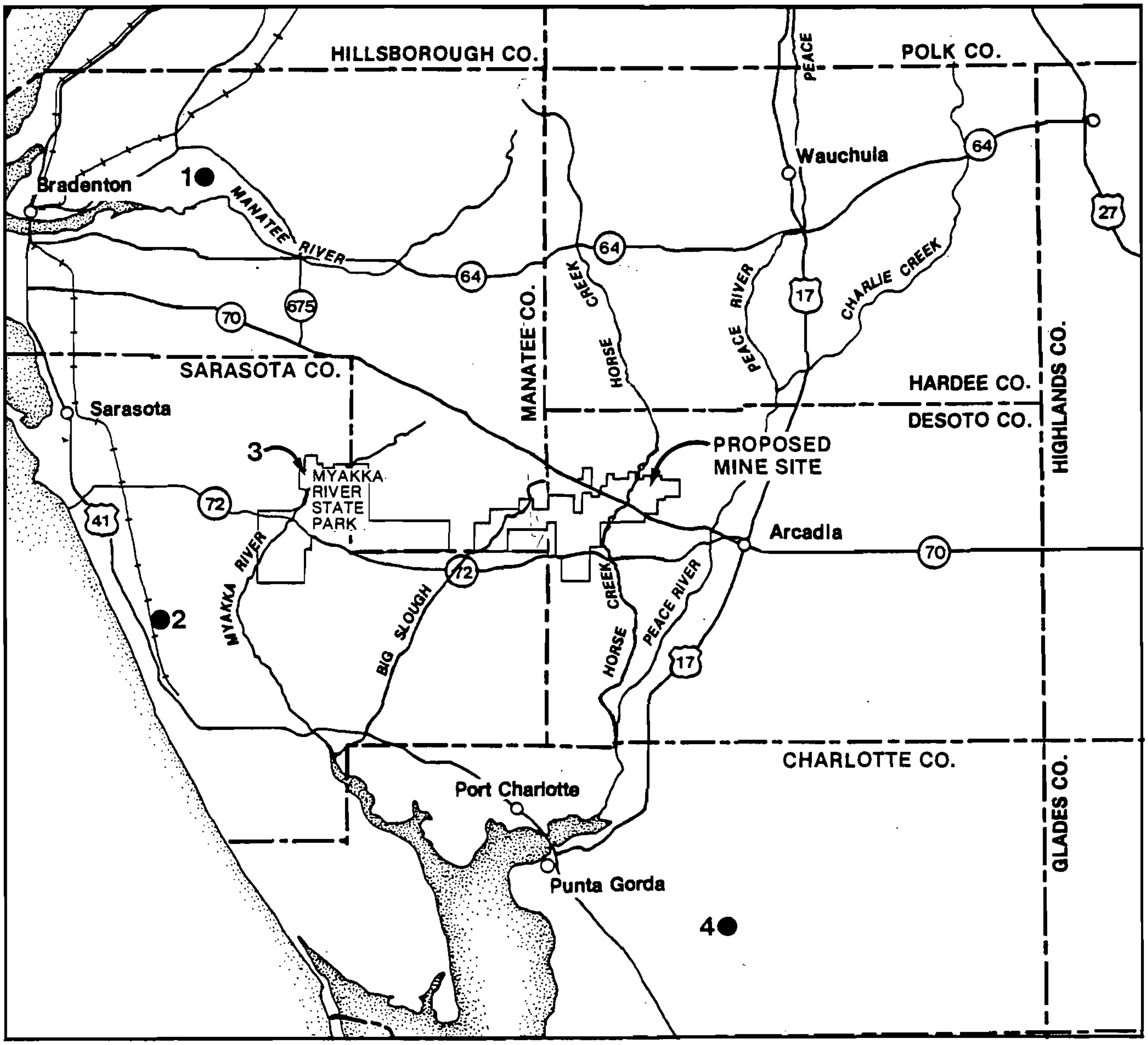
the new source's air quality impact is below these levels for any pollutant, EPA, or delegated administering authority, may exempt the ambient monitoring requirements for the source on a pollutant specific basis.

Currently, the Florida DER has administrative and technical review authority for the federal PSD new source review program. PSD applications are submitted through the DER, and this agency conducts the technical review and issues the preliminary determination. Under this delegation, the EPA can comment on the application during the public comment period and must sign off on the permit. It is anticipated that in the near future, Florida DER will be delegated full PSD authority, whereupon, DER will issue the PSD permit.

The proposed site and all areas within 160 km of the site are currently classified as Class II for PSD. Major areas located within 50 km of the site and designated for public use are shown in Figure 3.3-1. These areas include the Myakka River State Park and the Lake Manatee Recreation area. The nearest Class I areas to the site are the Chassahowitzka Wilderness Area and the Everglades National Park, both located about 160 km from the proposed site.

3.3.3 NONATTAINMENT AREAS

EPA has promulgated (EPA, 1981, 40 CFR, Part 81) a list of areas of the country which are not currently meeting Federal AAQS. These areas are termed nonattainment areas, and special stringent permitting conditions are in effect for new sources locating in or significantly impacting these areas. The nearest nonattainment areas to the proposed site are in Hillsborough County, the nearest border of which is located about 40 km north. All of Hillsborough County has been designated a nonattainment area for ozone, and a particulate matter nonattainment area exists in the Tampa area (about 70 km north-northwest of the proposed site) (DER, 1983). Significance levels for impacts on nonattainment areas due to emission sources are presented in Table 3.3-3.



KEY

1. LAKE MANATEE STATE RECREATION AREA
2. OSCAR SCHERER STATE RECREATION AREA
3. MYAKKA RIVER STATE PARK
4. CECIL M. WEBB WILDLIFE MANAGEMENT AREA

Figure 3.3-1
DESIGNATED PUBLIC USE AREAS LOCATED WITHIN 50 KM OF THE AMAX SITE

Table 3.3-3. Significance Levels for Air Quality Impacts

Pollutant	Annual (ug/m3)	24-Hour (ug/m3)	8-Hour (mg/m3)	3-Hour (ug/m3)	1-Hour (mg/m3)
Sulfur Dioxide	1	5	--	25	--
Total Suspended Particulates	1	5	--	--	--
Nitrogen Dioxide	1	--	--	--	--
Carbon Monoxide	--	--	0.5	--	2

Source: EPA, Federal Register, 43 (118), June 19, 1978.

3.3.4 EMISSION STANDARDS

Federal emission standards applicable to the proposed project consist of the New Source Performance Standards (NSPS) for phosphate rock plants (EPA, 1982, 40 CFR, Part 60). NSPS for phosphate rock plants consist of emission and opacity standards for phosphate rock dryers, calciners, grinders, and ground phosphate rock handling and storage systems (see Table 3.3-4).

The State of Florida has adopted the Federal NSPS for phosphate rock plants. Florida's general particulate emission limiting standards [FAC, Chapter 17-2.610(1)] and general visible emission standard [FAC, Chapter 17-2.610(2)] would apply to the proposed AMAX facility. These standards are as follows:

Particulate Matter Standard

$$\left.\begin{array}{l}\text{Process weights} \leq 30 \text{ tons per hour: } E = 3.59\ P^{0.62} \\ \text{Process weights} > 30 \text{ tons per hour: } E = 17.31\ P^{0.16}\end{array}\right\}$$

Where: E = Allowable emission in pounds per hour.
P = Process weight rate in tons per hour.

Opacity Standard

Less than 20 percent opacity

Florida has also promulagated a general regulation for unconfined emissions of particulate matter [FAC, Chapter 17-2.610(3)], which requires reasonable precautions to be taken by a source in preventing the escape of unconfined particulate matter emissions.

A Best Available Control Technology (BACT) demonstration must be performed for each new major source subject to PSD review. The demonstration must be made for each pollutants emitted in significant quantities (see Table 3.3-2), and includes selection of a control technology and specific emission limits.

Table 3.3-4. New Source Performance Standards for Phosphate Rock Plants*

Facility	Particulate Matter Standard	Opacity Standard
Phosphate rock dryer	0.030 kg/Mg (0.06 lb/ton)	10%
Phosphate rock calciners processing unbeneficiated rock or combinations of beneficiated and unbeneficiated rock	0.12 kg/Mg (0.23 lb/ton)	10%
Phosphate rock calciners processing beneficiated rock	0.055 kg/Mg (0.11 lb/ton)	10%
Phosphate rock grinder	0.006 kg/Mg (0.012 lb/ton)	0%
Ground phosphate rock handling and storage systems	--	0%

* Applicable to dryers, calciners, grinders, and ground rock handling and storage facilities in plants having a production capacity greater than 3.6 megagrams per hour (4.0 tons/hr).

Source: EPA, 1984 (40 CFR 60, Subpart NN).

The proposed new source must meet the more stringent of the emission standards promulgated under federal NSPS or state emission regulations, or those established under BACT review.

3.4 EMISSION SOURCES

Information concerning existing and proposed emission sources in the vicinity of the AMAX site were obtained from several sources: Florida DER Air Pollutant Inventory System (APIS); the National Emissions Data System (NEDS), Florida DER permit files; and various air quality reports, permit applications, and other similar information.

Figures 3.4-1, 3.4-2, and 3.4-3 present the location of the proposed AMAX site in relation to the major (50 tons/year or more) existing point sources for particulate matter, sulfur dioxide, and nitrogen dioxide emissions, respectively. The 50-kilometer (km) radius circle represents the approximate geographic extent of the locations of emission sources which could impact the site as indicated by past dispersion modeling studies for a number of industrial sources (ESE, 1980, 1981; EPA, 1979) and U.S. EPA guidance (EPA-Federal Register, 43 (118), June 19, 1978]. The recommendation by EPA to limit the application of air quality models to a downwind distance of no more than 50 km is primarily due to the model uncertainties of concentration estimates for larger downwind distances.

3.4.1 PARTICULATE MATTER

There are no major existing particulate matter point sources located in the immediate area (about 20-km radius) of the proposed AMAX site. The site is located about 50 km south of the Polk County/Hillsborough County mine district. The only major phosphate plant in this district within 50 km of the site is Gardinier, Inc., located in Polk County. A permitted (i.e., air construction permits approved), but not yet constructed, phosphate rock drying facility is the Estech Duette phosphate plant which is situated about 40 km north of the site. Major sources in Hardee County within 50 km of the site are American Orange and the recently permitted but not yet constructed Mississippi Chemical

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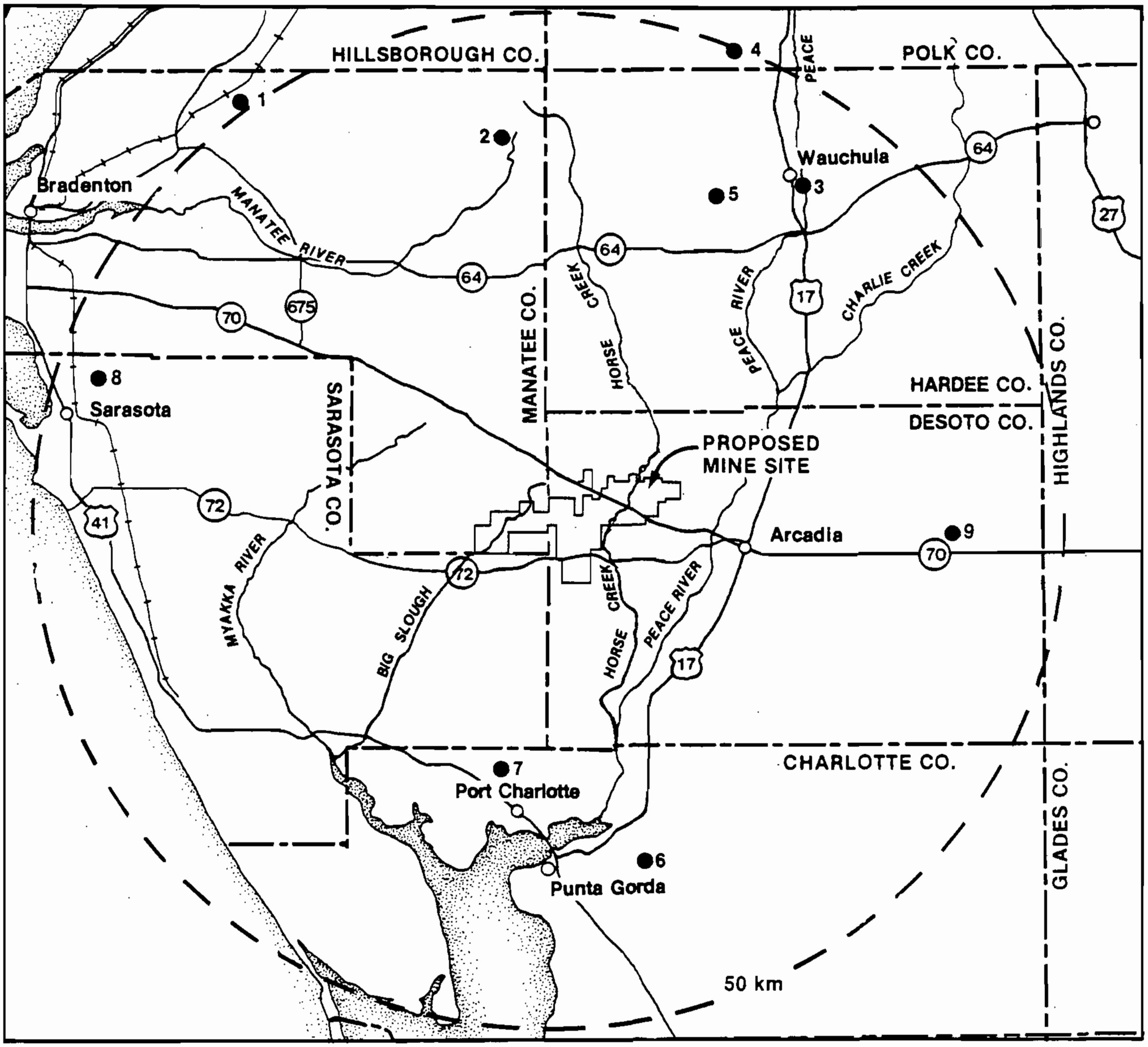

LEGEND

1. FPL-MANATEE
2. ESTECH
3. AMERICAN ORANGE
4. GARDINIER
5. MISSISSIPPI CHEMICAL
6. ASPHALT DEVELOPERS
7. MACASPHALT INC.
8. MACASPHALT INC.
9. AMERICAN ORANGE

SOURCE: ESE, 1982.

Figure 3.4-1
LOCATIONS OF AMAX PROPOSED MINE SITE AND MAJOR PARTICULATE MATTER EMISSION SOURCES

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

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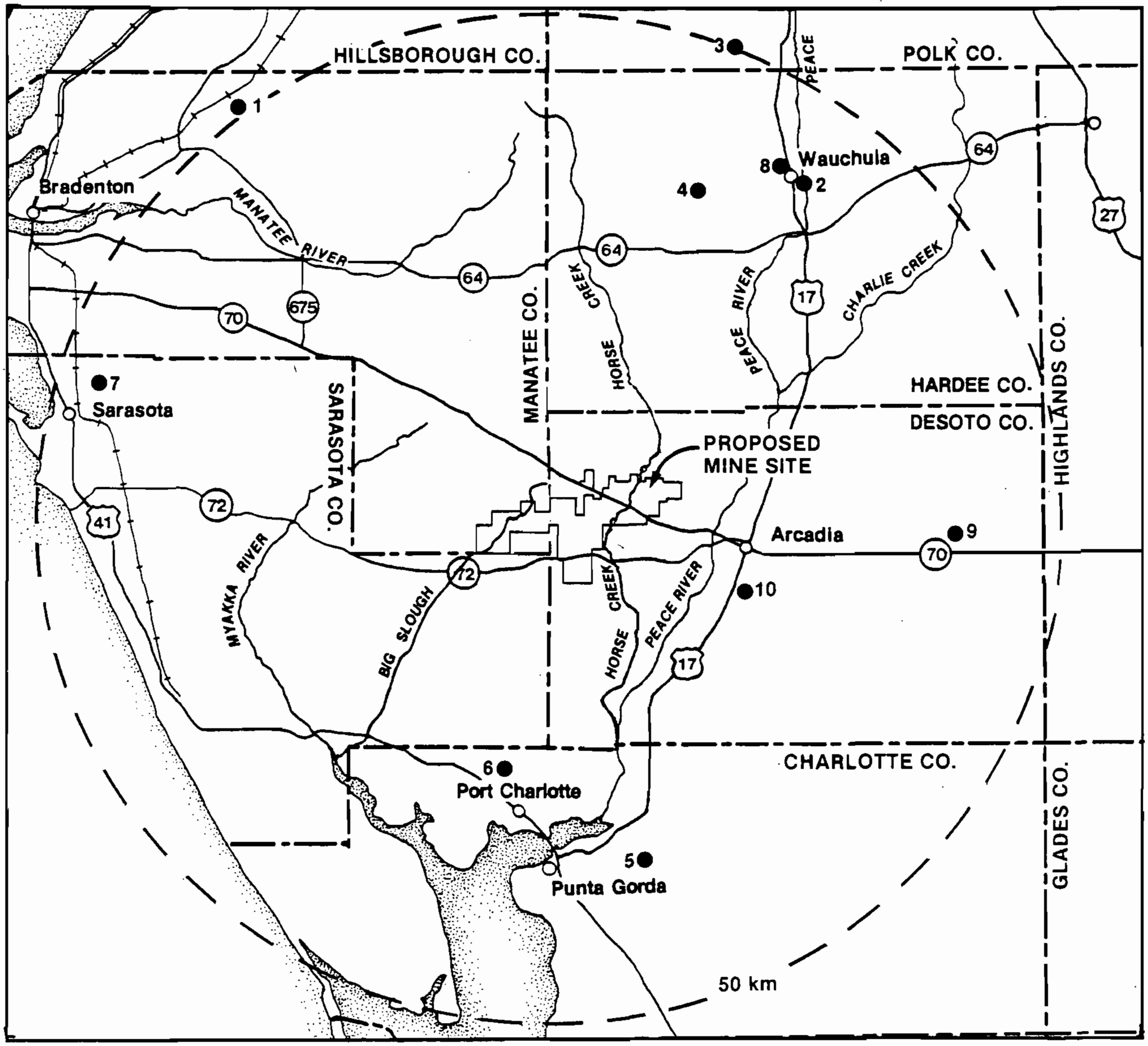

LEGEND

1. FPL-MANATEE
2. AMERICAN ORANGE
3. GARDINIER
4. MISSISSIPPI CHEMICAL
5. ASPHALT DEVELOPERS
6. MACASPHALT INC.
7. MACASPHALT INC.
8. CITY OF WAUCHULA
9. AMERICAN ORANGE
10. HIGHWAY PAVERS

SOURCE: ESE, 1982.

Figure 3.4-2
LOCATION OF AMAX PROPOSED MINE SITE AND MAJOR SULFUR DIOXIDE EMISSIONS SOURCES

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

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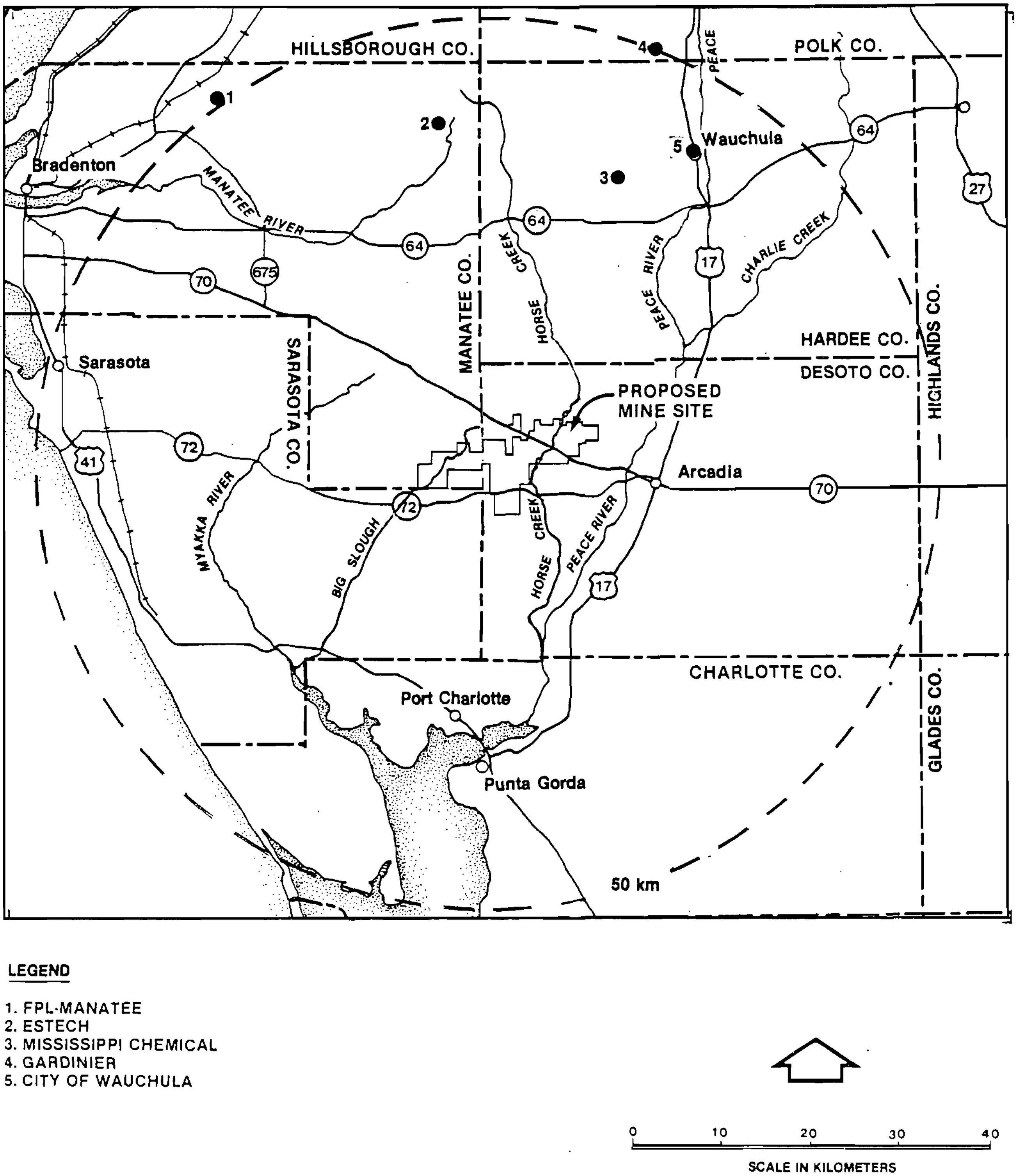

LEGEND

1. FPL-MANATEE
2. ESTECH
3. MISSISSIPPI CHEMICAL
4. GARDINIER
5. CITY OF WAUCHULA

SOURCE: ESE 1982.

Figure 3.4-3
LOCATION OF AMAX PROPOSED MINE SITE AND MAJOR NITROGEN DIOXIDE EMISSION SOURCES

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

Corporation phosphate rock drying facility. Major sources to the south of the proposed site include Asphalt Developers and Macasphalt, Inc., in Charlotte County. The only major source to the west of the site is Macasphalt, Inc., in Sarasota County. The Florida Power & Light Manatee power plant is located slightly greater than 50 km to the northwest of the site, but was included in Figure 3.4-1 because it is potentially a larger pollutant emitter than any of the sources located within 50 km of the site.

3.4.2 SULFUR DIOXIDE

Sources of sulfur dioxides are related to fuel burning and chemical processes. The locations of major sulfur dioxide emission point sources (>50 tons/yr) within 50 km of the proposed site are shown in Figure 3.4-2. There are no major sulfur dioxide sources located within 20 km of the site. Most of the major sources of particulate matter shown in Figure 3.4-1 are also major sources of sulfur dioxide. These sources include Gardinier, Inc.; American Orange; the permitted but not yet constructed Mississippi Chemical Corporation facility; Asphalt Developers; the Macasphalt, Inc., facilities in Charlotte and Sarasota Counties; and the FP&L Manatee Plant. Another major source of sulfur dioxide within 50 km is the City of Wauchula's power plant located about 40 km to the northeast of the site.

3.4.3 NITROGEN OXIDES

Nitrogen oxides are a by-product of the high temperature combustion of coal, gas, and fuel oils, and their emissions are related to fuel burning facilities. Figure 3.4-3 shows the locations of major point sources of nitrogen oxides (>50 tons/yr) within approximately 50 km of the proposed AMAX site. These major nitrogen oxides sources, which include Gardinier, Inc., the permitted Estech-Duette facility, the City of Wauchula's power plant, the permitted Mississippi Chemical Corporation facility, and FP&L Manatee, are generally also major sources of sulfur dioxide.

3.4.4 OTHER POLLUTANTS

Sources of atmospheric hydrocarbons generally coincide with fuel storage facilities and fuel combustion sources. The major sulfur dioxide and nitrogen oxides sources shown in Figures 3.4-2 and 3.4-3 are fuel combustion sources. No existing significant point sources of fluoride emissions currently are located within 50 km of the AMAX site. The largest sources of atmospheric fluorides nearest to the site are located in the Hillsborough County/Polk County phosphate mine district.

3.4.5 EMISSION INVENTORY

Tables 3.4-1 and 3.4-2 present the SO_2, particulate matter, and NO_x emission inventory used to develop the preceding discussion. The inventory includes plant ID number, plant name, UTM coordinates, and annual permitted and/or estimated actual emissions. Table 3.4-1 lists sources included in the PSD baseline emissions, and Table 3.4-2 lists increment-consuming sources and emissions. Although each source is not a major source (>50 tons per year) for all three pollutants, emission data are presented, if known, for each pollutant.

3.5 MEASURED AIR QUALITY--GENERAL

As discussed in the introduction to this baseline description, the measurement of ambient air quality levels at the proposed AMAX site was not initially required by EPA or contained in the POS for the Environmental Impact Statement. However, in view of AMAX's acquisition of additional lands from Noranda, consideration of the site as a location for a rock dryer, and the possibility of revised PSD regulations which would alter preconstruction monitoring requirements, AMAX desired to obtain baseline air quality information, and an ambient monitoring program for the site was developed. The program included the acquisition of air data gathered previously by Noranda, as well as the initiation of an air monitoring network.

The ambient monitoring program conducted at the AMAX site is summarized in Table 3.5-1. Figure 3.5-1 shows the AMAX site ambient air monitoring locations and station numbering system used in this document.

Table 3.4-1. Summary of Point Sources with Baseline Emissions (Before December 1977) Greater Than 50 Tons/Year of Particulate Matter, SO_2, or NO_x

			UTM Coordinates		Maximum Permitted Baseline* Emissions (tons/yr)		
County	APIS	Plant Name	East (km)	North (km)	PM	SO_2	NO_x
Hardee	40-25-0006-01	American Orange Corp.	419.8	3047.3	10	80	30
	-02	American Orange Corp.	419.8	3047.3	3	40	10
	-03	American Orange Corp.	419.8	3047.3	18	NA	NA
	-04	American Orange Corp.	419.8	3047.3	10	NA	NA
	-06	American Orange Corp.	419.8	3047.3	UN	UN	UN
	40-25-0009-01	City of Wauchula-Powerplant	419.8	3046.5	4(5)	36	13(19)
	-02	City of Wauchula-Powerplant	419.8	3046.5	4(5)	36	13(19)
	-03	City of Wauchula-Powerplant	419.8	3046.5	4(5)	36	13(19)
	-04	City of Wauchula-Powerplant	419.8	3046.5	4(5)	36	13(19)
	-05	City of Wauchula-Powerplant	419.8	3046.5	4(5)	36	13(19)
Manatee	40-41-0010-01	Florida Power & Light Manatee	367.6	3055.1	3,035	36,722	9,105
	-02	Florida Power & Light Manatee	367.6	3055.1	3,035	36,722	9,105
Charlotte	52-08-0002-01	Asphalt Developers	400.7	2977.6	145	85	19
	52-08-0001-01	Macasphalt Inc.	387.9	2988.9	163	NA(137)	NA(39)
Sarasota	40-58-0001-01	Macasphalt Inc.	348.7	3028.0	42(121)	NA(204)	NA(36)
Polk	40-53-0044-01	Gardinier	415.3	3063.3	175	854	268†
DeSoto	40-14-0003-01	Myakka Processors	409.9	3010.3	18	NA(30)	NA(10)
	-02	Myakka Processors			NA	27	NA(5)
	-03	Myakka Processors			12	NA	NA

* Estimated actual emissions are given in parentheses if those emissions are greater than maximum permitted emissions or if no maximum permitted emissions are specified.
† NO_x emissions based on AP-42 emission factor.
NA = Not applicable.
UN = Unknown data.

Sources: Florida DER, 1978, 1982.
EPA, 1975.
ESE, 1982.

Table 3.4-2. Summary of Point Sources with New Emissions (After December 1977) Greater Than 50 Tons/Year of Particulate Matter, SO_2, or NO_x

			UTM Coordinates		Maximum Permitted Emissions† (tons/yr)		
County	APIS	Plant Name	East (km)	North (km)	PM	SO_2	NO_x
Hardee	40-25-0011-01	American Orange Corp.	419.8	3047.3	23	99	NA
	-02	American Orange Corp.	419.8	3047.3	38	99	NA
	40-25-0012-01	Mississippi Chemical Corp.*	409.5	3045.0	89	1,253	343
	-02	Mississippi Chemical Corp.*	409.5	3045.0	6	80	13
	-03	Mississippi Chemical Corp.*	409.5	3045.0	4	48	8
	-04	Mississippi Chemical Corp.*	409.5	3045.0	10	NA	NA
	-05	Mississippi Chemical Corp.*	409.5	3045.0	25	NA	NA
	-06	Mississippi Chemical Corp.*	409.5	3045.0	14	NA	NA
	-07	Mississippi Chemical Corp.*	409.5	3045.0	14	NA	NA
Manatee	40-41-0038-01	Estech General Chemicals Corp.*	388.9	3047.2	—	12	3
	-02	Estech General Chemicals Corp.*	388.9	3047.2	101	38	282
	-03	Estech General Chemicals Corp.*	388.9	3047.2	38	NA	NA
	-04	Estech General Chemicals Corp.*	388.9	3047.2	25	NA	NA
DeSoto	40-14-0008-01	American Orange Corp.	433.2	3009.8	5(21)	NA	NA
	-02	American Orange Corp.			NA(11)	NA(128)	NA(3)
	-03	American Orange Corp.			22	15(128)	30
	40-14-0009-01	Highway Pavers Inc.	412.0	3005.0	9	59(60)	NA

* Emission data taken from construction permit.

NA = Not applicable.

† Estimated actual emissions are given in parentheses if those emissions are greater than maximum permitted emissions or if no maximum permitted emissions are specified.

Sources: Florida DER, 1982.
EPA, 1979.
ESE, 1981.

Table 3.5-1. Summary of Ambient Monitoring Programs Conducted at AMAX Phosphate Pine Level Site

Operator	Station	Time Period	Pollutants Monitored TSP	Pollutants Monitored SO_2	Pollutants Monitored F
ESE/AMAX	1, 2, 3	03/04/79-12/31/81	X		
	1	10/17/79-12/31/81		X	
	2	04/30/80-12/31/81		X	
	1	03/04/79-12/31/81			X
	2	10/06/79-01/04/80			X
CCI/Noranda	3, 4, 5	05/19/77-09/30/79	X	X	X
Sarasota County	6	01/01/77-12/31/81	X	X	
		01/01/80-12/31/81			X

Source: ESE, 1982.

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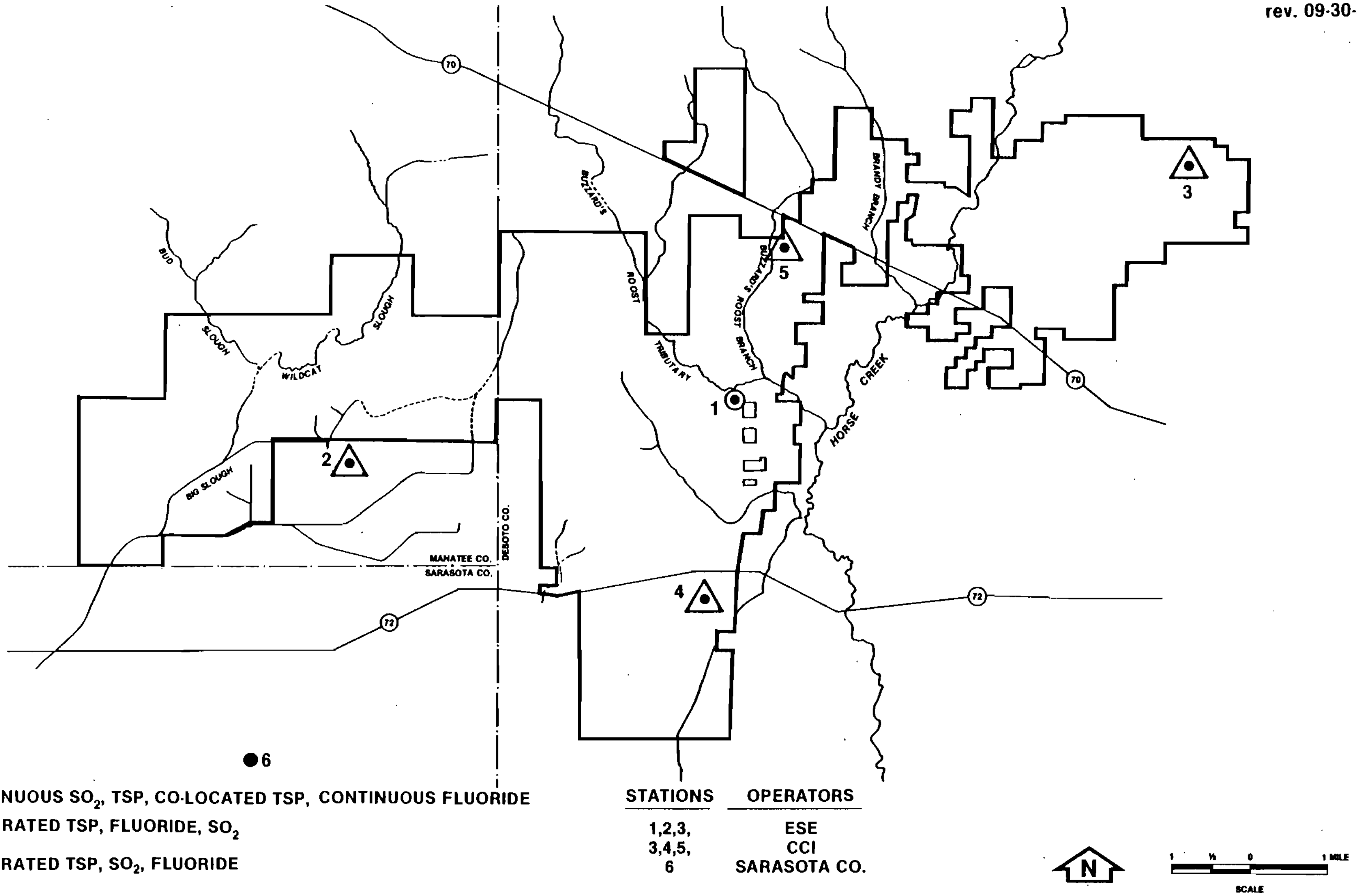

KEY

◉ CONTINUOUS SO_2, TSP, CO-LOCATED TSP, CONTINUOUS FLUORIDE

△ INTEGRATED TSP, FLUORIDE, SO_2

● INTEGRATED TSP, SO_2, FLUORIDE

STATIONS	OPERATORS
1,2,3,	ESE
3,4,5,	CCI
6	SARASOTA CO.

SOURCE: ESE, 1982.

Figure 3.5-1
AMAX MINE SITE AMBIENT AIR MONITORING LOCATIONS

U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

Air quality data have been collected by Conservation Consultants, Inc. (CCI) on the AMAX (Noranda) property. CCI obtained measurements of total suspended particulate matter (TSP), sulfur dioxide (SO_2) and atmospheric fluorides (F). Data were obtained by CCI from May 1977 through September 1979. Stations designated in this report as Stations 3, 4, and 5 (Figure 3.5-1) were referenced at that time as Noranda stations 3, 1, and 2 (N-3, N-1, and N-2) respectively.

In addition to the data collected for Noranda, ESE monitored for TSP, SO_2, and F. The ambient air monitoring network operated by ESE consisted of one continuous sulfur dioxide monitoring station (established October 1979), three TSP monitoring stations (various start dates), one continuous gaseous and particulate fluoride sampler (established October 1979), one bubbler fluoride sampler (established March 1979), and a colocated TSP sampler for quality assurance purposes (established October 1979). The ambient air quality samplers were set up at various times (Table 3.5-1) because of AMAX's acquisition of new land (the Noranda property) and the desire for additional baseline air quality data. Three stations (1, 2, and 3) were operated by ESE through April 1980 as set forth in the addendum to the POS and have been maintained by AMAX since that time with quarterly quality assurance audits conducted by ESE.

Sarasota County also has an ambient air quality monitoring station which was located southwest of the proposed AMAX site (Station 6). This station has been measuring SO_2 and TSP air quality since September 1976, and gaseous fluorides since 1980.

3.5.1 TSP MEASUREMENT RESULTS

Measurements of TSP were taken at six locations in the general vicinity of the proposed site, as shown in Figure 3.5-1 and Table 3.5-1. All measurements were taken by using High Volume samplers in accordance with the suspended particulate measurement reference method (EPA, 1971, 40 CFR 50, Appendix B). Measurements were conducted on an every-sixth-day schedule corresponding to the National Ambient Sampling Network (NASN) sampling schedule. Table 3.5-2 presents a summary of the data collected.

Data from Stations 1, 2, and 3, operated by ESE, displayed fairly consistent observed 24-hour TSP levels, reflecting the rural, remote nature of the area. Maximum 24-hour values ranged from 43 ug/m^3 at Station 2 to 105 ug/m^3 at Station 1. Geometric means ranged from 23 ug/m^3 to 32 ug/m^3 for the 3-year period for the three stations, again reflecting fairly consistent levels.

Stations 3, 4, and 5 were operated by CCI beginning in May 1977 and ending in September 1979. The maximum observed 24-hour value at any of the CCI stations was 142 ug/m^3 at Station 5. A local agricultural influence probably caused this high value (CCI, 1980; EPA, 1979). The next highest 24-hour TSP measurement at Station 5 was 59 ug/m^3, which further suggests that a locally occurring phenomenon caused the highest value. The maximum 24-hour TSP observation at any of the other CCI stations was 128 ug/m^3, representing 85 percent of the 150 ug/m^3 standard. This value, although not specifically identified as being attributable to local or unknown influences, is also suspect due to the rural, remote nature of the site area. Other than the two abnormally high values, the CCI data are consistent with the ESE data taken at Stations 1, 2, and 3. For the CCI data, geometric means ranged from 21 ug/m^3 to 28 ug/m^3, depending upon the reporting period. These values represent less than 50 percent of the 60 ug/m^3 annual standard.

TSP data from the Sarasota County station, covering a 5-year period beginning in 1977, display a maximum 24-hour value of 94 ug/m^3 and a second-highest value of 83 ug/m^3. The annual geometric mean for this time period ranged from 25 ug/m^3 to 32 ug/m^3. These data

Table 3.5-2. Summary of Total Suspended Particulate Concentrations in the Vicinity of the Proposed AMAX Site (Results in ug/m^3)

Station	Operator	Time Period	No. of Obs.	Geometric Mean	Maximum 24-Hour	Second Highest 24-Hour
1	ESE	3/4/79-12/31/79	47	31.5	92	64
		1/1/80-12/31/80	59	27.8	85	56
		1/1/81-12/31/81	55	27.0	105	94
		3/4/79-12/31/81	161	29.0	105	94
2	ESE	3/4/79-12/31/79	22	23.4	43	38
		1/1/80-12/31/80	60	24.9	90	52
		1/1/81-12/31/81	56	24.5	86	81
		3/4/79-12/31/81	138	25.0	90	81
3	ESE	3/4/79-12/31/79	8	29.1	43	37
		1/1/80-12/31/80	59	25.8	52	52
		1/1/81-12/31/81	47	24.8	96	90
		3/4/79-12/31/81	114	26.0	96	90
3	CCI (N-3)	5/19/77-9/30/79	136	22-26	128	60
4	CCI (N-1)	5/19/77-9/30/79	138	21-27	66	63
5	CCI (N-2)	5/19/77-9/30/79	135	22-28	142*	59
6	Sarasota County	1/1/77-12/31/79	—	28-31	94	83
		1/1/80-12/31/80	53	25	78	54
		1/1/81-12/31/81	54	32	88	79

Notes: Annual Ambient Air Quality Standard is 60 ug/m^3 (Geometric Mean).
24-Hour Ambient Air Quality Standard is 150 ug/m^3.
Short-term standards ($\leq$ 24-hours) are not to be exceeded more than once per year.

* Local agricultural influence expected (Conservation Consultants, Inc., 1980).

Sources: ESE, 1982.
CCI, 1980.
EPA, 1982.

also are consistent with the rural nature of the area and the data obtained by the ESE and CCI monitors.

3.5.2 SULFUR DIOXIDE MEASUREMENT RESULTS

Measurements of sulfur dioxide were conducted at six locations in the general vicinity of the AMAX phosphate site. All measurements, except those at Station 1, were performed by using the 24-hour integrated bubbler sample Federal Reference Method (EPA, 1971, 40 CFR, Appendix A). Integrated 24-hour SO_2 bubbler samples were taken at five sampling locations: by ESE at Station 2 from April 1980 through December 1981; by CCI at Stations 3, 4, and 5 from May 1977 through September 1979; and by Sarasota County at Station 6 from January 1977 through December 1981. The samples were collected every sixth day, concurrent with TSP measurements, under the required temperature-controlled conditions. Table 3.5-3 presents a summary of the data collected. The maximum observed 24-hour value was 110 ug/m^3 and occurred at Station 5. This value is 42 percent of the 260 ug/m^3 24-hour standard. The maximum observed arithmetic mean was 12 ug/m^3 or 20 percent of the annual arithmetic mean standard of 60 ug/m^3 standard.

The Meloy model 285-E SO_2 analyzer was used at the AMAX continuous monitoring station (Station 1) until the first quarter of 1981. This analyzer uses the flame ionization detection method for detecting sulfur dioxide and converts it to electronic signals and then transmits it to a strip-chart recorder. The Thermo-Electron Model 43 pulsed fluorescence continuous SO_2 analyzer was used at the station from the first quarter of 1981 to the present. A quality assurance manual, which includes standard operating procedures, was developed prior to sampling to insure that data are collected in a uniform and accurate manner and to comply with all PSD air quality analysis requirements (ESE, 1979).

Continuous sulfur dioxide monitoring has been conducted at Station 1 from October 1979 through December 1981. A total of 16,198 1-hour observations were obtained over the sampling period, representing a data

Table 3.5-3. Summary of Sulfur Dioxide Concentrations in the Vicinity of the Proposed AMAX Site (Results in ug/m^3)

Station	Operator	Date of Operation	Number of Observations	Maximum 24-Hour Obs.	Second Highest 24-Hour Obs.	Annual Arithmetic Mean
2	ESE	4/3/80-12/31/80	45	21	14	4
		1/1/81-12/31/81	53	13	12	5
		4/3/80-12/31/81	98	21	14	5
3	CCI (N-3)	5/19/77-9/30/79	128	105	44	5-11
4	CCI (N-1)	5/19/77-9/30/79	127	74	60	7-12
5	CCI (N-2)	5/19/77-9/30/79	126	110	37	7-11
6	Sarasota County	1/1/77-12/31/79	—	41	30	4-5
		1/1/80-12/31/80	54	23	8	3
		1/1/81-12/31/81	42	8	7	3

Station	Operator	Date of Operation	No. of Obs.	24-Hour Average		3-Hour Average		Arithmetic Mean
				Maximum	Second-Highest	Maximum	Second-Highest	
1	ESE	10/17/79-12/31/79	1,621	36	36	158	137	6
		1/1/80-12/31/80	7,622	37	37	91	82	5
		1/1/81-12/31/81	6,955	68	67	115	112	7
		10/17/79-12/31/81	16,198	68	67	158	136	6

Notes: Annual Ambient Air Quality Standard is 60 ug/m^3 (Arithmetic Mean).
24-Hour Ambient Air Quality Standard is 260 ug/m^3.
3-Hour Ambient Air Quality Standard is 1,300 ug/m^3.
Short-term standards ($\leq$ 24-hours) are not to be exceeded more than once per year.

Sources: ESE, 1982.
CCI, 1979.
EPA, 1980-1982.

Table 3.5-4. Summary of Gaseous and Particulate Fluoride Measurements in the Vicinity of the Proposed AMAX Site (Results in ug/m^3)

Station	Operator	Date of Operation	Number of Observations	Maximum 24-Hour Obs.*	Arithmetic Mean*
1	ESE	3/4/79-9/30/79†	--	<2.8	<2.8
		10/18/79-12/31/79**	12	0.76 (0.04)	0.14 (<0.02)
		1/1/80-12/31/80**	38	0.07 (<0.02)	0.01 (<0.02)
		1/1/81-12/31/81**	53	0.38 (0.23)	0.12 (0.07)
		10/18/79-12/31/81	103	0.76 (0.23)	0.09 (0.04)
2	ESE	10/6/79-11/17/79†	--	<2.8	<2.8
		11/23/79-1/4/80†	--	<1.4	<1.4
3	CCI (N-3)	5/19/77-9/30/79	136	4.6	0.41-0.74
4	CCI (N-1)	5/19/77-9/30/79	139	2.7	0.44-0.67
5	CCI (N-2)	5/19/77-9/30/79	135	3.1	0.41-0.62
6	Sarasota County	1/1/80-12/31/80 1/1/81-12/31/81	53 55	All values below minimum detectable limit of 7.9 ug/m^3	

* Numbers in parentheses represent the measured particulate fluoride concentration in ug/m^3.

† Bubbler method minimum detectable limit of procedure was changed from 2.8 ug/m^3 to 1.4 ug/m^3 in November 1979.

**Double-tape gaseous/particulate monitor. Minimum detectable limit of procedure is 0.02 ug/m^3.

Sources: ESE, 1982.
CCI, 1979.

recovery of approximately 82 percent. The maximum 24-hour and 3-hour SO_2 values from the continuous monitor were 68 ug/m^3 and 158 ug/m^3, respectively, representing 26 percent and 12 percent of the State of Florida AAQS, respectively. The measured arithmetic mean for the time period represents 10 percent of the annual Florida AAQS. Second-highest measured concentrations are similar to the maximum concentrations.

3.5.3 FLUORIDE MEASUREMENT RESULTS

Ambient data have been gathered in the vicinity of the proposed site for both gaseous and particulate fluorides. "Gaseous" fluorides exist as a gas in the atmosphere; "particulate fluorides" are the portion of suspended particulate matter which is fluoride.

ESE operated a gaseous fluoride bubbler at Station 1 from March 1979 to October 1979, at which time it was moved to Station 2. A double tape continuous fluoride monitor (manufactured by Research Appliance Corporation) was installed with the continuous sulfur dioxide monitor at Station 1 beginning in October 1979 and was utilized to determine both particulate and gaseous fluoride levels. All double tape fluoride measurements were performed in accordance with procedures presented in Methods of Air Sampling and Analysis (American Public Health Association, 1977). Gaseous fluoride bubbler samples also were collected at Stations 3, 4, and 5 from May 1977 through September 1979 by CCI and by Sarasota County at Station 6 in 1980 and 1981. All sampling was conducted on an every-sixth-day schedule concurrent with TSP and sulfur dioxide measurements.

A summary of the available gaseous fluoride data is presented in Table 3.5-4. The maximum observed value at any of these stations using the bubbler method was 4.6 ug/m^3 and occurred at Station 3. The maximum arithmetic average was 0.74 ug/m^3 and also occurred at Station 3. The measured CCI data display gaseous fluorides levels much higher than would be expected in a remote area without significant sources of atmospheric fluorides. In the report developed by CCI concerning the Noranda data (CCI, 1980), problems in the fluoride bubbler measurement method and analysis method were described. The highest measured 24-hour values for the measurement period were specifically identified as suspect. It is noted that from December 1978 through September 1979, the highest 24-hour fluoride measurement at any CCI station was 1.4 ug/m^3.

The fluoride bubbler data collected by ESE through January 1980 are limited because the minimum detectable limit of the sampling procedure utilized was 1.4 ug/m^3 or greater. No observations above this limit were recorded during this period. During October 1979, the double-tape fluoride sampler was initiated at Station 1 with a minimum detectable limit of 0.02 ug/m^3. Using the double-tape sampler, the maximum observed 24-hour gaseous fluoride level was 0.76 ug/m^3, and the maximum observed 24-hour particulate fluoride level was 0.23 ug/m^3. The arithmetic mean gaseous fluoride concentration for Station 1 was 0.09 ug/m^3, and the arithmetic mean particulate fluoride concentration was 0.04 ug/m^3.

Sarasota County has also measured gaseous fluorides using the bubbler method at Station 6. During 1980 and 1981, no values above the minimum detectable limit of the method (7.9 ug/m^3) were recorded.

Manatee County has enacted an ambient air standard for fluorides. The standard, which is 1 ppb (0.78 ug/m^3) maximum 24-hour average, relates to the maximum impact beyond the property boundary due to any individual plant. No standard has been passed which can be compared to the total ambient impact of all fluoride-emitting sources.

3.6 ESTIMATED EXISTING AIR QUALITY

Existing levels of pollutants at the site are expected to be at or near background levels. Background levels of pollutants are a function of geographical location, meteorology, and topography. Monitoring conducted at the proposed site is generally representative of background levels because of the lack of industrialization and the remoteness of the area.

The AMAX POS document presented assumed background air quality levels for the mine site, since initially no monitoring was anticipated. The assumed background levels, derived from U.S. EPA guidance documents, were as follows:

TSP	35 ug/m^3
SO_2	20 ug/m^3
NO_2	20 ug/m^3
F	Level to be assigned based upon county monitoring data

The baseline air quality levels, documented in this section, differ in some ways from these initial estimates. The 35 ug/m^3 TSP value, although typical of annual geometric mean levels recorded in rural remote areas of the southeastern U.S., appears to be high. Actual measurements indicate that a lower value of 25 ug/m^3 to 30 ug/m^3 is justified based on the geometric means from all 6 montitoring stations which ranged from 21 to 32 ug/m^3. However, a higher value should be used for the maximum 24-hour background level since maximum 24-hour TSP measurements ranged from 43 to 105 ug/m^3 (deleting assumed biased measurements of 142 ug/m^3 and 128 ug/m^3).

Comparison of the SO_2 results to the initially assumed background of 20 ug/m^3 yields similar results. This level is considered too high for an annual time period: measured data indicate 10 ug/m^3 or less is representative. For the 24-hour and 3-hour averaging times, a range of concentrations was again experienced. Maximum 24-hour concentrations based on bubbler data ranged from 8 ug/m^3 to 110 ug/m^3, and second-highest 24-hour values ranged from 7 ug/m^3 to 60 ug/m^3. The highest 24-hour average based upon continuous monitoring data was 68 ug/m^3, and the 3-hour maximum was 158 ug/m^3.

NO_2 data were not taken at the mine site; therefore, the assumed background of 0.01 ppm (20 ug/m^3) is still considered to be representative.

Gaseous fluoride data obtained by the bubbler method are inconclusive since CCI cited problems with the measurement technique, and values obtained from the ESE and Sarasota County stations were all below the minimum detectable limit of the measurement methods. As a result, the double-tape sampler provides the best estimate of existing gaseous and particulate fluoride concentrations at the site: the maximum 24-hour gaseous and particulate fluorides levels measured were 0.76 ug/m^3 and 0.23 ug/m^3, respectively. Arithmetic mean levels were 0.09 ug/m^3 for gaseous fluorides and 0.04 ug/m^3 for particulate fluorides.

Consumption of PSD increments in the vicinity of the AMAX site is believed to be small in comparison to the allowable increments. Increment-consuming sources located within about 50 km of the site are: American Orange, located about 40 km to the northeast; the permitted Estech facility, 40 km north; and the permitted Mississippi Chemical Corporation facility, located about 35 km northeast. These sources impact primarily SO_2 increments, but also have small impacts upon TSP increment consumption. No other sources, facilities, or developments are known to be planned in the vicinity of the AMAX site at this time.

3.7 PROJECTED ENVIRONMENT WITHOUT THE PROPOSED PROJECT

Without the proposed project, the projected future air quality levels are expected to be similar to the estimated existing air quality levels described in Section 3.6. However, the proposed, but not yet operating sources within 50 km of the site, which consist of the Estech and Mississippi Chemical Corporation rock drying facilities, may elevate the existing air quality levels slightly. Due to the distance of the proposed site to these sources (35 to 40 km), significant effects on the proposed site are not expected from these sources.

No other new phosphate rock drying, chemical plant operations, or other potential sources are known to be planned for the area at this time. However, if such sources do locate near the proposed AMAX site, the existing air quality could be significantly altered. Increased phosphate mining activities in Hardee and Manatee Counties will probably cause a slight increase in TSP levels at the site.

Counties surrounding the proposed site, which include Hardee, DeSoto, Manatee, and Sarasota, are projected to experience population increases even if the proposed project is not constructed (see Section 10, Socioeconomics). As a result of these population increases, anthropogenic activities (i.e., agricultural activities, vehicular traffic, etc.) are likely to result in small increases in maximum and average air quality concentrations at the AMAX site in the future.

3.8 NOISE

3.8.1 SOUND MEASUREMENT

The human ear perceives sound between frequencies of 16 and 20,000 Hertz. One important characteristic of the human ear is that throughout its range of perception, sounds of equal pressure level at different frequencies are not perceived equally. Sounds of low and high frequencies are not heard as easily as sounds in the mid-range. A commonly used weighting scale, which nearly approximates the response of the human ear, is the A scale. A sound level meter measures the A scale by electronically attenuating low and high frequency sounds.

The unit of measure in acoustics is the decibel (dB), defined as:

$$dB = 10 \log PA^2/PR^2$$

where PA is the measured sound pressure level, and
PR is a reference level (in this case, 20 micropascals).

Guidelines for environmental noise are defined in terms of the A scale and are expressed as one of the following statistical measures [United States Environmental Protection Agency (EPA), 1974]:

1. L_{10}--the sound level which is exceeded 10 percent of the time during a measurement period.
2. L_{50}--the sound level which is exceeded 50 percent of the time during a measurement period.
3. $L_{eq}(24)$--the sound level equal in cumulative energy to all time-varying noise produced during a 24-hour period.
4. L_{dn}--the equivalent sound level for day (7 a.m.--10 p.m.) and night (10:00 p.m.--7:00 a.m.) in which the equivalent night time level has been biased by the addition of 10 decibels.

EPA (1974) also presents the following information on the nighttime weighting factor:

> The choice of the 10 dB nighttime weighting in the computation of L_{dn} has the following effect: In low noise level environments below L_{dn} of approximately 55 dB, the natural drop in L_{dn} values is approximately 10 dB, so that daytime and nighttime levels contribute about equally to L_{dn}. However, in high noise

environments, the night noise levels drop relatively little from their daytime values. In these environments, the nighttime weighting applies pressure towards around-the-clock reduction in noise levels if the noise criteria are to be met.

3.8.2 NOISE GUIDELINES

EPA has published noise levels requisite to protect the public against hearing loss or activity interference for various land use categories (EPA, 1974) (see Table 3.8-1). Sound levels are given as $L_{eq(24)}$ and $L_{eq(dn)}$ and are yearly averages on an energy basis. These values are for long-term exposures and take into consideration the cumulative effects of noise. Requisite noise levels have been set to protect the public against hearing loss such that 96 percent of the population will not experience a hearing threshold shift of more than five dBA at 4000 hertz in 40 years of continual exposure.

In addition to EPA's published guidelines, the U.S. Department of Transportation has published Design Noise level criteria based upon land use (U.S. Federal Highway Administration, 1976) (see Table 3.8-2). Highway noise has long been recognized as a major contributor to environmental noise, thus, the suggested criteria, based on L_{10}'s, have been developed for various land use categories.

Table 3.8-1. Yearly Average* Equivalent Sound Levels Requisite to Protect the Public Health and Welfare

		INDOOR			OUTDOOR		
Land Use	Measure	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects**	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects**
1 Residential with Outdoor Space and Farm Residences	L_{dn}	45		45	55		55
	$L_{eq}(24)$		70			70	
2 Residential with No Outside Space	L_{dn}	45		45			
	$L_{eq}(24)$		70				
3 Commercial	$L_{eq}(24)$	†	70	70 ††	†	70	70 ††
4 Inside Transportation	$L_{eq}(24)$	†	70	†			
5 Industrial	$L_{eq}(24)$***	†	70	70 ††	†	70	70 ††
6 Hospitals	L_{dn}	45		45	55		55
	$L_{eq}(24)$		70			70	
7 Educational	$L_{eq}(24)$	45		45	55		55
	$L_{eq}(24)$***		70			70	
8 Recreational Areas	$L_{eq}(24)$	†	70	70 ††	†	70	70 ††

Table 3.8-1. Yearly Average* Equivalent Sound Levels Requisite to Protect the Public Health and Welfare (continued, page 2 of 2)

		INDOOR			OUTDOOR		
Land Use	Measure	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects**	Activity Interference	Hearing Loss Consideration	To Protect Against Both Effects**
9 Farm Land and General Unpopulated Land	$L_{eq}(24)$				†	70	70 ††

* Refers to energy rather than arithmetic averages.

† Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity.

** Based on lowest level.

†† Based only on hearing loss.

*** An $L_{eq}(8)$ of 75dB may be identified in these situations so long as the exposure over the remaining 16 hours per day is low enough to result in a negligible contribution to the 24-hour average, i.e., no greater than an L_{eq} of 60 dB.

NOTE: Explanation of identified level for hearing loss. The exposure period which results in hearing loss at the identified level is a period of 40 years.

Source: U.S. Environmental Protection Agency, 1974.

Table 3.8-2. Federal Highway Administration Design Noise Level/Land Use Relationships

Land Use Category	Design Noise Level - L_{10}*	Description of Land Use Category
A	60 dBA (Exterior)	Tracts of lands in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	70 dBA (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	75 dBA (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	Variable	For requirements on undeveloped lands see paragraph 5a(5) and (6), Federal Highway Administration policy and procedure manual.
E	55 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

*L_{10} represents the level which can be exceeded no more than 10 percent of the time.

Source: U.S. Federal Highway Administration, 1976.

3.8.3 EXISTING NOISE ENVIRONMENT

The existing land use of the proposed site area (see Figure 3.8-1) reflects the rural nature of the site. Existing land use on properties surrounding the proposed site is also rural, agricultural with very low population densities. There are currently no major noise sources in the area. A few scattered residences, a church, and a community center, are located on the eastern portion of the site. The most significant anthropogenic noise sources are Highways 70 and 72 and the county roads near and on the site. The City of Arcadia, located approximately 10 km to the east, is the nearest population center to the proposed site.

In the initial POS for the AMAX EIS (December 1978), noise monitoring was not required for the Pine Level site, then planned for only mining purposes (i.e., no rock dryer). The POS addendum (December 1979) also did not require baseline noise monitoring at the Pine Level site. Even though the site was then being considered for the rock drying facility, baseline noise monitoring was not considered necessary because of the existing rural, remote nature of the area, and no baseline noise monitoring was performed.

Baseline noise levels at the Pine Level site can be estimated from available literature. Various authors have compiled examples of typical sound levels for different land use types (Table 3.8-3 and Figure 3.8-2). In a rural area such as the AMAX site, the expected overall L_{dn} is 40 to 45 dBA, a range representative of rural or quiet suburban areas. Noise levels may be somewhat higher for intermittent periods near roadways or agricultural activity, or during periods of insect activity (i.e., crickets chirping during nighttime hours). These assumed baseline noise levels at the Pine Level site are similar to levels documented by ambient noise monitoring conducted for other site-specific phosphate EISs with similar rural, remote locations (e.g., Farmland Industries, Inc., 1981).

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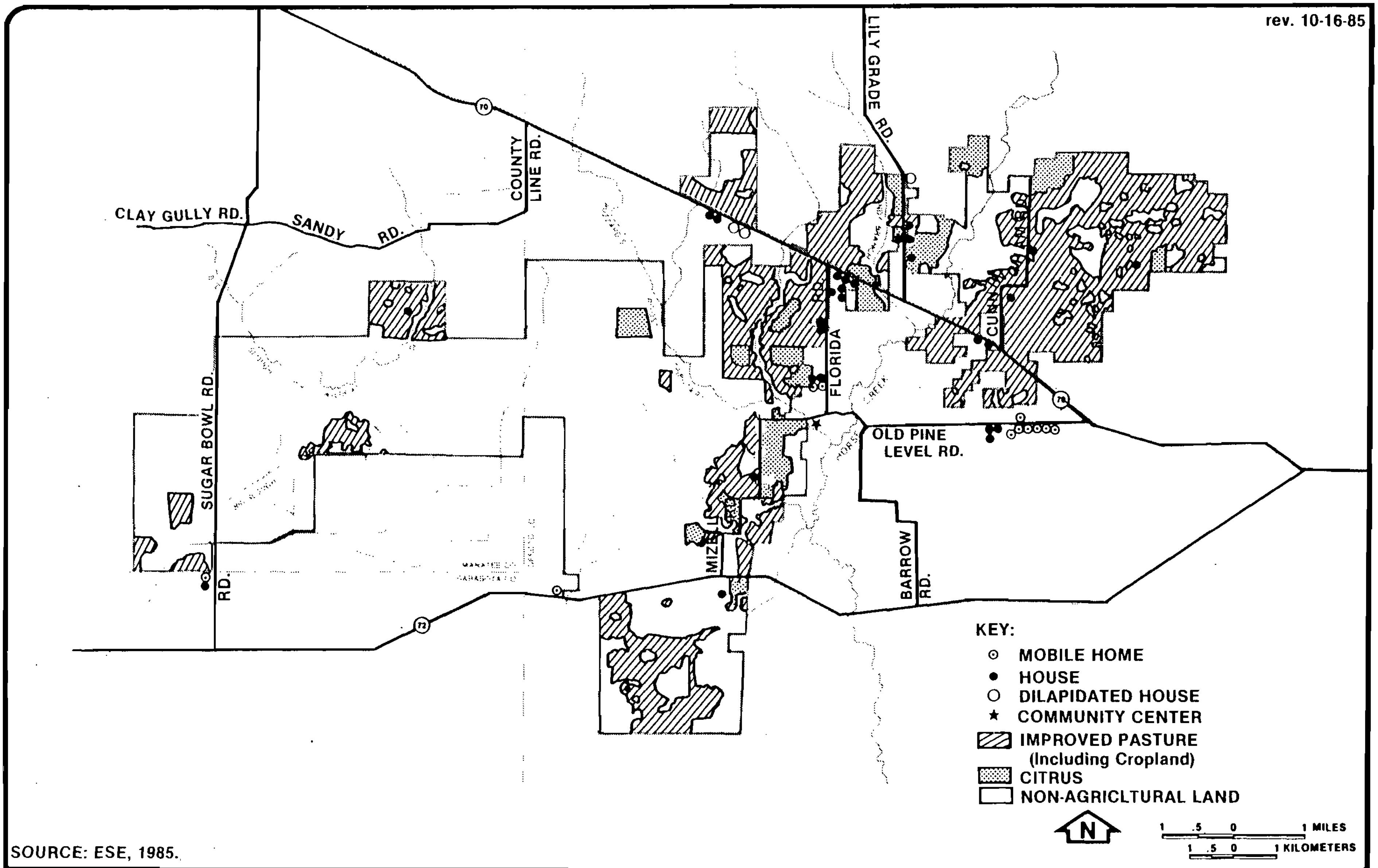


SOURCE: ESE, 1985.

Figure 3.8-1
EXISTING LAND USE

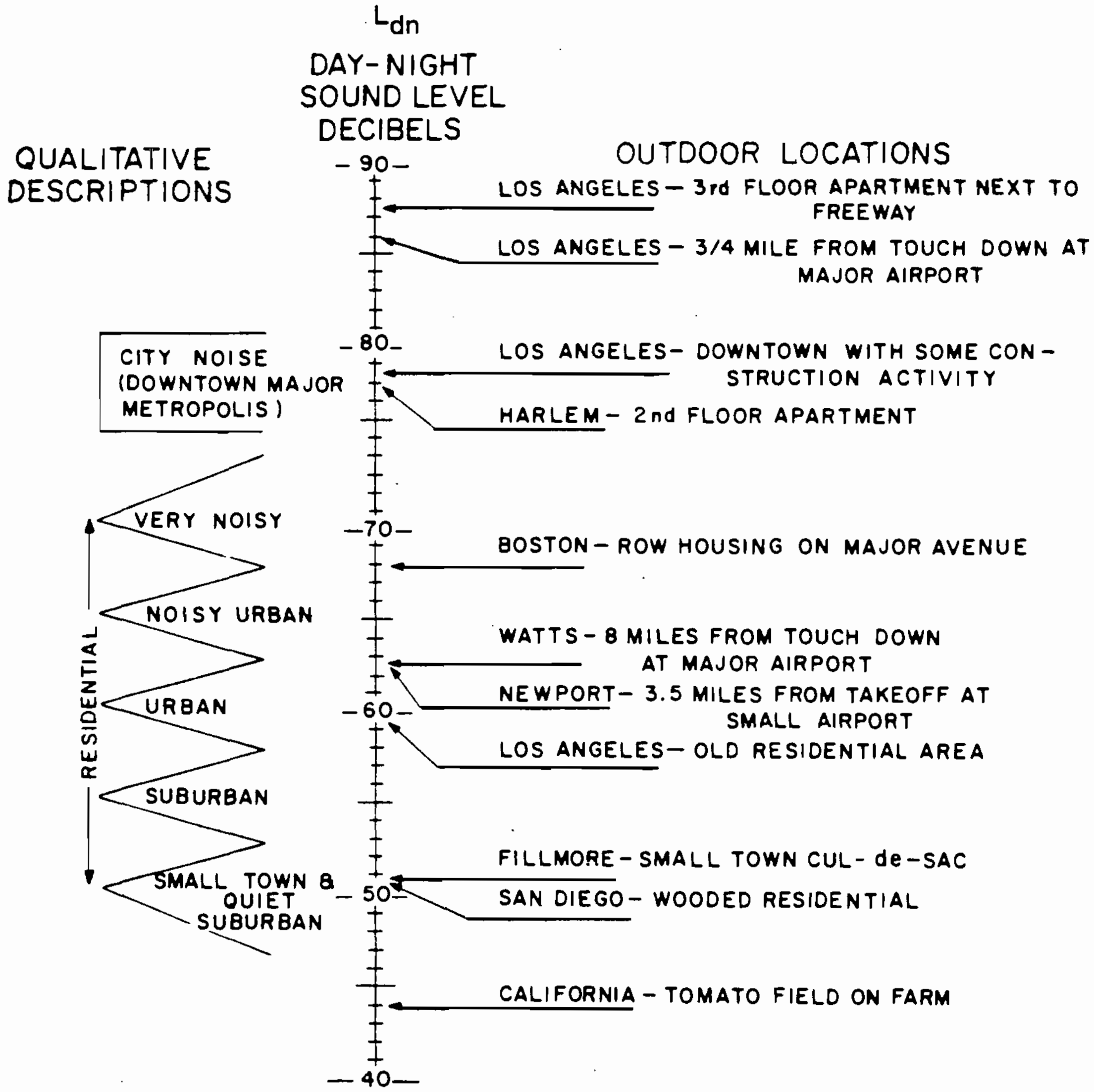
U.S. Environmental Protection Agency, Region IV
Draft Environmental Impact Statement

AMAX CHEMICAL CORPORATION
Pine Level Mine
Manatee and DeSoto Counties, Florida

Table 3.8-3. Typical Values of Yearly Day-Night Average Sound Level for Various Residential Neighborhoods Where There Are No Well-Defined Sources of Noise Other Than Usual Transportation Noise

Description	Population Density (People/Sq Mi)	L_{dn} - dB
Rural (undeveloped)	20	35
Rural (partially developed)	60	40
Quiet Suburban	200	45
Normal Suburban	600	50
Urban	2,000	55
Noisy Urban	6,000	60
Very Noisy Urban	20,000	65

Source: National Academy of Science, 1977.



SOURCE: U. S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF NOISE ABATEMENT AND CONTROL, 1974.

Figure 3.8-2
EXAMPLES OF OUTDOOR DAY-NIGHT SOUND LEVEL IN dB (RE 20 MICROPASCALS) MEASURED AT VARIOUS LOCATIONS

3.8.4 PROJECTED ENVIRONMENT WITHOUT THE PROPOSED PROJECT

The projected noise levels at the Pine Level site without the proposed project are anticipated to be similar to those currently existing.

No other major industrial development is projected within 30 km of the site. Anthropogenic activities (i.e., agricultural, vehicular traffic, etc.) are likely to result in slight changes from the assumed baseline levels.

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

May 11, 1984

DER
MAY 17 1984
BAQM

Mr. Willard Hanks
Florida Department of
Environmental Regulation
Central Air Permitting Section
2600 Blair Stone Road
Tallahassee, FL 32301

Dear Mr. Hanks:

Attached is the air point source test results for the AMAX Big Four Mine Dryer COWM (Coal-Oil-Water-Mixture) test results. These tests were run for AMAX on February 16 and 17 by Sholtes and Koogler Environmental Consultants.

The test results indicate that the dryer was well within the allowable standards established by your staff.

If you have any questions about this point source test, please let me know.

Sincerely,

Fred G. Mullins, III
Regulatory Compliance Manager

FGM/ds
Attachment

cc: G.P. Uebelhoer
R.F. Crabill

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION COMMISSION

CONVERSATION RECORD

Date May 2, 1984

Subject Relief from EPC's 20% Rule

Time

Permit No.

Department

M Fred Mullins

Telephone No. 687-2561

Representing AMAX

[ ] Telephoned Me [✓] Was Called [ ] Scheduled Meeting [ ] Unscheduled Meeting

Other Individuals Involved in Conversation/Meeting

Summary of [✓ Conversation]/Meeting

Told Fred that he needs to submit a letter summarizing the information presented at the meeting this AM. Once this is accomplished we will sit down with the lawyers + discuss the mechanism which would allow EPC the right to relieve AMAX from the 20% rule. I made it clear we would not recommend such relief until the EPC is satisfied that AMAX has done everything possible to reduce opacity. AMAX is going to request a BACT or LAER determination from CAPS. Discussed all this with Bill Thomas this PM and he is in agreement.

(continue on another sheet, if necessary)

Signature Jerry Campbell

Title

To: Files
FROM: Jerry Campbell
DATE: May 2, 1984
SUBJECT: FBRs #1 and #2 + Paragon Kiln / AMAX's Request for Relief from Cty's 20% Opacity Std

The following items were discussed at a meeting attended by the people listed on the attached sheet on this date:

1. The only other FBR in Florida is at Occidental Chemical with a crossflow scrubber for controls.
2. AMAX's 2 ambient stations have been setup for a 15μ cut + have not recorded any #s approaching the proposed 24 hour and annual standard over 3 years.
3. Fred has discussed this with his lawyers who have contacted Sara + they feel our rule allows for a modification of the Cty 20%.
4. AMAX is withdrawing their request for a variance, instead they will attempt to accomplish the same end through the lawyers.
5. A compliance schedule was discussed to keep AMAX out of enforcement.
6. AMAX offered to request a BACT or LAER determination from CAPS.

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07503

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

April 3, 1984

752-1161

Mr. Anthony Jones
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 Ninth Avenue
Tampa, FL 33605

Dear Mr. Jones:

In accordance with the requirements of operating permit No. A029-66058, a compliance test was conducted at the No. 2 Feed Preparation wet scrubber, located at the Plant City Facility, on March 27, 1984. We are transmitting the results on the attached report.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

Robert L. Harrison Jr.

Robert L. Harrison
Central Monitoring Supervisor

RH/ds
Attachment

cc: Bob Garrett, DER
N. W. Lowrey
F. G. Mullins
G. Townsend
J. J. Lewis (w/o attachment)

RECEIVED
APR 9 1984
H.C.E.P.C.

462 (AMAX)

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COUNTY OF HILLSBOROUGH

RECEIVED
JUL 11 1983
H.C.E.P.C.

TO

MEMORANDUM

Date July 6, 1983

~~To Bill Thomas~~

From Jerry Campbell JC

Subject: NEDS Number for Amax R&D FBR Scrubber

The construction permit AC29-65451 issued for the above source lists the NEDS number as 231. Other sources at this same Plant City facility have a NEDS number of 75. Please explain why this difference exists or if this was simply an oversight just advise us of the correct number.

Thank you for your cooperation.

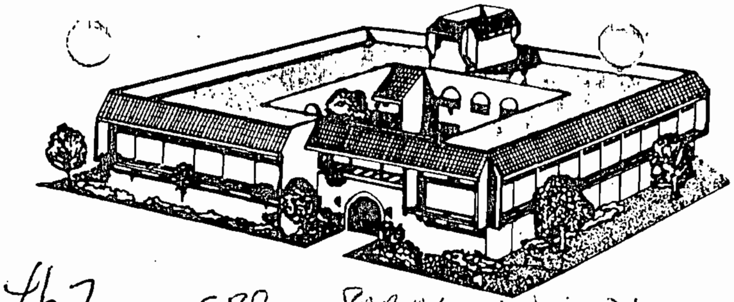
ck

When this permit was issued, it was to be operated by a separate agency - other than AMAX - hence it was given a separate plant no. to differentiate it from the AFI ~~plant~~ complex at Plant City.

Bob.

JUL 21 1983
SOUTHWEST DISTRICT
TAMPA

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION
COMMISSION
E. L. BING
RODNEY COLSON
MATT JETTON
JOHN R. PAULK
JAN KAMINIS PLATT



ROGER P. STEWART
DIRECTOR

1900 - 9th AVE
TAMPA, FLORIDA 33605

TELEPHONE (813) 272-5960

fh2 FBR - PARAGON KILN

September 16, 1983

Mr. Dan Williams
Air Engineer
Florida Department of Environmental Regulation
Southwest District
7601 Highway 301 ~~North~~
Tampa, ~~Florida 33610~~

Re: AMAX Chemical Corporation

Dear Mr. Williams:

This is in response to AMAX Chemical Corporation's request to have Florida Department of Environmental Regulation establish a 40% opacity limit for the two fluid bed reactors at their Coronet Junction defluorination plant. While Chapter 17-2.610, FAC, provides the mechanism by which the Department may establish such a standard, doing so in this case would create a permit condition which conflicts with the Rules of the Hillsborough County Environmental Protection Commission.

Our rules are specific with respect to visible emissions. Please refer to Chapter 1-3.03I. This section states that no person shall emit pollutants in excess of 20% opacity. The general particulate emission limiting standard varies proportionally with the amount of material processed. Nothing in the VE rule can be construed as allowing the particulate mass emission rate limit to supercede the opacity limit. The two are measurements of different emission phenomena. Particulate limits are gravimetric efficiency measurements based on process weight rate. The VE is a volumetric estimation of the small particle content of the gas stream. Due to the relatively low mass of these small particles, large increases in their concentration may not substantially increase total particulate mass. However, it is these small particles that have the greater impact on public health, and visibility.

Granted, relationships between particulate concentrations and visible emissions can be established, but few conclusions can be made based on results from a single Method 5 test. More needs to be known about size distribution over a variety of operating conditions and product matrices.

The character and composition of the particles need to be determined. Many process and control equipment parameters must be measured under varied conditions too. Even then AMAX must show that compliance with our rule creates some insurmountable hardship. Under these circumstances the Director may request that the Commission establish an alternative emission plan for AMAX. Only then would an increase in the visible emission limit for this source be possible.

Perhaps it is important to note that AMAX recently requested, and was granted, an increase in the process rates and allowable particulate emissions for these two units. Until this increase became effective AMAX apparently had no difficulty in meeting the opacity limit. In any case no such problem was reported to our office. It appears, on the surface, that what we have is a control device that is unable to handle the increased load from the reactors. If this is the problem, AMAX's approach should be to upgrade the control equipment not to raise the emission limit. Maybe to comply with our VE rule AMAX may have to return to the lesser process rate.

We cannot support AMAX's request to circumvent our VE rule. In Hillsborough County the VE is not a surrogate standard. It is a separate, independently enforceable regulation. It is equally as important as the particulate and other emission limits, and ranks first among the prohibited acts listed in our rules. Since ours is a more stringent regulation than 17-2.610, the Department is compelled by the provisions of Chapter 403.186(6), F.S., to enforce this stricter rule.

We recently issued two Notices of Alleged Violation to AMAX requiring that they cease and desist the excess visible emissions. The Notices will be rescinded but Hillsborough County Environmental Protection Commission will initiate administrative enforcement should they continue to exceed the limits of Chapter 1-3.03.

Hopefully, this letter clarifies out position on this and any similar request that your office may receive concerning other sources located in Hillsborough County. If you have any questions or require further comments, please contact Anthony Jones of the Air Compliance Section.

Sincerely,

Iwan Choronenko
Air Pollution Control Programs Manager
Hillsborough County Environmental
Protection Commission

IC/lw

cc: Fred G. Mullins, AMAX Chemical Corp.

LEGAL BRIEFS

by H. Newcomb Morse, J.D., LL.M., F.A.A.F.S.

VISUAL OPACITY STANDARDS: The Chemithon Corporation appealed a fine for violating a regional air pollution regulation.

The Puget Sound Air Pollution Control Agency (PSAPCA) is a regional air pollution control agency which adopted procedural and substantive rules, under the heading Regulation I, to implement its authority. Among the Regulation I rules is § 9.03, which pertains to visual opacity standards and states in part:

> (b) After July 1, 1975, it shall be unlawful for any person to use or allow the emission of any air contaminant . . . which is:
>
> (1) Darker in shade than that designated as No. 1 (20% density) . . .
>
> (e) This section shall not apply when the presence of uncombined water is the only reason for failure of the emission to meet the requirements of this section.

Section 9.09, which pertains to particulate emission standards, provides in relevant part:

> It shall be unlawful for any person to cause or allow the emission of particulate matter if the emission is in violation of Section 9.03 *or* if the particulate matter discharged into the atmosphere from any single source exceeds the following weights at the point of discharge: . . .

(Emphasis added.) The penalties for violating any of the standards are set forth in § 3.29 of Regulation I:

> In addition to or as an alternate to or any other penalty provided for herein or by law, any person who violates *any* of the provisions of this regulation shall incur a penalty in the form of a fine in an amount not to exceed two hundred fifty dollars per day for each violation.

(Emphasis added.)

On September 17, 1976, a PSAPCA enforcement officer made a *visual opacity* observation of a plume rising from a stack of a Chemithon plant and discovered the plume had a density of 50 to 80 percent. As a result of this observation, a $250 penalty was imposed on Chemithon for violating § 9.03. Chemithon appealed the penalty to the Pollution Control Hearings Board (Board), presenting evidence that the stack emission at the time of the alleged violation was within the *particulate* weight standards established by PSAPCA. The Board found that the particulate emissions were within the weight standards established by the PSAPCA, but affirmed the penalty notwithstanding such findings, reasoning that Chemithon violated a separate visual opacity standard. On review, the Superior Court of King County, Washington, rendered judgment holding the findings and conclusions of the Board were not clearly erroneous, nor arbitrary or capricious, and upheld the penalty.

Chemithon argued that it should not be fined for violation of the opacity standard, § 9.03, when the requirements as established by the particulate standard, § 9.09, are not also violated. According to Chemithon, the visual opacity test is a less reliable measure of pollution in a stack emission than actual particulate analysis of the emission. From this premise, Chemithon reasoned that the visual opacity test creates only a presumption of illegal pollution and is subject to rebuttal proof that actual emissions are within particulate standards; thus, superior particulate evidence should rebut opacity observations. Chemithon stated that Regulation I did not intend that a plant emitting dry (particulate) pollutants up to the amount allowed in § 9.09 complies with the Regulation, but a plant emitting the same pollutants mixed with water, a nonpollutant, is subject to a civil penalty because of the § 9.03 opaqueness standard, especially since § 9.03 is not a "cosmetic" regulation. Since PSAPCA requires Chemithon to demonstrate that all particulate emissions have been removed in order to be exempt from the visual opacity standards, Chemithon asserted it is being fined merely because it mixes harmless water vapor with an allowable amount of particulate pollution.

Chemithon's contention was rejected by the Court of Appeals of Washington, which affirmed the judgement of the Superior Court.

The Court of Appeals declared: "We are unpersuaded by Chemithon's argument and hold a visual opacity civil penalty legal even when the particulate standards are not violated. The language of § 3.29 makes it clear that a violation of *any* of the provisions of Regulation I will subject the violator to a civil penalty. Furthermore, the Pollution Control Hearings Board provided that a person shall violate § 9.09 if he violates the opacity standards in § 9.03, or if he exceeds the particulate standards in § 9.09. We believe that violations of § 9.03 may be determined independently of the particulate standard of § 9.09. It does not matter that water vapor might be the primary cause of the observed visual opacity. For the uncombined water exception of § 9.03 to apply, the effluent must be free of all particulate contaminants . . . We do not speculate here why the Board decided that lawful particulate effluents when mixed with nonpolluting water vapor create unlawful pollution. It is enough to say that there are possible rational bases for the Board's decision; for example, particulates uncombined with water may dissipate resulting in no harm, but when combined with water the particulates may quickly fall to earth and have a harmful effect."

Citation: Chemithon Corporation v. Puget Sound Air Pollution Control Agency, 31 Wash. App. 276, 640 P.2d 1085 (1982).

VISIBLE EMISSION OBSERVATION FORM

SOURCE NAME: AMAX CHEMICAL

ADDRESS:

CITY: PLANT CITY

STATE:

ZIP:

PHONE:

SOURCE ID NUMBER: 0075 24

PROCESS EQUIPMENT: FBR #2

OPERATING MODE:

CONTROL EQUIPMENT: SCRUBBER + IWS

OPERATING MODE:

DESCRIBE EMISSION POINT: STACK FOR FBR #2

HEIGHT ABOVE GROUND LEVEL: 155'

HEIGHT RELATIVE TO OBSERVER: 150'

DISTANCE FROM OBSERVER: 150'

DIRECTION FROM OBSERVER: W

DESCRIBE EMISSIONS:

EMISSION COLOR: WHITE

PLUME TYPE: CONTINUOUS ☑ FUGITIVE ☐ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐

IS WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐

AT WHAT POINT IN THE PLUME WAS OPACITY DETERMINED: 2 STACK DIA. DOWNWIND

DESCRIBE BACKGROUND: SKY

BACKGROUND COLOR: BLUE

SKY CONDITIONS: 30% OVERCAST

WIND SPEED: 5-10 mph

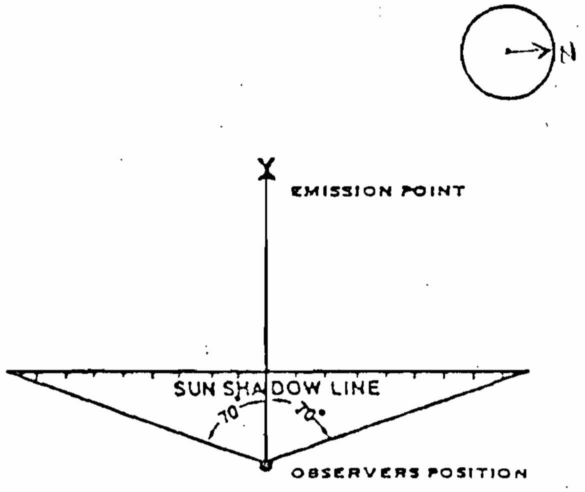
WIND DIRECTION: SSW

AMBIENT TEMPERATURE: 85°F

RELATIVE HUMIDITY:

SOURCE LAYOUT SKETCH

DRAW NORTH ARROW



COMMENTS: VE TAKEN DURING SECOND RUN OF COMPLIANCE TEST / OPERATING RATE UNKNOWN

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

OBSERVATION DATE: 5-3-84

START TIME: 11:33

STOP TIME: 11:45

M \ sec	0	15	30	45	M \ sec	0	15	30	45
1	30	35	30	25	31				
2	20	25	25	25	32				
3	25	25	25	25	33				
4	25	30	30	30	34				
5	30	30	30	30	35				
6	30	30	30	30	36				
7	35	35	30	30	37				
8	30	30	30	30	38				
9	30	30	30	30	39				
10	35	35	35	30	40				
11	30	30	30	30	41				
12	30	30	30	30	42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 31%

NUMBER OF READINGS ABOVE 20 % WERE 47

RANGE OF OPACITY READINGS: 20% MINIMUM 35% MAXIMUM

OBSERVER'S NAME (PRINT): JERRY CAMPBELL

OBSERVER'S SIGNATURE: Jerry Campbell

DATE: 5/3/84

ORGANIZATION: HCEPC

CERTIFIED BY: ETA

DATE: 3/84

VERIFIED BY:

DATE:

Type III

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HILLSBOROUGH COUNTY ENVIRONMENTAL
PROTECTION COMMISSION

INSPECTION REPORT
EXECUTIVE SUMMARY

PLANT NAME Amax Phosphate NEDS 075 DATE/TIME 3 May 84 11:00 AM

PLANT LOCATION Plant City, FL # OF NEDS POINTS 25

PROCESS DESCRIPTION Fluidized bed reactor #2, a packed bed scrubber and an electrostatic precipitator type scrubber, and a spray tower are used to defluorinate phosphate-based animal feed.

COMPLIANCE VERIFICATION (X) PERMIT REVIEW ( )
ENFORCEMENT ( ) OTHER ( )

PERSONS CONTACTED-TITLE George Townsend - Plant Engineer

NEDS POINTS CHECKED 24 NEDS POINTS IN COMPLIANCE NEDS POINTS IN VIOLATION 24

SUMMARY OF FINDINGS A Visible Emissions test (EPA Method 9) was performed to measure the opacity of the plume arising from the process stack. This stack is the common emission point for Fluidized Bed Reactor #2 and Paragon Defluorinating Kiln #2; however, only Fluidized Bed Reactor #2 was on-line at the time of the inspection. The visible emission (opacity) was approximately 35%. The process controls and operations logs for the reactor and precipitator were inspected. Stack testing was in progress and was monitored briefly. Technique and equipment appeared to be in order. Operating rate at the time of inspection was not available. George Townsend was directed to perform a VE concurrent with the stack test.

INSPECTION COMMENTS FOR APIS (LIMIT 50 SPACES) A 12 min. VE showed average 31% opacity

INSPECTOR'S SIGNATURE Steve [illegible]

AIR POLLUTION EMISSIONS
COMPLIANCE TEST

BIG FOUR MINE DRYER

AMAX CHEMICAL CORPORATION

FEBRUARY 1984

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

TABLE OF CONTENTS

APPENDICES

To the best of my knowledge, all applicable field and analytical procedures comply with Florida Department of Environmental Regulation requirements and all test data and plant operating data are true and correct.

Robert S. Sholtes

ROBERT S. SHOLTES, PH.D., P.E.

R. S. SHOLTES
CERTIFICATE NO. 7801

3-9-84

DATE

SEAL

1.0 EXECUTIVE SUMMARY

On February 16 and 17, 1984, Sholtes & Koogler, Environmental Consultants, Inc. (SKEC) of Gainesville, Florida performed emission tests on the Big Four Mine Dryer for the pollutants sulfur dioxide, nitrogen oxides, particulate matter and visible emissions. The measured emissions proved to be in compliance with all limitations specified in Permit AC29-65834 for this installation. The specific limits and measured emissions are summarized on Page 11 of this report.

2.0 INTRODUCTION

AMAX Chemical Corporation operates 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 company has recently been permitted (AC29-65834) for a coal-oil-water mix fuel (COWM) containing up to 2.5 percent sulfur by weight.

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 absorbed in the scrubber and the phosphate rock product.

Specific Condition 17 of the above referenced permit requires emission testing for particulate matter, sulfur dioxide, nitrogen oxides and opacity while firing with the two alternate fuels, No. 6 fuel oil and COWM. This report constitutes an evaluation of these emissions in fulfillment of this specific permit condition.

3.0 SAMPLING PROCEDURES

A. Sampling Location

Sampling for particulates required traversing of the dryer discharge in accordance with EPA Reference Methods 1 and 5. Figure 1 illustrates the geometry of this sampling location and specifies the specific traverse points used in these testing efforts. The other emission monitoring methods do not require traversing, however, sampling for these methods with the exception of opacity, were taken at one of the described sampling ports and at a location approximately one-third to one-half of the stack diameter away from the inner wall.

B. Particulate Matter

Particulate matter samples were collected by the particulate matter emission measurement method adopted by the FDER in October 1980. A schematic diagram of the sampling train used is shown in Figure 2. All particulate matter captured from the nozzle to, and including, the filter was included in the calculation of the emission rate of particulate matter.

Preparation of Equipment

1. Filters - Gelman type "A" filters were placed in a drying oven for two hours at 105 degrees C, removed and placed in a standard glass desiccator containing indicating silica gel, allowed to cool for two hours, and weighed to the nearest 0.1 mg.

2. Nozzle, Filter Holder and Sampling Probe - The nozzle, filter holder and sampling probe were washed vigorously with soapy water and brushes, rinsed with acetone and distilled water and dried prior to the test program. All openings on the sampling equipment were sealed while in transit to the test site.

3. Impingers - The Greenburg-Smith impingers were cleaned with a warm soapy water solution and brushes, rinsed with distilled water and acetone and dried. The impingers were sealed tightly during transit.

Test Procedure

Prior to performing the actual particulate matter sample runs, certain stack and stack gas parameters were measured. These preliminary measurements included the average gas temperature, the stack gas velocity head, the stack gas moisture content, and the stack dimensions at the point where the tests were being performed. The stack gas temperature was determined by using an iron-constantan thermocouple with a digital readout. Velocity head measurements were made with calibrated type "S" pitot tube and an inclined manometer.

The sampling traverse points were selected so that a representative sample could be extracted from the gas stream. The traverse points were located in the center of equal areas, which were dependent upon the distance upstream and downstream from flow disturbances.

Each particulate matter test run consisted of sampling for a specific time at each traverse point. The type "S" pitot tube was connected to the sampling probe so that an instantaneous velocity head measurement could be made at each traverse point while making the test run. The stack gas temperature was also measured at each traverse point. Nomographs were used to calculate the isokinetic sampling rate at each traverse point during each test run.

The gases sampled passed through the following components: a stainless steel nozzle and probe; a glass fiber filter; two impingers with 100 ml of distilled water; one impinger dry; one impinger with 180 grams of silica gel; a flexible sample line; an air-tight pump; a dry test meter; and a calibrated orifice. The second impinger had a standard tip, while the first, third and fourth impingers had modified tips with a 0.5 inch I.D. opening.

Sample recovery was accomplished by the following procedures:

1. The pretared filter was removed from its holder and placed in Container 1 and sealed.
2. All sample-exposed surfaces prior to the filter were washed with acetone and placed in Container 2.
3. The volume of water from the first three impingers was measured for the purpose of calculating the moisture in the stack gas and then discarded.
4. The used silica gel from the fourth impinger was transferred to the original tared container and sealed.

Laboratory Analysis

The three sample containers from each sample run were analyzed according to the following procedures:

1. The contents of Container 1 were transferred to a tared glass weighing dish, dried, and desiccated to a constant weight.
2. The acetone from Container 2 was transferred to a tared beaker and evaporated to dryness at 212 degrees F. It was then desiccated to a constant weight.
3. The used silica gel in its tared container was weighed to the nearest gram.

The total sample weight included the weight of material collected on the filter plus the weight of material collected in the nozzle, sampling probe, and front half of the filter holder.

Data

The field data sheets, calculation sheets, and nomenclature definitions are included in the Appendix of this report.

C. Sulfur Dioxide Testing

As specified in the FDER permit, testing for sulfur dioxide was carried out in accordance with EPA Reference Method 6. The procedures used in this testing were those outlined in the Method, a copy of which is appended hereto, along with field data and computations.

D. Nitrogen Oxides Testing

As specified in the FDER permit testing for nitrogen oxides was carried out in accordance with EPA Reference Method 7. The procedures used in this testing were those outlined in the Method, a copy of which is appended hereto, along with field data and computations.

E. Opacity Determinations

Opacity observations were made on the discharge while burning oil and COWM for periods of one-half hour in accordance with the provisions of Chapter 17-2, Florida Administrative Code. The observation period was selected on the basis that this source constituted a minor source with respect to particulate emissions.

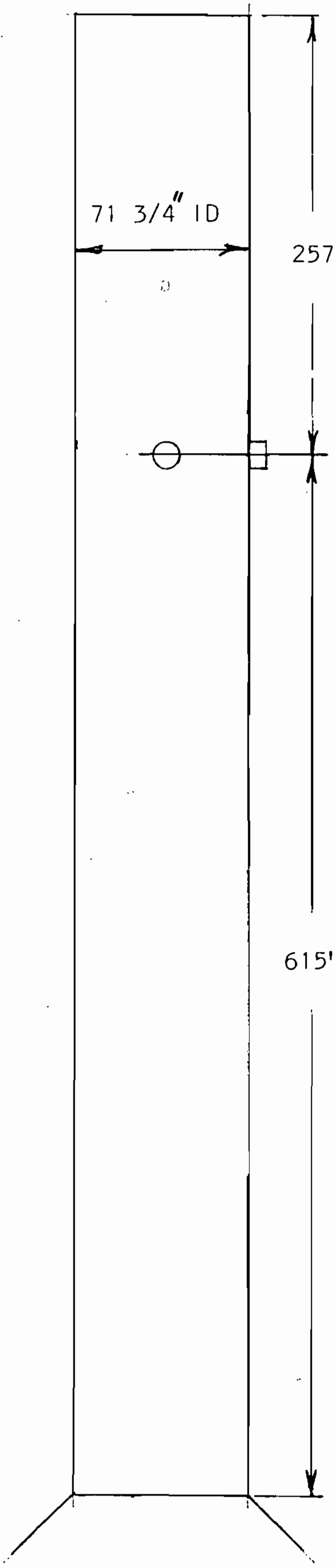

FIGURE 1

AMAX CHEMICAL CORPORATION
BIG FOUR MINE DRYER
STACK GEOMETRY

Traverse Point	Distance From Inside Wall (inches)
1	3.2
2	10.5
3	21.2
4	50.6
5	61.2
6	68.6

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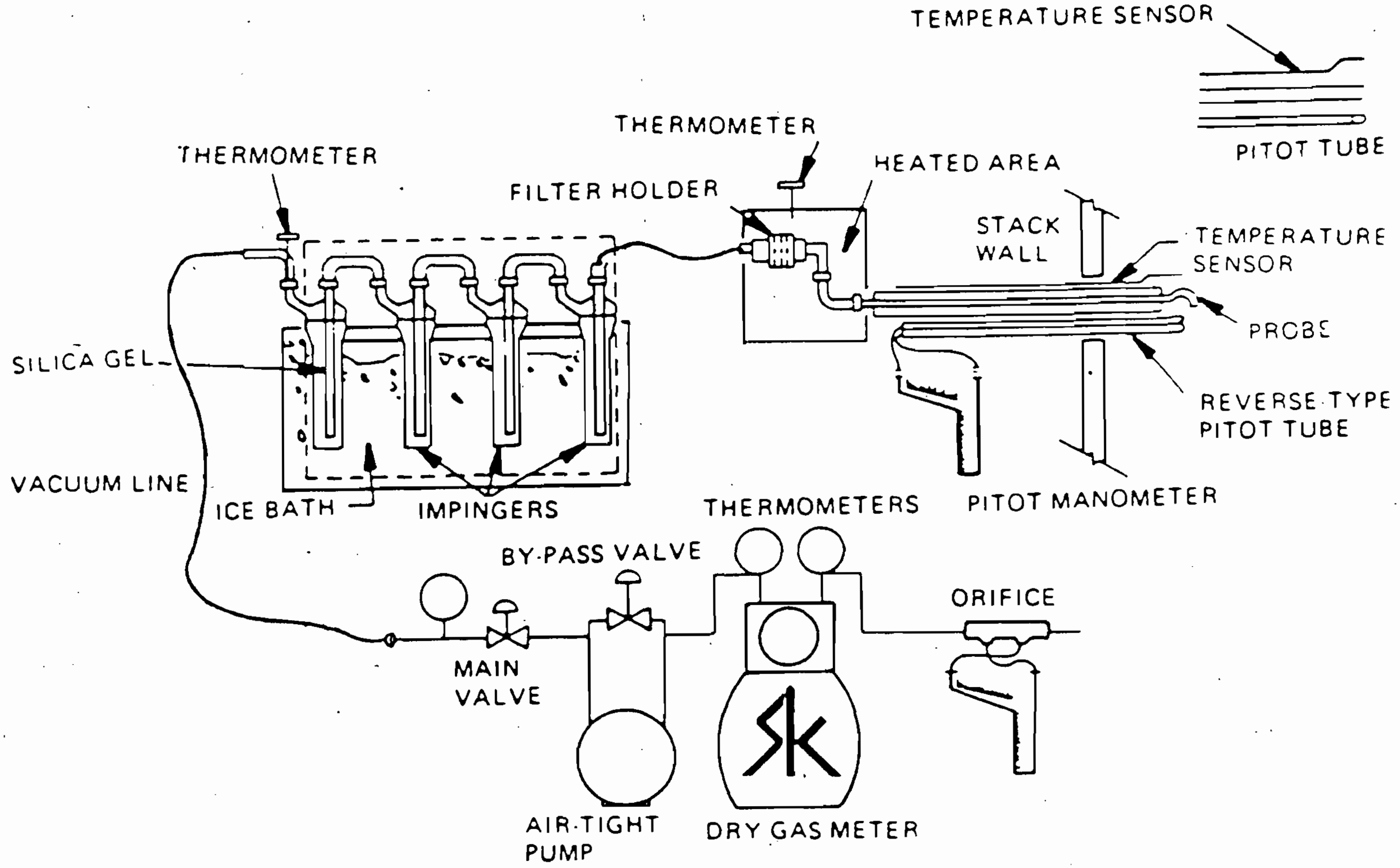


FIGURE 2

FDER PARTICULATE MATTER SAMPLING TRAIN

4.0 RESULTS

Table I summarizes the results of these test series. It will be observed that for both fuel regimes, all specified emission limits were attained during the testing period.

From the point of view of testing, there are no known limitations upon these data and it is purported that they represent a fair and representative evaluation of the emissions involved.

TABLE I

EMISSIONS TESTS
BIG FOUR MINE DRYER

AMAX CHEMICAL CORPORATION

Date	Test No.	Feed Rate (tph)	Fuel	/ Rate (gal/hr)	Heat Input* (10^6 btu/hr)	Opacity (%)	Particulate Matter (lb/hr)	Particulate Matter (lb/ton)	Sulfur Dioxide (lb/hr)	Sulfur Dioxide (lb/10^6 btu)	Nitric Oxides (lb/hr)
02-16-84	1	270	COWM	600	81.7	0	11.6	0.04	3.76	0.046	
02-16-84	2	270	COWM	600	81.7		13.5	0.05	19.95	0.244	19.5
02-16-84	3	270	COWM	600	81.7		13.4	0.05	38.39	0.470	
Average							12.6	0.043	20.7	0.253	
02-16-84	1	277	Oil	600	77.7		12.5	0.05	64.02	0.824	
02-17-84	2	300	Oil	625	77.7	5	10.2	0.03	23.38	0.301	28.1
02-17-84	3	270	Oil	640	77.7		10.4	0.04	63.69	0.820	
Average							11.0	0.040	50.36	0.648	

2

Allowable Emissions:

Particulate Matter	0.06 lb/ton
Sulfur Dioxide	1.1 lb/10^6 btu
Nitrogen Oxide	35.5 lb/hr
Opacity	10 Percent

*Heat Input Based on Duration of Method 6 (SO_2) Tests.

APPENDICES

Appendix A - Field Data Sheets and Computations
- A1 - Particulate Sampling/Method 5
- A2 - Sulfur Dioxide Sampling/Method 6
- A3 - Nitrogen Oxide Sampling/Method 7
- A4 - Opacity/Method 9

Appendix B - Plant Operating Data

Appendix C - Calibrations and Project Participants

APPENDIX A1

Field Data Sheets and Computations
Particulate Sampling/Method 5

EQUATIONS FOR CALCULATING PARTICULATE EMISSIONS

$$\text{VWV} = 0.0000893(\text{TSTD})(\text{VC})$$

$$\text{VSTPD} = (\text{VM})(\text{PB} + \frac{\Delta H}{13.6})(\frac{\text{TSTD}}{\text{TM}})(\frac{1}{29.92})$$

$$\text{VT} = (\text{VWV}) + (\text{VSTPD})$$

$$\text{W} = (\text{VWV}) \div (\text{VT})$$

$$\text{FDA} = (1.0) - (\text{W})$$

FMOIST = Assumed moisture fraction

$$\text{MD} = (0.44 \times \%\ \text{CO}_2) + (0.32 \times \%\ \text{O}_2) + (0.28 \times \%\ \text{N}_2) + (0.28 \times \%\ \text{CO})$$

$$\text{MS} = (\text{MD} \times \text{FDA}) + (18 \times \text{W})$$

$$\text{GS} = (\text{MS}) \div (28.99)$$

$$\text{EA} = \left[(100) \times (\%\ \text{O}_2 - \frac{\%\ \text{CO}}{2})\right] \div \left[(0.266 \times \%\ \text{N}_2) - (\%\ \text{O}_2 - \frac{\%\ \text{CO}}{2})\right]$$

$$\underline{\text{U}} = 4{,}006(\text{CP})\sqrt{\text{H}}\sqrt{(\frac{\text{TS}}{\text{TSTD}})(\frac{29.92}{\text{PS}})(\frac{1}{\text{GS}})}$$

$$\text{QS} = (\underline{\text{U}}) \times (\text{AS})$$

$$\text{QD} = (\text{QS}) \times (\text{FDA})$$

$$\text{QSTPD} = \text{TSTD}(\text{QD})(\text{PS}) \div [\text{TS}(29.92)]$$

$$\text{PISO} = \left[(0.00267 \times \text{VC} \times \text{TS}) + (\text{P}_o \times \text{TS} \times \text{VM} \div \text{TM})\right] \div \left[(\text{Time} \times \underline{\text{U}} \times \text{PS} \times \text{AN})\right]$$

$$\text{ESTP} = \frac{(\frac{15.43\ \text{grains}}{\text{gram}})\ (\text{y})}{\text{VSTPD}}$$

$$\text{E}_{12} = \frac{(\text{ESTP})\ (12)}{(\text{CO}_2\ \%)}$$

$$\text{E50} \doteq \frac{(\text{ESTP})\ (100 + \text{EA})}{150}$$

$$\text{EM} = (\text{ESTP})\ (\text{QSTPD})\ (60\ \frac{\text{min}}{\text{hr}})\ (\frac{\text{lb}}{7000\ \text{grains}})$$

SOURCE SAMPLING NOMENCLATURE SHEET

PB - Barometric pressure, inches Hg
PS - Stack pressure, inches Hg
As - Stack area, sq. ft.
AS'- Effective area of positive stack gas flow, sq. ft.
NPTS - Number of traverse points where the pitot velocity head was greater than zero
TSTD - Standard temperature, °R
TS - Stack temperature, °R
TM - Meter temperature, °R
H - Average square root of velocity head, $\sqrt{\text{inches } H_2O}$
$\bar{H}$ - Average meter orifice pressure differential, inches H_2O
AN - Sampling nozzle area, square feet
CP - S-type pitot tube correction factor
VM - Recorded meter volume sample, cubic feet (meter conditions)
VC - Condensate and silica gel increase in impingers, milliliters
Po - Pressure at the dry test meter orifice, $\left[PB + \frac{\Delta H}{13.6}\right]$ inches Hg
STP - Standard conditions

VWV - Converstion of condensate in milliliters to water vapor in cubic feet (STP)
VSTPD - Volume sampled, cubic feet (STP)
VT - Total water vapor volume and dry gas volume sampled, cubic feet (STP)
W - Moisture fraction of stack gas
FDA - Dry gas fraction
MD - Molecular weight of stack gas, lbs/lb-mole (dry conditions)
MS - Molecular weight of stack gas, lbs/lb-mole (stack conditions)
GS - Specific gravity of stack gas, referred to air
EA - Excess air, %
$\sqrt{HxTS}$ - Average square root of velocity head times stack temperature
$\bar{U}$ - Stack gas velocity, feet per minute
QS - Stack gas flow rate, cubic feet per minute (stack conditions)
QD - Stack gas flow rate, cubic feet per minute (dry conditions)
QSTDP - Stack gas flow rate, cubic feet per minute (STP)
PISO - Percent isokinetic volume sampled (method described in Federal Register)
ESTP - Particulate concentration at standard and dry conditions, grains/scf
E_{12} - ESTP corrected to 12% CO_2, grains/scf
E_{50} - ESTP corrected to 50% excess Air, grains/scf
EM - Mass Emission Rate, lbs/hr

* - Stack Gas Saturated

Table 1

SUMMARY OF PARTICULATE MATTER EMISSIONS

AMAX
BIG 4 DRYER COAL/OIL
2/16/84

					Particulate Matter	
Run No.	Process Weight Rate (Tons/Hr)	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (Deg F)	Stack Gas Moisture (%)	Conc. (gr/SCF)	Emission Rate (Lbs/Hr)
1	270.0	52612	131.5	14.1	.0258	11.64
2	270.0	52099	134.2	14.3	.0302	13.50
3	270.0	51949	131.2	14.0	.0300	13.40
Avg	270.0	52220	132.3	14.1	.0287	12.85

Allowable Particulate Matter Emission Rate = Lbs/Hr
(Chap. 17-2, Florida Administrative Code)

```
                SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

                        Source Sampling Calculations

-----------------------------------------------------------------------------

     Plant: AMAX                                          Date: 2/16/84
     Stack: BIG 4 DRYER COAL/OIL                  Run 1 From 1106 - 1210
   Weather: PARTLY CLOUDY                             Total Time: 60 Min

          Stack Area     28.08 Sq Ft         Nozzle Area   .000539 Sq Ft
          Stack Temp     131.5 Deg F          Meter Temp      87.3 Deg F
      Stack Pressure     30.12 "Hg        Baro. Pressure     30.12 "Hg
      Stack Vel Head      .666 "H2O     Meter Press Diff      3.45 "H2O
                                            Meter Volume    58.372 cf
     Pitot Tube Factor     .84         Condensate Volume     198.7 ml

-----------------------------------------------------------------------------


    1.  Volume Water Vapor                                   9.359 SCF
    2.  Gas Volume Sampled - STPD                           57.167 SCFD
    3.  Total Volume                                        66.526 SCF
    4.  Moisture in Stack Gas - Volume Fraction               .141
    5.  Dry Stack Gas - Volume Fraction                       .859
    6.  Molecular Weight of Stack Gas - Dry Basis            29.00
    7.  Molecular Weight of Stack Gas - Stack Conditions     27.45
    8.  Specific Gravity of Stack Gas Relative to Air          .95
    9.  Excess Air - Percent
   10.  Average Stack Velocity                              2426.4 FPM
   11.  Average Stack Gas Flow Rate                          68133 ACFM
   12.  Actual Stack Gas Flow Rate Dry                       58548 CFMD
   13.  Stack Gas Flow Rate STPD                             52612 SCFMD
   14.  Percent Isokinetic                                    94.3 %


   Probe Wash:      8.70 Mg      .0023 Gr/SCF      1.06 Lbs/Hr
       Filter:     86.90 Mg      .0234 Gr/SCF     10.58 Lbs/Hr
   ===Totals===    95.60 Mg      .0258 Gr/SCF     11.64 Lbs/Hr
```

```
                SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

                        Source Sampling Calculations

--------------------------------------------------------------------------------


    Plant: AMAX                                                Date: 2/16/84
    Stack: BIG 4 DRYER COAL/OIL                       Run 2 From 1237 - 1342
  Weather: PARTLY CLOUDY                                  Total Time: 60 Min

           Stack Area      28.08 Sq Ft          Nozzle Area   .000539 Sq Ft
           Stack Temp      134.2 Deg F           Meter Temp      94.2 Deg F
       Stack Pressure      30.12 "Hg         Baro. Pressure     30.12 "Hg
       Stack Vel Head       .663 "H2O      Meter Press Diff      3.48 "H2O
                                               Meter Volume    59.900 cf
    Pitot Tube Factor        .84          Condensate Volume     204.6 ml

--------------------------------------------------------------------------------


  1.  Volume Water Vapor                                          9.637 SCF
  2.  Gas Volume Sampled - STPD                                  57.937 SCFD
  3.  Total Volume                                               67.574 SCF
  4.  Moisture in Stack Gas - Volume Fraction                      .143
  5.  Dry Stack Gas - Volume Fraction                              .857
  6.  Molecular Weight of Stack Gas - Dry Basis                   29.00
  7.  Molecular Weight of Stack Gas - Stack Conditions            27.43
  8.  Specific Gravity of Stack Gas Relative to Air                 .95
  9.  Excess Air - Percent
 10.  Average Stack Velocity                                     2419.1 FPM
 11.  Average Stack Gas Flow Rate                                 67929 ACFM
 12.  Actual Stack Gas Flow Rate Dry                              58241 CFMD
 13.  Stack Gas Flow Rate STPD                                    52099 SCFMD
 14.  Percent Isokinetic                                           96.5 %



 Probe Wash:      9.60 Mg       .0026 Gr/SCF        1.14 Lbs/Hr
     Filter:    103.90 Mg       .0276 Gr/SCF       12.36 Lbs/Hr
 ===Totals===   113.50 Mg       .0302 Gr/SCF       13.50 Lbs/Hr
```

```
                SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

                          Source Sampling Calculations

--------------------------------------------------------------------------------

      Plant: AMAX                                             Date: 2/16/84
      Stack: BIG 4 DRYER COAL/OIL                    Run 3 From 1405 - 1508
    Weather: PARTLY CLOUDY                                Total Time: 60 Min

            Stack Area     28.08 Sq Ft            Nozzle Area  .000539 Sq Ft
            Stack Temp     131.2 Deg F             Meter Temp     92.9 Deg F
        Stack Pressure     30.12 "Hg           Baro. Pressure    30.12 "Hg
        Stack Vel Head      .657 "H20        Meter Press Diff     3.43 "H20
                                                 Meter Volume   59.988 cf
      Pitot Tube Factor      .84           Condensate Volume     200.8 ml

--------------------------------------------------------------------------------


    1.  Volume Water Vapor                                       9.458 SCF
    2.  Gas Volume Sampled - STPD                               58.152 SCFD
    3.  Total Volume                                            67.610 SCF
    4.  Moisture in Stack Gas - Volume Fraction                   .140
    5.  Dry Stack Gas - Volume Fraction                           .860
    6.  Molecular Weight of Stack Gas - Dry Basis                29.00
    7.  Molecular Weight of Stack Gas - Stack Conditions         27.46
    8.  Specific Gravity of Stack Gas Relative to Air              .95
    9.  Excess Air - Percent
   10.  Average Stack Velocity                                  2392.4 FPM
   11.  Average Stack Gas Flow Rate                              67178 ACFM
   12.  Actual Stack Gas Flow Rate Dry                           57781 CFMD
   13.  Stack Gas Flow Rate STPD                                 51949 SCFMD
   14.  Percent Isokinetic                                        97.2 %


   Probe Wash:      5.60 Mg      .0015 Gr/SCF        .66 Lbs/Hr
       Filter:    107.80 Mg      .0285 Gr/SCF      12.74 Lbs/Hr
   ===Totals===   113.40 Mg      .0300 Gr/SCF      13.40 Lbs/Hr
```

```
              Source Sampling Input Data       09:33 24-Feb-84


    Plant Name: AMAX                                    Pollutant: 3
Stack Location: BIG 4 DRYER COAL/OIL                     H2SO4=1
       Weather: PARTLY CLOUDY                             Part=2
      Run Date: 2/16/84                                Scrubber=3
         Run #: 1
    Time Start: 1106
      Time End: 1210                                   Source Type: 2
     Total Min: 60                                   Combustion=1
   Baro. Press: 30.12                                 Non-Comb.=2
   Stack Press: 30.12      H2SO4 ---  Vt:                 ORSAT=3
   Nozzle Diam: .3143                Vtb:
    Stack Area: 28.08                  N:                     %CO2:
   Final Meter: 332.872            Vsoln:            ORSAT -  % CO:
 Initial Meter: 274.5                 Va:                     % O2:
  Cond. Volume: 198.7        SO2 ---  Vt:
Stack Velocity: .444                 Vtb:           Weights for -
    Meter Diff: 3.45                   N:               Probe Wash: 8.70
Stack Gas Temp: 131.5              Vsoln:                   Filter: 86.9
    Meter Temp: 87.3                  Va:                         :
                          Prod Rate(TPD):                         :
                                    % O2:                         :
```

```
                Source Sampling Input Data        09:36 24-Feb-84


    Plant Name: AMAX                                                Pollutant: 3
Stack Location: BIG 4 DRYER COAL/OIL                                 H2SO4=1
       Weather: PARTLY CLOUDY                                         Part=2
      Run Date: 2/16/84                                            Scrubber=3
         Run #: 2
    Time Start: 1237
      Time End: 1342                                              Source Type: 2
     Total Min: 60                                               Combustion=1
   Baro. Press: 30.12                                             Non-Comb.=2
  Stack Press: 30.12          H2SO4 ---   Vt:                         ORSAT=3
   Nozzle Diam: .3143                      Vtb:
    Stack Area: 28.08                        N:                           %CO2:
   Final Meter: 393.2                    Vsoln:             ORSAT -    % CO:
 Initial Meter: 333.3                       Va:                         % O2:
  Cond. Volume: 204.6           SO2 ---     Vt:
Stack Velocity: .439                       Vtb:              Weights for -
    Meter Diff: 3.476                        N:                  Probe Wash: 9.60
Stack Gas Temp: 134.2                    Vsoln:                      Filter: 103.9
    Meter Temp: 94.2                        Va:                             :
                              Prod Rate(TPD):                               :
                                         % O2:                              :
```

```
             Source Sampling Input Data       09:39 24-Feb-84

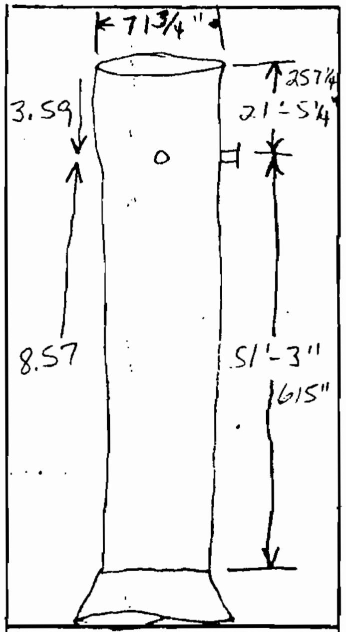

    Plant Name: AMAX                                              Pollutant: 3
Stack Location: BIG 4 DRYER COAL/OIL                               H2SO4=1
       Weather: PARTLY CLOUDY                                       Part=2
      Run Date: 2/16/84                                         Scrubber=3
         Run #: 3
    Time Start: 1405
      Time End: 1508                                            Source Type: 2
     Total Min: 60                                            Combustion=1
   Baro. Press: 30.12                                          Non-Comb.=2
   Stack Press: 30.12       H2SO4 ---   Vt:                        ORSAT=3
   Nozzle Diam: .3143                  Vtb:
    Stack Area: 28.08                    N:                           %CO2:
   Final Meter: 453.888              Vsoln:                   ORSAT -  % CO:
 Initial Meter: 393.9                   Va:                            % O2:
  Cond. Volume: 200.8         SO2 ---   Vt:
Stack Velocity: .432                   Vtb:                   Weights for -
    Meter Diff: 3.43                     N:                      Probe Wash: 5.60
Stack Gas Temp: 131.2                Vsoln:                          Filter: 107.8
    Meter Temp: 92.9                    Va:                                :
                         Prod Rate(TPD):                                   :
                                      % O2:                                :
```

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS, INC.
GAINESVILLE, FLORIDA 32601
(904) 377-5822

SK

SOURCE SAMPLING FIELD DATA SHEET

Plant Amax
Sampling Location Big 4
Type of Control Scrubber
Type of Samples Part
Date 2-16-84 Run No. 1 Coal oil
Time Start 1106 Time End 1210
Sample Time 5 min/pt 60 Total min
DB ____ °F, WB ____ °F, VP @ DP ____ "Hg
Bar. Press. 30.12 "Hg, Stack Press. 30.12 "Hg
Moisture 15 %, FDA ____, Gas Density Factor ____
Temp. 74 °F, W/D Vari, W/S 3-5
Weather Ptly Cloudy Thermocouple Readout Sb-1
Sample Box No. Sb-1 meter Box No. Sb-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sb-81 ft
Probe Heater Setting 4 Nomograph C_f 7.76
Stack Dimensions 71.75" in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ____ ft



Stack Dimensions

Umbilical Cord 100' [✓ 200']

Mat'l Processing Rate ____
Final Gas Meter Reading 332.872 ft^3
Initial Gas Meter Reading 274.500 ft^3 58.372
Condensate Increase in Impingers 188 ml
Moisture in Silica Gel 10.7 gm 198.7
Silica Gel Container No. 27 Filter No. 4-045

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R Paul
D Gabel

Stack Test Observers: ____

Leak Check Meter Box
Initial 0.00 cfm @ 15 In H_2
Final 0.015 cfm @ 12 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. [✓ Stable], Leak
Static 3 In H_2O for 15 sec. [✓ Stable], Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1	3.2		74.5	.43	334	3.34	143	81	248	57	8
2	10.5		79.2	.49	3.8	3.8	142	81	254	46	10
3	21.2		84.3	.46	3.57	3.57	137	82	262	48	10
4	50.6		89.5	.40	3.11	3.11	131	84	260	48	9
5	61.2		94.1	.2541	[illegible]	[illegible]	126	85	266	48	9
6	68.6		98.5	.36	2.79	2.79	122	88	239	49	8
1			02.8	.47	3.65	3.65	134	89	257	54	10
2			7.8	.47	3.65	3.65	132	90	250	50	10

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			12.8	.45	3.49	3.49	128	90	247	49	10
4			17.8	.45	349	3.49	128	92	243	49	10
5			22.8	.47	3.65	3.65	127	92	242	50	11
6			27.9	.48	3.72	3.72	128	93	242	50	12

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS, INC.
GAINESVILLE, FLORIDA 32601
(904) 377-5822

SOURCE SAMPLING FIELD DATA SHEET

Plant Amax
Sampling Location Blg 4 Dryer
Type of Control Scrubber
Type of Samples Part
Date 2-16-84 Run No. 2 Coal Oil
Time Start 1237 Time End 1342
Sample Time 5 min/pt 60 Total min
DB ____ °F, WB ____ °F, VP @ DP ____ "Hg
Bar. Press. 30.12 "Hg, Stack Press. 30.12 "Hg
Moisture 15 %, FDA ____, Gas Density Factor ____
Temp. 77 °F, W/D Vari, W/S 3-5
Weather Plty Cloudy Thermocouple Readout Sb-1
Sample Box No. Sb-1 meter Box No. Sb-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sb-8' ft
Probe Heater Setting 4 Nomograph C_f 7.905
Stack Dimensions 71.75" in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ____ ft

Stack Dimensions

Umbilical Cord 100' [✓ 200']

Mat'l Processing Rate ____
Final Gas Meter Reading 393.200 ft^3
Initial Gas Meter Reading 333.300 ft^3
Condensate Increase in Impingers 196 ml 204.6
Moisture in Silica Gel 8.6 gm
Silica Gel Container No. 31 Filter No. 5-046
Orsat: $\%CO_2$
$\%O_2$
%CO
$\%N_2$

Test Conducted By: R Paul
G Zabel

Stack Test Observers: ____

Leak Check Meter Box
Initial 0.00 cfm @ 15 In Hg
Final 0.00 cfm @ 13 In Hg

40

Pitot Tubes
Impact 3 In H_2O for 15 sec. [✓ Stable] Leak
Static 3 In H_2O for 15 sec. [✓ Stable] Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1			33.3	.40	3.16	3.16	139	93	232	63	9
2			38.1	.47	3.72	3.72	134	93	241	46	11
3			43.1	.47	3.72	3.72	135	93	257	46	11
4			48.3	.47	3.72	3.72	133	93	259	47	11
5			53.6	.47	3.72	3.72	131	94	250	45	11
6			58.6	.42	3.3	3.3	129	94	247	45	11
1			63.6	.42	3.3	3.3	142	95	263	47	11
2			68.5	.49	3.87	3.87	135	95	242	47	13

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			73.9	.47	3.72	3.72	136	95	255	48	13
4			78.8	.44	3.48	3.48	133	95	264	49	13
5			83.9	.39	3.08	3.08	132	95	265	48	12
6			88.8	.37	2.92	2.92	131	95	260	48	12

8

SH[redacted] & K[redacted]R
ENVIRONMENTAL CONSULTANTS, INC.
GAINESVILLE, FLORIDA 32601
(904) 377-5822

SOURCE SAMPLING FIELD DATA SHEET

Plant Amad
Sampling Location Big 4 Dryer
Type of Control Scrubber
Type of Samples Part
Date 2-16-84 Run No. 3 Coated
Time Start 1405 Time End 1508
Sample Time 5 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.12 "Hg, Stack Press. 30.12 "Hg
Moisture 15 %, FDA ___, Gas Density Factor ___
Temp. 75 °F, W/D Vari, W/S 3-8
Weather Ptly Cloudy Thermocouple Readout Sh-4
Sample Box No. Sh1 meter Box No. Sh-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sh-81 ft
Probe Heater Setting 4 Nomograph C_f 7.905
Stack Dimensions 71.75 in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ___ ft

Stack Dimensions

Umbilical Cord 100' [✓ 200']

Mat'l Processing Rate ___
Final Gas Meter Reading 453.888 ft^3
Initial Gas Meter Reading 393.900 ft^3
Condensate Increase in Impingers 192 ml 200.8
Moisture in Silica Gel 8.8 gm
Silica Gel Container No. 3 Filter No. 6-047

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R Paul
G Gabel

Stack Test Observers: ___

Leak Check
Meter Box
Initial 0.00 cfm @ 15 In H_2
Final 0.006 cfm @ 11 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. [✓ Stable], Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1			93.9	.42	3.32	3.32	143	92	266	60	10
2			99.1	.47	3.72	3.72	137	92	264	54	11
3			4.0	.47	3.72	3.72	132	91	259	55	11
4			9.2	.42	332	332	123	91	260	55	11
5			14.3	.39	3.08	3.08	122	92	267	56	10
6			19.0	.36	2.85	2.85	124	93	254	56	10
1			23.5	.41	3.24	3.24	134	94	250	61	11
2			28.5	.41	3.24	3.24	133	94	256	52	9

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft³)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			33.3	.47	3.72	3.72	132	94	242	51	10
4			38.5	.47	3.72	3.72	132	94	243	50	11
5			43.6	.47	3.72	3.72	130	94	260	49	11
6			49.0	.44	3.48	3.48	132	94	264	48	11

SK

SAMPLING RATE CALCULATIONS

S&K NOMOGRAPH

CO. NAME: Amax
DATE: 2-16-84
STACK: Beg 4
LOCATION:

ΔH = ORIFICE READING (INCHES H_2O)
D_N = NOZZLE DIA. (INCHES)
$\Delta H@$ = METER BOX CONSTANT
B_W = MOISTURE FRACTION
T_m = METER TEMP (°F)
T_s = STACK TEMP (°F)
M_s = WET MOLECULAR WEIGHT OF STACK GAS (FROM TABLE)
ΔP = PITOT READING (INCHES H_2O

$$\left[\frac{T_m+460}{M_s(T_s+460)}(1-B_w)^2\,\Delta H@\,(D_n)^4\,17741\right]\Delta P = \Delta H$$

130

.45 – .30

MOISTURE FRACTION	Ms
0.0	29.0
0.05	28.5
0.10	27.9
0.15	27.4
0.20	26.8
0.25	26.2
0.30	25.7
0.35	25.2
0.40	24.6

$$\frac{548}{27.4(590)}\quad 16164$$

$$\frac{558}{\quad}$$

	RUN 1		RUN 2		RUN 3
$\frac{T_m+460}{M_s(T_s+460)}$ =	0.033898		0.03452		
× $(1-B_w)^2$ =	0.7225				
× $\Delta H@$ =	1.83				
× $(D_n)^4$ =	0.009763				
× 17741 =	17741	17741	17741	17741	17741
× ΔP =	7.76		7.904		

METER ORIFICE CHECK

Meter Box No. Ab-1

Δ Ha of Box 1.83

Date 2-16-84

Time for 10 ft^3 = 13 min. 24 sec.

264.1

10 ÷ 13.4 total minutes = 0.7463 Δ Ha$_2$

$$\frac{0.75}{\Delta \text{Ha}_2} = 1.005 \times 100 = 100.5\%$$

RCPaul

Signature

Procedure: Set flow rate of meter box at ΔHa of meter box--measure the amount of time required to sample 10.00 ft^3.

<u>Note:</u> If answer is within 5 percent meter is o.k. If not, recalibrate meter.

NOZZLE CALIBRATION

Nozzle 5/16

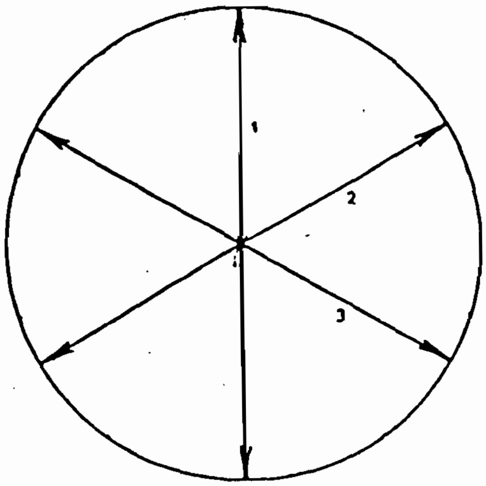
Date 2-16-84

Measurement No.	Inside Diameter (inches)
1	.314
2	.314
3	.315

Average .3143 "

Area of Nozzle ________ Ft^2

Calibrated by: Rodney Paul



Nozzle X-section

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax

SOURCE NAME: Big 4 Dryer Coal Oil

DATE: 2-16-84 TYPE OF SAMPLE: Part

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION
1-ACO-P	Probe Wash Run 1
2-ACO-P	" " " 2
3-ACO-P	" " " 3
4	Filter Holder Run 1
5	" " " 2
6	" " " 3
27	Silica Gel Run 1
31	" " " 2
3	" " " 3

Sample Recovered By: RS & GZ

Particulate Analysis By: R. Paul

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS, INC.

PARTICULATE LAB DATA SHEET

Project No. AMAX - COAL/OIL 2-16-84

	Run 1	Run 2	Run 3	Blank
Container No.	sb-29	sb-47	sb-31	sb-3
Total Volume (ml)	253	247	236	100
Aliquot Evaporated (ml)	253	247	236	100
Final Weight (g)	108.8817	97.3080	88.0466	90.4763
Tare Weight (g)	-108.8730	-97.2984	-88.0410	-90.4763
Gross Weight Gained (g)	0.0087	0.0096	0.0056	0.0000
Average Blank (g)	- —	- —	- —	- —
Net Weight (g)	0.0087	0.0096	0.0056	—
Aliquot Factor	x 1.0	x 1.0	x 1.0	x 1.0
Total Net Weight (mg)	8.7	9.6	5.6	

Container No.	1F	2F	3F	
Filter No.	045	046	047	
Final Weight (g)	0.5444	0.5609	0.5638	
Tare Weight (g)	-0.4575	-0.4570	-0.4560	-
Gross Weight Gained (g)	0.0869	0.1039	0.1078	
Average Blank	- —	- —	- —	-
Total Net Weight (mg)	86.9	103.9	107.8	

Tare Balance Check

0 0.0 50g 50.0000

10g 10.0000 100g 100.0000

0.5g .5000

By RC Paul

Date 2-22-84

Final Balance Check

0 0.0000 50g 50.0000

10g 10.0000 100g 100.0000

0.5g 0.5000

By R Paul

Date 2-23-84

Table 1

SUMMARY OF PARTICULATE MATTER EMISSIONS

AMAX
BIG 4 DRYER
2/17/84

Run No.	Process Weight Rate (Tons/Hr)	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (Deg F)	Stack Gas Moisture (%)	Particulate Matter Conc. (gr/SCF)	Particulate Matter Emission Rate (Lbs/Hr)
1	276.7	54051	130.7	14.2	.0268	12.45
2	270.0	53472	141.9	14.4	.0223	10.24
3	270.0	53324	144.8	14.2	.0228	10.43
Avg	272.2	53616	139.1	14.2	.0240	11.04

Allowable Particulate Matter Emission Rate = Lbs/Hr
(Chap. 17-2, Florida Administrative Code)

SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

Source Sampling Calculations

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--------------------------------------------------------------------------------


     Plant: AMAX                                               Date: 2/16/84
     Stack: BIG 4 DRYER - OIL                        Run 1 From 1617 - 1719
   Weather: PARTLY CLOUDY                                  Total Time: 60 Min

            Stack Area      28.08 Sq Ft             Nozzle Area   .000539 Sq Ft
            Stack Temp      130.7 Deg F              Meter Temp      91.3 Deg F
        Stack Pressure      30.12 "Hg            Baro. Pressure     30.12 "Hg
        Stack Vel Head       .685 "H2O         Meter Press Diff      3.72 "H2O
                                                   Meter Volume    61.972 cf
     Pitot Tube Factor       .84              Condensate Volume     211.5 ml

--------------------------------------------------------------------------------


    1.   Volume Water Vapor                                         9.962 SCF
    2.   Gas Volume Sampled - STPD                                 60.292 SCFD
    3.   Total Volume                                              70.253 SCF
    4.   Moisture in Stack Gas - Volume Fraction                     .142
    5.   Dry Stack Gas - Volume Fraction                             .858
    6.   Molecular Weight of Stack Gas - Dry Basis                  29.00
    7.   Molecular Weight of Stack Gas - Stack Conditions           27.44
    8.   Specific Gravity of Stack Gas Relative to Air                .95
    9.   Excess Air - Percent
   10.   Average Stack Velocity                                    2492.6 FPM
   11.   Average Stack Gas Flow Rate                                69993 ACFM
   12.   Actual Stack Gas Flow Rate Dry                             60068 CFMD
   13.   Stack Gas Flow Rate STPD                                   54051 SCFMD
   14.   Percent Isokinetic                                          96.8 %



   Probe Wash:      13.00 Mg        .0033 Gr/SCF         1.54 Lbs/Hr
       Filter:      92.00 Mg        .0235 Gr/SCF        10.91 Lbs/Hr
   ===Totals===    105.00 Mg        .0268 Gr/SCF        12.45 Lbs/Hr
```

```
              SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

                      Source Sampling Calculations

-----------------------------------------------------------------------------


   Plant: AMAX                                             Date: 2/17/84
   Stack: BIG 4 DRYER - OIL                      Run 2 From 0841 - 0943
 Weather: CLEAR                                      Total Time: 60 Min

        Stack Area     28.08 Sq Ft          Nozzle Area   .000539 Sq Ft
        Stack Temp     141.9 Deg F           Meter Temp      75.8 Deg F
    Stack Pressure     30.14 "Hg         Baro. Pressure     30.14 "Hg
    Stack Vel Head      .685 "H20       Meter Press Diff     3.51 "H20
                                            Meter Volume   59.830 cf
   Pitot Tube Factor    .84            Condensate Volume    213.2 ml

-----------------------------------------------------------------------------


  1.   Volume Water Vapor                                   10.042 SCF
  2.   Gas Volume Sampled - STPD                            59.902 SCFD
  3.   Total Volume                                         69.943 SCF
  4.   Moisture in Stack Gas - Volume Fraction                .144
  5.   Dry Stack Gas - Volume Fraction                        .856
  6.   Molecular Weight of Stack Gas - Dry Basis             29.00
  7.   Molecular Weight of Stack Gas - Stack Conditions      27.42
  8.   Specific Gravity of Stack Gas Relative to Air           .95
  9.   Excess Air - Percent
 10.   Average Stack Velocity                               2516.2 FPM
 11.   Average Stack Gas Flow Rate                           70655 ACFM
 12.   Actual Stack Gas Flow Rate Dry                        60511 CFMD
 13.   Stack Gas Flow Rate STPD                              53472 SCFMD
 14.   Percent Isokinetic                                     97.2 %



 Probe Wash:     15.00 Mg      .0039 Gr/SCF        1.77 Lbs/Hr
     Filter:     71.70 Mg      .0184 Gr/SCF        8.47 Lbs/Hr
 ===Totals===    86.70 Mg      .0223 Gr/SCF       10.24 Lbs/Hr
```

```
              SHOLTES AND KOOGLER ENVIRONMENTAL CONSULTANTS

                      Source Sampling Calculations

---------------------------------------------------------------------------


    Plant: AMAX                                           Date: 2/17/84
    Stack: BIG 4 DRYER - OIL                      Run 3 From 1003 - 1107
  Weather: CLEAR                                       Total Time: 60 Min

         Stack Area     28.08 Sq Ft           Nozzle Area   .000539 Sq Ft
         Stack Temp     144.8 Deg F            Meter Temp     90    Deg F
     Stack Pressure     30.14 "Hg          Baro. Pressure    30.14 "Hg
     Stack Vel Head      .683 "H20       Meter Press Diff     3.65 "H20
                                             Meter Volume   61.300 cf
    Pitot Tube Factor    .84            Condensate Volume    209.7 ml

---------------------------------------------------------------------------


  1.  Volume Water Vapor                                     9.877 SCF
  2.  Gas Volume Sampled - STPD                             59.808 SCFD
  3.  Total Volume                                          69.685 SCF
  4.  Moisture in Stack Gas - Volume Fraction                 .142
  5.  Dry Stack Gas - Volume Fraction                         .858
  6.  Molecular Weight of Stack Gas - Dry Basis              29.00
  7.  Molecular Weight of Stack Gas - Stack Conditions       27.44
  8.  Specific Gravity of Stack Gas Relative to Air            .95
  9.  Excess Air - Percent
 10.  Average Stack Velocity                                2515.9 FPM
 11.  Average Stack Gas Flow Rate                            70648 ACFM
 12.  Actual Stack Gas Flow Rate Dry                         60635 CFMD
 13.  Stack Gas Flow Rate STPD                               53324 SCFMD
 14.  Percent Isokinetic                                      97.3 %



 Probe Wash:      9.60 Mg      .0025 Gr/SCF       1.13 Lbs/Hr
     Filter:     78.80 Mg      .0203 Gr/SCF       9.29 Lbs/Hr
 ===Totals===    88.40 Mg      .0228 Gr/SCF      10.43 Lbs/Hr
```

```
              Source Sampling Input Data       09:08 24-Feb-84


    Plant Name: AMAX                                              Pollutant: 3
Stack Location: BIG 4 DRYER - OIL                                 H2SO4=1
       Weather: PARTLY CLOUDY                                       Part=2
      Run Date: 2/16/84                                         Scrubber=3
         Run #: 1
    Time Start: 1617
      Time End: 1719                                            Source Type: 2
     Total Min: 60                                            Combustion=1
    Baro. Press: 30.12                                         Non-Comb.=2
   Stack Press: 30.12      H2SO4 ---   Vt:                         ORSAT=3
   Nozzle Diam: .3143                 Vtb:
    Stack Area: 28.08                   N:                              %CO2:
   Final Meter: 516.172             Vsoln:                    ORSAT -   % CO:
 Initial Meter: 454.2                  Va:                              % O2:
  Cond. Volume: 211.5        SO2 ---   Vt:
Stack Velocity: .469                  Vtb:                   Weights for -
    Meter Diff: 3.716                   N:                       Probe Wash: 13.0
Stack Gas Temp: 130.7               Vsoln:                           Filter: 92.0
    Meter Temp: 91.3                   Va:                                 :
                           Prod Rate(TPD):                                 :
                                     % O2:                                 :
```

```
                Source Sampling Input Data        09:13 24-Feb-84


     Plant Name: AMAX                                          Pollutant: 3
 Stack Location: BIG 4 DRYER - OIL                               H2SO4=1
        Weather: CLEAR                                            Part=2
       Run Date: 2/17/84                                     Scrubber=3
          Run #: 2
     Time Start: 0841
       Time End: 0943                                        Source Type: 2
      Total Min: 60                                        Combustion=1
    Baro. Press: 30.14                                      Non-Comb.=2
   Stack Press: 30.14       H2SO4 ---   Vt:                    ORSAT=3
   Nozzle Diam: .3143                   Vtb:
    Stack Area: 28.08                     N:                        %CO2:
   Final Meter: 576.630               Vsoln:           ORSAT  -   % CO:
 Initial Meter: 516.8                    Va:                      % O2:
  Cond. Volume: 213.2         SO2 ---   Vt:
Stack Velocity: .469                    Vtb:           Weights for -
    Meter Diff: 3.513                     N:               Probe Wash: 15.0
Stack Gas Temp: 141.9                 Vsoln:                   Filter: 71.7
    Meter Temp: 75.8                     Va:                         :
                             Prod Rate(TPD):                         :
                                      % O2:                          :
```

```
              Source Sampling Input Data       09:16 24-Feb-84

    Plant Name: AMAX                                         Pollutant: 3
Stack Location: BIG 4 DRYER - OIL                             H2SO4=1
       Weather: CLEAR                                          Part=2
      Run Date: 2/17/84                                 Scrubber=3
         Run #: 3
    Time Start: 1003
      Time End: 1107                                    Source Type: 2
     Total Min: 60                                    Combustion=1
   Baro. Press: 30.14                                  Non-Comb.=2
   Stack Press: 30.14      H2SO4 ---  Vt:                 ORSAT=3
   Nozzle Diam: .3143                Vtb:
    Stack Area: 28.08                  N:                     %CO2:
   Final Meter: 648.6              Vsoln:            ORSAT -  % CO:
 Initial Meter: 587.3                 Va:                     % O2:
  Cond. Volume: 209.7        SO2 ---  Vt:
Stack Velocity: .467                 Vtb:           Weights for -
    Meter Diff: 3.649                  N:               Probe Wash: 9.60
Stack Gas Temp: 144.8              Vsoln:                   Filter: 78.8
    Meter Temp: 90                    Va:                         :
                          Prod Rate(TPD):                         :
                                    % O2:                         :
```

SH[redacted] & [redacted]ER
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(904) 377-5822

SOURCE SAMPLING FIELD DATA SHEET

Plant Amax
Sampling Location Big 4 Dryer
Type of Control Scrubber
Type of Samples Part
Date 2-16-84 Run No. 1 ~~Com~~ 1011
Time Start 1617 Time End 1719
Sample Time 5 min/pt 60 Total min
DB ____ °F, WB ____ °F, VP @ DP ____ "Hg
Bar. Press. 30.12 "Hg, Stack Press. 30.12 "Hg
Moisture 15 %, FDA ____, Gas Density Factor ____
Temp. 72 °F, W/D Var., W/S 3-8
Weather Partly Cloudy Thermocouple Readout Sk-1
Sample Box No. Sk-1 meter Box No. Sk-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sk-8 ft
Probe Heater Setting 4 Nomograph C_f 7.905
Stack Dimensions 71.75 in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ____ ft

0.12

Stack Dimensions

Umbilical Cord 100' [✓ 200]

Mat'l Processing Rate ____
Final Gas Meter Reading 516.172 ft^3
Initial Gas Meter Reading 454.200 ft^3
Condensate Increase in Impingers 200 ml 211.5
Moisture in Silica Gel 11.5 gm
Silica Gel Container No. 10 Filter No. 1-1252

Orsat:				
$\%CO_2$				
$\%O_2$				
$\%CO$				
$\%N_2$				

Test Conducted By: R Paul
G Gale

Stack Test Observers: ____

Leak Check Meter Box
Initial 0.00 cfm @ 15 In H_2
Final 0.00 cfm @ 12 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. [✓ Stable], Leak
Static 3 In H_2O for 15 sec. [✓ Stable], Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1			54.2	.47	3.72	3.72	133	~~260~~ 90	260	49	10
2			59.4	.52	4.11	4.11	137	90	251	48	11
3			64.7	.52	4.11	4.11	139	90	263	51	11
4			70.2	.47	3.72	3.72	128	90	270	52	11
5			75.4	.49	3.87	3.87	129	91	261	51	11
6			80.7	.50	3.95	3.95	131	91	266	51	12
1			86.0	.45	3.55	3.55	138	91	269	52	11
2			90.9	.47	3.72	3.72	131	92	256	52	12

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			96.0	.49	3.87	3.87	133	92	262	53	12
4			501.5	.45	3.56	3.56	126	92	262	53	12
5			505.9	.45	3.56	3.56	123	93	255	53	12
6			11.5	.36	2.85	2.85	120	93	253	54	10

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S[redacted]S & [redacted]ER
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SOURCE SAMPLING FIELD DATA SHEET

Plant A-mad
Sampling Location Big 4 Dryer
Type of Control Scrubber
Type of Samples Part
Date 2-17-84 Run No. 2 oil
Time Start 0841 Time End 0943
Sample Time 5 min/pt 60 Total min
DB ____ °F, WB ____ °F, VP @ DP ________ "Hg
Bar. Press. 30.14 "Hg, Stack Press. 30.14 "Hg
Moisture 15 %, FDA ____, Gas Density Factor ____
Temp. 55 °F, W/D Vari, W/S 2-3
Weather Clear. Thermocouple Readout Sh-1
Sample Box No. Sh-1 meter Box No. Sh-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sh-8' ft
Probe Heater Setting ____ Nomograph C_f 7.512
Stack Dimensions 71.75 in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ________ ft

Stack Dimensions

Umbilical Cord 100' [✓ 200']

Mat'l Processing Rate ________
Final Gas Meter Reading 576.630 ft^3
Initial Gas Meter Reading 516.800 ft^3
Condensate Increase in Impingers 203 ml 213.2
Moisture in Silica Gel 10.2 gm
Silica Gel Container No. 22 Filter No. 2-1253

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R Paul
G Gale

Stack Test Observers: ________

Leak Check Meter Box
Initial 0.00 cfm @ 15 In H_2
Final 0.00 cfm @ 13 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec, [✓ Stable], Leak
Static 3 In H_2O for 15 sec, [✓ Stable], Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1			16.8	.45	3.38	3.38	143	66	266	62	10
2			21.6	.45	3.38	3.38	146	66	268	55	10
3			26.5	.50	3.76	3.76	146	69	270	53	11
4			31.7	.48	3.61	3.61	145	71	267	51	11
5			37.2	.50	3.76	3.76	146	74	261	51	12
6			41.7	.47	3.53	3.53	145	76	257	51	11
1			46.7	.44	3.31	3.31	152	78	259	53	11
2			51.7	.51	3.83	3.83	148	80	266	51	13

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			56.9	.49	368	3.68	144	81	251	51	13
4			61.9	.47	3.53	3.53	134	82	252	51	13
5			66.9	.44	331	3.31	127	83	250	51	12
6			72.0	.41	308	3.08	127	84	248	51	12

SK

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(904) 377-5822

SOURCE SAMPLING FIELD DATA SHEET

Plant Amad
Sampling Location Big 4 Dryer
Type of Control Scrubber
Type of Samples Part
Date 2-17-84 Run No. 3 oil
Time Start 1003 Time End 1107
Sample Time 5 min/pt 60 Total min
DB ___ °F, WB ___ °F, VP @ DP ___ "Hg
Bar. Press. 30.14 "Hg, Stack Press. 30.14 "Hg
Moisture 15 %, FDA ___, Gas Density Factor ___
Temp. 163 °F, W/D Var, W/S 3-5
Weather Clear Thermocouple Readout Sk-1
Sample Box No. Sk-1 meter Box No. Sk-1
Meter ΔH@ 1.83 Pitot Corr. Factor 0.84
Nozzle Dia. 5/16 in., Probe Length Sk-81 ft
Probe Heater Setting 4 Nomograph C_f 1.808
Stack Dimensions 71.75 in
Stack Area 28.08 ft^2
Effective Stack Area 28.08 ft^2
Stack Height ___ ft

Stack Dimensions

Umbilical Cord 100' [✓ 200]

Mat'l Processing Rate ___
Final Gas Meter Reading 648.600 ft^3
Initial Gas Meter Reading 587.300 ft^3
Condensate Increase in Impingers 198 ml 209.7
Moisture in Silica Gel 11.7 gm
Silica Gel Container No. 37 Filter No. 3-1254

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R Paul
D Gabel

Stack Test Observers: ___

Leak Check Meter Box
Initial 0.00 cfm @ 15 In H_2
Final 0.00 cfm @ 12 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. [✓ Stable], Leak
Static 3 In H_2O for 15 sec. [✓ Stable], Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
1			87.3	.47	3.67	3.67	156	87	235	61	9
2			92.4	.52	4.06	4.06	154	87	241	53	10
3			97.7	.46	3.59	3.59	153	88	259	55	10
4			2.8	.46	3.59	3.59	151	89	257	54	10
5			7.8	.41	3.2	3.2	145	90	251	55	9
6			12.7	.41	3.2	3.2	145	91	260	54	9
1			17.3	.45	3.51	3.51	146	91	266	57	10
2			22.5	.50	3.9	3.9	139	91	247	54	12

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
3			27.7	.48	3.75	3.75	139	91	257	55	12
4			33.0	.48	3.75	3.75	133	91	239	54	12
5			38.2	.51	3.98	3.98	133	92	245	55	12
6			63.7	.46	3.59	3.59	143	92	256	56	12

SAMPLING RATE CALCULATIONS

S¢K NOMOGRAPH

CO. NAME: __________
DATE: __________
STACK: __________
LOCATION: __________

ΔH = ORIFICE READING (INCHES H_2O)
D_N = NOZZLE DIA. (INCHES)
$\Delta H@$ = METER BOX CONSTANT
B_W = MOISTURE FRACTION
T_M = METER TEMP (°F)
T_S = STACK TEMP (°F)
M_S = WET MOLECULAR WEIGHT OF STACK GAS (FROM TABLE)
ΔP = PITOT READING (INCHES H_2O

$$\left[\frac{T_m+460}{M_s(T_s+460)}(1-B_w)^2\,\Delta H@\,(D_n)^4\,17741\right]\Delta P = \Delta H$$

MOISTURE FRACTION	Ms
0.0	29.0
0.05	28.5
0.10	27.9
0.15	27.4
0.20	26.8
0.25	26.2
0.30	25.7
0.35	25.2
0.40	24.6

$$\frac{533}{27.4\,(593)}\ 16248.2$$

	RUN 1		RUN 2		RUN 3
$\frac{T_M+460}{M_S(T_S+460)}$ =	0.032803		0.034094		
× $(1-B_W)^2$ =	0.7225				
× $\Delta H@$ =	1.83				
× $(D_n)^4$ =	0.009763				
× 17741 =	17741	17741	17741	17741	17741
× ΔP =	7.512				

METER ORIFICE CHECK

Meter Box No. ______ Δ Ha of Box ____________

Date ______________

Time for 10 ft^3 = 13 min. 20 sec.

576.900

10 ÷ 13.33 total minutes = 0.75 Δ Ha$_2$

$\frac{0.75}{\Delta \text{Ha}_2}$ = 1.00 x 100 = 100%

R C Paul
Signature

Procedure: Set flow rate of meter box at ΔHa of meter box--measure the amount of time required to sample 10.00 ft^3.

Note: If answer is within 5 percent meter is o.k. If not, recalibrate meter.

NOZZLE CALIBRATION

Nozzle 5/16

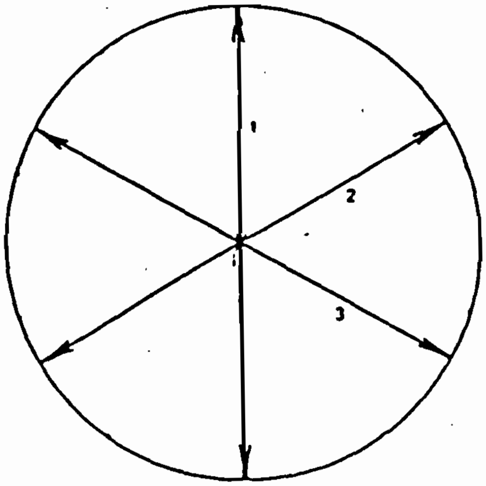
Date 2-16+17-84

Measurement No.	Inside Diameter (inches)
1	.314
2	.310
3	.315

Average .3143

Area of Nozzle ______ Ft^2

Calibrated by: RC Paul



Nozzle X-section

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax Chemical Corp.

SOURCE NAME: Big Bend Dryer

DATE: 2-17-84 TYPE OF SAMPLE: Particulate

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION
SK-41	Run 1 Oil Probe Wash
SK-33	Run 2 " " "
SK-301	Run 3 " " "
SK-45	Acetone Blank Oil
15	Run 1 Filter Oil
25	Run 2 " "
35	Run 3 " "

Sample Recovered By: R. Paul - R.S. Sholtes

Particulate Analysis By: R. Paul

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS, INC.

PARTICULATE LAB DATA SHEET

Project No. AMAX - OIL
2-17-84

	Run 1	Run 2	Run 3	Blank
Container No.	Sb-41	Sb-33	Sb-301	Sb-45
Total Volume (ml)	203	183	226	100
Aliquot Evaporated (ml)	203	183	226	100
Final Weight (g)	93.8620	91.8932	101.1009	99.2636
Tare Weight (g)	-93.8490	-91.8782	-101.0913	-99.2634
Gross Weight Gained (g)	0.0130	0.0150	0.0096	0.0002
Average Blank (g)	- —	- —	- —	- —
Net Weight (g)	0.0130	0.0150	0.0096	0.0002
Aliquot Factor	x 1.0	x 1.0	x 1.0	x 1.0
Total Net Weight (mg)	13.0	15.0	9.6	0.2

Container No.	1J	2J	3J	
Filter No.	1252	1253	1254	
Final Weight (g)	0.5455	0.5235	0.5312	
Tare Weight (g)	-0.4535	-0.4518	-0.4524	-
Gross Weight Gained (g)	0.0920	0.0717	0.0788	
Average Blank	- —	- —	- —	-
Total Net Weight (mg)	92.0	71.7	78.8	

Tare Balance Check

0 0.0000 50g 50.0000
10g 10.0000 100g 100.0000
0.5g 0.5000

By R Paul
Date 2-22-84

Final Balance Check

0 0.0000 50g 50.0000
10g 10.0000 100g 100.0000
0.5g 0.5000

By R Paul
Date 2-23-84

APPENDIX A2

Field Data Sheets and Computations
Sulfur Dioxide Sampling/Method 6

2-16-84 Coal/Oil

From Run 1 of Method 5
1106 - 1210 hr.
Flow = 52612 SCFMD

Run 1 1045 hr.

$$V_{m(std)} = 17.4 \frac{0.700 \times 30.12}{(86+460)} = 0.673 \text{ ft}^3$$

$$C_{SO_2} = \frac{0.3989\times10^{-5}(0.5-0.3)}{0.673} = 0.119\times10^{-5} \text{ lb/dscf}$$

Mass Emission = $0.119\times10^{-5} \times 52{,}612 \times 60 = 3.76$ lb/hr.

Run 2 1140 hr.

$$V_{m(std)} = 17.4 \frac{0.849 \times 30.12}{(460+104)} = 0.789 \text{ ft}^3$$

$$C_{SO_2} = 0.3989\times10^{-5} \frac{(1.55-0.3)}{0.789} = 0.632\times10^{-5} \text{ lb/dscf}$$

Mass Emission = $0.632\times10^{-5} \times 52{,}612 \times 60 = 19.95$ lb/hr.

Run 3 1230 hr.

$$V_{m(std)} = 17.4 \frac{1.065\times30.12}{(460+107)} = 0.984 \text{ ft}^3$$

$$C_{SO_2} = 0.3989\times10^{-5} \frac{(3.3-0.3)}{0.984} = 1.216\times10^{-5} \text{ lb/dscf}$$

Mass Emission = $1.216\times10^{5} \times 52{,}612 \times 60 = 38.39$ lb/hr.

Avg Mass Emission = 20.7 lb/hr SO_2

From Run 1 of Method 5
1617 - 1719
Flow = 54051 SCFMD

2-16-84 Oil

Run 1 1610 hr

$V_{m(std)} = 17.4 \dfrac{0.705 \times 30.12}{(460+94)} = 0.667$ ft³

$C_{SO_2} = \dfrac{0.3989 \times 10^{-5} (3.6 - .3)}{0.667} = 1.974 \times 10^{-5}$ lb/SCFD

Mass Emission = $1.974 \times 10^{-5} \times 54051 \times 60$ = 64.02 lb/hr. SO_2

Run 2 1645 hr

$V_{m(std)} = 17.4 \dfrac{0.777 \times 30.12}{(460+106)} = 0.719$ ft³

$C_{SO_2} = \dfrac{0.3989 \times 10^{-5} (1.6 - .3)}{0.719} = 0.721 \times 10^{-5}$ lb/SCFD

Mass Emission = $0.721 \times 10^{-5} \times 54{,}051 \times 60$ = 23.38 lb/hr SO_2

Run 3 ~1700 hr.

$V_{m(std)} = 17.4 \dfrac{0.935 \times 30.12}{(460+108)} = 0.863$ ft³

$C_{SO_2} = \dfrac{0.3989 \times 10^{-5} (4.55 - .3)}{0.863} = 1.964 \times 10^{-5}$ lb/SCFt

Mass Emission = $1.964 \times 10^{-5} \times 54051 \times 60$ = 63.69 lb/hr SO_2

Average Mass Emission = 50.36 lb/hr. SO_2

Method 6 Computations

SO_2 in Stack Gases

From Method 6

$$C_{SO_2} = K_2 \frac{(V_t - V_{tb}) N \left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}}$$

where $K_2 = 7.061 \times 10^{-5}$ for English Units

$V_a = 20$ ml

$V_{soln} = 100$ ml.

$V_{tb} = 0.3$

$N = .0113$ all constant

$$C_{SO_2} = \frac{7.061 \times 10^{-5} (V_t - 0.3)(.0113)\left(\frac{100}{20}\right)}{V_{m(std)}}$$

$$C_{SO_2} = \frac{0.3989 \times 10^{-5} (V_t - 0.3)}{V_{m(std)}}$$ in ~~ppm~~ lb/dscf

$$V_{m(std)} = K_1 Y \frac{V_m P_{bar}}{T_m}$$

where $K_1 = 17.64$ for English Units.

$Y = 1,000$

$$V_{m(std)} = 17.64 \frac{V_m P_{bar}}{T_m}$$ in std ft^3

Fuel Consumption / Heat Release

Coal/Oil Mix

14,660 Btu/lb heat value

9.29 lb/gal @ 72F   8.61 lb/gal @ 122F

~~assume 8.5 lb/gal @ metered temp.~~ not metered

Given 600 gal/hr. @ 72F

Heat input = 600 x ~~8.5~~ 9,3 x 14,660 = 81.7 x 10⁶ Btu/hr.

#6 Oil   Heat Value given to be

~~18,357 Btu/lb.~~   148,000 Btu/gal

~~8.28 lb/gal~~

Oil Meter @ 1600 = 1391160

@ 1700 = 1391760

2/16/84

600 gal/hr.

@ 1700 = 1391760

@ 1800 = 1392210

450 gal/hr.

SO_2 Tests started 1610 & Ran thru 1730

Avg = 525 gal/hr.

Heat Release = 77.7 x 10⁶ Btu/hr.

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SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer
Type of Control Scrubber
Type of Samples SO2
Date 2-16 Run No. 1 Com
Time Start 1045 Time End
Sample Time min/pt Total min
DB °F, WB °F, VP @ DP "Hg
Bar. Press. 30.12 "Hg, Stack Press. "Hg
Moisture %, FDA , Gas Density Factor
Temp. °F, W/D , W/S
Weather Thermocouple Readout
Sample Box No. meter Box No.
Meter ΔH@ Pitot Corr. Factor
Nozzle Dia. in., Probe Length ft
Probe Heater Setting Nomograph C_f
Stack Dimensions in
Stack Area ft^2
Effective Stack Area ft^2
Stack Height ft

Method 6

Begin Purge 1122

End 1137

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate
Final Gas Meter Reading 723.292 ft^3
Initial Gas Meter Reading 722.592 ft^3 0.7
Condensate Increase in Impingers ml
Moisture in Silica Gel gm
Silica Gel Container No. Filter No.

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R. Shelton

Stack Test Observers:

Leak Check Meter Box
Initial 0.00 cfm @ NA In H_2
Final 0.00 cfm @ 2 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual	130	86			
		1045	722.592					80			1.8
		1050	22.695				130	80			1.8
		1055	22.782				130	82			2.2
		1100	22.880					83			2.0
		1105	22.992				130	87			2.2
		1110	23.092					90			2.2
		1115	23.182					92			2.2
		1120	23.292					94			2.2

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SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer
Type of Control
Type of Samples Coal/Oil Mix
Date 2-16 Run No. 2
Time Start 1140 Time End
Sample Time min/pt Total min
DB °F, WB °F, VP @ DP "Hg
Bar. Press. "Hg, Stack Press. "Hg
Moisture %, FDA , Gas Density Factor
Temp. °F, W/D , W/S
Weather Thermocouple Readout
Sample Box No. meter Box No.
Meter ΔH@ Pitot Corr. Factor
Nozzle Dia. in., Probe Length ft
Probe Heater Setting Nomograph C_f
Stack Dimensions in
Stack Area ft^2
Effective Stack Area ft^2
Stack Height ft

Method 6

Begin purge 1206

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate
Final Gas Meter Reading 724.617 ft^3
Initial Gas Meter Reading 723.768 ft^3 0.849
Condensate Increase in Impingers ml
Moisture in Silica Gel gm
Silica Gel Container No. Filter No.

Orsat:				
$\%CO_2$				
$\%O_2$				
$\%CO$				
$\%N_2$				

Test Conducted By: K. Sholtes

Stack Test Observers: Anthony

Leak Check Meter Box
Initial 0.00 cfm @ 10 In H_2
Final cfm @ In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		103.5			
		1140	23.768					102			2.8
		1145	23.900					102			2.4
		1150	24.100					104			2.5
		1155	24.270					104			2.5
		1200	24.422					104			2.6
		1205	724.617					105			2.7

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SK

SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer
Type of Control
Type of Samples Coal/Oil
Date Run No. 3
Time Start 1230 Time End
Sample Time min/pt Total min
DB °F, WB °F, VP @ DP "Hg
Bar. Press. "Hg, Stack Press. "Hg
Moisture %, FDA, Gas Density Factor
Temp. °F, W/D, W/S
Weather Thermocouple Readout
Sample Box No. meter Box No.
Meter ΔH@ Pitot Corr. Factor
Nozzle Dia. in., Probe Length ft
Probe Heater Setting Nomograph C_f
Stack Dimensions in
Stack Area ft^2
Effective Stack Area ft^2
Stack Height ft

Method 6

Purg 1252 Start
End

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate
Final Gas Meter Reading 726.400 ft^3
Initial Gas Meter Reading 725.335 ft^3 1.065
Condensate Increase in Impingers ml
Moisture in Silica Gel gm
Silica Gel Container No. Filter No.

Orsat:				
$\%CO_2$				
$\%O_2$				
$\%CO$				
$\%N_2$				

Test Conducted By: R. Sholtes

Stack Test Observers:

Leak Check Meter Box
Initial [illegible] cfm @ 15 In H_2
Final cfm @ In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F) 106.8	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
		1230	25.335					105			2.7
		1235	25.620					106			2.6
		1240	25.940					107			2.6
		1245	26.250					108			2.5
		1250	26.400					108			2.4

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SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer
Type of Control Scrubber
Type of Samples SO2
Date ______ Run No. 1 Oil
Time Start 1610 Time End ______
Sample Time ______ min/pt ______ Total min
DB ____ °F, WB ____ °F, VR @ DP ______ "Hg
Bar. Press. ______ "Hg, Stack Press. ______ "Hg
Moisture ____ %, FDA ____, Gas Density Factor ____
Temp. ____ °F, W/D ______, W/S ______
Weather ______ Thermocouple Readout ______
Sample Box No. ______ meter Box No. ______
Meter ΔH@ ______ Pitot Corr. Factor ______
Nozzle Dia. ______ in., Probe Length ______ ft
Probe Heater Setting ______ Nomograph C_f ______
Stack Dimensions ______ in
Stack Area ______ ft^2
Effective Stack Area ______ ft^2
Stack Height ______ ft

Method 6
Oil

St Purge @1631

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate ______
Final Gas Meter Reading 727,915 ft^3
Initial Gas Meter Reading 727210 ft^3 0.705
Condensate Increase in Impingers ______ ml
Moisture in Silica Gel ______ gm
Silica Gel Container No. ______ Filter No. ______

Orsat:				
%CO_2				
%O_2				
%CO				
%N_2				

Test Conducted By: R. Sholtes

Stack Test Observers: ______

Leak Check Meter Box
Initial 0.00 cfm @ 10 In H2
Final 0.00 cfm @ 10 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		94			
		1610	27.210					92			2.7
		1615	27.340					93			2.8
		1620	27.470					94			↑ 4.5
		1625	27.730					95			4.0
		1630	27.915					96			4.0

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SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer.
Type of Control Scrubber
Type of Samples SO_2 - Method 6
Date ______ Run No. 2 Oil
Time Start 1645 Time End ______
Sample Time ______ min/pt ______ Total min
DB ______ °F, WB ______ °F, VP @ DP ______ "Hg
Bar. Press. ______ "Hg, Stack Press. ______ "Hg
Moisture ______ %, FDA ______, Gas Density Factor ______
Temp. ______ °F, W/D ______, W/S ______
Weather ______ Thermocouple Readout ______
Sample Box No. ______ meter Box No. ______
Meter ΔH@ ______ Pitot Corr. Factor ______
Nozzle Dia. ______ in., Probe Length ______ ft
Probe Heater Setting ______ Nomograph C_f ______
Stack Dimensions ______ in
Stack Area ______ ft^2
Effective Stack Area ______ ft^2
Stack Height ______ ft

Method 6
Oil

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate ______
Final Gas Meter Reading 729.188 ft^3
Initial Gas Meter Reading 728.411 ft^3 0.777
Condensate Increase in Impingers ______ ml
Moisture in Silica Gel ______ gm
Silica Gel Container No. ______ Filter No. ______

Orsat:				
$\%CO_2$				
$\%O_2$				
%CO				
$\%N_2$				

Test Conducted By: R. Sholtes

Stack Test Observers: ______

Leak Check Meter Box
Initial 0.00 cfm @ 10 In H_2
Final 0.00 cfm @ 10 In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F) 105.6	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual					
		1645	728411					104			2.9
		1650	728.605					105			2.8
		1655	28.800					106			2.8
		1700	28.940					106			2.2
		1705	729.188					107			2.2

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SOURCE SAMPLING FIELD DATA SHEET

Plant AMAX
Sampling Location Fluid Bed Dryer
Type of Control Scrubber
Type of Samples SO_2 · Oil
Date ______ Run No. 3 Oil
Time Start ______ Time End ______
Sample Time ______ min/pt ______ Total min.
DB ______ °F, WB ______ °F, VP @ DP ______ "Hg
Bar. Press. ______ "Hg, Stack Press. ______ "Hg
Moisture ______ %, FDA ______, Gas Density Factor ______
Temp. ______ °F, W/D ______, W/S ______
Weather ______ Thermocouple Readout ______
Sample Box No. ______ meter Box No. ______
Meter ΔH@ ______ Pitot Corr. Factor ______
Nozzle Dia. ______ in., Probe Length ______ ft
Probe Heater Setting ______ Nomograph C_f ______
Stack Dimensions ______ in
Stack Area ______ ft^2
Effective Stack Area ______ ft^2
Stack Height ______ ft

Method 6
Oil

Purge 1730
1745

Stack Dimensions

Umbilical Cord 100' 200'

Mat'l Processing Rate ______
Final Gas Meter Reading 730.558 ft^3
Initial Gas Meter Reading 729.623 ft^3 0.935
Condensate Increase in Impingers ______ ml
Moisture in Silica Gel ______ gm
Silica Gel Container No. ______ Filter No. ______

Orsat:				
$\%CO_2$				
$\%O_2$				
$\%CO$				
$\%N_2$				

Test Conducted By: Cicholtes
______

Stack Test Observers: ______
______

Leak Check
Meter Box
Initial ______ cfm @ ______ In H_2
Final ______ cfm @ ______ In Hg

Pitot Tubes
Impact 3 In H_2O for 15 sec. Stable, Leak
Static 3 In H_2O for 15 sec. Stable, Leak

Port and Traverse Point No.	Distance From Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head ("H_2O)	Meter Orifice Press. Diff. ("H_2O)		Stack Gas Temp. (°F)	Meter Temp. (°F)	Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		108.4			
		1710	729.623					110			4.0
		1715	29.765					109			5.0
		1720	—					108			4.8
		1725	730.400					108			5.0
		1730	730.558					107			5.0

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax Chemical Corp.

SOURCE NAME: Big Bend Dryer.

DATE: 2-17-84 TYPE OF SAMPLE: SO_2 on Oil

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION
Run 1	Method 6 on Oil
Run 2	" " "
Run 3	" " "

Sample Recovered By: R. Sholtes

~~Particulate~~ SO_2 Analysis By: George Gabel

SO_2
LAB DATA

Plant Name AMAX OIL Date Analyzed 2-17-84

Analyzed By Geo. Gebel

Stack	Sample No.	V.T.	V.T.B.	N.	V.Soln.	V.A.
DRYER	Run 1	3.6	0.3	.0113	100	20
OIL	"	3.6				
	Run 2	1.6				
	"	1.6				
	Run 3	4.5				
		4.6	↓	↓		

V.T. = Volume of Barium perchlorate titrant used for sample (ml)
V.T.B. = Volume of Barium perchlorate titrant used for blank (ml)
N. = Normality of Barium perchlorate
V.Soln. = Total solution volume
V.A. = Volume of sample aliquot titrated (ml)

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax Chemical Corp.

SOURCE NAME: Big Bend Dryer.

DATE: 2-16-84 TYPE OF SAMPLE: SO_2 on Coal/Oil

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION
Run 1	Method 6 on coal/oil
Run 2	" " "
Run 3	" " "

Sample Recovered By: R. Sholtes

~~Particulate~~ SO_2 Analysis By: George Gabel

SO_2
LAB DATA

Plant Name AMAX COAL/OIL Date Analyzed 2-17-84

Analyzed By Geo. Gabel

Stack	Sample No.	V.T.	V.T.B.	N.	V.Soln.	V.A.
DRYER	Run 1	0.5	0.3	.0113	100	20
COAL/OIL	"	0.5				
	Run 2	1.6				
	"	1.5				
	Run 3	3.3				
		3.3				

V.T. = Volume of Barium perchlorate titrant used for sample (ml)
V.T.B. = Volume of Barium perchlorate titrant used for blank (ml)
N. = Normality of Barium perchlorate
V.Soln. = Total solution volume
V.A. = Volume of sample aliquot titrated (ml)

where:
[illegible] °K/mm Hg for metric units
[illegible] °R/in. Hg for English units

NOTE.—Equation 5-1 can be used as written unless the leakage rate observed during any of the mandatory leak checks (i.e., the post-test leak check or leak checks conducted prior to component changes) exceeds L_a. If L_p or L_i exceeds L_a, Equation 5-1 must be modified as follows:

(a) Case I. No component changes made during sampling run. In this case, replace V_m in Equation 5-1 with the expression;

$$V_m - (L_p - L_a)\theta]$$

(b) Case II. One or more component changes made during the sampling run. In this case, replace V_m in Equation 5-1 by the expression:

$$\left[V_m - (L_1 - L_a)\theta_1 - \sum_{i=2}^{n} (L_i - L_a)\theta_i - (L_p - L_a)\theta_p\right]$$

and substitute only for those leakage rates (L_i or L_p) which exceed L_a.

6.4 Volume of water vapor.

Equation 5-2

$$V_{w(std)} = V_{lc}\left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right) = K_2 V_{lc}$$

where:
K_2 = 0.001333 m³/ml for metric units
= 0.04707 ft³/ml for English units.

6.5 Moisture Content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$$

Equation 5-3

NOTE.—In saturated or water droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 5-3), and a second from the assumption of saturated conditions. The lower of the two values of B_{ws} shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note of Section 1.2 of Method 4. For the purposes of this method, the average stack gas temperature from Figure 5-2 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is ± 1° C (2° F).

6.6 Acetone Blank Concentration.

$$C_a = \frac{m_a}{V_a \rho_a}$$

Equation 5-4

6.7 Acetone Wash Blank.

$$W_a = C_a V_{aw} \rho_a$$

Equation 5-5

6.8 Total Particulate Weight. Determine the total particulate catch from the sum of the weights obtained from containers 1 and 2 less the acetone blank (see Figure 5-2). NOTE.—Refer to Section 4.1.5 to assist in calculation of results involving two or more filter assemblies or two or more sampling trains.

6.9 Particulate Concentration.

$$c_s = (0.001\ g/mg)\ (m_n/V_{m(std)})$$

Equation 5-6

6.10 Conversion Factors:

From	To	Multiply by
scf	m³	0.02832
g/ft³	gr/ft³	15.43
g/ft³	lb/ft³	2.205×10⁻³
g/ft³	g/m³	35.31

6.11 Isokinetic Variation.

6.11.1 Calculation From Raw Data.

$$I = \frac{100\, T_s [K_3 V_{lc} + (V_m/T_m)\,(P_{bar} + \Delta H/13.6)]}{60\, \theta v_s P_s A_n}$$

Equation 5-7

where:
K_3 = 0.003454 mm Hg-m³/ml-°K for metric units.
= 0.002669 in. Hg-ft³/ml-°R for English units.

6.11.2 Calculation From Intermediate Values.

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} v_s \theta A_n P_s 60(1 - B_{ws})}$$

$$= K_4 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1 - B_{ws})}$$

Equation 5-8

where:
K_4 = 4.320 for metric units
= 0.09450 for English units.

6.12 Acceptable Results. If 90 percent $\leq I \leq 110$ percent, the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or, if I is less than 90 percent, the Administrator may opt to accept the results. Use Citation 4 to make judgments. Otherwise, reject the results and repeat the test.

7. *Bibliography*

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9. Annual Book of ASTM Standards. Part 26. Gaseous Fuels; Coal and Coke; Atmospheric Analysis. American Society for Testing and Materials. Philadelphia, Pa. 1974. pp. 617-622.

METHOD 6—DETERMINATION OF SULFUR DIOXIDE EMISSIONS FROM STATIONARY SOURCES

1. *Principle and Applicability*

1.1 Principle. A gas sample is extracted from the sampling point in the stack. The sulfuric acid mist (including sulfur trioxide) and the sulfur dioxide are separated. The sulfur dioxide fraction is measured by the barium-thorin titration method.

1.2 Applicability. This method is applicable for the determination of sulfur dioxide emissions from stationary sources. The minimum detectable limit of the method has been determined to be 3.4 milligrams (mg) of SO_2/m³ (2.12×10^{-7} lb/ft³). Although no upper limit has been established, tests have shown that concentrations as high as 80,000 mg/m³ of SO_2 can be collected efficiently in two midget impingers, each containing 15 milliliters of 3 percent hydrogen peroxide, at a rate of 1.0 lpm for 20 minutes. Based on theoretical calculations, the upper concentration limit in a 20-liter sample is about 93,300 mg/m³.

Possible interferents are free ammonia, water-soluble cations, and fluorides. The cations and fluorides are removed by glass wool filters and an isopropanol bubbler, and hence do not affect the SO_2 analysis. When samples are being taken from a gas stream with high concentrations of very fine metallic fumes (such as in inlets to control devices), a high-efficiency glass fiber filter must be used in place of the glass wool plug (i.e., the one in the probe) to remove the cation interferents.

Free ammonia interferes by reacting with SO_2 to form particulate sulfite and by reacting with the indicator. If free ammonia is present (this can be determined by knowledge of the process and noticing white particulate matter in the probe and isopropanol bubbler), alternative methods, subject to the approval of the Administrator, U.S. Environmental Protection Agency, are required.

2. *Apparatus*

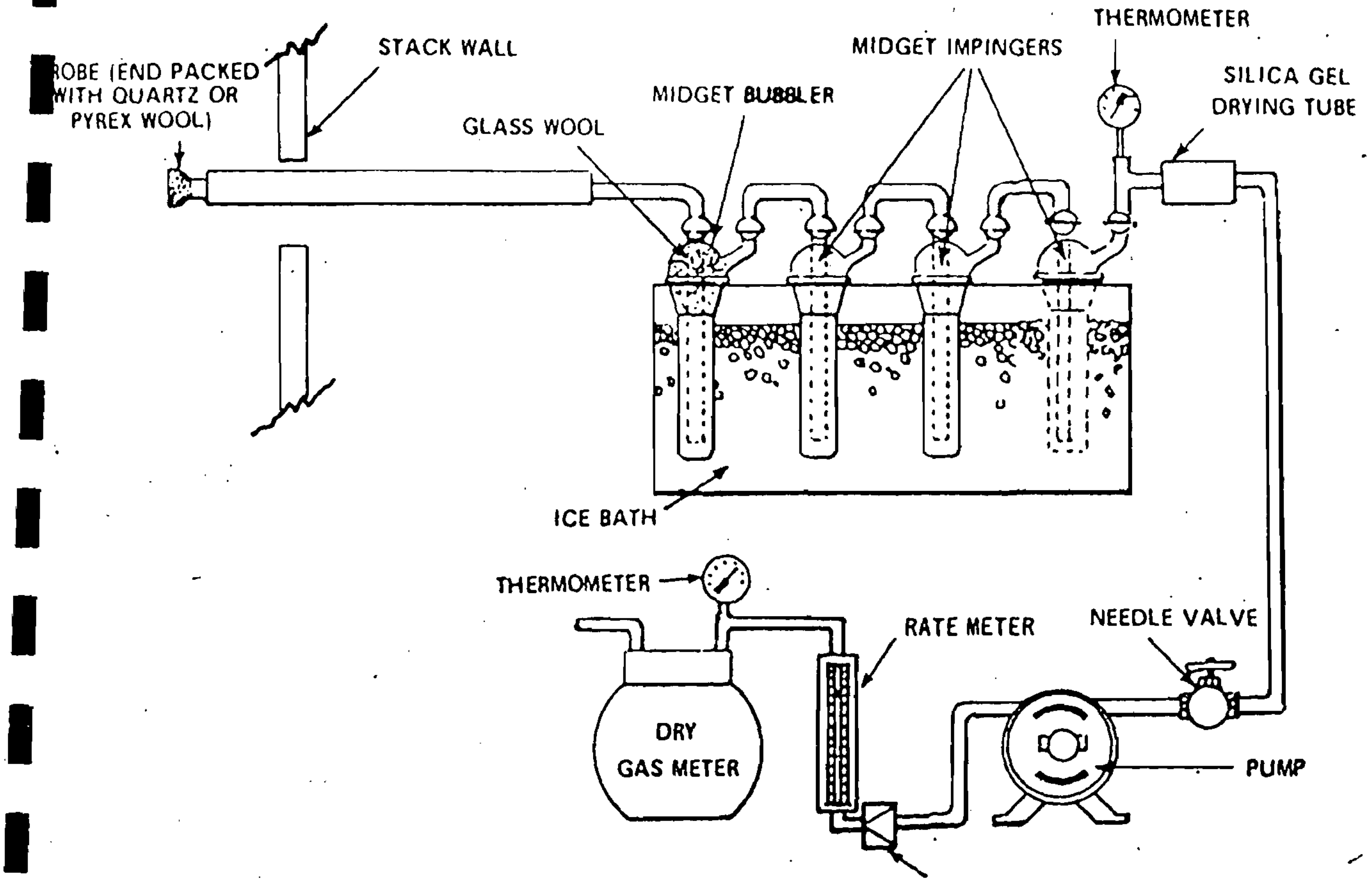

Figure 6-1. SO_2 sampling train.

2.1 Sampling. The sampling train is shown in Figure 6-1, and component parts are discussed below. The tester has the option of substituting sampling equipment described in Method 8 in place of the midget impinger equipment of Method 6. However, the Method 8 train must be modified to include a heated filter between the probe and isopropanol impinger, and the operation of the sampling train and sample analysis must be at the flow rates and solution volumes defined in Method 8.

The tester also has the option of determining SO_2 simultaneously with particulate matter and moisture determinations by (1) replacing the water in a Method 5 impinger system with 3 percent perioxide solution, or (2) by replacing the Method 5 water impinger system with a Method 8 isopropanol-filter-peroxide system. The analysis for SO_2 must be consistent with the procedure in Method 8.

2.1.1 **Probe.** Borosilicate glass, or stainless steel (other materials of construction may be used, subject to the approval of the Administrator), approximately 6-mm inside diameter, with a heating system to prevent water condensation and a filter (either in-stack or heated out-stack) to remove particulate matter, including sulfuric acid mist. A plug of glass wool is a satisfactory filter.

2.1.2 **Bubbler and Impingers.** One midget bubbler, with medium-coarse glass frit and borosilicate or quartz glass wool packed in top (see Figure 6-1) to prevent sulfuric acid mist carryover, and three 30-ml midget impingers. The bubbler and midget impingers must be connected in series with leak-free glass connectors. Silicone grease may be used, if necessary, to prevent leakage.

At the option of the tester, a midget impinger may be used in place of the midget bubbler.

Other collection absorbers and flow rates may be used, but are subject to the approval of the Administrator. Also, collection efficiency must be shown to be at least 99 percent for each test run and must be documented in the report. If the efficiency is found to be acceptable after a series of three tests, further documentation is not required. To conduct the efficiency test, an extra absorber must be added and analyzed separately. This extra absorber must not contain more than 1 percent of the total SO_2.

2.1.3 **Glass Wool.** Borosilicate or quartz.

2.1.4 Stopcock Grease. Acetone-insoluble, heat-stable silicone grease may be used, if necessary.

2.1.5 Temperature Gauge. Dial thermometer, or equivalent, to measure temperature of gas leaving impinger train to within 1° C (2° F.)

2.1.6 Drying Tube. Tube packed with 6- to 16-mesh indicating type silica gel, or equivalent, to dry the gas sample and to protect the meter and pump. If the silica gel has been used previously, dry at 175° C (350° F) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to approval of the Administrator.

2.1.7 Value. Needle value, to regulate sample gas flow rate.

2.1.8 Pump. Leak-free diaphragm pump, or equivalent, to pull gas through the train. Install a small tank between the pump and rate meter to eliminate the pulsation effect of the diaphragm pump on the rotameter.

2.1.9 Rate Meter. Rotameter, or equivalent, capable of measuring flow rate to within 2 percent of the selected flow rate of about 1000 cc/min.

2.1.10 Volume Meter. Dry gas meter, sufficiently accurate to measure the sample volume within 2 percent, calibrated at the selected flow rate and conditions actually encountered during sampling, and equipped with a temperature gauge (dial thermometer, or equivalent) capable of measuring temperature to within 3°C (5.4°F).

2.1.11 Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station, in which case the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft) elevation increase or vice versa for elevation decrease.

2.1.12 Vacuum Gauge. At least 760 mm Hg (30 in. Hg) gauge, to be used for leak check of the sampling train.

2.2 Sample Recovery.

2.2.1 Wash bottles. Polyethylene or glass, 500 ml, two.

2.2.2 Storage Bottles. Polyethylene, 100 ml, to store impinger samples (one per sample).

2.3 Analysis.

2.3.1 Pipettes. Volumetric type, 5-ml, 20-ml (one per sample), and 25-ml sizes.

2.3.2 Volumetric Flasks. 100-ml size (one per sample) and 100-ml size.

2.3.3 Burettes. 5- and 50-ml sizes.

2.3.4 Erlenmeyer Flasks. 250 ml-size (one for each sample, blank, and standard).

2.3.5 Dropping Bottle. 125-ml size, to add indicator.

2.3.6 Graduated Cylinder. 100-ml size.

2.3.7 Spectrophotometer. To measure absorbance at 352 nanometers.

3. *Reagents*

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

3.1 Sampling.

3.1.1 Water. Deionized, distilled to conform to ASTM specification D1193-74, Type 3. At the option of the analyst, the $KMnO_4$ test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

3.1.2 Isopropanol, 80 percent. Mix 80 ml of isopropanol with 20 ml of deionized, distilled water. Check each lot of isopropanol for peroxide impurities as follows: shake 10 ml of isopropanol with 10 ml of freshly prepared 10 percent potassium iodide solution. Prepare a blank by similarly treating 10 ml of distilled water. After 1 minute, read the absorbance at 352 nanometers on a spectrophotometer. If absorbance exceeds 0.1, reject alcohol for use.

Peroxides may be removed from isopropanol by redistilling or by passage through a column of activated alumina; however, reagent grade isopropanol with suitably low peroxide levels may be obtained from commercial sources. Rejection of contaminated lots may, therefore, be a more efficient procedure.

3.1.3 Hydrogen Peroxide, 3 Percent. Dilute 30 percent hydrogen peroxide 1:9 (v/v) with deionized, distilled water (30 ml is needed per sample). Prepare fresh daily.

3.1.4 Potassium Iodide Solution, 10 Percent. Dissolve 10.0 grams KI in deionized, distilled water and dilute to 100 ml. Prepare when needed.

3.2 Sample Recovery.

3.2.1 Water. Deionized, distilled, as in 3.1.1.

3.2.2 Isopropanol, 80 Percent. Mix 80 ml of isopropanol with 20 ml of deionized, distilled water.

3.3 Analysis.

3.3.1 Water. Deionized, distilled, as in 3.1.1.

3.3.2 Isopropanol, 100 percent.

3.3.3 Thorin Indicator. 1-(o-arsonophenylazo)-2-naphthol-3,6-disulfonic acid, disodium salt, or equivalent. Dissolve 0.20 g in 100 ml of deionized, distilled water.

3.3.4 Barium Perchlorate Solution, 0.0100 N. Dissolve 1.95 g of barium perchlorate trihydrate $[Ba(ClO_4)_2 \cdot 3H_2O]$ in 200 ml distilled water and dilute to 1 liter with isopropanol. Alternatively, 1.22 g of $[BaCl_2 \cdot 2H_2O]$ may be used instead of the perchlorate. Standardize as in Section 5.5.

3.3.5 Sulfuric Acid Standard, 0.0100 N. Purchase or standardize to ±0.0002 N against 0.0100 N NaOH which has previously been standardized against potassium acid phthalate (primary standard grade).

4. *Procedure*

4.1 Sampling.

4.1.1 Preparation of collection train. Measure 15 ml of 80 percent isopropanol into the midget bubbler and 15 ml of 3 percent hydrogen peroxide into each of the first two midget impingers. Leave the final midget impinger dry. Assemble the train as shown in Figure 6-1. Adjust probe heater to a temperature sufficient to prevent water condensation. Place crushed ice and water around the impingers.

4.1.2 Leak-check procedure. A leak check prior to the sampling run is optional; however, a leak check after the sampling run is mandatory. The leak-check procedure is as follows:

With the probe disconnected, place a vacuum gauge at the inlet to the bubbler and pull a vacuum of 250 mm (10 in.) Hg; plug or pinch off the outlet of the flow meter, and then turn off the pump. The vacuum shall remain stable for at least 30 seconds. Carefully release the vacuum gauge before releasing the flow meter end to prevent back flow of the impinger fluid.

Other leak-check procedures may be used, subject to the approval of the Administrator, U.S. Environmental Protection Agency. The procedure used in Method 5 is not suitable for diaphragm pumps.

4.1.3 Sample collection. Record the initial dry gas meter reading and barometric pressure. To begin sampling, position the tip of the probe at the sampling point, connect the probe to the bubbler, and start the pump. Adjust the sample flow to a constant rate of approximately 1.0 liter/min as indicated by the rotameter. Maintain this constant rate (±10 percent) during the entire sampling run. Take readings (dry gas meter, temperatures at dry gas meter and at impinger outlet and rate meter) at least every 5 minutes. Add more ice during the run to keep the temperature of the gases leaving the last impinger at 20° C (68° F) or less. At the conclusion of each run, turn off the pump, remove probe from the stack, and record the final readings. Conduct a leak check as in Section 4.1.2. (This leak check is mandatory.) If a leak is found, void the test run. Drain the ice bath, and purge the remaining part of the train by drawing clean ambient air through the system for 15 minutes at the sampling rate.

Clean ambient air can be provided by passing air through a charcoal filter or through an extra midget impinger with 15 ml of 3 percent H_2O_2. The tester may opt to simply use ambient air, without purification.

4.2 Sample Recovery. Disconnect the impingers after purging. Discard the contents of the midget bubbler. Pour the contents of the midget impingers into a leak-free polyethylene bottle for shipment. Rinse the three midget impingers and the connecting tubes with deionized, distilled water, and add the washings to the same storage container. Mark the fluid level. Seal and identify the sample container.

4.3 Sample Analysis. Note level of liquid in container, and confirm whether any sample was lost during shipment; note this on analytical data sheet. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results.

Transfer the contents of the storage container to a 100-ml volumetric flask and dilute to exactly 100 ml with deionized, distilled water. Pipette a 20-ml aliquot of this solution into a 250-ml Erlenmeyer flask, add 80 ml of 100 percent isopropanol and two to four drops of thorin indicator, and titrate to a pink endpoint using 0.0100 N barium perchlorate. Repeat and average the titration volumes. Run a blank with each series of samples. Replicate titrations must agree within 1 percent or 0.2 ml, whichever is larger.

(NOTE.—Protect the 0.0100 N barium perchlorate solution from evaporation at all times.)

5. *Calibration*

5.1 Metering System.

5.1.1 Initial Calibration. Before its initial use in the field, first leak check the metering system (drying tube, needle valve, pump, rotameter, and dry gas meter) as follows: place a vacuum gauge at the inlet to the drying tube and pull a vacuum of 250 mm (10 in.) Hg; plug or pinch off the outlet of the flow meter, and then turn off the pump. The vacuum shall remain stable for at least 30 seconds. Carefully release the vacuum gauge before releasing the flow meter end.

Next, calibrate the metering system (at the sampling flow rate specified by the method) as follows: connect an appropriately sized wet test meter (e.g., 1 liter per revolution) to the inlet of the drying tube. Make three independent calibration runs, using at least five revolutions of the dry gas meter per run. Calculate the calibration factor, Y (wet test meter calibration volume divided by the dry gas meter volume, both volumes adjusted to the same reference temperature and pressure), for each run, and average the results. If any Y value deviates by more than 2 percent from the average, the metering system is unacceptable for use. Otherwise, use the average as the calibration factor for subsequent test runs.

5.1.2 Post-Test Calibration Check. After each field test series, conduct a calibration check as in Section 5.1.1 above, except for the following variations: (a) the leak check is not to be conducted, (b) three, or more revolutions of the dry gas meter may be used, and (c) only two independent runs need be made. If the calibration factor does not deviate by more than 5 percent from the initial calibration factor (determined in Section 5.1.1), then the dry gas meter volumes obtained during the test series are acceptable. If the calibration factor deviates by more than 5 percent, recalibrate the metering system as in Section 5.1.1, and for the calculations, use the calibration factor (initial or recalibration) that yields the lower gas volume for each test run.

5.2 Thermometers. Calibrate against mercury-in-glass thermometers.

5.3 Rotameter. The rotameter need not be calibrated but should be cleaned and maintained according to the manufacturer's instruction.

5.4 Barometer. Calibrate against a mercury barometer.

5.5 Barium Perchlorate Solution. Standardize the barium perchlorate solution against 25 ml of standard sulfuric acid to which 100 ml of 100 percent isopropanol has been added.

6. *Calculations*

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculation.

6.1 Nomenclature.

C_{SO_2} = Concentration of sulfur dioxide, dry basis corrected to standard conditions, mg/dscm (lb/dscf).
N = Normality of barium perchlorate titrant, milliequivalents/ml.
P_{bar} = Barometric pressure at the exit orifice of the dry gas meter, mm Hg (in. Hg).
P_{std} = Standard absolute pressure, 760 mm Hg, (29.92 in. Hg).
T_m = Average dry gas meter absolute temperature, °K (°R).
T_{std} = Standard absolute temperature, 293° K (528° R).
V_a = Volume of sample aliquot titrated, ml.
V_m = Dry gas volume as measured by the dry gas meter, dcm (dcf).
$V_{m(std)}$ = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscm (dscf).
V_{soln} = Total volume of solution in which the sulfur dioxide sample is contained, 100 ml.
V_t = Volume of barium perchlorate titrant used for the sample, ml (average of replicate titrations).
V_{tb} = Volume of barium perchlorate titrant used for the blank, ml.
Y = Dry gas meter calibration factor.
32.03 = Equivalent weight of sulfur dioxide.

6.2 Dry sample gas volume, corrected to standard conditions.

$$V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m}\right)\left(\frac{P_{bar}}{P_{std}}\right) = K_1 Y \frac{V_m P_{bar}}{T_m}$$

Equation 6-1

where:

K_1 = 0.3858 °K/mm Hg for metric units.
= 17.64 °R/in. Hg for English units.

6.3 Sulfur dioxide concentration.

$$C_{SO_2} = K_2 \frac{(V_t - V_{tb})\, N \left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}}$$

Equation 6-2

where:

K_2 = 32.03 mg/meq. for metric units.
= 7.061×10^{-5} lb/meq. for English units.

7. *Bibliography*

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METHOD 7—DETERMINATION OF NITROGEN OXIDE EMISSIONS FROM STATIONARY SOURCES

1. *Principle and Applicability*

1.1 Principle. A grab sample is collected in an evacuated flask containing a dilute sulfuric acid-hydrogen peroxide absorbing solution, and the nitrogen oxides, except nitrous oxide, are measured colorimetrically using the phenoldisulfonic acid (PDS) procedure.

1.2 Applicability. This method is applicable to the measurement of nitrogen oxides emitted from stationary sources. The range of the method has been determined to be 2 to 400 milligrams NO_x (as NO_2) per dry standard cubic meter, without having to dilute the sample.

2. *Apparatus*

2.1 Sampling (see Figure 7-1). Other grab sampling systems or equipment, capable of measuring sample volume to within ±2.0 percent and collecting a sufficient sample volume to allow analytical reproducibility to within ±5 percent, will be considered acceptable alternatives, subject to approval of the Administrator, U.S. Environmental Protection Agency. The following equipment is used in sampling:

2.1.1 Probe. Borosilicate glass tubing, sufficiently heated to prevent water condensation and equipped with an in-stack or out-stack filter to remove particulate matter (a plug of glass wool is satisfactory for this purpose). Stainless steel or Teflon[3] tubing may also be used for the probe. Heating is not necessary if the probe remains dry during the purging period.

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[3] Mention of trade names or specific products does not constitute endorsement by the Environmental Protection Agency.

APPENDIX A3

Field Data Sheets and Computations
Nitrogen Oxide Sampling/Method 7

NO$_x$ Mass Emissions

Coal/Oil Sample time 1315 thru 1600 on 2/16/84

Average Concen = 8.968×10^{-6} lb/scf.

Particulate Runs 1, 2 & 3 span this time period.

Avg Flow = 52220 SCFMD.

NO$_x$ Mass Emission = $8.968 \times 10^{-6} \times 52{,}220 \times 60$

= 28.1 lb/hr.

Oil Sample time 0830 thru 1115 on 2/17/84

Average Concen = 6.080×10^{-6} lb/scf.

Particulate Runs 2 & 3 span this time period

Average Flow = 53398 SCFMD

NO$_x$ Mass Emission = $6.080 \times 10^{-6} \times 53398 \times 60$

= 19.5 lb/hr.

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P.O. Box 52718 Jacksonville, Florida 32201

PLANTS: 925 N. Lane Avenue Jacksonville, Florida 32201 904-786-0750
Stephens Drive Nicholasville, Kentucky 40356 606-885-6011

Coal/Oil

8.968×10^{-6} lb/scf 75.4 ppm

= 28.1 Lb/h

Oil

6.080×10^{-6} lb/scf. 51.1

= 19.5 Lb/hr.

as NO_2

$Lb/scF \times \frac{SCF}{h} =$

James G. Nolan
(502) 451-6737

P. O. Box 20283
Louisville, Ky. 40220

TABLE
NO_x
EMISSION DATA

PLANT AMAX Fluid Bed Dryer

STACK Coal/oil

Bar 30.12

Run No.	1	2	3	4
Date	2-16-84	2-16	2-16	2-16
Time	1315	1330	1345	1400
Flask No.	28	38	39	44
V_f = Flask + Valve Volume, ml	2090	2026	2039	2017
V_a = Absorbing Soln. Volume, vl	25	25	25	25
Ti = Initial Flask Temp., °F	78	77	79	79
T_f = Final Flask Temp., °F	63	63	63	63
P_i = Initial Flask Vacuum, "Hg	28.3"	28.3	28.2	28.0
P_f = Final Flask Vacuum, "Hg	-.2	0	0	0
V_{stpd} = Gas Sample Volume, ml*	1939.5	1892.7	1898.8	1865.0
m = Mass of NO_2 in Gas Sample, µg	285.0	285.0	349.1	270.8
NO_2 Concentration, lbs/scf	9.174 E-6	9.401 E-6	11.478 E-6	9.065 E-6
NO_2 Concentration, ppm	77.12	79.02	96.48	76.20

*Dry, 70°F, 29.92"Hg

$V_{stpd} = 17.64 \times (V_f - V_a) \times \left[\frac{Pbf - Pf}{Tf} - \frac{Pbi - Pi}{Ti}\right]$, when P_{bf} & P_{bi} = the final and initial barometric pressures.

$NO_2\ (lbs/scf) = 6.243 \times \left(\frac{m}{V_{stpd}}\right) \times 10^{-5}$

$NO_2\ (ppm) = 8.406 \times 10^6 \times \frac{lbs}{ft^3}\ NO_2$

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TABLE

NO_x

EMISSION DATA

PLANT AMAX

STACK

~~Barometer 30.18~~ 30.12

Run No.	9	10	11	12
Date	2/16/84	2/16/84	2/16/84	2/16/84
Time	1515	1530	1545	1600
Flask No.	32	31	40	36
V_f = Flask + Valve Volume, ml	2079	2080	2017	2117
V_a = Absorbing Soln. Volume, vl	25	25	25	25
Ti = Initial Flask Temp., °F	80	84	89	83
T_f = Final Flask Temp., °F	62	62	62	62
P_i = Initial Flask Vacuum, "Hg	28.2	27.0	28.1	27.7
P_f = Final Flask Vacuum, "Hg	-.1	-.4	-.7	-.2
V_{stpd} = Gas Sample Volume, ml*	1933.8	1834.8	1830.6	1929.2
m = Mass of NO_2 in Gas Sample, μg	256.5	277.9	257.9	327.8
NO_2 Concentration, lbs/scf	8.281 E-6	9.456 E-6	8.795 E-6	10.607 E-6
NO_2 Concentration, ppm	69.61	79.48	73.93	89.17

*Dry, 70°F, 29.92"Hg

FINAL-PB-29.80

$V_{stpd} = 17.64 \times (V_f - V_a) \times [\frac{Pbf - Pf}{Tf} - \frac{Pbi - Pi}{Ti}]$, when P_{bf} & P_{bi} = the final and initial barometric pressures.

NO_2 (lbs/scf) $= 6.243 \times (\frac{m}{V_{stpd}}) \times 10^{-5}$

NO_2 (ppm) $= 8.406 \times 10^6 \times \frac{lbs}{ft^3}$ NO_2

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TABLE

NO_x

EMISSION DATA

Baromet. 2/16/84
30.12

PLANT AMAX

STACK Scrubber Oil

2/17/84 Bar = 30.10

Run No.	1	2	3	4
Date	2/17/84	2/17	2/17	2/17
Time >	0830	0845	0900	0915
Flask No. >	10	5	21	24
V_f = Flask + Valve Volume, ml	2047	2024	2078	2083
V_a = Absorbing Soln. Volume, vl	25	25	25	25
Ti = Initial Flask Temp., °F >	65	61	60	60
T_f = Final Flask Temp., °F	63	63	63	63
P_i = Initial Flask Vacuum, "Hg >	28.5	27.8	28.0	28.5
P_f = Final Flask Vacuum, "Hg	-.1	0	-.2	0
V_{stpd} = Gas Sample Volume, ml*	1917.9	1854.6	1904.5	1957.9
m = Mass of NO_2 in Gas Sample, µg	185.3	175.3	153.9	213.8
NO_2 Concentration, lbs/scf	6.032 E-6	5.901 E-6	5.045 E-6	6.817 E-6
NO_2 Concentration, ppm	50.70	49.60	42.41	57.31

*Dry, 70°F, 29.92"Hg

$V_{stpd} = 17.64 \times (V_f - V_a) \times \left[\frac{Pbf - Pf}{Tf} - \frac{Pbi - Pi}{Ti}\right]$, when P_{bf} & P_{bi} = the final and initial barometric pressures.

NO_2 (lbs/scf) $= 6.243 \times \left(\frac{m}{V_{stpd}}\right) \times 10^{-5}$

NO_2 (ppm) $= 8.406 \times 10^6 \times \frac{lbs}{ft^3}$ NO_2

TABLE

NO_x

EMISSION DATA

PLANT AMAX

STACK Scrubber 0:1

Bar 30.10

Run No.	5	6	7	8
Date	2/17/82	2/17	2/17	2/17
Time	0930	0945	1000	1015
Flask No.	43	42	25	27
V_f = Flask + Valve Volume, ml	2051	2026	2076	2107
V_a = Absorbing Soln. Volume, vl	25	25	25	25
Ti = Initial Flask Temp., °F >	67	69	73	74
T_f = Final Flask Temp., °F	63	64	64	64
P_i = Initial Flask Vacuum, "Hg >	28.3	28.4	28.3	28.3
P_f = Final Flask Vacuum, "Hg	-.5	-1.1	-1.1	-.4
V_{stpd} = Gas Sample Volume, ml*	1881.2	1820.9	1860.5	1937.9
m = Mass of NO_2 in Gas Sample, µg	188.1	186.7	216.6	183.8
NO_2 Concentration, lbs/scf	6.242 E-6	6.401 E-6	7.268 E-6	5.921 E-6
NO_2 Concentration, ppm	52.47	53.81	61.10	49.77

*Dry, 70°F, 29.92"Hg

$V_{stpd} = 17.64 \times (V_f - V_a) \times [\frac{Pbf - Pf}{Tf} - \frac{Pbi - Pi}{Ti}]$, when P_{bf} & P_{bi} = the final and initial barometric pressures.

NO_2 (lbs/scf) $= 6.243 \times (\frac{m}{V_{stpd}}) \times 10^{-5}$

NO_2 (ppm) $= 8.406 \times 10^6 \times \frac{lbs}{ft^3}$ NO_2

TABLE

NO_x

EMISSION DATA

PLANT AMAX

STACK Scrubber Oil

Bar 30.10

Run No.	9	10	11	12
Date	2/17/84	2/17	2/–	2/–
Time	1030	1045	1100	1115
Flask No.	3	13	4	15
V_f = Flask + Valve Volume, ml	2013	2076	2051	2075
V_a = Absorbing Soln. Volume, vl	25	25	25	25
T_i = Initial Flask Temp., °F	69	76	76	76
T_f = Final Flask Temp., °F	64	64	63	62
P_i = Initial Flask Vacuum, "Hg	28.2	28.4	28.2	28.2
P_f = Final Flask Vacuum, "Hg	-.4	-.7	-.6	-.5
V_{stpd} = Gas Sample Volume, ml*	1842.7	1895.5	1869.7	1902.7
m = Mass of NO_2 in Gas Sample, μg	142.5	185.3	175.3	199.5
NO_2 Concentration, lbs/scf	4.828 E-6	6.103 E-6	5.853 E-6	6.546 E-6
NO_2 Concentration, ppm	40.58	51.30	49.20	55.03

*Dry, 70°F, 29.92"Hg

$V_{stpd} = 17.64 \times (V_f - V_a) \times \left[\frac{Pbf - Pf}{Tf} - \frac{Pbi - Pi}{Ti}\right]$, when P_{bf} & P_{bi} = the final and initial barometric pressures.

NO_2 (lbs/scf) $= 6.243 \times \left(\frac{m}{V_{stpd}}\right) \times 10^{-5}$

NO_2 (ppm) $= 8.406 \times 10^6 \times \frac{lbs}{ft^3}$ NO_2

NO$_X$ LABORATORY DATA

LAB. NO. 5 DATE 2-22-84

SAMPLE SOURCE

SAMPLE NUMBER	ABSORBANCE 410 mu	VOLUME ml	ALIQUOT ml	DILUTION ml	DILUTION FACTOR	TOTAL ug
3	0.100	100	50 -	-	2	142.5
4	0.123					175.3
5	0.123					175.3
10	0.130					185.3
15	0.140					199.5
21	0.108					153.9
24	0.150					213.8
25	0.152					216.6
27	0.129					183.8
28	0.200					285.0
30	0.172					245.1
32	0.180					256.5
31	0.195					277.9
33	0.155					220.9
36	0.230					327.8
38	0.200					285.0
39	0.245					349.1
40	0.181					257.9
41	0.170					242.3

STANDARDS		
1	.135	100
2	.275	200
3	.420	300
4	.565	400

$$K_C = \frac{A_1 + 2A_2 + 3A_3 + 4A_4}{A_1^2 + A_2^2 + A_3^2 + A_4^2}(100)$$

K_C = 712.5

ANALYST M. Eisman

NO$_X$ LABORATORY DATA

LAB. NO. ____________ DATE 2-22-84

SAMPLE SOURCE ____________

SAMPLE NUMBER	ABSORBANCE 410 mu	VOLUME ml	ALIQUOT - DILUTION ml ml	DILUTION FACTOR	TOTAL ug
35	0.165	100	50 - -	2	235.1
42	0.131				186.7
43	0.132				188.1
44	0.190				270.8
13	0.130				185.3
STANDARDS					

1	.135	100
2	.275	200
3	.420	300
4	.565	400

$$K_C = \frac{A_1 + 2A_2 + 3A_3 + 4A_4}{A_1^2 + A_2^2 + A_3^2 + A_4^2}(100)$$

K_C = 712.5

ANALYST M. Eisman

NO_x FLASK CALIBRATION

FLASK NO.	VOLUME (ml)
1	2016
2	2063
3	2013
4	2051
5	2024
6	2045
7	2064
8	2069
9	2065
10	2047
11	2071
12	2055
13	2076
14	2043
15	2075
16	2010
17	2099
18	2086
19	2096
20	2086
21	2078
22	2011
23	2061
24	2083
25	2076
26	2085
27	2107
28	2090
29	2070
30	2055
31	2080
32	2079
33	2075
34	2104
35	2067
36	2117
37	2058
38	2026
39	2039
40	2017
41	2050
42	2026
43	2051
44	2017
45	2047
46	2063

CALIBRATED BY: Scott Mike
9/23/83

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax Chemical Corp.

SOURCE NAME: Big Bend Dryer.

DATE: 2-16/17/84 TYPE OF SAMPLE: NO_x

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION		
28	NO_x Flask	Coal/Oil	1315
38	"	"	1330
39	"	"	1345
44	"	"	1400
33	"	"	1415
35	"	"	1430
41	"	"	1445
30	"	"	1500
32	"	"	1515
31	"	"	1530
40	"	"	1545
36	"	"	1600

Sample Recovered By: M. Eisman

~~Particulate~~ NO_x Analysis By: M. Eisman

Sample Collection By R. Sholtes

SAMPLE CHAIN OF CUSTODY

PLANT NAME: Amax Chemical Corp.

SOURCE NAME: Big Bend Dryer

DATE: 2-17-84 TYPE OF SAMPLE: NOx

SAMPLE RECOVERY

CONTAINER NO.	DESCRIPTION		
10	NOx Flask	Oil Firing	0830
5	"	"	0845
21	"	"	0900
24	"	"	0915
43	"	"	0930
42	"	"	0945
25	"	"	1000
27	"	"	1015
3	"	"	1030
13	"	"	1045
4	"	"	1100
15	"	"	1115

Sample Recovered By: M. Eisman

~~Particulate~~ NOx Analysis By: M. Eisman

Sample Collection By R. Sholtes

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4. Procedure

4.1 Sampling.

4.1.1 Preparation of Collection Train. Preparation of the sample train is the same as described in Method 6A, Section 4.1.4, with the addition of the following:

The sampling train is assembled as shown in Figure 6A–1, except the isopropanol bubbler is not included. The probe must be heated to a temperature sufficient to prevent water condensation and must include a filter (either in-stack, out-of-stack, or both) to prevent particulate entrainment in the peroxide impingers. The electric supply for the probe heat should be continuous and separate from the timed operation of the sample pump.

Adjust the timer-switch to operate in the "on" position from 2 to 4 minutes on a 2-hour repeating cycle or other cycle specified in the applicable regulation. Other timer sequences may be used with the restriction that the total sample volume collected is between 25 and 60 liters for the amounts of sampling reagents prescribed in this method.

Add cold water to the tank until the impingers and bubblers are covered at least two-thirds of their length. The impingers and bubbler tank must be covered and protected from intense heat and direct sunlight. If freezing conditions exist, the impinger solution and the water bath must be protected.

Note.—Sampling may be conducted continuously if a low flow-rate sample pump (20 to 40 ml/min for the reagent volumes described in this method) is used. Then the timer-switch is not necessary. In addition, if the sample pump is designed for constant rate sampling, the rate meter may be deleted. The total gas volume collected should be between 25 and 60 liters for the amounts of sampling reagents prescribed in this method.

4.1.2 Leak-Check Procedure. The leak-check procedure is the same as described in Method 6, Section 4.1.2.

4.1.3 Sample Collection. Record the initial dry gas meter reading. To begin sampling, position the tip of the probe at the sampling point, connect the probe to the first impinger (or filter), and start the timer and the sample pump. Adjust the sample flow to a constant rate of approximately 1.0 liter/min as indicated by the rotameter. Assure that the timer is operating as intended, i.e., in the "on" position for the desired period and the cycle repeats as required.

During the 24-hour sampling period, record the dry gas meter temperature one time between 9:00 a.m. and 11:00 a.m., and the barometric pressure.

At the conclusion of the run, turn off the timer and the sample pump, remove the probe from the stack, and record the final gas meter volume reading. Conduct a leak check as described in Section 4.1.2. If a leak is found, void the test run or use procedures acceptable to the Administrator to adjust the sample volume for leakage. Repeat the steps in this section (4.1.3) for successive runs.

4.2 Sample Recovery. The procedures for sample recovery (moisture measurement, peroxide solution, and ascarite bubbler) are the same as in Method 6A, Section 4.2.

4.3 Sample Analysis. Analysis of the peroxide impinger solutions is the same as in Method 6, Section 4.3.

5. Calibration

5.1 Metering System.

5.1.1 Initial Calibration. The initial calibration for the volume metering system is the same as for Method 6, Section 5.1.1.

5.1.2 Periodic Calibration Check. After 30 days of operation of the test train, conduct a calibration check as in Section 5.1.1 above, except for the following variations: (1) The leak check is not to be conducted, (2) three or more revolutions of the dry gas meter must be used, and (3) only two independent runs need be made. If the calibration factor does not deviate by more than 5 percent from the initial calibration factor determined in Section 5.1.1, then the dry gas meter volumes obtained during the test series are acceptable and use of the train can continue. If the calibration factor deviates by more than 5 percent, recalibrate the metering system as in Section 5.1.1; and for the calculations for the preceding 30 days of data, use the calibration factor (initial or recalibration) that yields the lower gas volume for each test run. Use the latest calibration factor for succeeding tests.

5.2 Thermometers. Calibrate against mercury-in-glass thermometers initially and at 30-day intervals.

5.3 Rotameter. The rotameter need not be calibrated, but should be cleaned and maintained according to the manufacturer's instruction.

5.4 Barometer. Calibrate against a mercury barometer initially and at 30-day intervals.

5.5 Barium Perchlorate Solution. Standarize the barium perchlorate solution against 25 ml of standard sulfuric acid to which 100 ml of 100 percent isopropanol has been added.

6. Calculations

The nomenclature and calculation procedures are the same as in Method 6A with the following exceptions:

P_{bar} = Initial barometric pressure for the test period, mm Hg.

T_m = Absolute meter temperature for the test period, °K.

7. Emission Rate Procedure

The emission rate procedure is the same as described in Method 6A, section 7, except that the timer is needed and is operated as described in this method.

8. Bibliography

The bibliography is the same as described in Method 6A, Section 8.

METHOD 7—DETERMINATION OF NITROGEN OXIDE EMISSIONS FROM STATIONARY SOURCES

1. Principle and Applicability

1.1 Principle. A grab sample is collected in an evacuated flask containing a dilute sulfuric acid-hydrogen peroxide absorbing solution, and the nitrogen oxides, except nitrous oxide, are measured colorimeterically using the phenoldisulfonic acid (PDS) procedure.

1.2 Applicability. This method is applicable to the measurement of nitrogen oxides emitted from stationary sources. The range of the method has been determined to be 2 to 400 milligrams NO_x (as NO_2) per dry standard cubic meter, without having to dilute the sample.

2. Apparatus

2.1 Sampling (see Figure 7-1). Other grab sampling systems or equipment, capable of measuring sample volume to within ±2.0 percent and collecting a sufficient sample volume to allow analytical reproducibility to within ±5 percent, will be considered acceptable alternatives, subject to approval of the Administrator, U.S. Environmental Protection Agency. The following equipment is used in sampling:

2.1.1 Probe. Borosilicate glass tubing, sufficiently heated to prevent water condensation and equipped with an in-stack or out-stack filter to remove particulate matter (a plug of glass wool is satisfactory for this purpose). Stainless steel or Teflon [3] tubing may also be used for the probe. Heating is not necessary if the probe remains dry during the purging period.

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[3] Mention of trade names or specific products does not constitue endorsement by the Environmental Protection Agency.

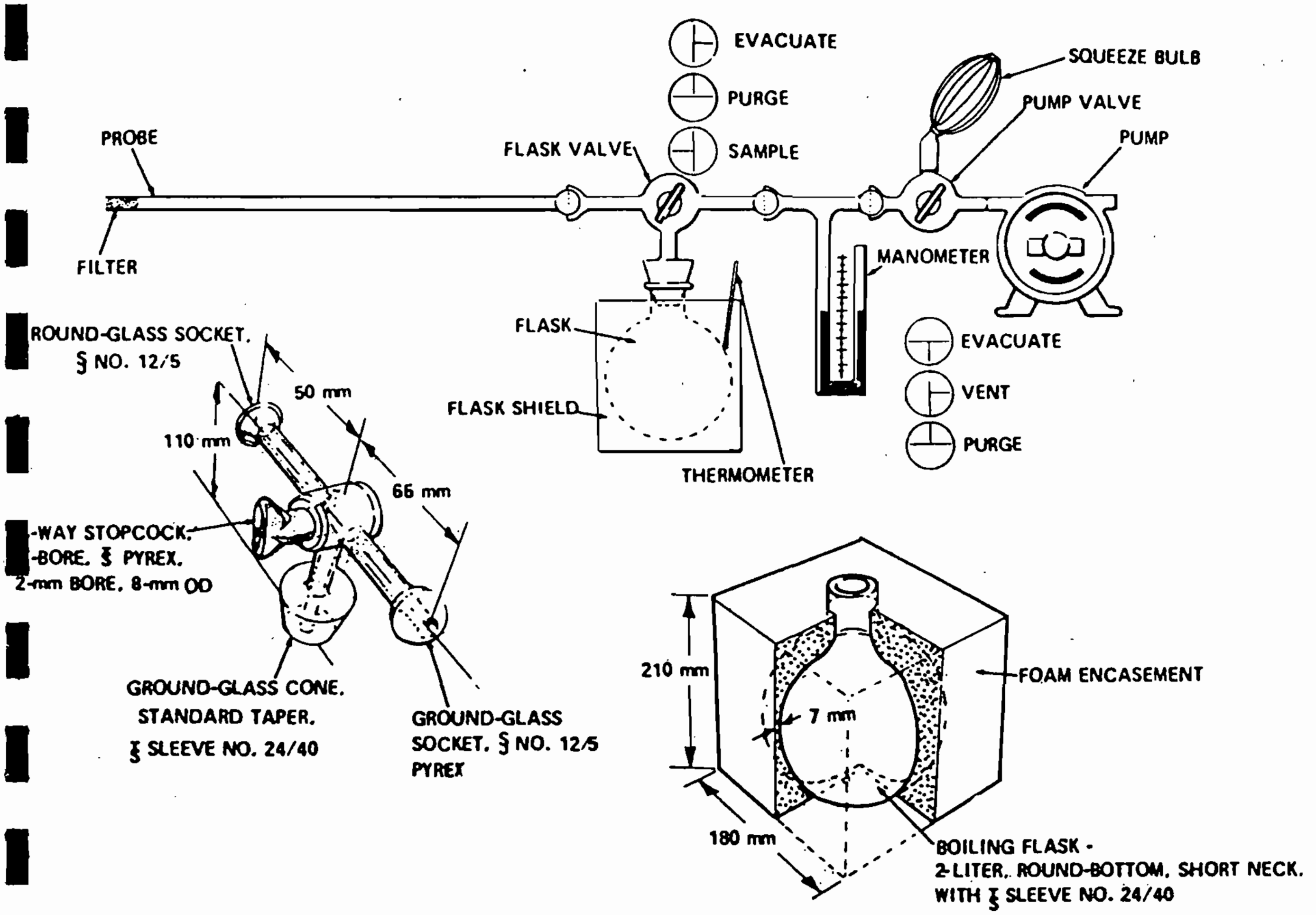

Figure 7-1. Sampling train, flask valve, and flask.

2.1.2 Collection Flask. Two-liter borosilicate, round bottom flask, with short neck and 24/40 standard taper opening, protected against implosion or breakage.

2.1.3 Flask Valve. T-bore stopcock connected to a 24/40 standard taper joint.

2.1.4 Temperature Gauge. Dial-type thermometer, or other temperature gauge, capable of measuring 1° C (2° F) intervals from −5 to 50° C (25 to 125° F).

2.1.5 Vacuum Line. Tubing capable of withstanding a vacuum of 75 mm Hg (3 in. Hg) absolute pressure, with "T" connection and T-bore stopcock.

2.1.6 Vacuum Gauge. U-tube manometer, 1 meter (36 in.), with 1-mm (0.1-in.) divisions, or other gauge capable of measuring pressure to within ±2.5 mm Hg (0.10 in. Hg).

2.1.7 Pump. Capable of evacuating the collection flask to a pressure equal to or less than 75 mm Hg (3 in. Hg) absolute.

2.1.8 Squeeze Bulb. One-way.

2.1.9 Volumetric Pipette. 25 ml.

2.1.10 Stopcock and Ground Joint Grease. A high-vacuum, high-temperature chlorofluorocarbon grease is required. Halocarbon 25-5S has been found to be effective.

2.1.11 Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station, in which case the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft) elevation increase, or vice versa for elevation decrease.

2.2 Sample Recovery. The following equipment is required for sample recovery:

2.2.1 Graduated Cylinder. 50 ml with 1-ml divisions.

2.2.2 Storage Containers. Leak-free polyethylene bottles.

2.2.3 Wash Bottle. Polyethylene or glass.

2.2.4 Glass Stirring Rod.

2.2.5 Test Paper for Indicating pH. To cover the pH range of 7 to 14.

2.3 Analysis. For the analysis, the following equipment is needed:

2.3.1 Volumetric Pipettes. Two 1 ml, two 2 ml, one 3 ml, one 4 ml, two 10 ml, and one 25 ml for each sample and standard.

2.3.2 Porcelain Evaporating Dishes. 175- to 250-ml capacity with lip for pouring, one for each sample and each standard. The Coors No. 45006 (shallow-form, 195 ml) has been found to be satisfactory. Alternatively, polymethyl pentene beakers (Nalge No. 1203, 150 ml), or glass beakers (150 ml) may be used. When glass beakers are used, etching of the beakers may cause solid matter to be present in the analytical step; the solids should be removed by filtration (see Section 4.3).

2.3.3 Steam Bath. Low-temperature ovens or thermostatically controlled hot plates kept below 70° C (160° F) are acceptable alternatives.

2.3.4 Dropping Pipette or Dropper. Three required.

2.3.5 Polyethylene Policeman. One for each sample and each standard.

2.3.6 Graduated Cylinder. 100 ml with 1-ml divisions.

2.3.7 Volumetric Flasks. 50 ml (one for each sample and each standard), 100 ml (one for each sample and each standard, and one for the working standard KNO$_3$ solution), and 1000 ml (one).

2.3.8 Spectrophotometer. To measure absorbance at 410 nm.

2.3.9 Graduated Pipette. 10 ml with 0.1-ml divisions.

2.3.10 Test Paper for Indicating pH. To cover the pH range of 7 to 14.

2.3.11 Analytical Balance. To measure to within 0.1 mg.

3. *Reagents*

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

3.1 Sampling. To prepare the absorbing solution, cautiously add 2.8 ml concentrated H$_2$SO$_4$ to 1 liter of deionized, distilled water. Mix well and add 6 ml of 3 percent hydrogen peroxide, freshly prepared from 30 percent hydrogen peroxide solution. The absorbing solution should be used within 1 week of its preparation. Do not expose to extreme heat or direct sunlight.

3.2 Sample Recovery. Two reagents are required for sample recovery:

3.2.1 Sodium Hydroxide (1*N*). Dissolve 40 g NaOH in deionized, distilled water and dilute to 1 liter.

3.2.2 Water. Deionized, distilled to conform to ASTM specification D1193–77, Type 3 (incorporated by reference—see § 60.17). At the option of the analyst, the KMnO$_4$ test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

[3.2.2 amended by 48 FR 3735, January 27, 1983]

3.3 Analysis. For the analysis, the following reagents are required:

3.3.1 Fuming Sulfuric Acid. 15 to 18 percent by weight free sulfur trioxide. HANDLE WITH CAUTION.

3.3.2 Phenol. White solid.

3.3.3 Sulfuric Acid. Concentrated, 95 percent minimum assay. HANDLE WITH CAUTION.

3.3.4 Potassium Nitrate. Dried at 105 to 110° C (220 to 230° F) for a minimum of 2 hours just prior to preparation of standard solution.

3.3.5 Standard KNO$_3$ Solution. Dissolve exactly 2.198 g of dried potassium nitrate (KNO$_3$) in deionized, distilled water and dilute to 1 liter with deionized, distilled water in a 1,000-ml volumetric flask.

3.3.6 Working Standard KNO$_3$ Solution. Dilute 10 ml of the standard solution to 100 ml with deionized distilled water. One milliliter of the working standard solution is equivalent to 100 μg nitrogen dioxide (NO$_2$).

3.3.7 Water. Deionized, distilled as in Section 3.2.2.

3.3.8 Phenoldisulfonic Acid Solution. Dissolve 25 g of pure white phenol in 150 ml concentrated sulfuric acid on a steam bath. Cool, add 75 ml fuming sulfuric acid, and heat at 100° C (212° F) for 2 hours. Store in a dark, stoppered bottle.

4. *Procedures*

4.1 Sampling.

4.1.1 Pipette 25 ml of absorbing solution into a sample flask, retaining a sufficient quantity for use in preparing the calibration standards. Insert the flask valve stopper into the flask with the valve in the "purge" position. Assemble the sampling train as shown in Figure 7-1 and place the probe at the sampling point. Make sure that all fittings are tight and leak-free, and that all ground glass joints have been properly greased with a high-vacuum, high-temperature chlorofluorocarbon-based stopcock grease. Turn the flask valve and the pump valve to their "evacuate" positions. Evacuate the flask to 75 mm Hg (3 in. Hg) absolute pressure, or less. Evacuation to a pressure approaching the vapor pressure of water at the existing temperature is desirable. Turn the pump valve to its "vent" position and turn the off the pump. Check for leakage by observing the manometer for any pressure fluctuation. (Any variation greater than 10 mm Hg (0.4 in. Hg) over a period of 1 minute is not acceptable, and the flask is not to be used until the leakage problem is corrected. Pressure in the flask is not to exceed 75 mm Hg (3 in. Hg) absolute at the time sampling is commenced.) Record the volume of the flask and valve (V_f), the flask temperature (T_i), and the barometric pressure. Turn the flask valve counterclockwise to its "purge" position and do the same with the pump valve. Purge the probe and the vacuum tube using the squeeze bulb. If condensation occurs in the probe and the flask valve area, heat the probe and purge until the condensation disappears. Next, turn the pump valve to its "vent" position. Turn the flask valve clockwise to its "evacuate" position and record the difference in the mercury levels in the manometer. The absolute internal pressure in the flask (P_i) is equal to the barometric pressure less the manometer reading. Immediately turn the flask valve to the "sample" position and permit the gas to enter the flask until pressures in the flask and sample line (i.e., duct, stack) are equal. This will usually require about 15 seconds; a longer period indicates a "plug" in the probe, which must be corrected before sampling is continued. After collecting the sample, turn the flask valve to its "purge" position and disconnect the flask from the sampling train. Shake the flask for at least 5 minutes.

4.1.2 If the gas being sampled contains insufficient oxygen for the conversion of NO to NO$_2$ (e.g., an applicable subpart of the standard may require taking a sample of a calibration gas mixture of NO in N$_2$), then oxygen shall be introduced into the flask to permit this conversion. Oxygen may be introduced into the flask by one of three methods; (1) Before evacuating the sampling flask, flush with pure cylinder oxygen, then evacuate flask to 75 mm Hg (3 in. Hg) absolute pressure or less; or (2) inject oxygen into the flask after sampling; or (3) terminate sampling with a minimum of 50 mm Hg (2 in. Hg) vacuum remaining in the flask, record this final pressure, and then vent the flask to the atmosphere until the flask pressure is almost equal to atmospheric pressure.

4.2 Sample Recovery. Let the flask set for a minimum of 16 hours and then shake the contents for 2 minutes. Connect the flask to a mercury filled U-tube manometer. Open the valve from the flask to the manometer and record the flask temperature (T_f), the barometric pressure, and the difference between the mercury levels in the manometer. The absolute internal pressure in the flask (P_f) is the barometric pressure less the manometer reading. Transfer the contents of the flask to a leak-free polyethylene bottle. Rinse the flask twice with 5-ml portions of deionized, distilled water and add the rinse water to the bottle. Adjust the pH to between 9 and 12 by adding sodium hydroxide (1 N), dropwise (about 25 to 35 drops). Check the pH by dipping a stirring rod into the solution and then touching the rod to the pH test paper. Remove as little material as possible during this step. Mark the height of the liquid level so that the container can be checked for leakage after transport. Label the container to clearly identify its contents. Seal the container for shipping.

4.3 Analysis. Note the level of the liquid in container and confirm whether or not any sample was lost during shipment; note this on the analytical data sheet. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Immediately prior to analysis, transfer the contents of the shipping container to a 50-ml volumetric flask, and rinse the container twice with 5-ml portions of deionized, distilled water. Add the rinse water to the flask and dilute to the mark with deionized, distilled water; mix thoroughly. Pipette a 25-ml aliquot into the procelain evaporating dish. Return any unused portion of the sample to the polyethylene storage bottle. Evaporate the 25-

l aliquot to dryness on a steam bath and low to cool. Add 2 ml phenoldisulfonic id solution to the dried residue and triturate thoroughly with a polyethylene policeman. Make sure the solution contacts all e residue. Add 1 ml deionized, distilled ater and four drops of concentrated sulfu acid. Heat the solution on a steam bath for 3 minutes with occasional stirring. Allow the solution to cool, add 20 ml deionized, distilled water, mix well by stirring, and add ncentrated ammonium hydroxide, dropse, with constant stirring, until the pH is 10 (as determined by pH paper). If the sample contains solids, these must be reoved by filtration (centrifugation is an acptable alternative, subject to the approval the Administrator), as follows: filter through Whatman No. 41 filter paper into a 100-ml volumetric flask; rinse the evaporating dish with three 5-ml portions of deiond, distilled water; filter these three rinses. ash the filter with at least three 15-ml portions of deionized, distilled water. Add the filter washings to the contents of the volumetric flask and dilute to the mark with ionized, distilled water. If solids are sent, the solution can be transferred directly to the 100-ml volumetric flask and diluted to the mark with deionized, distilled water. Mix the contents of the flask thorghly, and measure the absorbance at the timum wavelength used for the standards (Section 5.2.1), using the blank solution as a zero reference. Dilute the sample and the blank with equal volumes of deionized, dised water if the absorbance exceeds A_4, e absorbance of the 400 μg NO_2 standard (see Section 5.2.2).

5 *Calibration*

.1 Flask Volume. The volume of the coltion flask-flask valve combination must be known prior to sampling. Assemble the flask and flask valve and fill with water, to the stopcock. Measure the volume of water ±10 ml. Record this volume on the flask.

.2 Spectrophotometer Calibration.

5.2.1 Optimum Wavelength Determination. Calibrate the wavelength scale of the spectrophotometer every 6 months. The ibration may be accomplished by using energy source with an intense line emission such as a mercury lamp, or by using a series of glass filters spanning the measuring range of the spectrophotometer. Calition materials are available commercially from the National Bureau of Standards. Specific details on the use of such materials should be supplied by the vendor; general information about calibration techniques be obtained from general reference ks on analytical chemistry. The wavelength scale of the spectrophotometer must read correctly within ± 5 nm al all calibration points; otherwise, the specrophotoer shall be repaired and recalibrated. ce the wavelength scale of the spectrophotometer is in proper calibration, use 410 nm as the optimum wavelength for the measurement of the absorbance of the standards and samples.

Alternatively, a scanning procedure may be employed to determine the proper measuring wavelength. If the instrument is a double-beam spectrophotometer, scan the spectrum between 400 and 415 nm using a 200 μg NO_2 standard solution in the sample cell and a blank solution in the reference cell. If a peak does not occur, the spectrophotometer is probably malfunctioning and should be repaired. When a peak is obtained within the 400 to 415 nm range, the wavelength at which this peak occurs shall be the optimum wavelength for the measurement of absorbance of both the standards and the samples. For a single-beam spectrophotometer, follow the scanning procedure described above, except that the blank and standard solutions shall be scanned separately. The optimum wavelength shall be the wavelength at which the maximum difference in absorbance between the standard and the blank occurs.

5.2.2 Determination of Spectrophotometer Calibration Factor K_c. Add 0.0 ml, 2 ml, 4 ml, 6 ml., and 8 ml of the KNO_3 working standard solution (1 ml = 100 μg NO_2) to a series of five 50-ml volumetric flasks. To each flask, add 25 ml of absorbing solution, 10 ml deionized, distilled water, and sodium hydroxide (1 N) dropwise until the pH is between 9 and 12 (about 25 to 35 drops each). Dilute to the mark with deionized, distilled water. Mix thoroughly and pipette a 25-ml aliquot of each solution into a separate porcelain evaporating dish. Beginning with the evaporation step, follow the analysis procedure of Section 4.3 until the solution has been transferred to the 100 ml volumetric flask and diluted to the mark. Measure the absorbance of each solution, at the optimum wavelength, as determined in Section 5.2.1. This calibration procedure must be repeated on each day that samples are analyzed. Calculate the spectrophotometer calibration factor as follows:

$$K_c = 100 \frac{A_1 + 2A_2 + 3A_3 + 4A_4}{A_1^2 + A_2^2 + A_3^2 + A_4^2}$$

Equation 7-1

where:

K_c = Calibration factor

A_1 = Absorbance of the 100-μg NO_2 standard

A_2 = Absorbance of the 200-μg NO_2 standard

A_3 = Absorbance of the 300-μg NO_2 standard

A_4 = Absorbance of the 400-μg NO_2 standard

5.3 Barometer. Calibrate against a mercury barometer.

5.4 Temperature Gauge. Calibrate dial thermometers against mercury-in-glass thermometers.

5.5 Vacuum Gauge. Calibrate mechanical gauges, if used, against a mercury manometer such as that specified in 2.1.6.

5.6 Analytical Balance. Calibrate against standard weights.

6. *Calculations*

Carry out the calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

6.1 Nomenclature.

A = Absorbance of sample.

C = Concentration of NO_x as NO_2, dry basis, corrected to standard conditions, mg/dscm (lb/dscf).

F = Dilution factor (i.e., 25/5, 25/10, etc., required only if sample dilution was needed to reduce the absorbance into the range of calibration).

K_c = Spectrophotometer calibration factor.

m = Mass of NO_x as NO_2 in gas sample, μg.

P_f = Final absolute pressure of flask, mm Hg (in. Hg).

P_i = Initial absolute pressure of flask, mm Hg (in. Hg).

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

T_f = Final absolute temperature of flask, °K (°R).

T_i = Initial absolute temperature of flask, °K (°R).

T_{std} = Standard absolute temperature 293° K (528° R)

V_{sc} = Sample volume at standard conditions (dry basis), ml.

V_f = Volume of flask and valve, ml.

V_a = Volume of absorbing soluton, 25 ml.

2 = 50/25, the aliquot factor. (If other than a 25-ml aliquot was used for analysis, the corresponding factor must be substituted).

6.2 Sample volume, dry basis, corrected to standard conditions.

$$V_{sc} = \frac{T_{std}}{P_{std}} (V_f - V_a) \left[\frac{P_f}{T_f} - \frac{P_i}{T_i} \right]$$

$$= K_1 (V_f - 25\ \text{ml}) \left[\frac{P_f}{T_f} - \frac{P_i}{T_i} \right]$$

Equation 7-2

where:

$$K_1 = 0.3858 \frac{°K}{\text{mm Hg}} \text{ for metric units}$$

$$= 17.64 \frac{°R}{\text{in. Hg}} \text{ for English units}$$

6.3 Total μg NO_2 per sample.

$$m = 2\,K_c\,AF$$

Equation 7-3

NOTE.—If other than a 25-ml aliquot is used for analysis, the factor 2 must be replaced by a corresponding factor.

6.4 Sample concentration, dry basis, corrected to standard conditions.

$$C = K_2 \frac{m}{V_{sc}}$$

Equation 7-4

APPENDIX A4

Field Data Sheets and Computations
Opacity/Method 9

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Emissions ~5-10 lb/hr. on oil

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS

VISIBLE EMISSIONS DATA SHEET

Plant AMAX
Date 2-16-84
Wind Direction and Speed ENE - 5/8
Stack Dryer - Coal/Oil Mix
Time 0810
Observer R. Sholtes

min. \ sec.	0	15	30	45
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

min. \ sec.	0	15	30	45
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Sum of # Recorded ______

Total # of Readings ______

Opacity = Sum of # Recorded / Total # of Readings = ______

Plume Description

coning X
Detached ______
lofting __
Color ______
fanning __
looping __
fumigating __

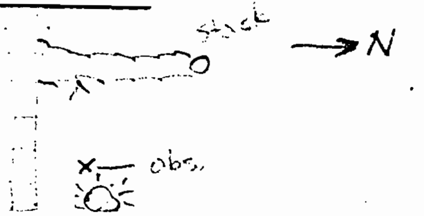
Point of Observation

Steam Plume. [illegible] hts.

Distance to base of Source 300'
Height of discharge above ground 100'

Back Ground Description
Blue Sky w/ light scattered layer.

Diagram of Stack



SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS, INC.

SUMMARY OF VISIBLE EMISSIONS

COMPANY NAME: AMAX Chemical Corporation DATE: February 16, 1984

SOURCE: Fluid Bed Scrubber TIME: 0810 - 0839

PERMIT NO.: AC29-65834

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start - End	Opacity Sum	Opacity Average
1	0810 - 0815	0	0.0
2	0816 - 0821	0	0.0
3	0822 - 0827	0	0.0
4	0828 - 0833	0	0.0
5	0834 - 0839	0	0.0

Readings ranged from 0 to 0 percent opacity. The source was in compliance with Chapter 17-2, Florida Administrative Code at the time evaluation was made.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

THIS IS TO CERTIFY THAT

Robert S. Sholtes, has completed the STATE OF FLORIDA visible emissions evaluation training and is a qualified observer of visible emissions as specified by EPA reference method 9.

This certificate expires on June 15, 1984

Judi Sears — Certification Officer

Robert S. Sholtes — Bearer's Signature

DER Form PERM 5-9 (Jun 79)

Signed: Robert S. Sholtes

Certificate Expires: June 15, 1984

SHOLTES & KOOGLER, ENVIRONMENTAL CONSULTANTS

VISIBLE EMISSIONS DATA SHEET

Plant AMAX

Stack Fluid Bed Scrubber.

Date 2-17-84

Time 1120

Wind Direction and Speed Calm

Observer R. Sholtes

sec. / min.	0	15	30	45
0	5	5	5	5
1	5	5	5	5
2	5	5	5	5
3	5	5	5	5
4	5	5	0	5
5	5	5	5	5
6	5	5	5	5
7	5	5	5	5
8	5	5	5	5
9	5	5	5	5
10	5	5	5	5
11	5	5	5	5
12	5	5	5	5
13	5	5	5	5
14	5	5	5	5
15	5	5	5	5
16	5	5	5	5
17	5	5	0	5
18	5	5	5	5
19	5	5	5	5
20	5	5	5	5
21	5	5	5	5
22	5	5	5	5
23	5	5	5	5
24	0	0	5	5
25	5	5	5	5
26	0	5	5	5
27	5	5	5	5
28	5	5	0	0
29	5	5	5	5

sec. / min.	0	15	30	45
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

Sum of # Recorded ______

Total # of Readings ______

Opacity = Sum of # Recorded / Total # of Readings = ______

Plume Description

coning __ Detached ______

lofting __ Color ______

fanning __ looping __

fumigating __

Point of Observation

Steam Plume

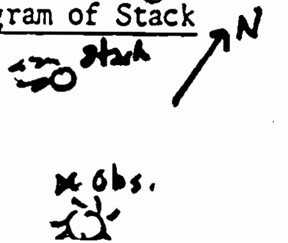
Distance to base of Source 200'

Height of discharge above ground 100'

Back Ground Description

Blue Sky - No Clouds

Diagram of Stack



Plume is ½ - ¾ dia hgt.

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS, INC.

SUMMARY OF VISIBLE EMISSIONS

COMPANY NAME: AMAX Chemical Corporation DATE: February 17, 1984

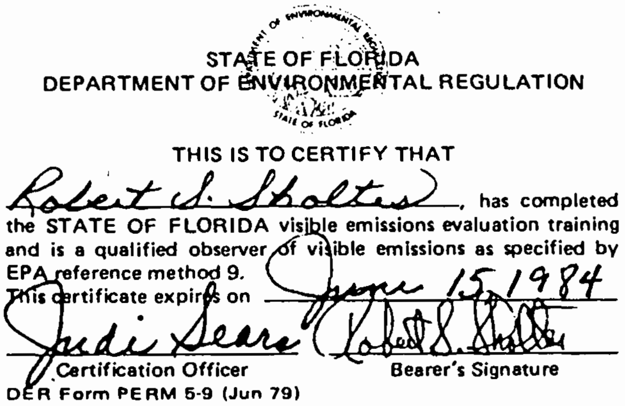
SOURCE: Fluid Bed Scrubber
(Fuel Is Oil)
TIME: 1120 - 1149

PERMIT NO.: AC29-65834

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start - End	Opacity Sum	Opacity Average
1	1120 - 1125	120	5.0
2	1126 - 1131	120	5.0
3	1132 - 1137	120	5.0
4	1138 - 1143	120	5.0
5	1144 - 1149	120	5.0

Readings ranged from 5 to 5 percent opacity. The source was in compliance with Chapter 17-2, Florida Administrative Code at the time evaluation was made.



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

THIS IS TO CERTIFY THAT

Robert S. Sholtes, has completed the STATE OF FLORIDA visible emissions evaluation training and is a qualified observer of visible emissions as specified by EPA reference method 9.

This certificate expires on June 15, 1984

Judi Sears — Certification Officer

Robert S. Sholtes — Bearer's Signature

DER Form PERM 5-9 (Jun 79)

Signed: Robert S. Sholtes

Certificate Expires: June 15, 1984

APPENDIX B

Plant Operating Data

PART I
SPECIFIC CONDITIONS

1. The phosphate rock dryer shall meet all applicable requirements of 40 CFR 60, Subpart NN - Standards of Performance for Phosphate Rock Plants.

2. Phosphate rock feed to the dryer shall not exceed 300 TPH.

3. Particulate emissions from the dryer shall not exceed 0.06 lbs/ton of wet phosphate rock feed or 18 pounds per hour, whichever is more restrictive. Visible emissions shall not exceed 10 percent opacity. Particulate emissions and opacity shall be determined in accordance with reference methods prescribed under 40 CFR §60.404.

4. Sulfur dioxide emissions shall not exceed 1.1 lbs per million BTU heat input. Sulfur dioxide emissions shall be determined by reference method 6, Appendix A, 40 CFR 60.

5. Nitrogen oxides emissions shall not exceed 35.5 lbs per hour. Nitrogen oxides emissions shall be determined by reference method 7, Appendix A, 40 CFR 60.

6. Heat input to the dryer shall not exceed 118 million BTU per hour.

7. Sulfur content of the fuels used in the dryer shall be of an appropriate value to ensure emissions of sulfur dioxide do not exceed the applicable limit (Specific Condition 4), but in no case shall the sulfur content exceed 2.5 percent by weight.

8. At a minimum, the owner/operator of the facility shall install, calibrate, and maintain devices meeting the requirements of 40 CFR §60.403(c) and (d), and maintain on site a daily log of scrubber operation which shall include:

   a. Pressure drop of the gas in inches of water.
   b. Flow rate of the scrubber water in GPM.
   c. pH of the scrubber water.
   d. Pressure of scrubber water feed.
   e. Scrubber feed water make up rate.

   These items shall be recorded at the time of performance tests and used in subsequent inspections as an indication of operating conditions necessary for compliance with emissions limits. Rock feed input rate, approximate product rock and rock feed moisture content, fuel sulfur content and heating value, scrubbing effluent particulate concentration, and scrubber water make up rate shall also be recorded during performance testing.

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

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 1033

DATE 02-13-84

CUSTOMER Mobil

COAL USED

Seam: Taggert & Imboden
Source: Man Coal Comp.
BTU/Lb.: 12,485
Ash (%): 10.5
Sulfur (%): 0.8
– Moisture (%): 6.86
Hardness: 51.5
Fusion (Ash):
Volatiles (%):
Fixed Carbon (%):
– Percent Passing 200 Mesh: 50.65

OIL USED

Type: #6 Bunker C
Source: Union 76
BTU/Lb.: 18,357
Ash (%): 0.05
Sulfur (%): 2.42
B. S. & W.:
– Sp. Grav.: 0.9944
API: 10.8 @ 60°F
Lb/Gal.: 8.2814
– Viscosity (@ 122°F): 340 Cp
– Flash: 185°F

COM

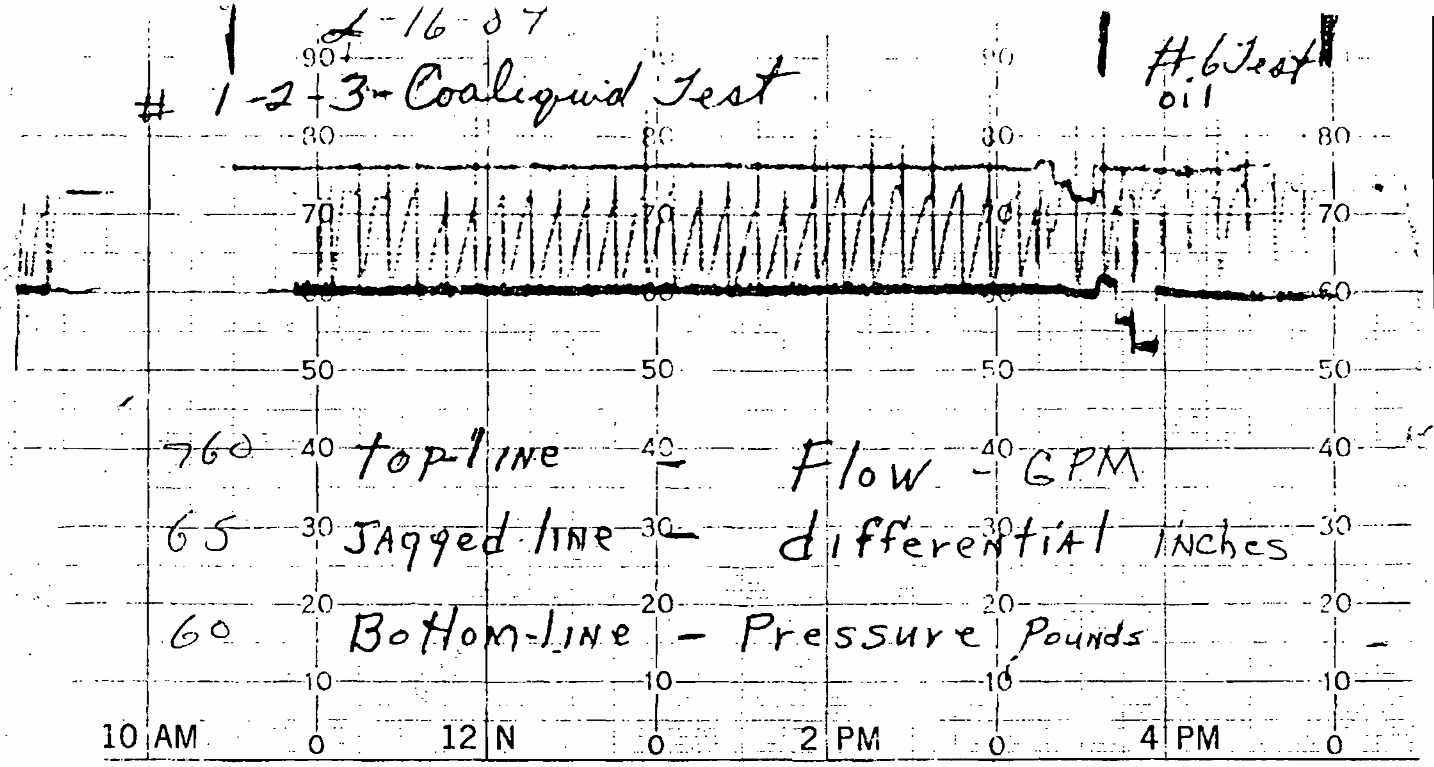
– Coal (%): 50.06
Oil (%): 39.66
Water (%): 10.28
BTU/Lb.: 14,660 –
Sulfur: 1.69
Ash (%): 4.90
– Sp. Grav.: 1.115 @ 72°F
– Lb/Gal.: 9.29 @ 72°F ; 8.61 @ 122°F
– Flash:
– Viscosity (@ 122°F): 7650 Cp.

BROOKFIELD VISCOSITY (COM)

Temp. (F)	Centipoise	Temp. (F)	Centipoise
50		140	5180
60		150	4200
70		160	3500
80		170	2850
90		180	2250
100	12,900	190	
110	10,100	200	
120	8080	220	
130	6300	240	

* Percentages are by weight.
* Typical Fuel

Name
Position Q.C.



2-16-87

1-2-3-Coaliquid Test

#6 Test oil

760 top-line - Flow - GPM

65 Jagged line - differential inches

60 Bottom-line - Pressure Pounds

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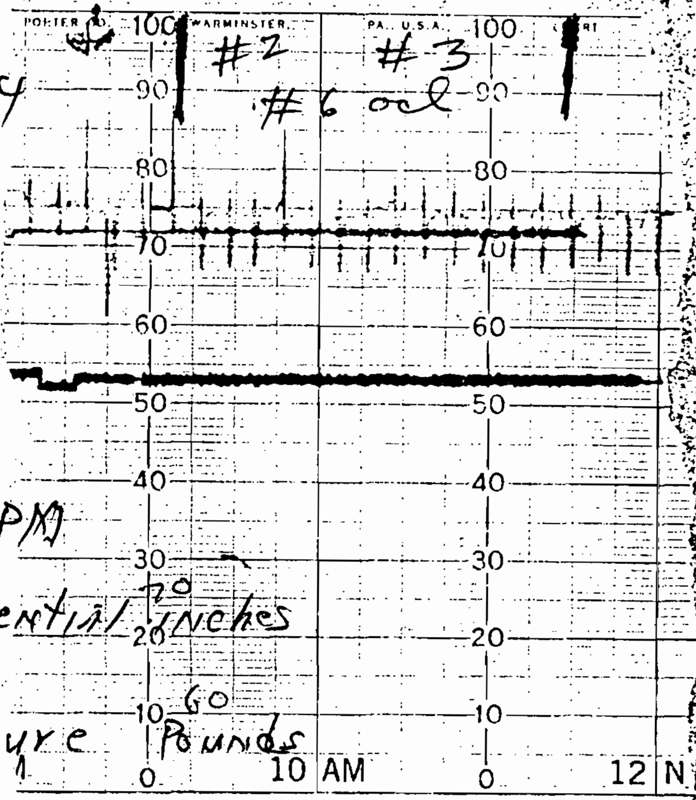
2-17-84



Top line - Flow 700 GPM

Jagged line - differential 70 inches

Bottom line Pressure 60 Pounds

Across Fan

DRYER LOG

OPERATOR: R. Guion SHIFT: 1 DATE: 2-16-84

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
6																							
7	150870		1390740		100°	50	240		1600	33	210	7	9	5.5	0	59	51	20	245	185	A2/D	B	change to
8	151090	220	1391050			70	230		1600	36	210	7	9	5.4	0	59	53	23	245	190	A2/D	B	B Rock 8:00
9	151340	250				75	225		1700	35	215	7	9	5.2	0	58	52	20	245	185	B	B	Down 9:23
10	151450	110																			B/D	A	Start 10:40
11	151550	100				70	225		1750	37	210	7	9	5.4	0	58	52	20	245	185	B/D	A	
12	151820	270				70	225		1700	36	205	7	9	5.2	0	58	52	21	245	180	B/D	A	
1	152090	270				65	245		1700	36	205	7	9	4.8	0	58	53	21	245	180	B/D	A	
2	152360	270				68	180		1700	38	210	7	9	5.0	0	58	52	21	245	185	B/D	A	

270

Com = 132,525 btu/gal 9.3 lb/gal 14,250 BTU/Lb.

SCALE STOP: 393120
SCALE START: 391370
TOTAL: 1750
8 68.70
12 2.09

1:30
A51
B-11
C-E
D-E

A 6410
B 6550

OIL STOP: 1391050
OIL START: 1390320
TOTAL: 730

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DRYER LOG

OPERATOR: M. Hawkins SHIFT: 2nd DATE: 2/16/84

276.7

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
2	152360	270	Coal liquid			68	180		1700	38	210	7	9	5.0	0	58	52	21	245	185	B/D	A	Change to #6
3	152630	270				65	180		1700	36	210	7	9	5.2	0	58	52	21	245	185	B/D	A	Oil 3:45
4	152900	270	1391160	110	100	25	220		1600	39	200	8	9	5.5	0	59	55	20	240	175	B/D	A	
5	153170	270	1391760	600	100	30	220		1700	36	210	8	8	5.2	0	59	53	20	245	185	B/D	A	Changed to D
6	153350 153460	290	1392210	450	100	29	230		1600	34	190	8	8	5.6	0	62	55	20	230	165	B/D D	A/D	silo 5:30
7	153760	300	1392790	580	100	25	230		1500	33	175	7	8	5.5	0	60	54	20	220	165	D	D	
8	154060	300	1393340	550	100	22	230		1500	33	175	7	8	5.2	0	61	54	20	220	165	D	D	
9	154360	300	1393880	540	100	21	230		1400	33	170	8	8	5.4	0	61	55	20	215	160	D	D	
10	154700	300	1394420	540	100	21	250		1450	34	170	8	8	5.4	0	62	55	20	215	160	D	D	

1:30 A-51
B-11
C-E
D-E

9:05 A-39
B-F
C-E
D-45

SCALE STOP: 395390
SCALE START: 393120
TOTAL: 2270

OIL STOP: 1394420
OIL START: 1391050
TOTAL: 3370

2:00 - 2.4
4:00 - 2.57 68.00
6:00 - 1.51 72.80
8:00 - 72.20 1.87

#6 oil 148,000 btu/gal.

DRYER LOG

OPERATOR: R. Guion SHIFT: 1 DATE: 2-17-84.

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
6	156910	300	1398420	560	100	26	225		1420	34	170	8	8	5.3	0	61	56	20	215	160	D	C	Change to A.
300 7	157210	300	1398960	560	100	26	225		1400	35	165	8	8	5.4	0	61	57	20	210	155	D	C	silo & mix
8	157510	300	1399510	750	100	28	225		1500	34	175	8	8	5.4	0	61	54	20	220	160	D	C	8:20
9	157660 157780	270	1400130	620	100	30	225		1550	36	205	8	8	5	0	61	55	19	240	180	D A·D	C A	
270 10	158050	270	1400760	630	100	30	225		1600	34	210	8	8	5	0	61	53	19	240	180	A/D	A	
11	158320	270	1401300	640	100	30	225		1600	34	210	8	8	5	0	61	54	19	245	180	A/D	A	
12	158590	270	1401940	640	100	30	220		1600	34	205	8	8	4.8	0	61	57	19	240	180	A/D	A	
1																							
2																							

A-39
B-F
C-E
D-F

SCALE STOP:
SCALE START: 397640
TOTAL:

6:00 17150

10: 65.98 7.88

OIL STOP:
OIL START: 1398420
TOTAL:

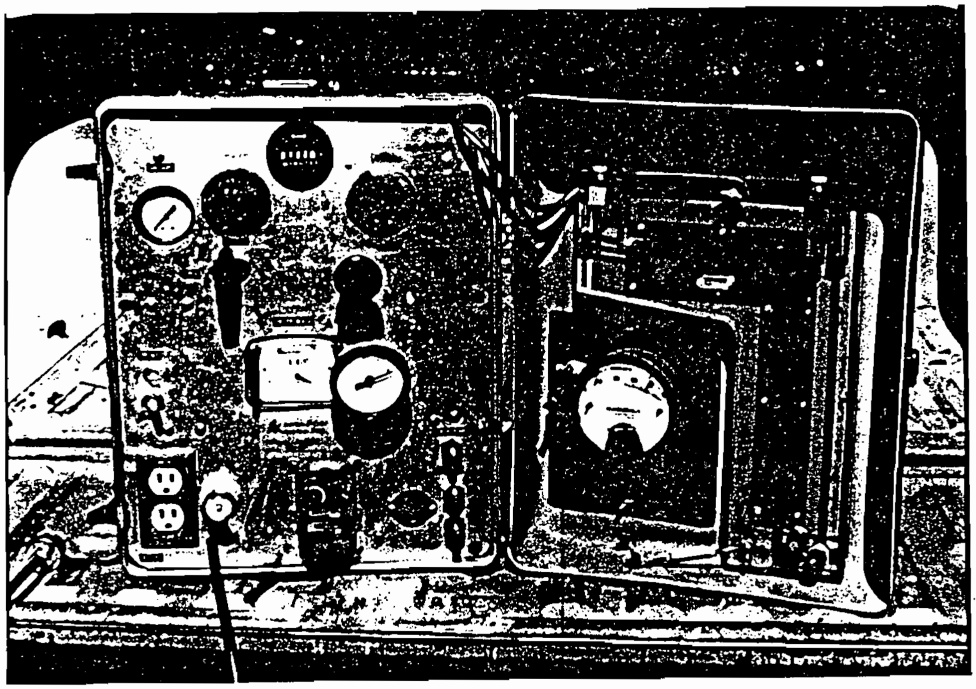
APPENDIX C

Calibrations and Project Participants

Best Available Copy

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS, INC.

SOURCE SAMPLING EQUIPMENT



S.K.E.C. Meter Box

Equipment used in Source Sampling is either manufactured by or assembled by SKEC. The guidelines followed are A.P.T.D. 0581, Details of Isokinetic Source Sampling Equipment, and A.P.T.D. 0576, Maintenance, Calibration and Operation of Isokinetic Source Sampling Equipment.

SK-81

PITOT TUBE CALIBRATION MEASUREMENTS

DATE CALIBRATED 5-11-82

Pitot tube assembly level? X yes ______ no

Pitot tube openings damaged? ______ yes (explain below) X no

α_1 = 1.5 ° (<10°), α_2 = 0.5 ° (<10°), β_1 = 1.5 ° (<5°),

β_2 = 1.5 ° (<5°)

γ = 0.5 °, θ = 3.5 °, A = .960 in. = (Pa + Pb)

z = A sin γ = 0.008 in. ; <0.32 <1/8 in.

w = A sin θ = 0.059 in. ; <0.08 <1/32 in.

P_A .386 in. P_b .574 in.

D_t = .375

Comments: ______

Calibration required? ______ yes X no

Calibrated by: George F. Gabel

CALIBRATION FORM

Date 2-8-84

Box No. SK-1

Barometric Pressure 30.36 inches Hg

ΔHT	ΔHD	Teledyne Mass Flow Meter		Gas Volume, Dry Gas Meter			Temp. Teledyne	Temp. of Dry Meter	Time Minutes
		Desired liters/min	Actual liters/min	Initial	Final	Actual ft.^{3}			
0	0.97	15	15	7.0	9.724	2.724	68	79	5
0	1.75	20	20	45.0	48.654	3.654	68	87	5
0	2.60	25	25	1.0	5.489	4.489	68	80	5
0	3.85	30	30	39.0	44.352	5.352	68	86	5
0	5.00	35	35	16.0	22.169	6.169	68	83	5

GAS METER THERMOMETER CALIBRATION

N.B.S. °F	METER BOX
33	34
51	50
72	72
93	94
115	114

```
                                                             --MEAN--
DELTA-H :   1.868     1.868     1.800     1.830     1.756      1.825

      Y :   0.990     0.997     0.999     1.014     1.018      1.003

   SCFM :   0.537     0.716     0.895     1.075     1.254

     OF :   4.150     5.615     6.800     8.321     9.457
```

Signature George F. Gabel

SHOLTES & KOOGLER,
ENVIRONMENTAL CONSULTANTS, INC.

THERMOCOUPLE CALIBRATIONS

Read Out No. SK-1 Umbilical Cord 200' Date 10-14-83

	Ice Bath		Ambient		150°		400°	
Probe Number	N.B.S.* °F	PROBE °F	N.B.S.* °F	PROBE °F	N.B.S.* °F	PROBE °F	N.B.S.* °F	PROBE °F
SK-21	32	32	65	66	171	168	391	395
SK-41	32	31	66	67	173	175	396	396
SK-61	32	31	66	66	168	168	420	422
SK-62	32	32	67	65	163	164	428	427
SK-71	33	34	68	68	158	155	419	421
SK-81	32	32	68	67	140	138	421	423
SK-91	33	35	68	69	151	152	398	400
SK-101	33	34	68	68	144	145	404	408
SK-111	32	33	68	70	162	160	378	377
SK-51-T	33	33	68	70	168	170	385	383
SK-101-T	34	32	67	68	170	170	391	392
HEATED BOX NO. 1	33	34	64	63	188	185	370	372
HEATED BOX NO. 2	33	35	64	64	186	188	374	374
LAST IMPINGER PROBE NO. 1	34	34	64	65	182	184	381	380
LAST IMPINGER PROBE NO. 2	34	33	64	65	178	176	386	387

* National Bureau of Standards Calibrated Mercury Thermometer

George F. Gebel
Signature

CALIBRATION FORM

Date 7-18-83

Box No. Sb-3

Barometric Pressure 30.05 inches Hg

ΔHT	ΔHD	Teledyne Mass Flow Meter		Gas Volume, Dry Gas Meter			Temp. Teledyne	Temp. of Dry Meter	Time Minutes
		Desired liters/min	Actual liters/min	Initial	Final	Actual ft.3			
0		15,6		94.2	97.115	2.915	68	95	5
0		~~20~~100		97.5	99.359	1.859	68	100	5
0		25					68		
0		30					68		
0		35					68		

GAS METER THERMOMETER CALIBRATION

N.B.S. °F	METER BOX

Signature R Paul

```
                                          ---MEAN---

DELTA-H :     0.000       0.000           0.000

      Y :     0.993       1.007           1.000

   SCFM :     0.553       0.355

     OF :     0.000       0.000
```

PROJECT PARTICIPANTS

Robert S. Sholtes, Ph.D, P.E.	Project Advisor
Rodney C. Paul	Field Test Crew
George F. Gabel	Field Test Crew

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ail To: Gary Rust
BACT/LAER Clearinghouse
U.S. EPA (MD-15)
RTP, NC 27711

9.16
Source Category
5/10/84
Date of This Report

BACT/LAER DETERMINATION REPORT

ource Type/Size: Fluidized bed phosphate rock dryer 300 TPH

mpany Name/Site Location: AMAX Phosphate, Inc. Bradley, Florida

etermination is: (circle appropriate efinition) [✓ BACT]/LAER For New/[✓ Modified] Source:

Date of Permit Issuance: October 7, 1983

Permit No.: PSD-FL-094

Date of Estimated Start-up: March 1, 1984

etermination Made By: Fl. Dept of Environmental Reg. (Agency) Willard Hanks (Person Directly Knowledgable About Permit) (904)488-1344 (Phone)

rmit Parameters: ist all rocesses subject this permit)	Throughput capacity, weight rate, Btu input, etc.	Pollutant(s) emitted (SO_2 particulate, etc.)	BACT/LAER emission limit(s) and basis for the limits* (units of emissions/ units of input	Control equipment or process modification description**	Eff.%
Rock Dryer	118 x 10^6 Btu/hr	Particulate	.06 lb/ton wet feed	Cyclone Separator	
	heat input			& Inpingement Scrubber	97%
		SO_2	1.1 lb/mmBtu		
		NO_x	.3 lb/mmBtu		
		VE	Max 10% opacity		

tes***: The dryer was modified to fire a coal-oil-water mixture (COWM) containing max 2.5% Sulfur.

*Indicate basis of emissions limit, i.e., BACT determined simply by technology and economics, NSPS, LAER, or determined by NAAQS or PSD increment constraints. (Example: 0.05 pounds particulate per million Btu input limit needed to protect Class I increment.) To promote consistency, please use NSPS emission limits where possible.

**To the extent possible in the space available, describe basic control or process equipment design details. Indicate unique or innovative features.

***Notes are optional and can address special items, unusual circumstances, or other clarifying information such as SIC codes.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: Clair Fancy Loctn.:
To: Loctn.:
To: Loctn.:
From: Vicki Date: 1-6

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: Date Due:

RECEIVED
JAN 4 1984
Office of the Secretary

TO: Victoria Tschinkel

FROM: Clair Fancy Clair Fancy

DATE: January 4, 1984

SUBJ: Modification of Conditions
Permit Nos. AC 29-65834 and PSD-FL-094

Attached for your signature is a letter modifying conditions of the above referenced permits. The Bureau recommends your approval.

CF/pa

Attachment

January 4, 1984

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

Dear Mr. Sandrik:

Modification of Conditions
Permit Nos. AC 29-65834
PSD-FL-094

We are in receipt of your request for modifications of conditions in the state and federal construction permits which allow the use of alternate fuels in the existing phosphate rock dryer located at your Big Four Mine plant.

The conditions of state permit AC 29-65834 are changed as follows:

Original Conditions

Permits to operate the dry rock storage (AO 29-20564) and shipping (AO 29-20563) facilities will be modified to reflect the new hours of operation before March 1, 1984.

Construction Permit Expiration Date: March 1, 1984

Revised Conditions

Permits to operate the dry rock storage (AO 29-20564) and shipping (AO 29-20563) facilities will be modified to reflect the new hours of operation before June 15, 1984.

Construction Permit Expiration Date: June 15, 1984

By copy of this letter, we are requesting the Environmental Protection Agency to extend the expiration date of federal construction permit PSD-FL-094 that was issued for this project.

Mr. S. R. Sandrik, Plant Manager
Page Two
January 4, 1984

This letter must be attached to your permit and becomes a condition of that permit.

Sincerely,

/s/Victoria J. Tschinkel

Victoria J. Tschinkel
Secretary

VJT/s

cc: Iwan Choronenko
Dan Williams
James Wilburn

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

December 16, 1983

11/22 ~~Bill~~ pls handle Willard

DER
DEC 21 1983
BAQM

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

SUBJECT: AMAX Big Four Mine Dryer Construction
Permit No. AC29-65834

Dear Mr. Fancy:

Recently your department issued a construction permit to AMAX Chemical Corporation for the fuel conversion of its Big Four Mine Dryer to high sulfur coal-oil-water mixture. AMAX would like to request an extension of the expiration date of the permit from the current March 1, 1984, to June 15, 1984. Also, AMAX requests that the modifications date of March 1, 1984, found in specific condition 20 be extended to June 15, 1984.

If you have any questions concerning this request for extension, please let me know.

Sincerely,

Fred G. Mullins
Regulatory Compliance Manager

FGM/ds

cc: S.R. Sandrik
G.P. Uebelhoer
R.F. Crabill

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

November 22, 1983

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

Re: PSD-Fl-094

Dear Mr. Sandrik:

The Department recently issued AMAX Phosphate, Inc. state construction permit No. AC 29-65834 which will allow the use of an alternate fuel in the phosphate rock dryer at the Ft. Lonesome plant. A federal permit from the Environmental Protection Agency must also be obtained before your Company proceeds with the use of this alternate fuel.

The Environmental Protection Agency approves of the emission standards for particulate matter and sulfur dioxide that are in the state permit. However, they question if these standards can be achieved with the existing scrubber serving the dryer. The attached November 3, 1983 letter from EPA shows their evaluation of your data that led to this conclusion.

Your environmental staff has stated that additional emission data for this scrubber is available. We request that you use the latest data to reevaluate the performances of the existing dryer scrubber to determine if the emission standards listed in the state permit will be met under all dryer operating conditions. Please send us a copy of all data and calculations used in the reevaluation and your comments on the issues raised by the Environmental Protection Agency in their November 3 letter.

If you have any questions on the information requested, please call Willard Hanks at (904)/488-1344.

Sincerely,

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

CHF/WH/s
Enclosure
cc: Michael Brandon, EPA
Jerry Campbell, Hillsborough Cty.
Bill Thomas, SW District

A copy of US EPA's letter dated 11/3/83
was attached to DER's letter dated 11/22/83

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

NOV 3 1983

4AW-AM

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

RE: PSD-FL-094 AMAX Phosphate, Inc.

Dear Mr. Fancy:

This is to acknowledge receipt of your letter containing the preliminary determination for the above company's use of alternate fuels and production increase at their Fort Lonesome facility.

We concur with the permit conditions as stipulated. However, data submittals (i.e., performance test results) do not substantiate the proposed emission limits. Preliminary calculations predict that the particulate emission limits will be met, but performance test data (test of March 2, 1982) show an emission rate of 0.069 lbs. of particulate per ton of phosphate rock feed exceeding New Source Performance Standards for Phosphate Rock Dryers (40CFR60.402). In addition, an analysis of sulfur dioxide removal efficiency data predicts that sulfur dioxide emission limits will also be exceeded (see enclosures).

Since we don't want to have to revise the conditions of the Federal Prevention of Significant Deterioration construction permit after it has been issued, we ask that you have the source submit further substantiation of their emission control claims. If they cannot, your permit should require them to upgrade or add on control equipment in the event that performance testing under worst-case conditions indicates the existing equipment is not adequate to meet emission limits. We also welcome any other proposals you may have for dealing with compliance test failure.

If you have any comments or questions regarding this letter or enclosures, please contact Michael Brandon at 404/881-7654.

Sincerely yours,

James T. Wilburn, Chief
Air Management Branch
Air and Waste Management Branch

Enclosures

Particulate Emissions Given:

1. Application reports from 600 to 1500 lbs/hr of uncontrolled particulate emissions.

2. Impingement scrubbers are reported to control 90-98% of particles in the 1 micron size range.

3. AP-42 reports approximately 11% of particulates from dryers are less than 1 micron.

Assumed:

1. Scrubber is 99.5% efficient for particles in size range greater than 1 micron.

2. Scrubber is 94% efficient for particles less than 1 micron.

3. Worst case uncontrolled emissions are 1500 lbs/hr.

Calculations:

Ash content of COM = 1.86% (appears low)

118×10^6 btu/hr ÷ 14,704 btu/lb COM x .0186 = 149 lbs/hr Ash

1500 + 149 = 1649 lbs/hr uncontrolled particulate emissions

$[1649 \times (1 - .11)] \times (1 - .995) + (1649 \times .11) \times (1 - .94) =$

$1649 \times .89 \times .005 + 1649 \times .11 \times .06 =$

$7.3 + 10.88 = 18.22$ lbs/hr

at 300 TPH emissions are $\frac{18.22}{300} = 0.06$ lbs/ton

COM Test Data:

252 TPH	.061 lbs/ton
	.056 lbs/ton
	.091 lbs/ton
	.069 lb/ton worst case pebble drying

Proposed Emission Rate = .06 lb/ton

Conclusion: Impingment scrubber is not capable of meeting the permitted emission limit.

Sulfur Dioxide emission:

Given:

1. Sulfur Dioxide removal efficiency tests on dryer and scrubber system at AMAX 9/81 to 4/82.

2. Proposed limit is to be 1.1 lbs SO_2/mmbtu heat input.

3. Maximum sulfur content of fuel is to be 2.5% or what is required to meet 1.1 lbs SO_2/mmbtu.

4. Greater air volumes will result in lower residence time for dryer gases.

Assume:

1. Higher product rates result in greater dryer gas volumes.

2. Residence time in dryer effects sulfur dioxide removal efficiencies.

3. Straight line correlations are possible with data at some product rate.

4. Product mix does not appreciably effect sulfur dioxide removal.

Data Interpretation:

Runs 1 through 3 gives sulfur dioxide removal efficiency as follows: $y = mx + b$

y = efficiency m = slope x = sulfur content $b = y$ at $x = o$

Values 1. $x = 3$ $y = 48$ $\frac{y - y_2}{x - x_2} = M$
2 & 3 $x = 1$ $y = 74$

$m = \frac{-26}{2} = -13$ $48 = -13(3) + B$ $B = 87$

$\underline{y = -13x + 87}$ For 300 TPH

Runs 4 and 8

Values 4. $x = 2.4$ $y = 69$

8. $x = 1.5$ $y = 78$

$$\frac{69 - 78}{2.4 - 1.5} = \frac{-9}{.9} = -10$$

$69 = -10\ (2.4) + B$ $B = 93$

<u>$y = -10x + 93$</u> <u>For 250 TPH</u>

Calculations:

118×10^6 Btu/hr ÷ 14,704 Btu/lb com = 8025 lbs/hr

8025 lbs/hr fuel x 2.5% S x $\frac{2 \text{ lbs } SO_2}{\text{lbs}}$ = 401 lbs/hr SO_2

300 TPH $y = -13(2.5) + 87 = 55\%$

250 TPH $y = -10(2.5) + 93 = 68\%$

<u>at 300 TPH</u> 401 x (1 - .55) / 118. = 1.5 lbs SO_2/mmbtu

<u>at 250 TPH</u> 401 x (1 - .68) / 118 = 1.08 lbs SO_2/mmbtu

minimum eff. $118 \times 1.1 = 401\ (\ 1 = y)$
at 300 TPH $y = 68\%$

<u>Max Sulfur fuel content at 300 TPH</u>

$68 = -13(x) + 87$

$x = 1.46\%$

Conclusions:

The sulfur dioxide emissions limit will not be met based on 300 TPH with 2.5% S fuel. A lower sulfur content fuel will probably be needed base on the above assumptions. However, if the variable moisture content of the rock is taken into account, it is conceivable that the data interpolation in this analysis does not account for variation in the amount of gases needed to dry the rock. The data is therefore subject to interpretation based upon the limited process data taken during these test runs.

Recommendation:

Further testing should be performed on this dryer with pertainment gas flow rates, moisture contents of input and product rock, gas temperature, and scrubber flow rate, pressure drop, PH measured. Such testing can be done during performance tests as the permit flexibility regarding compliance with the 1.1 lb per million BTU emission limit allows for several compliance measures including addition of caustic to scrubbing solution, reduction of fuel sulfur content, and/or reduction of process rates up to 10% (270 Tons/HR - 65% eff.)

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

October 14, 1983

DER
OCT 18 1983
BAQM

Mr. Williard Hanks
Dept. of Environmental Regulation
Bureau of Air Quality Management
Twin Towers Office Bldg.
2600 Blair Stone Road
Tallahassee, FL 32301

Subject: FDER No. AC29-65834
EPA No. PSD-FL-094

Dear Mr. Hanks:

AMAX Chemical is in receipt of the September 20, 1983 letter from the Hillsborough County Environmental Protection Commission concerning the ambient monitoring requirements for the Big Four Mine Dryer PSD Review. AMAX is in agreement with the specific conditions requested by the HCEPC in that letter.

If you need any further clarification of this agreement, please let me know.

Sincerely,

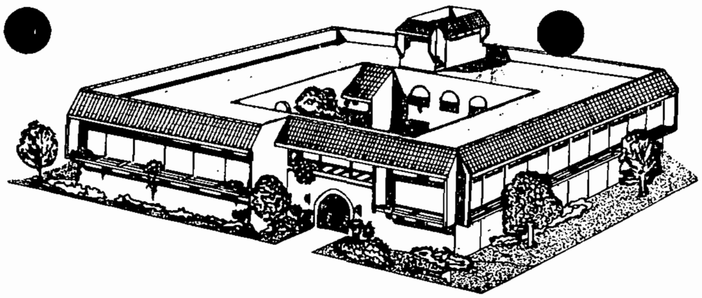
Fred G Mullins/ds

Fred G. Mullins
Regulatory Compliance Manager

FGM:mlm

cc: Dan Williams (FDER, Southwest District)
Debra Sanderson (HCEPC)
Jerry Cambell (HCEPC)
Fred Crabill
Randy Sandrik
Gary Uebelhoer
Bruce Galloway

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION
COMMISSION
E. L. BING
RODNEY COLSON
MATT JETTON
JOHN R. PAULK
JAN KAMINIS PLATT



ROGER P. STEWART
DIRECTOR

1900 - 9th AVE
TAMPA, FLORIDA 33605

TELEPHONE (813) 272-5960

September 20, 1983

DER
SEP 23 1983
BAQM

Mr. Willard Hanks
Florida Department of Environmental Regulations
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Hanks:

This letter is in response to the Preliminary Determination on AMAX's Big Four Mine rock dryer and our recent telephone conversation. As we discussed, the Hillsborough County Environmental Protection Commission (EPC) is working with AMAX to attach a specific condition to the permit to require that AMAX maintain an existing ambient air monitoring network. Debra Sanderson of this office spoke with Fred Mullins to confirm AMAX's commitment on this. It is my understanding that Mr. Mullins will call you to reassure the BAQM that AMAX will not reject the monitoring requirement once the permit is issued.

The EPC recommends that the following specific conditions be attached to AMAX's construction permit for the dryer:

1. AMAX Chemical Corporation's, Big Four Mine sampling locations by UTM coordinates shall be:

    #1 - 478.00E, 1245.39N
    #2 - 475.00E, 1233.70N
    #3 - 477.00E, 1225.33N

2. Total Suspended Particulate (TSP), Fluoride in TSP and sulfur dioxide will be monitored for 24 hours every 6th day according to the National Air Sampling Network schedule at Sites 1,2, and 3.

3. TSP and sulfur dioxide sample collection and analysis shall be performed according to Federal Reference Methods as outlined in the Code of Federal Regulations, Part 50, Appendices A and B.

4. The quality Assurance requirements as defined in the Code of Federal Regulations Part 58, Appendix A shall be followed for TSP and Sulfur Dioxide sampling. AMAX Chemical Corporation is understood to be a single reporting organization for its ambient air sampling activities in Hillsborough County.

5. Quarterly data reports shall be submitted to the Hillsborough County Environmental Protection Commission including precision and accuracy data.

If you have any questions or problems with these conditions, please contact Debra or myself.

Sincerely,

Jerry Campbell

Jerry Campbell
Environmental Engineer II
Hillsborough County Environmental
Protection Commission

JC/ljh

cc: Bill Thomas
Fred Mullins
Fred Crabill

COUNTY OF HILLSBOROUGH

DER

MAR 07 1983

BAQM

MEMORANDUM

February 25, 1983

To Tom Rogers, F.D.E.R., Tallahassee

From Frank Shindle/Iwan Choronenko, H.C.E.P.C. F.S.

Subject: Amax Phosphates, Inc. - PSD Application

My comments are as follows:

1. Secondary emissions calculation due to potential increase in mining activity omitted from the report. The increase of 389,000 tons per year dryer input must be the result of an increase in mining activity.

2. In Volume 1, Page 1-4, there is a statement that there will not be additional rail traffic; yet Page 2-8 indicates additional rail cars will be needed. Please explain.

3. Figure 2-2 indicates the locations of the 8 receptors used in the PTMTPW dispersion model. All these receptors are located beyond the plant boundary, in the direction of maximum impact contributed by Amax's sources.

   Prevention of significant deterioration is not limited to areas beyond plant boundaries. Nor does F.A.C. 17-2.500(1), or Hillsborough County Environmental Protection Commission Act, Chapter I, exclude the area within the plant boundaries. Non-deterioration must be demonstrated for any point within the baseline area [F.A.C. 17-2.500(5)(d) and 17-2.500(1)(a) and (b)].

4. Gulf Coast Lead is a major sulfur dioxide source which is not included in the model.

5. Doubling of the current allowable particulate emission standard may impact the non-attainment area and subject the facility to R.A.C.T. standards. The facilities impact is not modeled for an exemption at the proposed emission level and is also subject to the county non-deterioration clause.

6. Amax proposes application of N.S.P.S. which relaxes the emission limitation. Amax has continuously demonstrated in compliance tests for several years that the current standard can be met with present equipment. Additionally, other phosphate dryers are subject to the same emission limit.

7. Page 3-7 states that extrapolation of the data from PSD-FL-088 indicates SO_2 removal efficiency of approximately 60-65% when fuel with 2.5% sulfur is used to dry pebble rock and that it is the lowest expected SO_2 removal efficiency to be expected. Yet a compliance test conducted on August 27, 1981, utilizing 2.5% sulfur fuel oil demonstrated that SO_2 removal efficiency of less than 60-65% occurred. (See attachment)

8. The urban mixing height was used in the PTMTPW model. Rural mixing heights should have been used.

9. The ISCLT, using 10 meters for the height at which a wind data was measured, is incorrect. It should have been 7 meters.

10. Stability class data for the year 1973, Julian day 24, hour 18, indicates a stability class of 5. The stability class according to the crster preprocessor printout should be class 4.

11. Stability class data for the year 1972, Julian day 220, hour 18, indicates a stability class of 4. This should have been stability class 5.

For the above reasons, I deem the application incomplete.

FS/IC/lw

cc: Fred G. Mullins, AMAX
Willard Hanks, FDER, Tallahassee
Bill Thomas, FDER, Tampa

MEMORANDUM

AMAX Phosphate, Inc.

402 SOUTH KENTUCKY AVENUE • SUITE 600 • LAKELAND, FLORIDA 33801

Mr. Fred Mullins DATE: September 2, 1981

George Townsend

SULFUR DIOXIDE COMPLIANCE TEST

Compliance testing was conducted at the Big Four Mine Dryer on August 27, 1981. During the test procedures No. 6 fuel oil, containing approximately 2.5 percent sulfur, was utilized in the drying operation. Test results and related data were as follows:

OPERATING CONDITIONS

RUN	TPH	GPH #6 FUEL OIL	MMBTU/HR
1	300	445	66.613
2	300	440	65.861
3	300	435	65.115
Avg.	300	440	65.863

	STACK CONDITIONS		SO_2 EMISSIONS	
RUN	DSCFM	TEMP. °F	LBS/HR	LBS/MMBTU
1	42,297	141	83.091	1.247
2	43,788	142	84.850	1.288
3	45,329	142	91.962	1.412
Avg.	43,805	142	86.634	1.316

All above 1.1 # SO_2 / MBTU requested

George Townsend
George Townsend

GT:st

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

$$SO_{2\,\text{Potential}} = \frac{440\,\cancel{gal}}{hr} \times 8.3\,\frac{\cancel{\#oil}}{\cancel{gal}} \times \frac{2.5\,\cancel{\#S}}{100\,\cancel{\#oil}} \left| \frac{2\#SO_2}{\cancel{\#S}} \right. = 182.6\ \frac{\#SO_2}{hr}$$

$$\%\ SO_2\ \text{Removal} = \left[\frac{182.6 - 86.6}{182.6}\right] \times 100 = 52.6\ \%\ \text{removal}$$

Run #1

```
DATE - 8,27,81                    ********** EPA METHOD #8 **********                                   PAGE 1 OF

                                  SULFURIC ACID AND SULFUR DIOXIDE EMISSIONS


 ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  106          AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  1.1017

STACK STATIC PRESSURE(IN.HG.)=  0                               AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  141

VELOCITY HEAD OF STACK GAS(IN. H2O)=  .7687                     AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .590912

VOLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  42.2  DRY GAS METER CALIBRATION FACTOR=  1.004

DIAMETER OF SAMPLE NOZZLE(INCHES)=  .2477                       AREA OF SAMPLE NOZZLE(SQ FT)=  3.34642E-04

DIAMETER OF THE STACK(FT)=  5.9583                              AREA OF THE STACK(SQ FT)=  27.8828

BAROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.935           TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  222.2

TOTAL VOLUME OF SAMPLE(ML)=  2000                               VOLUME OF ALIQUOT(ML)=  25

 ITOT TUBE COEFFICIENT=  .8526                                  TOTAL SAMPLING TIME(MIN.)=  72

NORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  .01001

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0     VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  23.05 VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


DRY GAS VOLUME(DSCF)=  39.6352

STANDARD VOLUME OF H2O VAPOR(CF)=  10.459

MOISTURE CONTENT=  .233786

SULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0
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```
DATE - 8,27,81                    ********** FUEL INFORMATION **********                    PAGE 2 OF

HIGH HEATING VALUE OF FUEL(BTU/GAL)=  149690          AVERAGE TEMPERATURE OF FUEL(DEG F)=  210

FUEL FIRING RATE (GPM)=  7.25                         AVERAGE %TOTAL SULFUR AS S IN FUEL=  2.5 ←

DENSITY OF OIL(LB/GAL)=  8


LBS. OF SULFUR IN PER MIN.=  1.45

LBS. OF SO2 IN PER MIN.=  2.8971

LBS. OF SO2 OUT PER MIN.=  1.5327

REMOVAL EFFICIENCY IN PERCENT=  47.0955% ←

M.M. BTU'S PER MIN.=  1.08525

LBS. OF SO2 EMITTED/10^6 BTU'S INPUT=  1.41229 ←
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Run #2

```
DATE - 8,27,81                         ********** EPA METHOD #8 **********                                   PAGE 1 OF

                                    SULFURIC ACID AND SULFUR DIOXIDE EMISSIONS

AVERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  99.1         AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  1.19

STACK STATIC PRESSURE(IN.HG.)=  0                                AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  142

VELOCITY HEAD OF STACK GAS(IN. H2O)=  .7843                      AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .615091

VOLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  44     DRY GAS METER CALIBRATION FACTOR=  1.004

DIAMETER OF SAMPLE NOZZLE(INCHES)=  .2477                        AREA OF SAMPLE NOZZLE(SQ FT)=  3.34642E-04

DIAMETER OF THE STACK(FT)=  5.9583                               AREA OF THE STACK(SQ FT)=  27.8828

BAROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.935            TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  240.6

TOTAL VOLUME OF SAMPLE(ML)=  2000                                VOLUME OF ALIQUOT(ML)=  25

PITOT TUBE COEFFICIENT=  .8526                                   TOTAL SAMPLING TIME(MIN.)=  72

NORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  .01001

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0      VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  24     VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


DRY GAS VOLUME(DSCF)=  41.8449

STANDARD VOLUME OF H2O VAPOR(CF)=  11.325

MOISTURE CONTENT=  .237997

SULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0
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```
DATE - 8,27,81                    ********** FUEL INFORMATION **********                    PAGE 2 OF 2


HIGH HEATING VALUE OF FUEL(BTU/GAL)=  149690              AVERAGE TEMPERATURE OF FUEL(DEG F)=  210

FUEL FIRING RATE (GPM)=  7.4167                           AVERAGE %TOTAL SULFUR AS S IN FUEL=  2.5 ←

DENSITY OF OIL(LB/GAL)=  8


LBS. OF SULFUR IN PER MIN.=  1.48334

LBS. OF SO2 IN PER MIN.=  2.96371

LBS. OF SO2 OUT PER MIN.=  1.38485

REMOVAL EFFICIENCY IN PERCENT=  53.2732% ←

M.M. BTU'S PER MIN.=  1.11021

LBS. OF SO2 EMITTED/10^6 BTU'S INPUT=  1.24738 ←
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Run #3

```
DATE - 8,27,81                          ********** EPA METHOD #8 **********                                PAGE 1 OF 2

                                      SULFURIC ACID AND SULFUR DIOXIDE EMISSIONS


AVERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  101.8       AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  1.2713

STACK STATIC PRESSURE(IN.HG.)=  0                               AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  142

VELOCITY HEAD OF STACK GAS(IN. H20)=  .7966                     AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .634536

VOLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  45.4  DRY GAS METER CALIBRATION FACTOR=  1.004

DIAMETER OF SAMPLE NOZZLE(INCHES)=  .2477                       AREA OF SAMPLE NOZZLE(SQ FT)=  3.34642E-04

DIAMETER OF THE STACK(FT)=  5.9583                              AREA OF THE STACK(SQ FT)=  27.8828

BAROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.935           TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  242.5

TOTAL VOLUME OF SAMPLE(ML)=  2000                               VOLUME OF ALIQUOT(ML)=  25

PITOT TUBE COEFFICIENT=  .8526                                  TOTAL SAMPLING TIME(MIN.)=  72

NORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  .01001

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0     VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  25.8  VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


DRY GAS VOLUME(DSCF)=  42.9774

STANDARD VOLUME OF H2O VAPOR(CF)=  11.4145

MOISTURE CONTENT=  .234856

SULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0
```

```
DATE - 8,27,81                    ********** FUEL INFORMATION **********                                    PAGE 2 OF 2

HIGH HEATING VALUE OF FUEL(BTU/GAL)=  149690                   AVERAGE TEMPERATURE OF FUEL(DEG F)=  210

FUEL FIRING RATE (GPM)=  7.333                                 AVERAGE %TOTAL SULFUR AS S IN FUEL=  2.5   ←

DENSITY OF OIL(LB/GAL)=  8


LBS. OF-SULFUR IN PER MIN.=  1.4666

LBS. OF SO2 IN PER MIN.=  2.93027

LBS. OF SO2 OUT PER MIN.=  1.41416

REMOVAL EFFICIENCY IN PERCENT=  51.7395% ✓ ←

M.M. BTU'S PER MIN.=  1.09768

LBS. OF SO2 EMITTED/10^6 BTU'S INPUT=  1.28832  ←
```

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

March 3, 1983

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

Subject: AMAX Phosphate, Inc., Big Four Mine, Application for PSD Approval; Request for Additional Information PSD-FL-094, AC 29-65834

Dear Mr. Sandrik:

The Department has initially reviewed your application for PSD approval and has determined that additional information is needed to complete this review. Please respond to the following questions and comments as soon as possible so that our review may be completed.

1. Specify the nature of the plant or facility boundaries as used to place the receptor grids used in the dispersion modeling. Include maps (of larger scale than previously submitted), descriptions, and/or pictures. These boundaries, as used in the modeling, must be physical barriers which preclude the general public from entering the area. Property lines do <u>not</u> necessarily restrict public access. In general, when modeling to determine maximum ground-level concentrations, boundaries should not be used to restrict the placement of receptor grids. Maximum concentrations, as used for permitting purposes, may be adjusted for physical barriers after modeling the entire area. For the purposes of this permit application, however, modeling need only be redone if the boundaries, as initially used, do not conform to the physical barrier definition.

2. You have incorrectly used urban mixing heights in the PTMTPW dispersion model runs. Re-evaluate these runs using the rural heights. In some cases there are no differences between urban and rural mixing heights; these need not be rerun.

3. The STAR data summaries used as input to the ISCLT dispersion model contain frequencies in wind speed

categories that should not occur. Also, the frequencies you have calculated in the proper wind speed categories do not correspond to the FDER STAR summary results. Correct these summaries and rerun the model.

4. The maximum hourly SO_2 emission rate used in the modeling is based upon a maximum heat input rate of 118 million Btu per hour, whereas the maximum rated capacity of the dryer is listed as 125 million Btu per hour. If, in any one hour, this dryer uses in excess of 118 million Btu then the maximum hourly emission rate should be based on the higher heat input value.

5. Give the reasons your company has for wanting to use alternate fuels in the dryer.

6. Give the current and projected cost and availability of No. 6 fuel oil with 0.7 percent sulfur content and No. 6 fuel oil and COM with up to 2.5 percent sulfur content.

7. Furnish any additional data available to support the 60-65 percent sulfur dioxide removal by the dryer system.

8. Are the data used as the basis for the nitrogen oxide standard applicable to AMAX's fluid bed dryer?

When the Department receives the answers to the above questions and comments, the review process will continue. If you have any questions regarding this letter, please call Willard Hanks or Tom Rogers at (904)488-1344 or write me in care of the Bureau of Air Quality Management.

Sincerely,

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

CHF/TR/bjm

cc: Dr. John Koogler
Mr. Dan Williams
Mr. Iwan Choronenko

No. 0157983

RECEIPT FOR CERTIFIED MAIL

**NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL**
(See Reverse)

SENT TO
Mr. S. R. Sandrik
STREET AND NO.

P.O., STATE AND ZIP CODE

POSTAGE			$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE		¢
	OPTIONAL SERVICES	SPECIAL DELIVERY	¢
		RESTRICTED DELIVERY	¢
	RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
		SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
		SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
		SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES			$

POSTMARK OR DATE

3/3/83

PS Form 3800, Apr. 1976

PS Form 3811, Jan. 1979

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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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
P. O. Box 508
Bradley, FL 33835

3. **ARTICLE DESCRIPTION:**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	0157983	

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

4. **DATE OF DELIVERY**
3-7-83

POSTMARK
BRADLEY, FL
MAR 7 1983
USPO

5. **ADDRESS** (Complete only if requested)

6. **UNABLE TO DELIVER BECAUSE:**

CLERK'S INITIALS
SJ

☆GPO : 1979-300-459

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

November 22, 1983

Bill Thomas
Department of Environmental
Regulation
7601 Highway 301, N
Tampa, Florida 33610

Dear Bill:

The Bureau of Air Quality Management recently issued construction permit number AC 29-65834 to AMAX, Inc. which allows the company to convert an existing phosphate rock dryer from oil to COWM fuel. Hillsborough County Environmental Protection Commission asked the bureau to add a specific condition to this permit that would require AMAX, Inc. to continue to operate and report the data from three company ambient air monitoring stations. The construction permit was issued without this condition. Since then, the bureau has received a letter from AMAX, Inc. in which they agreed to the county's request.

As it is desirable to have this ambient air data and all parties are in agreement to supply and process it, the bureau requests that you add the following specific condition to any permit to operate issued for this phosphate rock dryer.

AMAX, Inc. shall continue to operate the ambient air monitoring stations and report the data collected to the Hillsborough County Environmental Protection as described in the county's letter dated September 20, 1983 and agreed to in the company's letter dated October 14, 1982.

Please let us know if you concur with this condition.

Sincerely,

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

CHF/WH/bjm

Attachments: HCEPC letter dated 9/20/83
AMAX, Inc. letter dated 10/14/82

cc: Jerry Campbell, HCEPC
Fred Crabill, AMAX, Inc.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To:	Loctn.:	
To:	Loctn.:	
To:	Loctn.:	
From:	Date:	
Reply Optional [ ]	Reply Required [ ]	Info. Only [ ]
Date Due:	Date Due:	

TO: Clair Fancy CHF

THRU: Bill Thomas BT

FROM: Willard Hanks wmh

DATE: November 22, 1983

SUBJ: AMAX, Inc.

Hillsborough County Environmental Protection Commission asked the Department to include an ambient air quality monitoring requirement as a specific condition in the recently issued permit (AC 29-65834) that allowed AMAX to use an alternate fuel in an existing phosphate rock dryer. The county wanted this specific condition in the construction permit to assure the company would continue to supply the ambient air data from the company's monitors and to justify use of the county's resources in processing the data.

In reviewing the application for this modification, it was decided that post-construction monitoring was not necessary. As review engineer, I did not want to add an ambient air monitoring requirement to the construction permit because it might result in a violation of a specific condition of the permit in the future if any of the monitoring, QA or QC conditions were not followed. This could make the Department have to enforce a condition we did not believe was justified to begin with.

Since issuing the construction permit, the company has written that they have no objection to the ambient air monitoring requirement. You stated that the condition should be added as the company has agreed to the county's request. I have discussed this with the SW District and they are willing to add a specific condition to the operation permit, when issued, requiring ambient air monitoring by AMAX. The attached letter confirms this and has notified all personnel involved of the situation.

WH/bjm

Acopy of Hillsborough County EPC's letter dated 9/20/83
was attached to ~~the~~ DER's letter dated 11/22/83

Acopy of AMAX Chemical Corporation's letter dated 10/14/83
was attached to DER's letter dated 11/22/83

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

October 11, 1983

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

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

RE: Final Determination - AMAX Phosphate, Inc.
Application for State and Federal PSD Permits
(AC 29-65834, PSD-FL-094)

Dear Mr. Sandrik:

Enclosed please find one copy of the referenced Final Determination. State Permit Number AC 29-65834, hereby issued as of October 7, 1983, pursuant to Section 403, Florida Statutes. Final approval of the Federal PSD permit, which is incorporated with the state permit, is contingent upon review and acceptance of the permit condition by the Environmental Protection Agency Region IV office in Atlanta. Questions concerning final issuance of the Federal permit should be directed to Mr. James T. Wilburn of the EPA office.

Acceptance of this permit constitutes notice and agreement that the department will periodically review this permit for compliance, including site inspections where applicable, and may initiate enforcement actions for violation of the conditions and requirements thereof.

Sincerely,

Thomas for

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

CHF/bjm

Enclosure

cc: James T. Wilburn, EPA Region IV
Iwan Choronenko, Hillsborough County Environmental Protection Commission
Dan Williams, DER Southwest District
John B. Koogler, Sholtes & Koogler Environmental Consultants

P 408 530 350

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Mr. 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 10/12/83	

PS Form 3800, Feb. 1982

PS Form 3811, Jan. 1979

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one.)
   - ☒ Show to whom and date delivered............ ¢
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     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
P. O. Box 508
Bradley, FL 33835

3. **ARTICLE DESCRIPTION:**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	P408530350	

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐Addressee ☒Authorized agent

4. **DATE OF DELIVERY**
10-17-83

POSTMARK
BRADLEY
OCT 17 1983
USPO

5. **ADDRESS** (Complete only if requested)

6. **UNABLE TO DELIVER BECAUSE:**

CLERK'S INITIALS

☆GPO : 1979-300-459

FINAL DETERMINATION

AMAX Phosphate, Inc.
Hillsborough County, Florida

Permit Number
AC 29-65834
PSD-FL-094

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

October 5, 1983

FINAL DETERMINATION

AMAX Phosphate, Inc.'s application for permit to burn an alternate fuel in their existing phosphate rock dryer located near Fort Lonesome, Hillsborough County, Florida has been reviewed by the Bureau of Air Quality Management. Public Notice of the department's intent to issue the permit was published in The Tampa Tribune on September 3, 1983. Hillsborough County Environmental Protection Commission and the U.S. Environmental Protection Agency commented on the department's proposed action.

Hillsborough County Environmental Protection Commission requested the department require AMAX Phosphate, Inc. to continue to operate three Company owned ambient air monitoring systems as a specific condition to the construction permit. The department encourages AMAX to furnish the ambient air quality data collected by the Company's monitors. All data meeting the quality assurance requirements will be added to the department's ambient air quality data bank. The department's policy is to require post-construction monitoring only when a project threatens an ambient air quality standard. Since this is clearly not the case for this project and the agreement to furnish the data is between the county and AMAX, the department feels the elements are not present to incorporate an ambient air monitoring requirement as an enforceable permit condition. For these reasons, we have not added a specific condition requiring post-construction monitoring to the construction permit.

The review engineer for EPA expressed doubt about AMAX being able to meet the proposed particulate matter and sulfur dioxide emission standards while burning the alternate fuel. He reached this position by reevaluating the test data submitted in the application. The Bureau of Air Quality Management believes the permitted emission standards can be met although the Company may have to burn a higher quality of fuel than they proposed in the application to meet them. The draft permit placed limits on the allowable emissions of criteria pollutants and specified the Company must use whatever quality of fuel is needed to meet the standards. We believe this is a reasonable, enforceable position and, therefore, no change to the permit is needed for this issue.

The final action of the Bureau of Air Quality Management is to recommend that proposed state permit AC 29-65834 and federal permit PSD-FL-094 be issued as proposed in the Technical Evaluation and Preliminary Determination.

11 Oct
9th
day

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

September 19, 1983

DER
SEP [illegible] 83

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

SUBJECT: AMAX BIG-FOUR MINE DRYER PERMIT REVISIONS AND PSD REVIEW - PUBLIC NOTICE - AC29-65834

Dear Mr. Fancy:

Pursuant to Section 403.815, Florida Statues, Florida Administrative Code Rule 17-1.62(3), and the request from your Department, AMAX Chemical Corporation has published the required legal notice for the above referenced permit modification. The notice ran one time on September 3, 1983, in the legal ad section of the Tampa Tribune.

In accordance with Rule 17-1.62, you will find attached an affidavit of publication provided by the newspaper as proof the public notice was given.

Sincerely,

Fred G. Mullins
Regulatory Compliance Manager

FGM/ds
Attachment

cc: Dan Williams (Southwest District FDER)
R.F. Crabill
S.R. Sandrik
G.P. Uebelhoer
Rhea Law

BEST AVAILABLE COPY

THE TAMPA TRIBUNE

Published Daily
Tampa, Hillsborough County, Florida

State of Florida
County of Hillsborough } ss.

Before the undersigned authority personally appeared R. F. Pittman, who on oath says that he is Publisher of The Tampa Tribune, a daily newspaper published at Tampa in Hillsborough County, Florida; that the attached copy of advertisement being a LEGAL NOTICE

in the matter of NOTICE THAT THE DEPARTMENT OF ENVIRONMENTAL REGULATION GIVES NOTICE OF ITS INTENT TO ISSUE A PERMIT TO AMAX PHOSPHATE, INC. FOR THE PURPOSE DESCRIBED HEREIN.

was published in said newspaper in the issues of SEPTEMBER 3, 1983

Affiant further says that the said The Tampa Tribune is a newspaper published at Tampa, in said Hillsborough County, Florida, and that the said newspaper has heretofore been continuously published in said Hillsborough County, Florida, each day and has been entered as second class mail matter at the post office in Tampa, in said Hillsborough County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm, or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and subscribed before me, this 16TH *day*

of SEPTEMBER *A.D. 19* 83.

Notary Public, State of Florida at Large
My Commission Expires Jan. 25, 1986

(SEAL)

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 42.8; Sulfur Dioxide 214.4; Nitrogen Oxides 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 increments consumed will be as follows: SO2-Three-Hour 34%; SO2-24-Hour 70%; SO2-Annual 35%; Particulate Matter-24-Hour 46%; and Particulate Matter-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 [illegible]
Tampa, Florida [illegible]

Any person may send written comments on the proposed action to Mr. Clair Fancy of 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.

4099 9/3/83

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

PERMITTEE:

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

Permit Number: AC 29-65834
Date of Issue:
Expiration Date: March 1, 1984
County: Hillsborough
Latitude/Longitude: 27° 44' 54"/ 82° 04' 04"
Project: Big Four Mine Phosphate Rock Dryer

This permit is issued under the provisions of Chapter(s) 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

Modification of operations of an existing 300 TPH (wet feed) Heyl Patterson fluid-bed rock dryer equipped with a twin cyclone and a Peabody Engineering Company impingement scrubber, Type M160, Size 88, that discharges 65,000 ACFM through a 5.96 foot diameter stack that is 100 feet high. The modification will allow the use of No. 6 fuel oil and COWM (mixture coal, No. 6 fuel oil and water) with a maximum of 2.5 percent sulfur in the dryer and increase the hours of operation to 8,760 hours per year (full time).

The facility is located near the intersection of State Road 674 and Bethlehem Road, Fort Lonesome, Hillsborough County, Florida. The UTM coordinates of the site are 394.77 E and 3069.62 N.

Modification shall be in accordance with the permit application, documents and drawings, that was signed by Mr. S. R. Sandrik and John B. Koogler on January 28, 1983, May 31, 1983 letter from AMAX Chemical Corporation and the May 27, 1983 letter from Dr. John B. Koogler.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

PERMITTEE:

AMAX Phosphate, Inc.

I. D. Number:
Permit Number: AC 29-65834
Date of Issue:
Expiration Date: March 1, 1984

GENERAL CONDITIONS:

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

- (X) Determination of Best Available Control Technology (BACT)
- (X) Determination of Prevention of Significant Deterioration (PSD)
- ( ) Compliance with New Source Performance Standards.

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. This permit replaces AO 29-22821 as it applies to the phosphate rock dryer.

2. The phosphate rock dryer shall meet all applicable requirements of 40 CFR 60, Subpart NN - Standards of Performance for Phosphate Rock Plants.

3. Phosphate rock feed to the dryer shall not exceed 300 TPH.

PERMITTEE: AMAX Phosphate, Inc.

I. D. Number:
Permit/Number: AC 29-65834
Date of Issue:
Expiration Date: March 1, 1984

SPECIFIC CONDITIONS:

4. Particulate matter emissions from the dryer, as determined by the test methods and procedures described in 40 CFR 60.404, shall not exceed 0.06 lbs/ton feed and 18 lbs/hr, whichever is more restrictive. Visible emissions shall not exceed 10 percent opacity, as determined by reference method 9 described in 40 CFR 60, during any 6 minute period.

5. Sulfur dioxide emissions, as determined by reference method 6 in 40 CFR 60, Appendix A, shall not exceed 1.1 lbs/MMBTU heat input and 138 lbs/hr, whichever is more restrictive.

6. Nitrogen oxides emission, as determined by reference method 7 described in 40 CFR 60, Appendix A, shall not exceed 35.5 lbs/hr.

7. Heat input to the dryer shall not exceed 118 MMBTU/hr.

8. The dryer is allowed to operate continuously, 8760 hours per year.

9. This permit is not valid until EPA issues a permit authorizing the proposed modification. In the event of a difference in any specific or general condition in the state and federal permits, AMAX Phosphate, Inc. must comply with the most restrictive operation or emission limit in either permit.

10. Construction shall reasonably conform to the plans submitted in the application.

11. Sulfur content of the fuel shall not exceed 2.5 percent by weight or the amount necessary to maintain sulfur dioxide emissions below 1.1 lbs/MMBTU heat input. To use fuels with more than 2.5 percent sulfur, AMAX Phosphate, Inc. must obtain the department's approval.

12. Carbon monoxide emissions, as determined by reference method 10, shall not exceed 4.5 lbs/hr or 19.5 TPY. Compliance test is required when requested in writing by the department.

13. Volatile Organic Compound emissions, as determined by method 25, shall not exceed 1.1 lbs/hr or 5.0 TPY. Compliance test is required when requested in writing by the department.

SPECIFIC CONDITIONS:

14. Stack test facilities on the scrubbers shall meet the minimum specifications in Chapter 17-2.700(4), FAC.

15. The applicant shall maintain a log on the dryer scrubber showing, for each day the dryer operates, the following:

    a. Pressure drop of the gas in inches of water;
    b. Flow rate of the scrubber water in GPM
    c. pH of the scrubber water
    d. Pressure of the scrubber water.

16. The fuel oil system for the dryer shall not be connected to the fuel oil system for the boiler.

17. Before this construction permit expires, the applicant shall test the emissions from the dryer scrubber while it is operating at 90-100 percent capacity, processing the maximum amount of pebble rock normally contained in the feed, and burning No. 6 fuel oil and COWM with approximately 2.5 percent sulfur for:

    a. Particulate Matter
    b. Sulfur Dioxide
    c. Nitrogen Oxides
    d. Opacity

18. The applicant will demonstrate compliance with the conditions of this construction permit and submit a complete application for an operating permit to Hillsborough County Environmental Protection Commission prior to 90 days before the expiration date of this permit. The applicant may continue to operate in compliance with all terms of this construction permit until its expiration or until issuance of an operation permit.

19. Upon obtaining an operating permit, the applicant will be required to submit annual reports on the actual operation of the facility. These reports will include, as a minimum: type and quality of phosphate rock processed; type, quantity and sulfur content (average and maximum for each type) of fuel used; total hours of operation of the dryer and emission test reports for particulate matter and sulfur dioxide.

PERMITTEE: AMAX Phosphate, Inc.

I. D. Number:
Permit Number: AC 29-65834
Date of Issuance:
Expiration Date: March 1, 1984

SPECIFIC CONDITIONS:

20. Permits to operate the dry rock storage (AO 29-20564) and shipping (AO 29-20563) facilities will be modified to reflect the new hours of operation before March 1, 1984.

21. The applicant will be required to do periodic compliance tests (annually for the department and semiannually for the County) for particulate matter, opacity, and sulfur dioxide.

Issued this 7 day of October, 1983.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

Victoria J Tschinkel
VICTORIA J. TSCHINKEL, Secretary

_________Pages attached.

GENERAL CONDITIONS

1. The permittee shall notify the permitting authority in writing of the beginning of construction of the permitted source within 30 days of such action and the estimated date of start-up of operation.

2. The permittee shall notify the permitting authority in writing of the actual start-up of the permitted source within 30 days of such action and the estimated date of demonstration of compliance as required in the specific conditions.

3. Each emission point for which an emission test method is established in this permit shall be tested in order to determine compliance with the emission limitations contained herein within sixty (60) days of achieving the maximum production rate, but in no event later than 180 days after initial start-up of the permitted source. The permittee shall notify the permitting authority of the scheduled date of compliance testing at least thirty (30) days in advance of such test. Compliance test results shall be submitted to the permitting authority within forty-five (45) days after the complete testing. The permittee shall provide (1) sampling ports adequate for test methods applicable to such facility, (2) safe sampling platforms, (3) safe access to sampling platforms, and (4) utilities for sampling and testing equipment.

4. The permittee shall retain records of all information resulting from monitoring activities and information indicating operating parameters as specified in the specific conditions of this permit for a minimum of two (2) years from the date of recording.

5. If, for any reason, the permittee does not comply with or will not be able to comply with the emission limitations specified in this permit, the permittee shall immediately notify the State District Manager by telephone and provide the District Office and the permitting authority with the following information in writing within four (4) days of such conditions:

   (a) description for noncomplying emission(s),

   (b) cause of noncompliance,

   (c) anticipated time the noncompliance is expected to continue or, if corrected, the duration of the period of noncompliance,

(d) steps taken by the permittee to reduce and eliminate the noncomplying emission,

and

(e) steps taken by the permittee to prevent recurrence of the noncomplying emission.

Failure to provide the above information when appropriate shall constitute a violation of the terms and conditions of this permit. Submittal of this report does not constitute a waiver of the emission limitations contained within this permit.

6. Any change in the information submitted in the application regarding facility emissions or changes in the quantity or quality of materials processed that will result in new or increased emissions must be reported to the permitting authority. If appropriate, modifications to the permit may then be made by the permitting authority to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause violation of the emission limitations specified herein.

7. In the event of any change in control or ownership of the source described in the permit, the permittee shall notify the succeeding owner of the existence of this permit by letter and forward a copy of such letter to the permitting authority.

8. The permittee shall allow representatives of the State environmental control agency or representatives of the Environmental Protection Agency, upon the presentation of credentials:

(a) to enter upon the permittee's premises, or other premises under the control of the permittee, where an air pollutant source is located or in which any records are required to be kept under the terms and conditions of the permit;

(b) to have access to any copy at reasonable times any records required to be kept under the terms and conditions of this permit, or the Act;

(c) to inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

(d) to sample at reasonable times any emission of pollutants;

and

(e) to perform at reasonable times an operation and maintenance inspection of the permitted source.

9. All correspondence required to be submitted to this permit to the permitting agency shall be mailed to:

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

10. The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

The emission of any pollutant more frequently or at a level in excess of that authorized by this permit shall constitute a violation of the terms and conditions of this permit.

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

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

Table 1

DRYER EMISSIONS (tons/year)

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

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

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

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

BACT Determination Requested by the Applicant:

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

Date of Receipt of a BACT Application:

February 10, 1983

Date of Publication in the Florida Administrative Weekly:

February 25, 1983

Review Group Members:

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

BACT Determined by DER:

Big Four Mine 300 ton per hour rock dryer:

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

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

BACT Determination Rationale:

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

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

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

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

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

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

Details of the Analysis May be Obtained by Contacting:

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

Recommended By:

D H Thomas for
C. H. Fancy, Deputy Bureau Chief

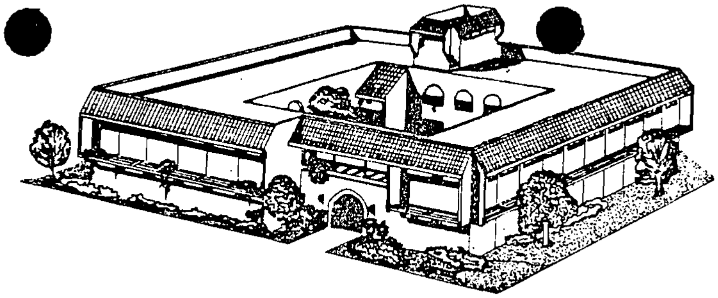
Date: Oct. 7, 1983

Approved:

Victoria
Victoria J. Tschinkel, Secretary

Date: Oct 7, 1983

HILLSBOROUGH COUNTY
ENVIRONMENTAL PROTECTION
COMMISSION
E. L. BING
RODNEY COLSON
MATT JETTON
JOHN R. PAULK
JAN KAMINIS PLATT



ROGER P. STEWART
DIRECTOR

1900 - 9th AVE
TAMPA, FLORIDA 33605

TELEPHONE (813) 272-5960

September 20, 1983

DER
SEP 23 1983
BAQM

Mr. Willard Hanks
Florida Department of Environmental Regulations
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Hanks:

This letter is in response to the Preliminary Determination on AMAX's Big Four Mine rock dryer and our recent telephone conversation. As we discussed, the Hillsborough County Environmental Protection Commission (EPC) is working with AMAX to attach a specific condition to the permit to require that AMAX maintain an existing ambient air monitoring network. Debra Sanderson of this office spoke with Fred Mullins to confirm AMAX's commitment on this. It is my understanding that Mr. Mullins will call you to reassure the BAQM that AMAX will not reject the monitoring requirement once the permit is issued.

The EPC recommends that the following specific conditions be attached to AMAX's construction permit for the dryer:

1. AMAX Chemical Corporation's, Big Four Mine sampling locations by UTM coordinates shall be:

   #1 - 478.00E, 1245.39N
   #2 - 475.00E, 1233.70N
   #3 - 477.00E, 1225.33N

2. Total Suspended Particulate (TSP), Fluoride in TSP and sulfur dioxide will be monitored for 24 hours every 6th day according to the National Air Sampling Network schedule at Sites 1,2, and 3.

3. TSP and sulfur dioxide sample collection and analysis shall be performed according to Federal Reference Methods as outlined in the Code of Federal Regulations, Part 50, Appendices A and B.

4. The quality Assurance requirements as defined in the Code of Federal Regulations Part 58, Appendix A shall be followed for TSP and Sulfur Dioxide sampling. AMAX Chemical Corporation is understood to be a single reporting organization for its ambient air sampling activities in Hillsborough County.

5. Quarterly data reports shall be submitted to the Hillsborough County Environmental Protection Commission including precision and accuracy data.

If you have any questions or problems with these conditions, please contact Debra or myself.

Sincerely,

Jerry Campbell

Jerry Campbell
Environmental Engineer II
Hillsborough County Environmental
Protection Commission

JC/ljh

cc: Bill Thomas
Fred Mullins
Fred Crabill

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
From: ____________ Date: ____________
Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: ________ Date Due: ________

RECEIVED
OCT 7 1983
Office of the Secretary

TO: Victoria J. Tschinkel

FROM: Clair Fancy BS for

DATE: October 5, 1983

SUBJ: Approval of Attached Air Construction Permit and BACT Determination

Attached for your approval and signature is one Air Construction Permit and BACT determination for which the applicant is AMAX Phosphate, Inc. The construction proposed is the Big Four Mine phosphate rock dryer at Fort Lonesome, Hillsborough County, Florida.

Day 90, after which the permit would be issued by default, is October 11, 1983.

The Bureau recommends your approval and signature.

CF/pa

Attachment

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

September 19, 1983

DER
SEP 21 1983
BAQM

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

SUBJECT: AMAX BIG-FOUR MINE DRYER PERMIT REVISIONS AND PSD REVIEW - PUBLIC NOTICE - AC29-65834

Dear Mr. Fancy:

Pursuant to Section 403.815, Florida Statues, Florida Administrative Code Rule 17-1.62(3), and the request from your Department, AMAX Chemical Corporation has published the required legal notice for the above referenced permit modification. The notice ran one time on September 3, 1983, in the legal ad section of the Tampa Tribune.

In accordance with Rule 17-1.62, you will find attached an affidavit of publication provided by the newspaper as proof the public notice was given.

Sincerely,

Fred G. Mullins
Regulatory Compliance Manager

FGM/ds
Attachment

cc: Dan Williams (Southwest District FDER)
R.F. Crabill
S.R. Sandrik
G.P. Uebelhoer
Rhea Law

BEST AVAILABLE COPY

THE TAMPA TRIBUNE

Published Daily
Tampa, Hillsborough County, Florida

State of Florida
County of Hillsborough } ss.

Before the undersigned authority personally appeared R. F. Pittman, who on oath says that he is Publisher of The Tampa Tribune, a daily newspaper published at Tampa in Hillsborough County, Florida; that the attached copy of advertisement being a LEGAL NOTICE

in the matter of NOTICE THAT THE DEPARTMENT OF ENVIRONMENTAL REGULATION GIVES NOTICE OF ITS INTENT TO ISSUE A PERMIT TO AMAX PHOSPHATE, INC. FOR THE PURPOSE DESCRIBED HEREIN.

was published in said newspaper in the issues of SEPTEMBER 3, 1983

Affiant further says that the said The Tampa Tribune is a newspaper published at Tampa, in said Hillsborough County, Florida, and that the said newspaper has heretofore been continuously published in said Hillsborough County, Florida, each day and has been entered as second class mail matter at the post office in Tampa, in said Hillsborough County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm, or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Sworn to and subscribed before me, this 16TH *day of* SEPTEMBER *A.D. 19* 83.

LINDA E. RUNION

(SEAL)

Notary Public, State of Florida at Large
My Commission Expires Jan. 25, 1986

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 42.8; Sulfur Dioxide 214.4; Nitrogen Oxides 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: SO2-Three-Hour°34%; SO2-24-Hour°70%; SO2-Annual°35% Particulate Matter-24-Hour°46%; and Particulate Matter-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.

4099 9/3/83

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,

Thomas
for 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,

Bill Thomas
for 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.

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,

Bill Thomas
for 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

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,

WG Thomas

for 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:

Pollutant and Time Average	Percent Consumed
SO_2	
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.

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,

for WH Thomas

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

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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............ ¢
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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. Thomas

DATE OF DELIVERY
8-16-83

POSTMARK
BRADLEY
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AUG 16 1983

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S INITIALS

☆GPO : 1979-300-459

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
Table of Contents

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:

Pollutant and Time Average	Percent Consumed
SO_2	
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.

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_2), and nitrogen oxides (NO_x) 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_2) and nitrogen oxides (NO_x) 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 commerical, 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_2 per million BTU of heat input (MMBTU) if all the SO_2 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_2/MMBTU, respectively, the company has compiled data showing absorption by the phosphate rock being dried and the scrubber water will reduce the SO_2 emission by 60-65 percent to below 1.1 lbs SO_2 MMBTU.

This emission of 1.1 lb SO_2/MMBTU is equivalent to burning No. 6 fuel oil with a sulfur content of approximately 1.0 percent. The result is that the SO_2 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_2.

C. Nitrogen Oxides

Presently, the fluid bed dryer is emitting 26.3 lbs NO_x/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_x 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_x 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_x burner used in boilers. The water in COWM fuel will hold down peak flame temperatures which should also help reduce NO_x 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_x 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.

	Maximum Pollutant Emission Rates					
Source	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		NO CHANGE		
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_2, PM and NO_x, 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_2 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 facilty, 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_2 - 13 ug/m^3, 24-hour average; PM - 10 ug/m^3, 24-hour average; and NO_2 - 14 ug/m^3, annual average. The impacts of both PM and NO_2 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_2. A continuous SO_2 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_2 ambient levels in the surrounding area. The four month average SO_2 concentration was 3.8 ug/m^3. The highest 24-hour value was 35 ug/m^3 and the highest 3-hour value was 112 ug/m^3. 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_2 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^3)	Predicted Increase (ug/m^3)	Percent Consumed
SO_2			
Three-hour(1)	512	173	34
24-hour(1)	91	64	70
Annual	20	7	35
PM			
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_2, PM, and NO_2.

Background values have been proposed by the applicant of 0 ug/m^3 for SO_2 for all averaging times; 30 ug/m^3, annual average, and 88 ug/m^3 24-hour average, for PM; and 0 ug/m^3, annual average, for NO_2. The SO_2 background value represents the measured concentration when no sources of SO_2 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_2 background concentration has been arbitrarily chosen. The NO_2 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_2 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^3)	National AAQS (ug/m^3)	Predicted Impact (ug/m^3)
SO2			
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_2			
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_2, PM, and NO_2. 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

DER
JUN 08 1983
BAQM

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

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

Dear Mr. Fancy:

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

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

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

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

2. 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 disproportionately expensive, particularly when considering the sulfur dioxide removal efficiency of the Big Four impingement scrubber; and (3) the proposed alternate fuels are more likely to be readily available at a more stable price than low sulfur oil.

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

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

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

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

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

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

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

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

Response to Hillsborough County Environmental Protection Commission Letter:

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

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

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

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

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

2. 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.

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

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

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

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

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

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

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

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

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

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

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

Sincerely,

Fred G. Mullins, III
Regulatory Compliance Manager

FGM/ko

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

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

SKEC 144-82-02

May 27, 1983

DER
JUN 08 1983
BAQM

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

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

Dear Mr. Fancy:

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

1. Property Boundaries

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

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

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

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

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

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

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

4. Phosphate Rock Dryer Heat Input Rate

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

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

5. Reasons for Use of Alternative Fuels

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

6. Cost and Availability of Alternative Fuels

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

7. Sulfur Dioxide Removal Efficiency

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

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

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

8. Nitrogen Oxide Emission Data

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

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

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

Response to Hillsborough County Environmental Protection Commission Comments

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

1. Secondary Particulate Matter Emissions

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

2. Rail Traffic

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

3. Receptor Locations

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

4. Additional Sulfur Dioxide Sources

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

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

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

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

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

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

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

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

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

6. Emission Limitations

AMAX Chemical Corporation has responded to this comment in detail.

7. Sulfur Dioxide Removal Efficiency

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

8. Short-Term Air Quality Modeling

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

9. Wind Instrument Elevation

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

10 & 11. Meteorological Input Data

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

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

Very truly yours,

SHOLTES & KOOGLER,
ENVIRONMENTAL CONSULTANTS, INC.

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

JBK:ldh
Attachments

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

ATTACHMENT 1

REVISED AIR QUALITY REVIEW

TABLE 6-2

SUMMARY OF AIR QUALITY REVIEW

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

	Impact (ug/m^3)		
	CLASS II AREAS		
Pollutant	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	---	---

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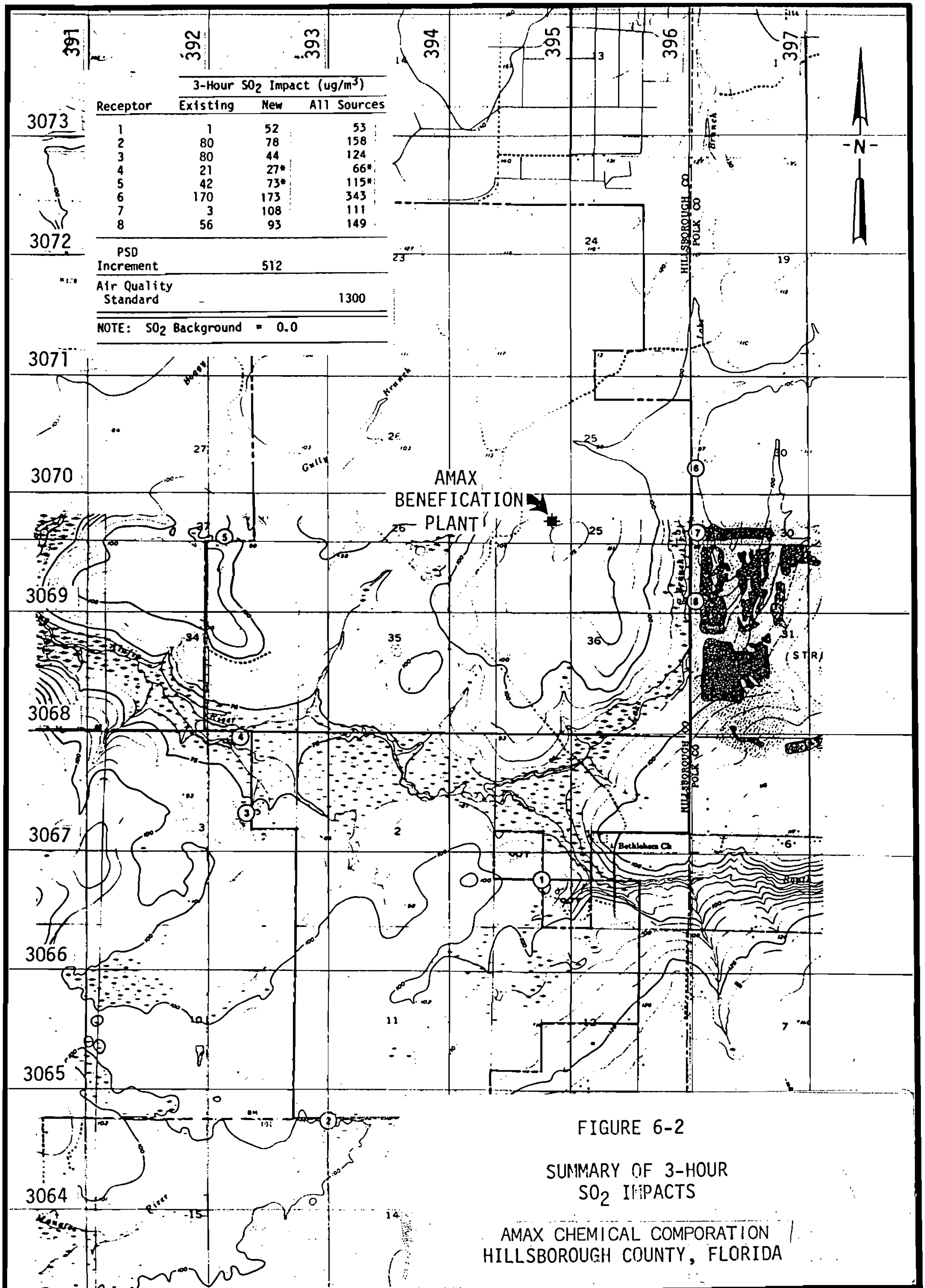
(1) Includes a background of 30 ug/m^3
(2) Includes a background of 88 ug/m^3
(3) Includes a background of zero for all time periods
(4) Impact near AMAX

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

* REVISED 4/29/83



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

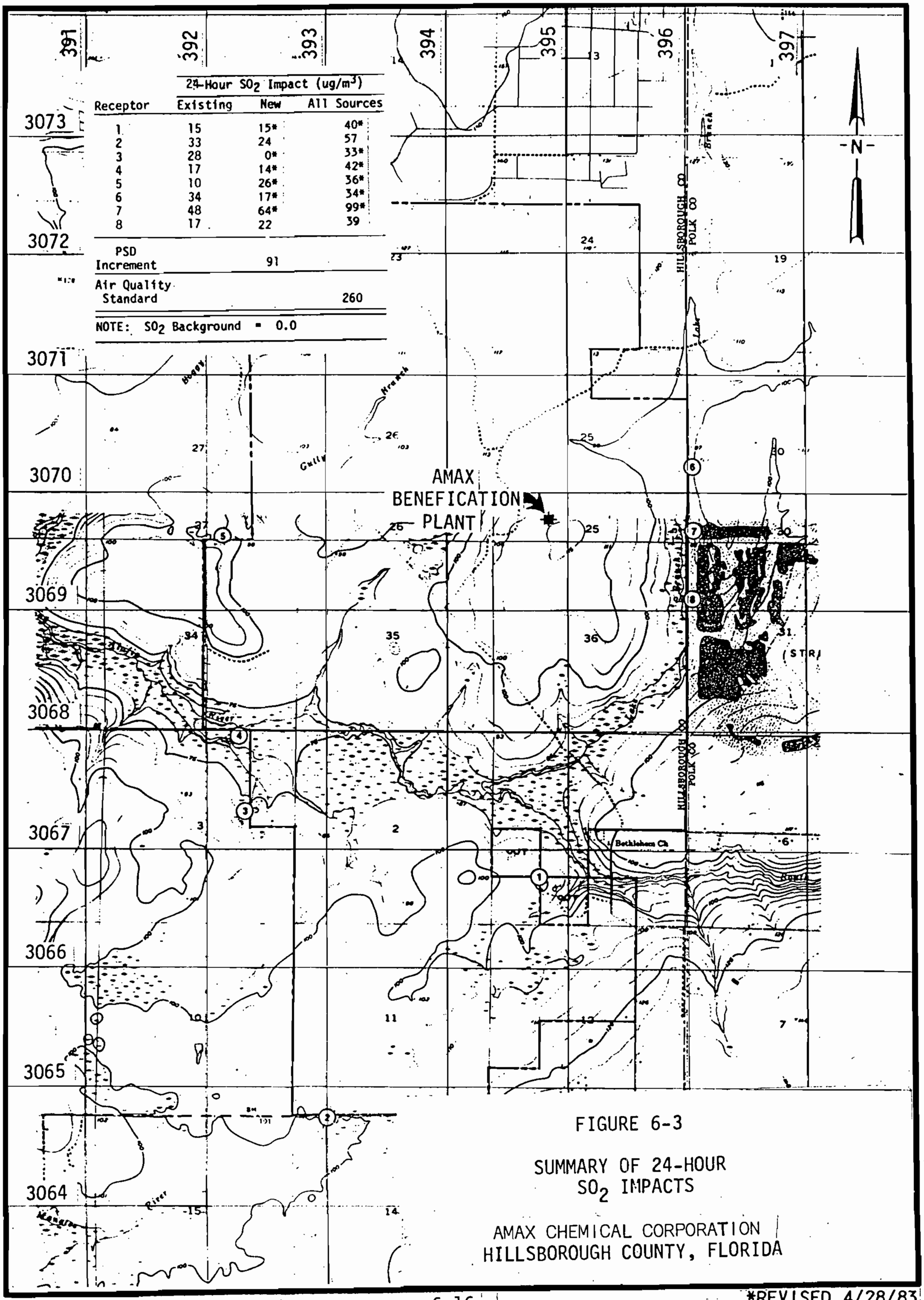
NOTE: SO_2 Background = 0.0

FIGURE 6-2

SUMMARY OF 3-HOUR SO_2 IMPACTS

AMAX CHEMICAL COMPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83



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

NOTE: SO_2 Background = 0.0

FIGURE 6-3

SUMMARY OF 24-HOUR SO_2 IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

Best Available Copy

SOURCE LIST

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

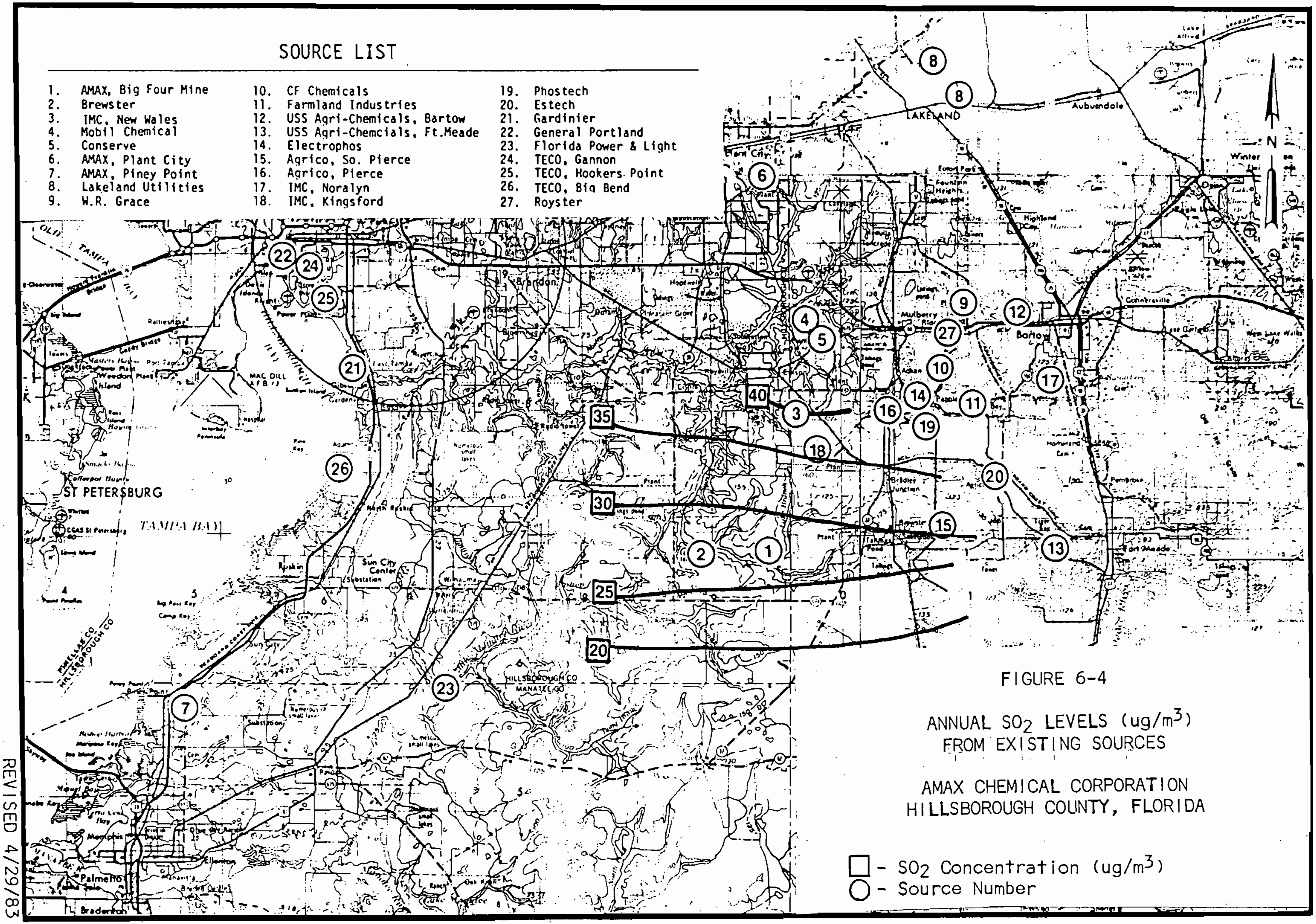


FIGURE 6-4

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

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

REVISED 4/29/83
SHOLTES & KOOGLER

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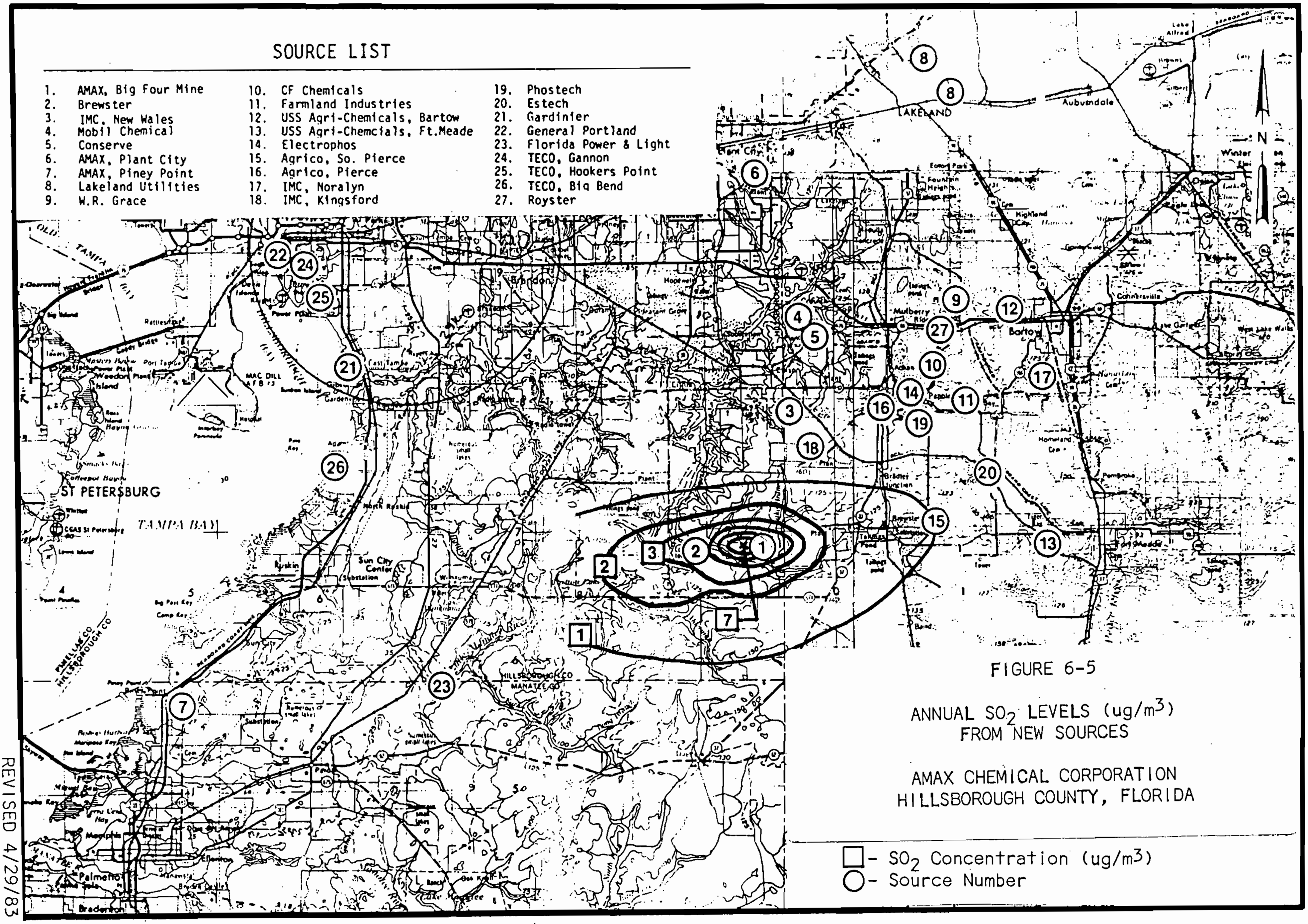

SOURCE LIST

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

FIGURE 6-5

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

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

REVISED 4/29/83
SHOLTES & KOOGLER

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SOURCE LIST

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

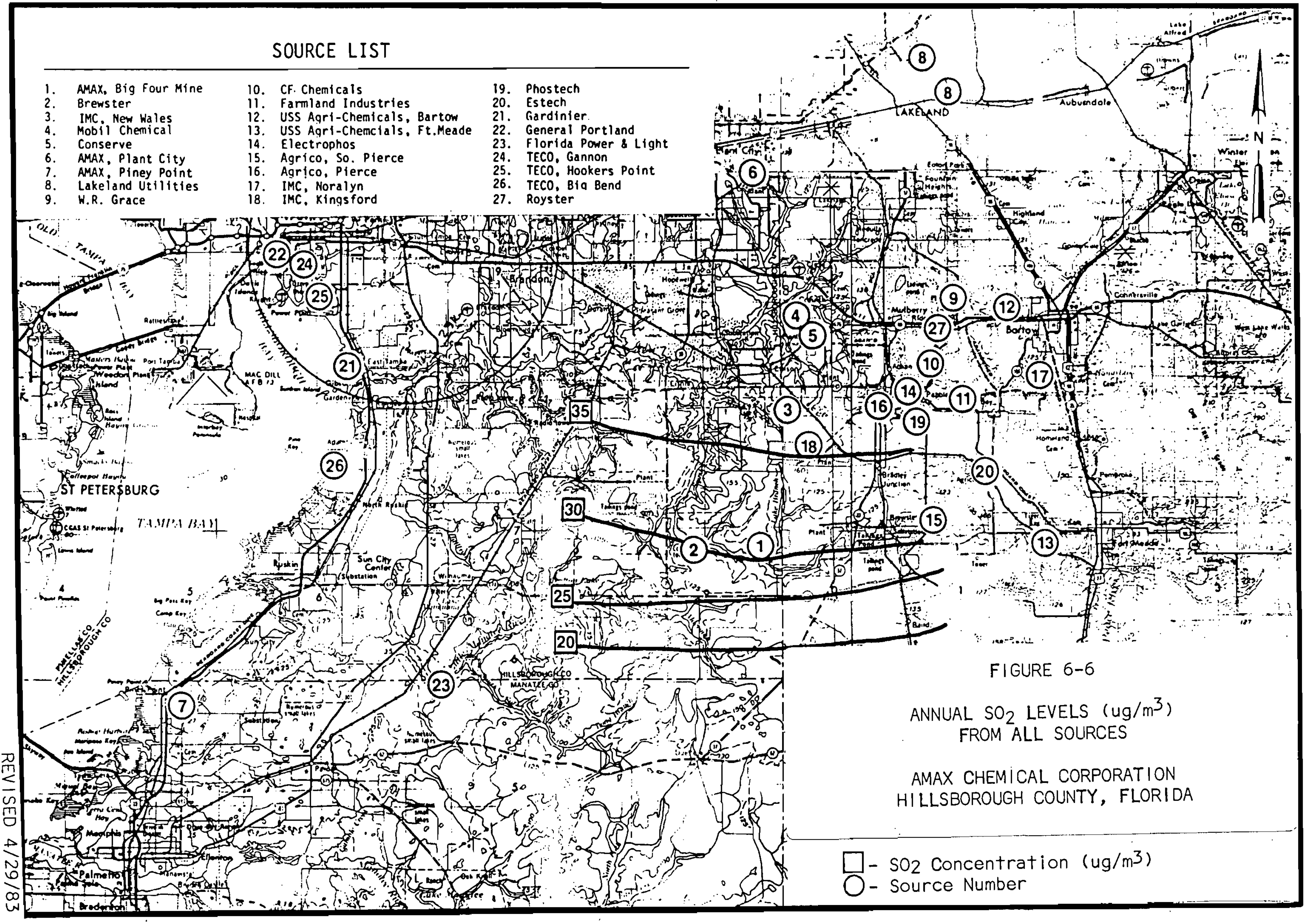


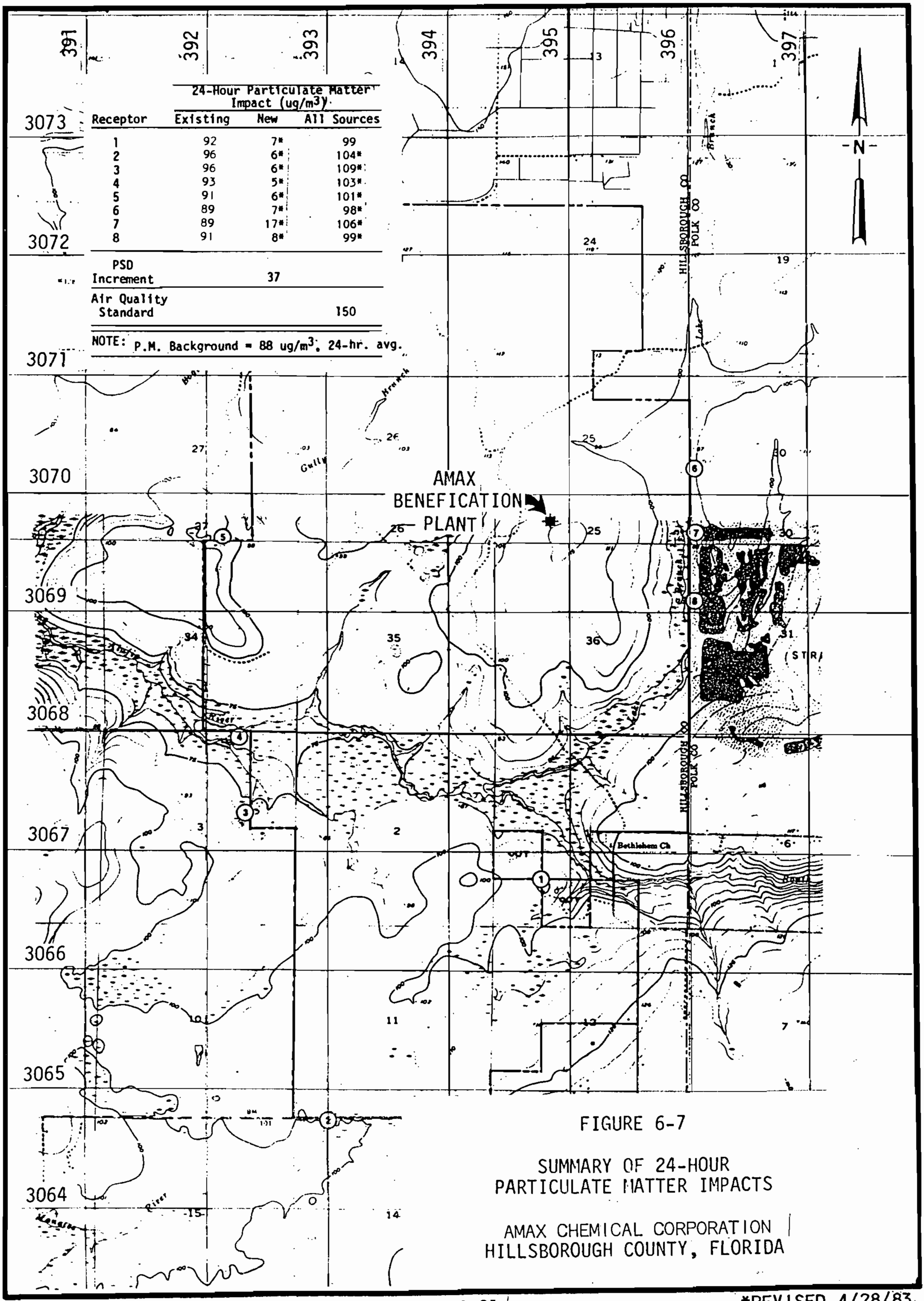
FIGURE 6-6

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

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

REVISED 4/29/83
SHOLTES & KOOGLER



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

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

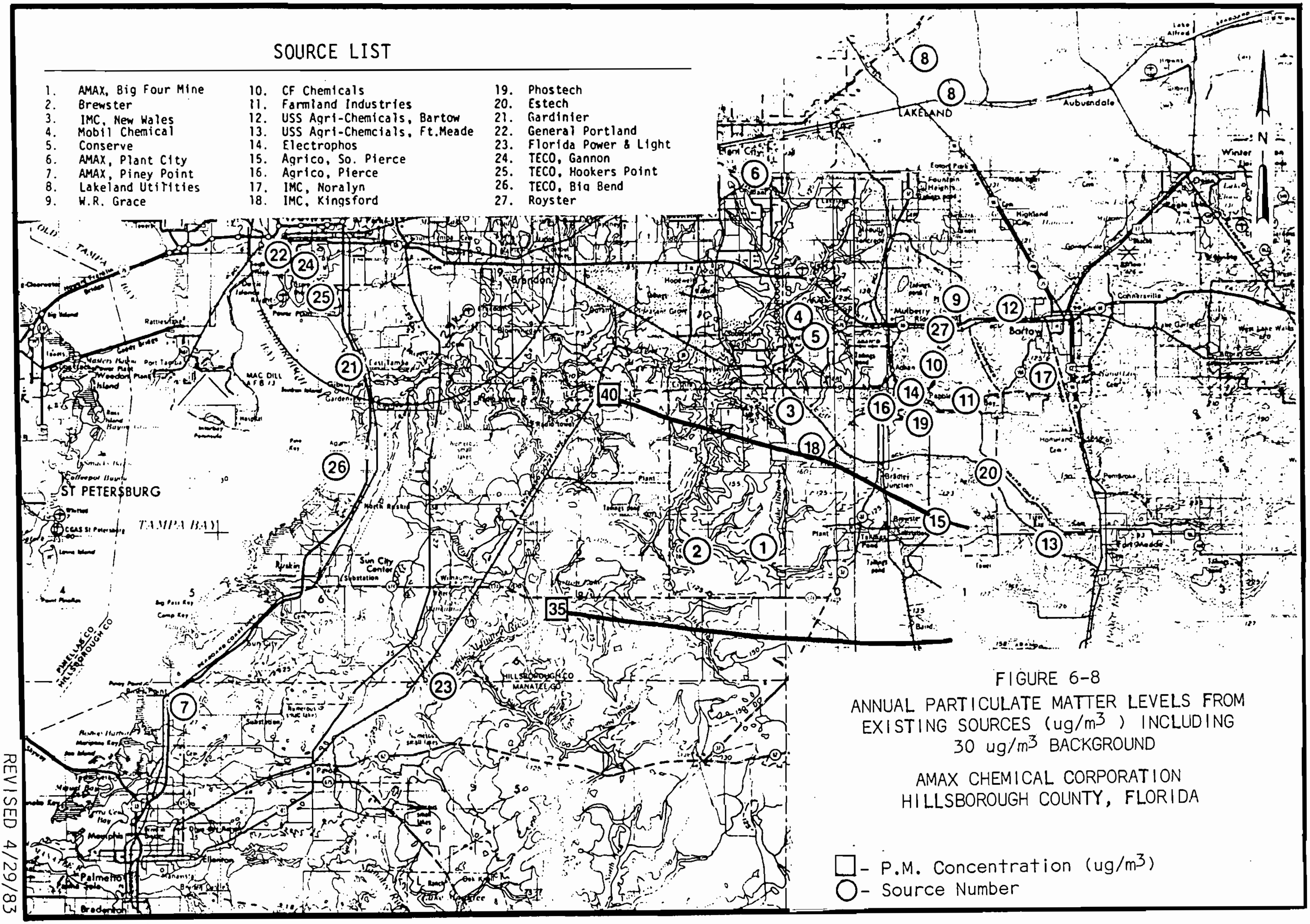
FIGURE 6-7

SUMMARY OF 24-HOUR PARTICULATE MATTER IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

Best Available Copy



SOURCE LIST

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

FIGURE 6-8

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

☐- P.M. Concentration (ug/m^3)
○- Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

SOURCE LIST

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

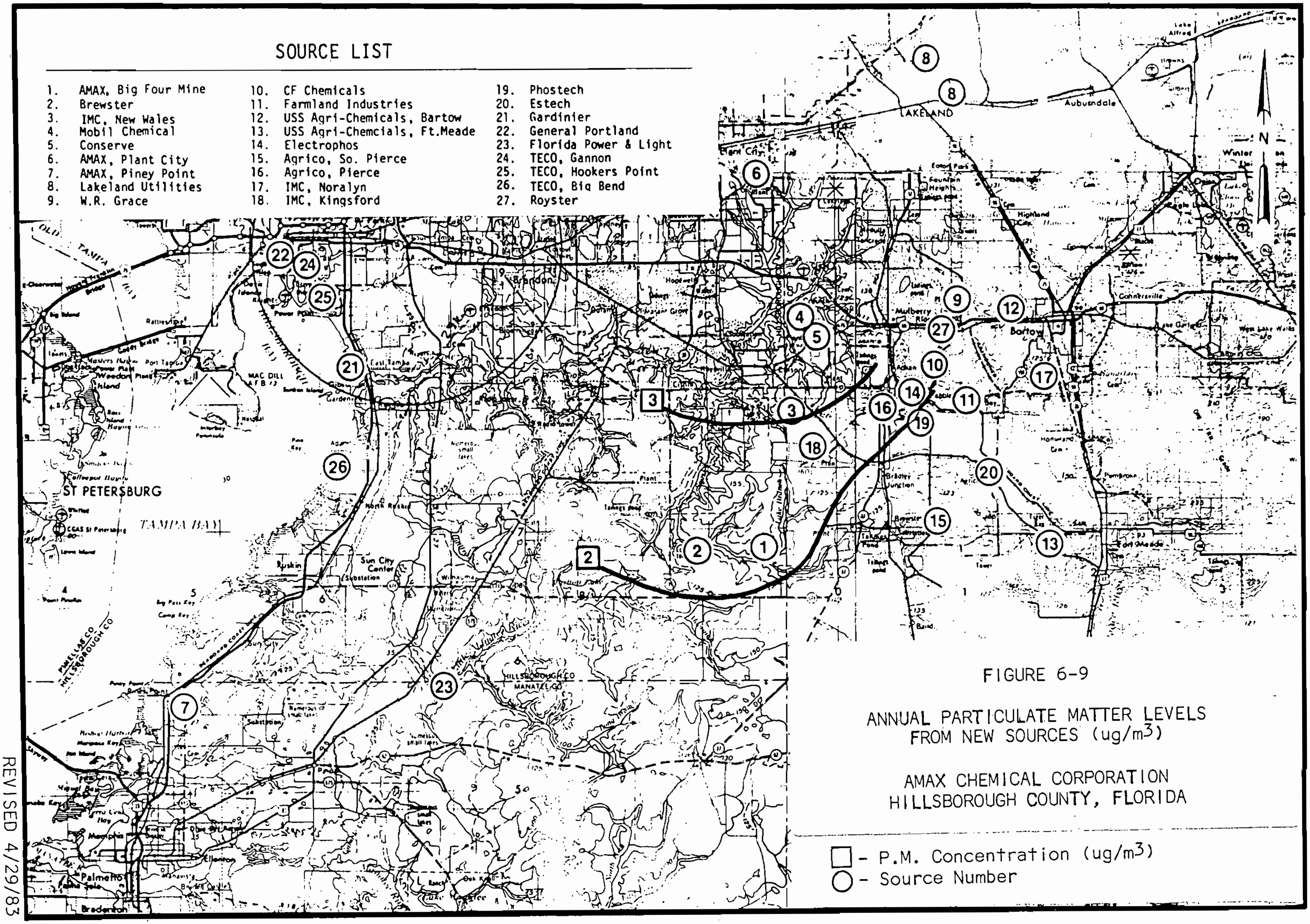

FIGURE 6-9

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

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

REVISED 4/29/83
SHOLTES & KOOGLER

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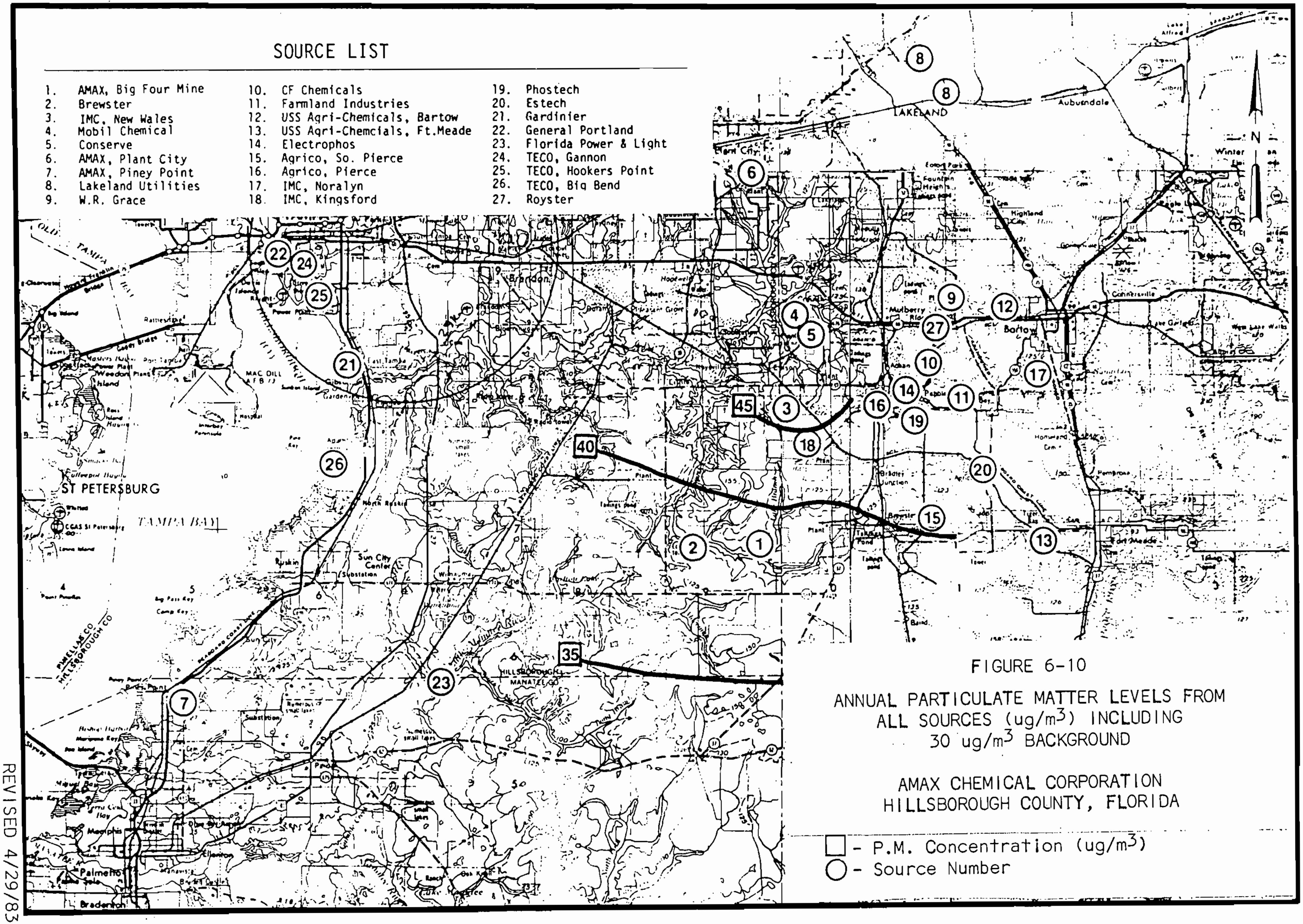


SOURCE LIST

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

FIGURE 6-10

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

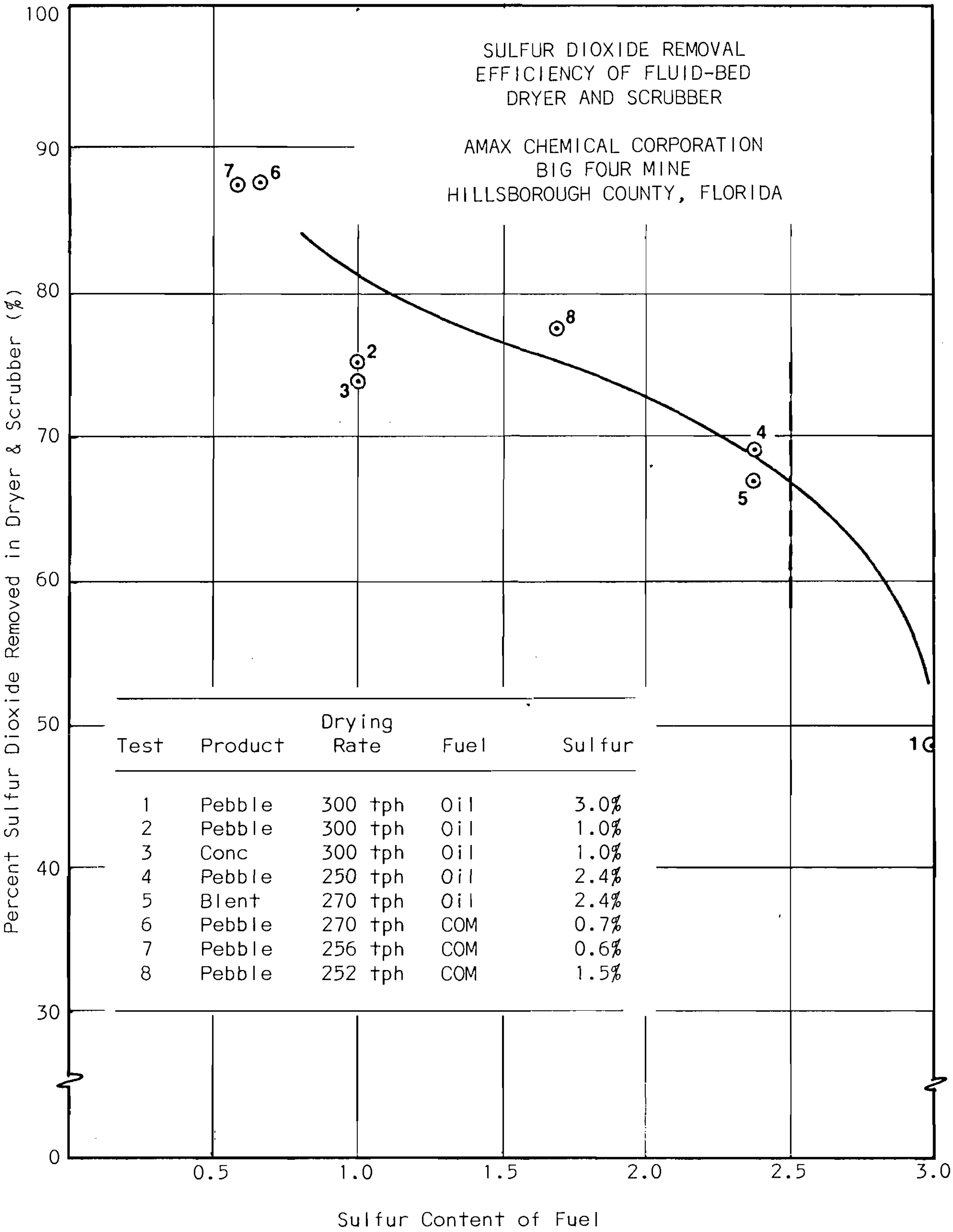
AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - P.M. Concentration (ug/m^3)
○ - Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

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

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

ATTACHMENT 3

NITROGEN OXIDES
EMISSION RATE CALCULATIONS

EMISSION RATE CALCULATIONS

ROCK DRYER

PRESENT

PARTICULATE MATTER

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

× 7488/2000

= 38.5 tpy

SULFUR DIOXIDE

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

= 94.58 lb/hour

× 7488/2000

= 354.1 tpy

NITROGEN OXIDES

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

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

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

= 26.33 lb/hr *

× 7488/2000

= 98.5 tpy *

CARBON MONOXIDE

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

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

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

= 4.18 lb/hour

× 7488/2000

= 15.6 tpy

HYDROCARBONS

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

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

= 0.84 lb/hour

× 7488/2000

= 3.1 tpy

* Revised 4/28/83

NITROGEN OXIDES

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

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

NO_x from Coal - AP-42

= 18 lb / ton
× (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)
= 0.67 lb NO_x / 10^6 BTU

NO_x from Oil - AP-42

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

= 0.41 lb NO_x / 10^6 BTU

NO_x emissions from Oil (same as present)
= 26.33 lb/hr *

NO_x emissions from Coal (by ratio)

= 26.33 (0.67/0.41) *
= 43.04 lb/hr *

NO_x emissions from COM

= 26.33 (0.45) + 43.04 (0.55) *
= 35.52 lb/hr *
× 8760/2000
= 155.6 tpy *

* Revised 4/28/83

AC 29-65834

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

D.E.R.
FEB 3 1983
SOUTHWEST DISTRICT
TAMPA

APPLICATION TO ~~OPERATE~~/CONSTRUCT AIR POLLUTION SOURCES

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

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

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

COMPANY NAME: AMAX Phosphate, Inc. COUNTY: Hillsborough

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

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

UTM: East 394.77 North 3069.62

Latitude ___ ° ___ ' ___ "N Longitude ___ ° ___ ' ___ "W

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

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

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

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

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

*Attach letter of authorization

Signed: S. R. S

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: JB Koogler

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

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

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

(Affix Seal)

Florida Registration No. 12925

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

---

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

SECTION II: GENERAL PROJECT INFORMATION

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

SEE ATTACHMENT (Page 2A)

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

Start of Construction Not Applicable Completion of Construction Not Applicable

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

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

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

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

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

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

if seasonal, describe:

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

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

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

SECTION II: General Project Information (Continued)

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

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

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

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

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

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

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

C. Airborne Contaminants Emitted:

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

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

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

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

---

[1] See Section V, Item 2.

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

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

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 149,500/147,095/135,876* BTU/gal

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

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

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

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

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

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

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

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

Water Vapor Content: 18 % Velocity: 38.79 FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

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

Description of Waste

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

Approximate Number of Hours of Operation per day days/week

Manufacturer

Date Constructed Model No.

	Volume (ft)^3	Heat Release (BTU/hr)	Fuel		Temperature (^oF)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

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

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

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

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

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

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

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

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

Contaminant	Rate or Concentration

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

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

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

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

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device: SEE SECTION 3.0 OF PSD APPLICATION.

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*: 3. Capital Cost:

4. Life: 5. Operating Cost:

6. Energy: 7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

SEE SECTION 3.0 OF PSD APPLICATION.

---

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

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

SEE SECTIONS 4.0 AND 5.0 OF PSD APPLICATION.

A. Company Monitored Data

1. ________ no sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

Period of monitoring ____/____/____ to ____/____/____
month day year month day year

Other data recorded ______________________________

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

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

2. Surface data obtained from (location) ______________________________

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

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

C. Computer Models Used

1. ______________________________ Modified? If yes, attach description.

2. ______________________________ Modified? If yes, attach description.

3. ______________________________ Modified? If yes, attach description.

4. ______________________________ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

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

E. Emission Data Used in Modeling

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

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

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

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

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

ATTACHMENT A

Total Process Input Rate

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

Total Product Weight

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

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

ATTACHMENT B

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

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

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

65.06 MMBTU/hr x 1.1 lbs SO_2/MMBTU input

71.57 lbs SO_2/hour allowable emissions

Actual Emissions = 30.8 lbs/hour SO_2

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

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

Actual Emissions = 17.49 lbs/hr particulate.

MEMORANDUM

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

TO: Mr. Fred Mullins

DATE: March 12, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

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

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

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

George Townsend
George Townsend

GT/rit

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

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

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED 0.24 Chlorine

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

OIL USED

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

COM

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

Percentages are by weight

BROOKFIELD VISCOSITY (COM)

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

Name William L Brown
Position Quality Control Mgr

4,140 Gallons

A Subsidiary of
MCDONNELL DOUGLAS

EMISSION RATE CALCULATIONS

PROPOSED ACTUAL

PARTICULATE MATTER

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

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT
$=(1.1\ \text{lb}\ SO_2/10^6\ \text{BTU})(118\times10^6\ \text{BTU/hr})$
= 129.80 lb/hr
x 8760/2000
= 568.5 tpy

Uncontrolled with 0.7% Sulfur fuel oil
$=(115\times10^6\ \text{BTU/hr})(1/149500\ \text{BTU/gal})(8.08\ \text{lb/gal})$
$\times(0.007\times2\ \text{lb}\ SO_2/\text{lb fuel})$
= 87.0 lb/hr
< 129.8 lb/hr; therefore no SO_2 sorption is necessary to meet the proposed emission limiting standard

Uncontrolled with 2.5% Sulfur fuel oil
$=(118\times10^6\ \text{BTU/hr})(1/147095\ \text{BTU/gal})(8.29\ \text{lb/gal})$
$\times(0.025\times2\ \text{lb}\ SO_2/\text{lb fuel})$
= 332.6 lb/hr
Absorption necessary to meet proposed std
= (332.6 − 129.8) x 100/332.6
= 61.0%

Uncontrolled with 2.00% Sulfur COM
$=(109\times10^6\ \text{BTU/hr})(1/135876\ \text{BTU/gal})(9.3\ \text{lb/gal})$
$\times(0.025\times2\ \text{lb}\ SO_2/\text{lb fuel})$
= 373.0 lb/hr
Absorption necessary to meet proposed std
= (373.0 − 129.8) x 100/373.0
= 65.2%

NITROGEN OXIDES

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

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

NO_x from Coal - AP-42

= 18 lb / ton
× (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)
= 0.67 lb NO_x / 10^6 BTU

NO_x from Oil - AP-42

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

= 0.41 lb NO_x / 10^6 BTU

NO_x emissions from Oil (same as present)

= 19.83 lb/hr

NO_x emissions from Coal (by ratio)

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

NO_x emissions from COM

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

× 8760/2000
= 117.2 tpy

CARBON MONOXIDE

CO from Coal - AP-42

= 1 lb / ton

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

$= 0.037$ lb CO / 10^6 BTU

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

= 4.18 lb/hr @ 125×10^6 BTU/hr

$= 0.033$ lb CO / 10^6 BTU

CO emissions from COM

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

= 4.46 lb/hr

x 8760/2000

= 19.5 tpy

HYDROCARBONS

HC from Coal - AP-42

= 0.3 lb / ton

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

$= 0.011$ lb HC / 10^6 BTU

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

= 0.84 lb/hr @ 125×10^6 BTU/hr

$= 0.007$ lb HC / 10^6 BTU

HC emissions from COM

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

= 1.14 lb/hr

x 8760/2000

= 5.0 tpy

PROPOSED Uncontrolled

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

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

= 2626 tpy

SULFUR DIOXIDE

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

= 1634 tpy

NO_x

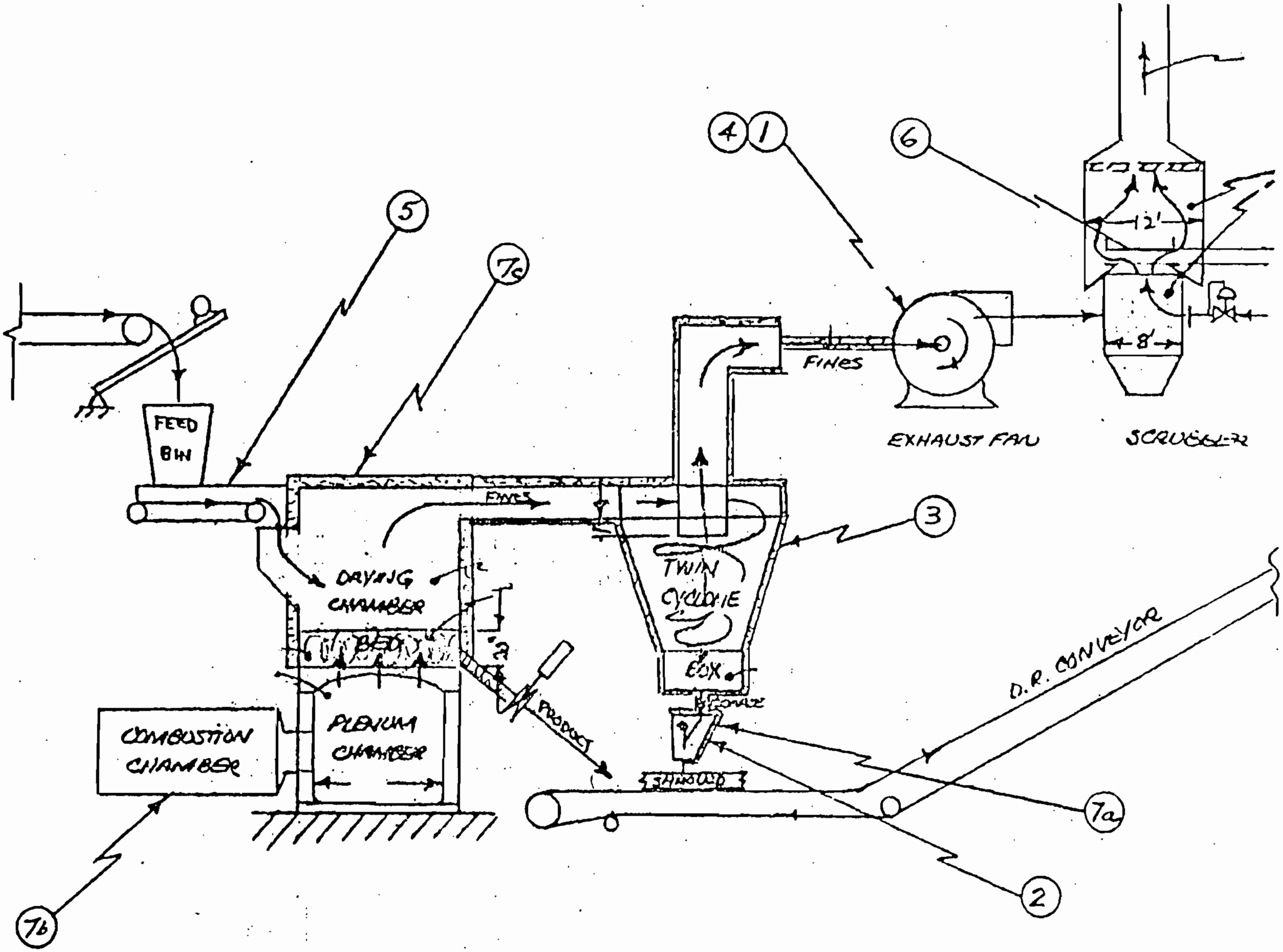
= 26.7 lb/hr and 117.2 tpy
(Same as Actual)

CO

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

HC

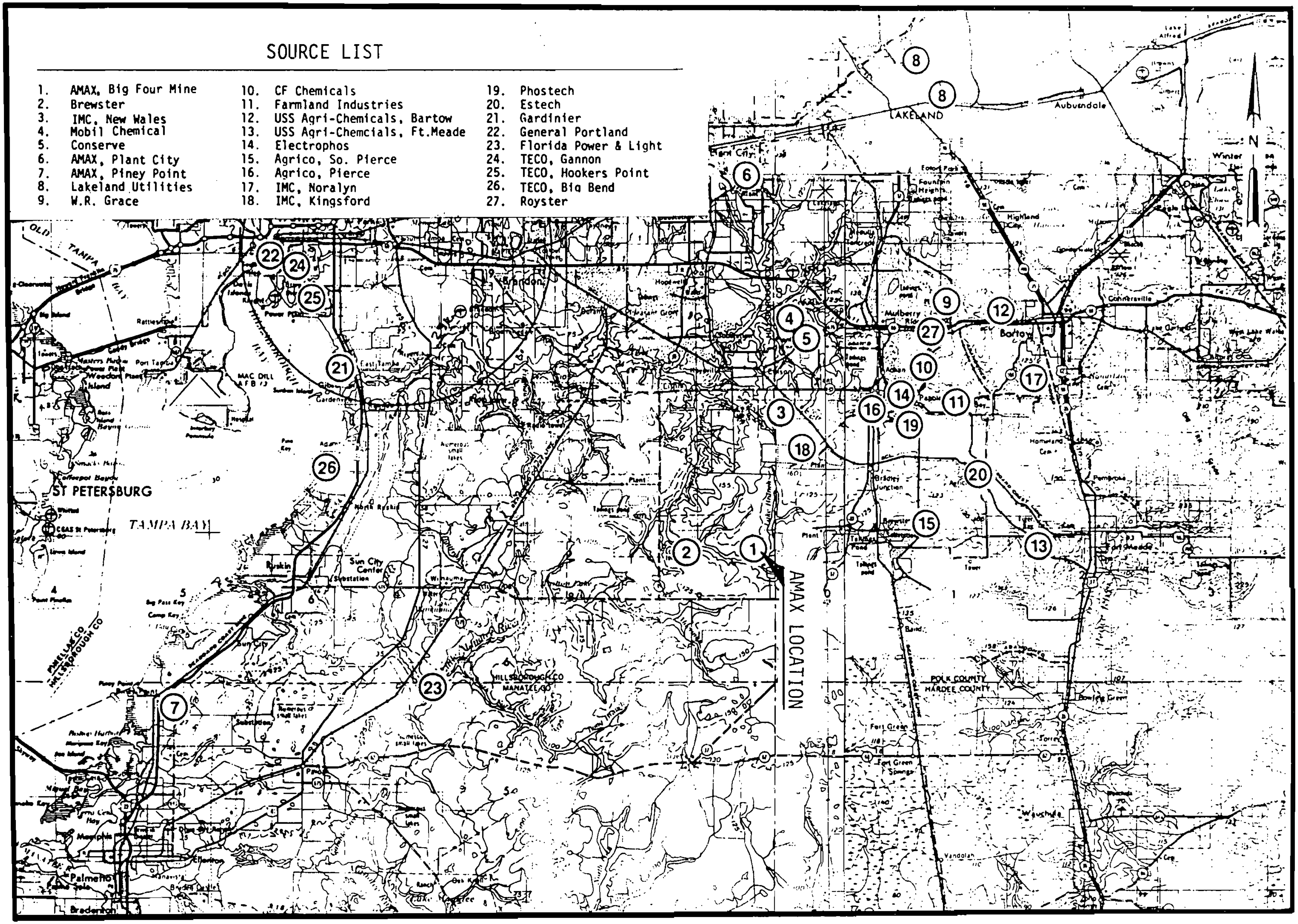
= 1.1 lb/hr and 5.0 tpy
(Same as Actual)



SCHEMATIC DRYER ARRANGEMENT

ATTACHMENT D

Best Available Copy

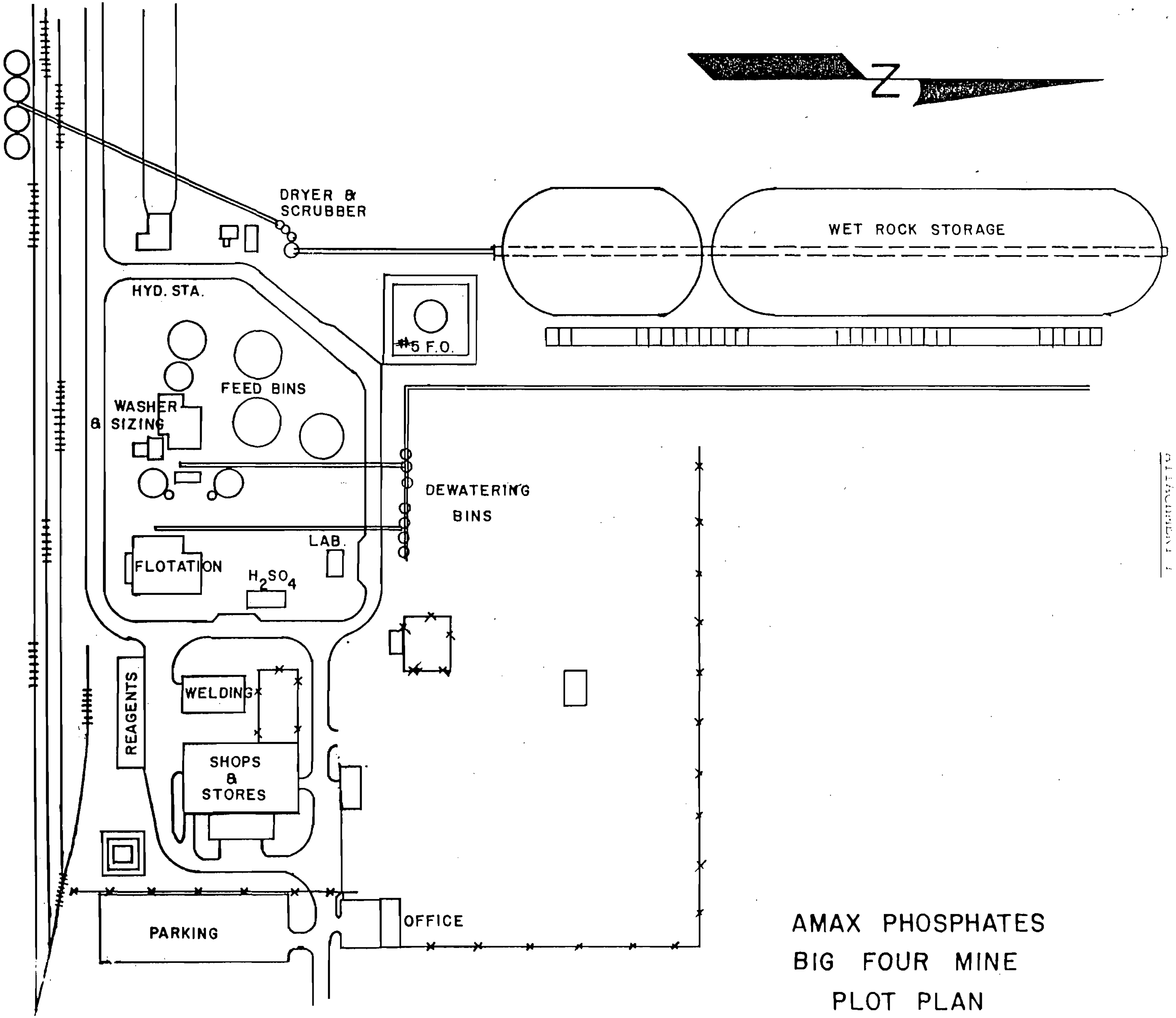


SOURCE LIST

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

ATTACHMENT E

SHOLTES & KOOGLER



AMAX PHOSPHATES
BIG FOUR MINE
PLOT PLAN

ATTACHMENT

need by Friday 8/12/83 by 2:00 p.m.

DUPLICATING JOB SHEET

COST CENTER 300402

DATE 8/11/83 PHONE 8-1344

REQUESTED BY Patty Adams

NO. PAGES 187 NO. COPIES 10

JOB DESCRIPTION AMAX permit

SPECIAL INSTRUCTIONS

☑ ONE SIDE COPY
☐ TWO SIDE COPY
☑ LETTER SIZE
☐ LEGAL SIZE
☐ REDUCE TO 8½ x 11

☑ COVER STOCK
☐ COLOR STOCK
☐ CARBONLESS
☑ COLLATE
☐ REDUCE TO 2 PER PAGE

☐ STAPLE
☐ DO NOT STAPLE
☑ BIND
☐ GLUE

D.E.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

SHOLTES KOOGLER

TABLE OF CONTENTS

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 NOx 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 Emission PM $= \frac{0.03\,gr}{ft^3} \times \frac{40{,}000\,ft^3}{min} \times \frac{60\,min}{hr} \times \frac{\#}{7000\,gr} = 10.29\,\frac{\#PM}{hr}$

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.

Permitted to use No 6
HAVE BURNED NO. 5 ALSO

(118 AVG)

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.

THEOR.
ACTUAL LESS

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

125 mBTU/hr max

AVG

118 x 10^6 BTU/hr used in calculations

AVG

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~~ NO, 138#/hr pounds per hour or 1.1 pounds per million BTU. The annual increase in sulfur dioxide emissions will be 214 tons per year.

$$\text{Projected } SO_2 \text{ Emission} = 125 \times 10^6 \frac{BTU}{hr} \; \frac{1.1 \# SO_2}{10^6 BTU} = 137.5 \frac{\# SO_2}{hr}$$

$$\text{ANNUAL INCREASE} \cong 94.6 \times 7488/2000 - 138 \times 8760/2000 \cong 250 \text{ TPY}$$

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. (2.628x10^6 TPY) INPUT Under these operating conditions, the maximum dried rock production rate of the dryer will be 267 tons per hour or 2.3~~2~~6 ✓ 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.

PM

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

NO_x

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.

$$TPY\ NO_x = \frac{(26.7)(8760)}{2000} = 116.9\ TPY$$

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.

ACTUAL NOW

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_2 - 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.

INCREASE

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

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

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

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

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

TABLE 2-1

SUMMARY OF EMISSION CHANGES RESULTING FROM THE USE OF ALTERNATIVE FUELS

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

Source	Pollutant Emission Rate Increase (tons/year)				
	Particulate Matter	SO_2	NOx	CO	HC
Dryer					
Present	38.5	354.1	74.2	15.6	3.1
Proposed - Oil	78.8	568.5	74.2	15.6	3.1
- COM	78.8	568.5	117.2	19.5	5.0
Max. Increase	40.3	214.4	43.0	3.9	1.9
Dry Rock Storage					
Present	7.7				
Proposed	9.0				
Max. Increase	1.3				
Dry Rock Loadout					
Present	7.5				
Proposed	8.7				
Max. Increase	1.2				
Boiler	NO CHANGE				
Traffic	ALL CHANGES <0.1 TPY				
Total Increase	42.8	214.4	43.0	3.9	1.9
Significant Increase	25	40	40	100	40

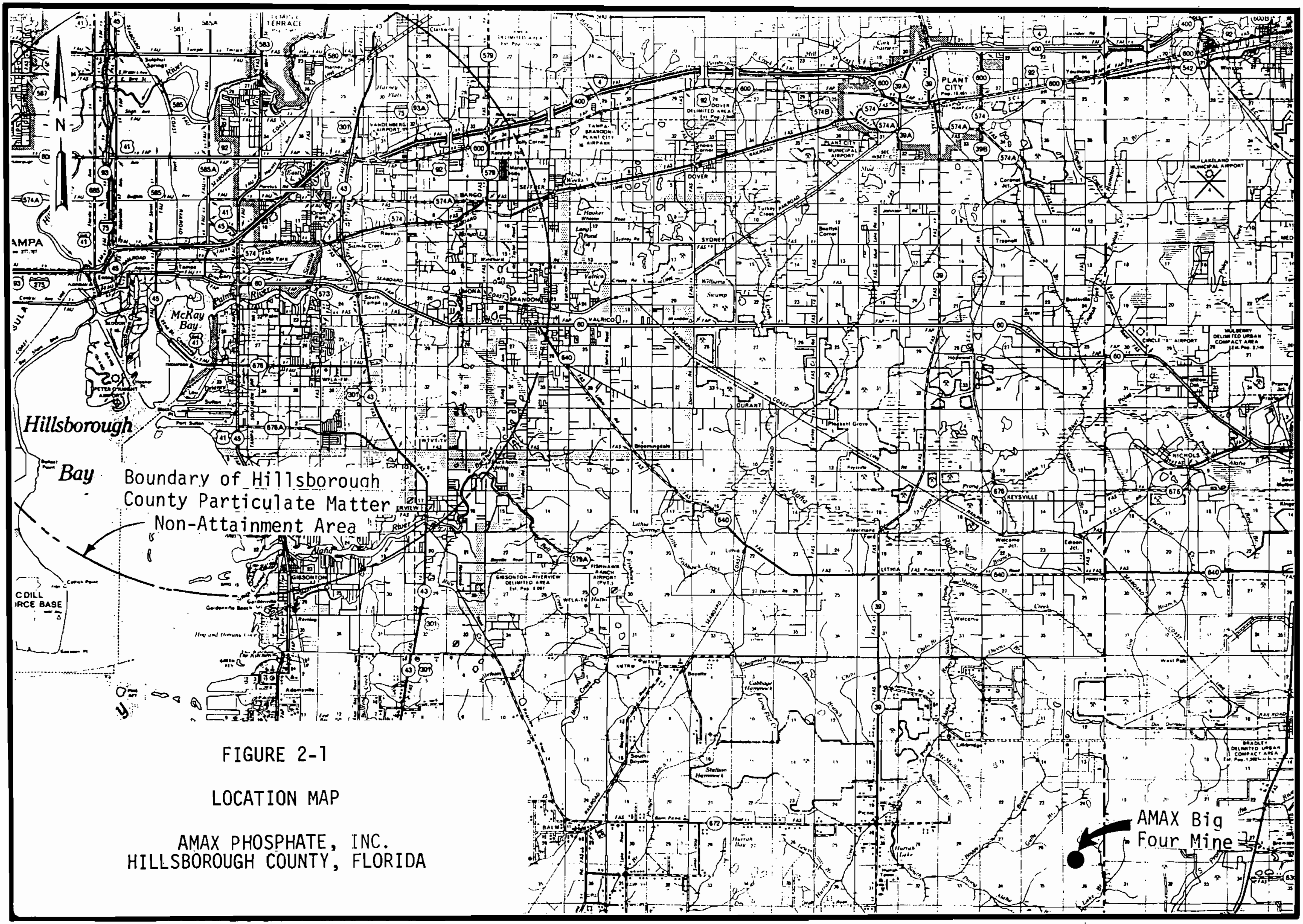


FIGURE 2-1

LOCATION MAP

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

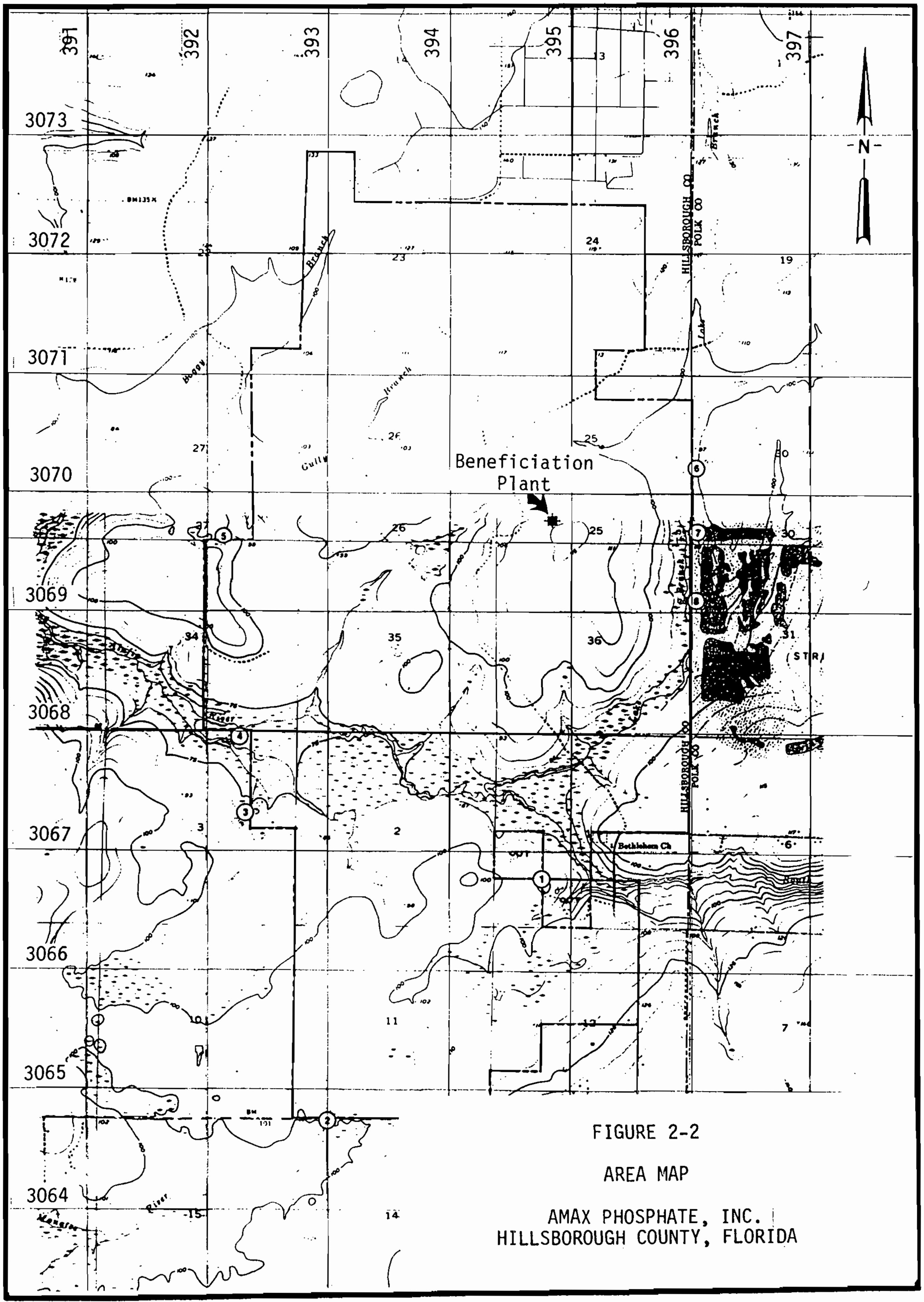


FIGURE 2-2

AREA MAP

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

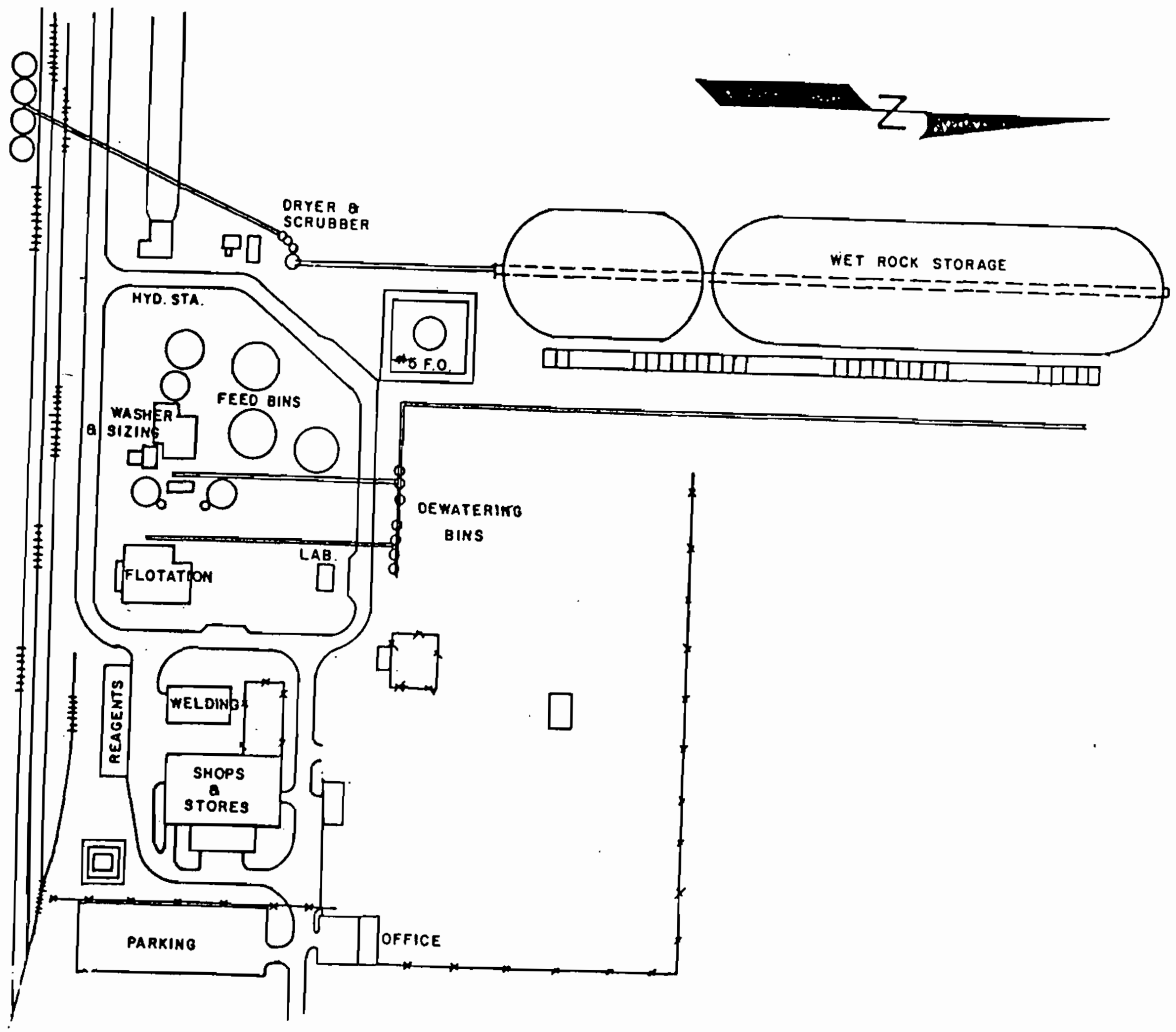


FIGURE 2-3

AMAX BIG FOUR MINE
BENEFICIATION PLANT

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

APPENDIX 2A-1

EMISSION CALCULATIONS

AMAX BIG FOUR MINE

AMAX PHOSPHATE, INC.

CALCULATION OF AIR POLLUTANT EMISSION INCREASES RESULTING FROM USE OF ALTERNATIVE FUELS

PRESENT

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

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

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

4. Boiler - No change

PROPOSED

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

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

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

4. Boiler - No change

EMISSION RATE CALCULATIONS

ROCK DRYER

PRESENT

PARTICULATE MATTER

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

x 7488/2000

= 38.5 tpy

SULFUR DIOXIDE

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

= 94.58 lb/hour

x 7488/2000

= 354.1 tpy

NITROGEN OXIDES

Based on a flow of 45350 scfm (actual) and a concentration of

? 61 ppm (see PSD-FL-088; Brewster)

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

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

= 19.83 lb/hr

x 7488/2000

= 74.2 tpy

CARBON MONOXIDE

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

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

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

= 4.18 lb/hour

x 7488/2000

= 15.6 tpy

NOW
4.18#/hr CO
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 lb/hour

x 7488/2000

= 3.1 tpy

NOW
0.84#/hr HC
3.1 TPY

ROCK DRYER (CONT.)

PROPOSED

PARTICULATE MATTER

= 300 tons/hr x 0.06 lb/ton

= 18.00 lb/hr

x 8760/2000

= 78.8 tpy

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT

= (1.1 lb $SO_2/10^6$ BTU)(118×10^6 BTU/hr)

= 129.80 lb/hr

x 8760/2000

= 568.5 tpy

Uncontrolled with 0.7% Sulfur fuel oil

= (115×10^6 BTU/hr)(1/149500 BTU/gal)(8.08 lb/gal)

x (0.007 x 2 lb SO_2/lb fuel)

= 87.0 lb/hr

< 129.8 lb/hr ; therefore no SO_2 sorption is necessary to meet the proposed emission limiting standard

Uncontrolled with 2.25% Sulfur fuel oil

APPLIC
for
2.5

= (118×10^6 BTU/hr)(1/147095 BTU/gal)(8.29 lb/gal)

x (0.0225 x 2 lb SO_2/lb fuel)

= 299.3 lb/hr

Absorption necessary to meet proposed std.

= (299.3 - 129.8) x 100/299.3

= 56.6%

APPL'X
for
2.5

Uncontrolled with 2.00% Sulfur COM

= (109×10^6 BTU/hr)(1/135876 BTU/gal)(9.3 lb/gal)

x (0.02 x 2 lb SO_2/lb fuel)

= 298.4 lb/hr

Absorption necessary to meet proposed std

= (298.4 - 129.8) x 100/298.4

= 56.5%

NITROGEN OXIDES

For fuel oil combustion an NOx 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 NOx emission factor divided by the AP-42 oil NOx emission factor. For COM the NOx emission factor was calculated as:

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

NO_x from Coal - AP-42

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

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

$= 0.67\ \text{lb } NO_x / 10^6\ \text{BTU}$

NO_x from Oil - AP-42

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

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

$= 0.41\ \text{lb } NO_x / 10^6\ \text{BTU}$

NO_x emissions from Oil (same as present)

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

NO_x emissions from Coal (by ratio)

$= 19.83\ (0.67/0.41)$

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

NO_x emissions from COM

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

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

$\times 8760/2000$

$= 117.2\ \text{tpy}$

CARBON MONOXIDE

CO from Coal - AP-42

$= 1 \text{ lb/ton}$

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

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

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

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

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

CO emissions from COM

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

$= 4.46 \text{ lb/hr}$

$\times 8760/2000$

$= 19.5 \text{ tpy}$

HYDROCARBONS

HC from Coal - AP-42

$= 0.3 \text{ lb/ton}$

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

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

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

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

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

HC emissions from COM

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

$= 1.14 \text{ lb/hr}$

$\times 8760/2000$

$= 5.0 \text{ tpy}$

3.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

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

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

3.1 BACT - Dried Rock Storage and Loadout Facilities

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

Dry rock silo
8,000 ACFM
2.06#PM/hr
0.03 gr/scf
Impingement scrub. control system

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 Loading
23,000 ACFM
5.96#PM/hr
0.03gr/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.

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 # PM/hr
(NOW) 0.034 # PM/T 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

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

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, (Brewster Phosphates AMAX can expect a sulfur dioxide removal efficiency of approximately 60-65 percent when fuel with a 2.5 percent sulfur content is used to dry pebble rock. This would be the lowest expected sulfur dioxide removal efficiency for the system since the removal efficiencies increase with decreased fuel sulfur and increase during the drying of rock concentrate or combinations of rock concentrate and pebble rock.

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

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

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

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

3.2.3 Nitrogen Oxides BACT

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

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

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

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

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

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

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

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

4.0 EXISTING AIR QUALITY DATA

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

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

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

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

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

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

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

APPENDIX 4A-1

AMBIENT SULFUR DIOXIDE MONITORING DATA

This is an EPA SAROAD Format

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

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY BREWSTER PHOSPHATES	PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric
SITE ADDRESS HISCOCK RD	CITY NAME FT. LONESOME, FL.	
PROJECT Air Monitoring	TIME INTERVAL OF OBS. One (1) Hour	UNITS OF OBS. P.P.M.

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

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

DAY 19 20	ST 21	HR 22	RDG 1 33 34 35 36	RDG 2 37 38 39 40	RDG 3 41 42 43 44	RDG 4 45 46 47 48	RDG 5 49 50 51 52	RDG 6 53 54 55 56	RDG 7 57 58 59 60	RDG 8 61 62 63 64	RDG 9 65 66 67 68	RDG 10 69 70 71 72	RDG 11 73 74 75 76	RDG 12 77 78 79 80
01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01	1	2	0	0	0	0	0	0	0	0	0	0	0	0
02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	1	2	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	1	2	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	1	2	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	1	2	0	0	0	0	0	0	0	0	0	0	0	0
06	0	0	0	0	0	0	0	0	0	0	0	0	1	0
06	1	2	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	0	0	0	0	0	0	1	1	1
07	1	2	8	7	6	2	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08	1	2	3	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09	1	2	0	0	0	0	0	6	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	6	11
10	1	2	1	0	0	3	0	10	9	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	2	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	2	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	2	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	2	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	2	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY OATA

AGENCY BREWSTER PHOSPHATES	PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric
SITE ADDRESS HISCOCK RD.	CITY NAME FT. LONESOME, FL	PROJECT Air Monitoring
TIME INTERVAL OF OBS. One (1) Hour	UNITS OF OBS. P.P.M.	

	STATE	AREA	SITE	AGENCY	PROJECT	TIME	YEAR	MONTH	PARAMETER CODE	METHOD	UNITS	DP
1	10	1800	097	J	05	1	81	10	42401	16	07	3
1	2 3	4 5 6 7	8 9 10	11	12 13	14	15 16	17 18	23 24 25 26 27	28 29	30 31	32

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

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY BREWSTER PHOSPHATES		PARAMETER OBSERVED Sulfur Dioxide	METHOD Flame Photometric		
SITE ADDRESS HISCOCK RD.	CITY NAME FT. LONESOME, FL.	PROJECT Air Monitoring	TIME INTERVAL OF OBS. One (1) Hour	UNITS OF OBS. P.P.M.	

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

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

DAY 19 20	ST 21	HR 22	RDG 1 33 34 35 36	RDG 2 37 38 39 40	RDG 3 41 42 43 44	RDG 4 45 46 47 48	RDG 5 49 50 51 52	RDG 6 53 54 55 56	RDG 7 57 58 59 60	RDG 8 61 62 63 64	RDG 9 65 66 67 68	RDG 10 69 70 71 72	RDG 11 73 74 75 76	RDG 12 77 78 79 80
01	0	0	0	0	0	0	0	0	0	0	8	0	0	0
01	1	2	0	0	0	0	0	0	0	0	0	0	0	1
02	0	0	0	0	0	0	0	0	0	0	1	0	0	0
02	1	2	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	0	0	0	0	2	2	4	8	7	0	0	0
03	1	2	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	0	0	0	0	8	4	0	0	0	0	0
04	1	2	0	0	0	0	2	0	4	0	0	0	0	0
05	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	1	2	0	0	0	0	125	4	0	0	0	0	0	0
06	0	0	0	0	0	0	0	0	0	0	0	0	3	3
06	1	2	0	0	0	0	0	0	0	0	0	0	0	0
07	0	0	0	0	0	2	11	7	1	0	0	0	0	0
07	1	2	0	0	0	11	12	22	28	14	8	2	0	0
08	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08	1	2	0	0	0	0	0	0	0	0	0	0	0	0
09	0	0	0	0	0	0	0	0	0	0	4	5	0	0
09	1	2	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	2	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	2	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	2	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	2	9
13	1	2	1	0	0	2	3	0	0	4	10	9	2	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	2	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	6	19	8	2	0
15	1	2	0	0	0	9	21	37	25	11	3	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY	PARAMETER OBSERVED	METHOD
BREWSTER PHOSPHATES	Sulfur Dioxide	Flame Photometric

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

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

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

DAY 19 20	ST HR 21 22	RDG 1 33 34 35 36	RDG 2 37 38 39 40	RDG 3 41 42 43 44	RDG 4 45 46 47 48	RDG 5 49 50 51 52	RDG 6 53 54 55 56	RDG 7 57 58 59 60	RDG 8 61 62 63 64	RDG 9 65 66 67 68	RDG 10 69 70 71 72	RDG 11 73 74 75 76	RDG 12 77 78 79 80
16	12	0	0	0	0	0	0	0	0	0	0	0	0
17	00	0	0	0	0	0	0	0	0	0	0	6	9
17	12	11	10	7	2	0	0	0	0	0	0	0	0
18	00	0	0	0	0	0	0	0	0	0	0	0	0
18	12	0	0	0	2	1	0	0	6	9	8	0	0
19	00	0	0	0	0	0	0	0	0	2	2	0	0
19	12	0	0	7	41	23	14	1	0	0	0	0	0
20	00	0	0	0	0	0	0	0	0	0	0	0	6
20	12	0	0	0	3	0	0	18	0	0	0	10	11
21	00	0	0	0	0	0	0	0	0	0	0	0	0
21	12	0	0	0	0	0	0	13	13	1	0	0	0
22	00	0	0	0	0	0	0	0	0	9	10	0	0
22	12	0	0	0	0	0	3	9	3	0	0	0	0
23	00	0	0	0	1	9	12	10	4	9	10	9	7
23	12	5	0	0	0	0	0	0	0	0	0	0	0
24	00	0	0	0	0	0	0	0	0	0	0	5	11
24	12	3	0	0	0	0	4	5	9	11	0	0	0
25	00	0	0	0	0	0	0	0	0	0	11	11	9
25	12	0	0	1	11	5	0	0	0	0	0	0	0
26	00	0	0	0	0	0	0	0	0	0	0	0	0
26	12	0	0	0	0	0	0	0	0	0	0	0	0
27	00	0	0	0	0	0	0	0	0	0	0	0	0
27	12	0	0	0	0	0	0	0	0	0	0	0	0
28	00	0	0	0	0	0	0	0	0	0	0	3	0
28	12	3	25	4	2	0	0	0	0	0	0	0	0
29	00	0	0	0	0	0	0	0	0	0	0	7	10
29	12	2	0	0	0	0	0	0	0	0	0	0	0
30	00	0	0	0	0	0	0	0	0	0	0	0	0
30	12	0	0	0	0	0	0	0	0	0	0	0	0
~~31~~	~~00~~												
~~31~~	~~12~~												

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

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

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

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

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

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

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

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

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

AGENCY: BREWSTER PHOSPHATES

PARAMETER OBSERVED: Sulfur Dioxide

METHOD: Flame Photometric

SITE ADDRESS: HISCOCK RD.

CITY NAME: FT. LONESOME, FL.

PROJECT: Air Monitoring

TIME INTERVAL OF OBS.: One (1) Hour

UNITS OF OBS.: P.P.M.

DAY 19 20	ST 21	HR 22	RDG 1 33 34 35 36	RDG 2 37 38 39 40	RDG 3 41 42 43 44	RDG 4 45 46 47 48	RDG 5 49 50 51 52	RDG 6 53 54 55 56	RDG 7 57 58 59 60	RDG 8 61 62 63 64	RDG 9 65 66 67 68	RDG 10 69 70 71 72	RDG 11 73 74 75 76	RDG 12 77 78 79 80
16	1	2	3	5	2	0	0	0	0	0	1	0	0	0
17	0	0	0	0	0	0	0	2	1	5	4	5	9	5
17	1	2	3	1	0	0	0	0	0	0	0	0	0	0
18	0	0	10	11	0	0	0	0	0	0	0	0	5	0
18	1	2	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1	2	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	2	0	0	0	0	0	0	0	5	4	3	6	10
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	1	2	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	2	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1	2	0	0	0	0	24	13	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	1	2	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	1	2	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	2	5	32	34	16	14	9	0	0	0	0	0	0
30	0	0	0	0	0	0	0	2	2	7	8	5	11	5
30	1	2	4	0	3	6	5	4	3	4	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	1	2	0	0	0	0	0	0	0	0	0	0	0	0

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DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY: BREWSTER PHOSPHATES

PARAMETER OBSERVED: Sulfur Dioxide

METHOD: Flame Photometric

SITE ADDRESS: HISCOCK RD.

CITY NAME: FT. LONESOME, FL.

PROJECT: Air Monitoring

TIME INTERVAL OF OBS.: One (1) Hour

UNITS OF OBS.: P.P.M.

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

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

DAY 19 20	ST 21	HR 22	RDG 1 33 34 35 36	RDG 2 37 38 39 40	RDG 3 41 42 43 44	RDG 4 45 46 47 48	RDG 5 49 50 51 52	RDG 6 53 54 55 56	RDG 7 57 58 59 60	RDG 8 61 62 63 64	RDG 9 65 66 67 68	RDG 10 69 70 71 72	RDG 11 73 74 75 76	RDG 12 77 78 79 80
01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01	1	2	0	0	2	4	5	2	0	0	0	0	0	0
02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02	1	2	0	0	0	0	0	0	0	0	0	0	0	0
03	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03	1	2	0	0	0	0	0	0	0	0	0	0	0	0
04	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04	1	2	0	0	0	9	14	6	2	0	0	0	0	0
05	0	0	0	0	0	0	0	0	0	0	0	8	9	10
05	1	2	6	3	2	0	0	1	1	0	0	6	3	0
06	0	0	0	0	1	0	1	1	6	4	5	1	0	0
06	1	2	0	0	0	0	17	38	5	0	0	0	0	0
07	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07	1	2	0	0	0	0	0	0	0	0	0	0	0	0
08	0	0	0	0	0	0	0	0	0	0	0	0	3	1
08	1	2	0	0	0	0	0	0	1	3	0	0	0	0
09	0	0	0	3	2	1	0	0	3	20	48	18	3	17
09	1	2	29	20	19	8	6	3	19	27	46	20	9	2
10	0	0	0	0	0	0	1	4	7	17	10	3	3	4
10	1	2	1	0	0	12	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	2	0	0	0	0	0	0	0	3	13	14	6	3
12	0	0	0	0	0	0	0	0	0	3	8	7	7	5
12	1	2	0	0	0	0	0	0	9	9	10	11	4	0
13	0	0	0	0	0	7	2	1	4	10	12	3	0	0
13	1	2	1	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	2	2	1	14	0	0	6	18	10	2	0	0	0
15	0	0	0	0	0	0	4	6	4	4	9	6	2	0
15	1	2	0	8	10	9	3	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	6	4	1

DER form PERM 12 - 8 (Feb 1976)

This is an EPA SAROAD Format

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

DEPARTMENT OF ENVIRONMENTAL REGULATION – AIR QUALITY INPUT FORM HOURLY DATA

AGENCY: BREWSTER PHOSPHATES
PARAMETER OBSERVED: Sulfur Dioxide
METHOD: Flame Photometric
SITE ADDRESS: HISCOCK RD.
CITY NAME: FT. LONESOME, FL.
PROJECT: Air Monitoring
TIME INTERVAL OF OBS.: One (1) Hour
UNITS OF OBS.: P.P.M.

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

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

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	33 34 35 36	37 38 39 40	41 42 43 44	45 46 47 48	49 50 51 52	53 54 55 56	57 58 59 60	61 62 63 64	65 66 67 68	69 70 71 72	73 74 75 76	77 78 79 80
16	1	2	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	5	3	17	30	20	16
17	1	2	10	4	3	4	4	4	5	1	2	4	3	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	1	2	0	0	0	0	1	16	1	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1	2	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	3	3	0
20	1	2	0	0	0	0	0	0	0	0	1	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1	2	2	5	19	42	8	8	11	3	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	1	2	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	2	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	1	0	7	10	9	7	10	3	3	0	0
25	1	2	0	0	0	3	0	0	0	0	0	0	0	2
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	1	2	0	0	0	0	0	0	0	0	0	0	4	22
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	1	2	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	1	2	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	3	1	0	0	0	0	0	0	16	16	1
29	1	2	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	1	2	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	1	2	0	0	0	0	0	0	0	0	0	0	0	0

DER form PERM 12 - 8 (Feb 1976)

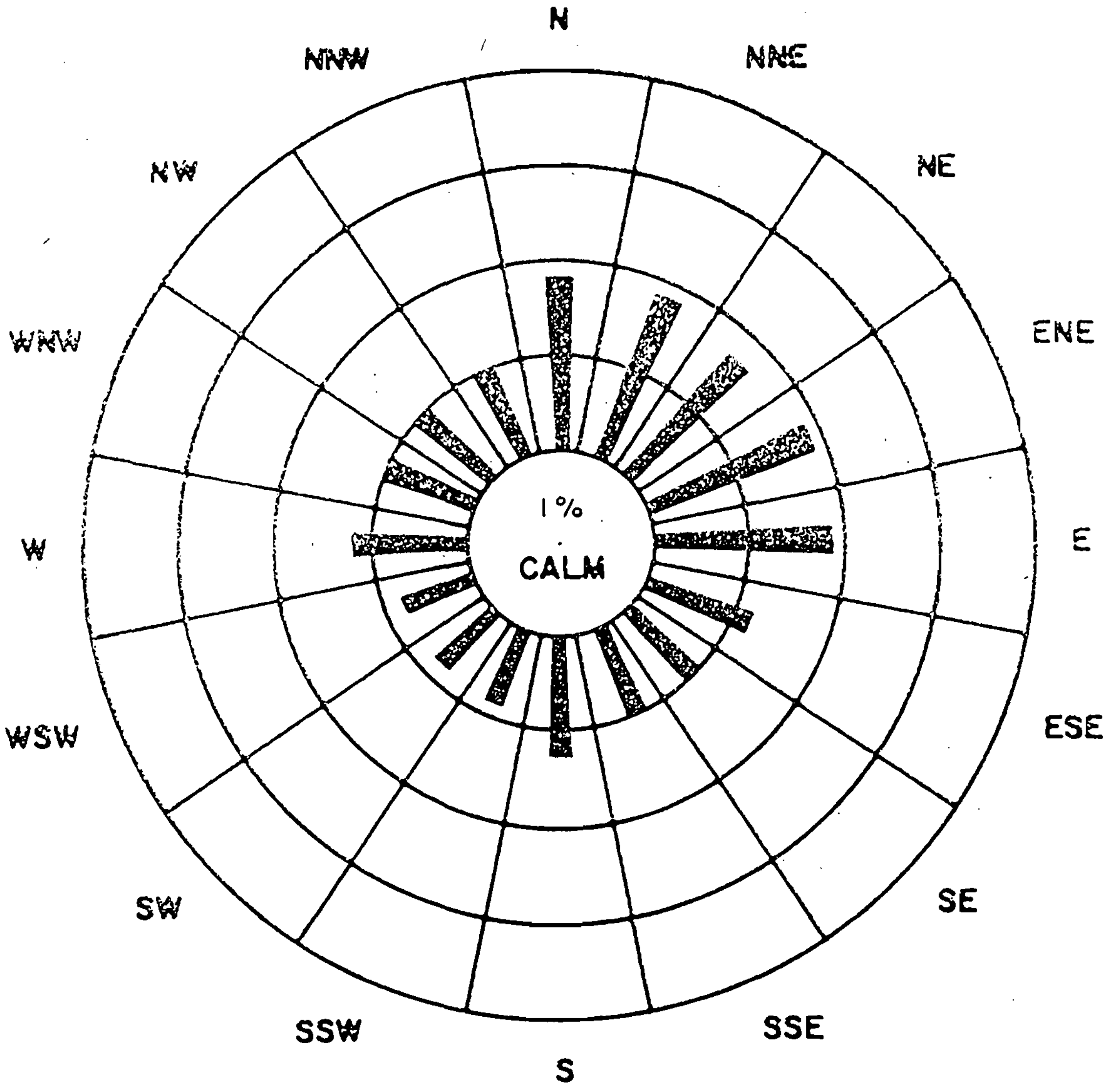
5.0 SITE METEOROLOGY

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

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

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

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



Note: Concentric circles represent 5 percent frequency intervals.

FIGURE 5-1

ANNUAL WIND ROSE FOR TAMPA, FLORIDA
1960 - 1964

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

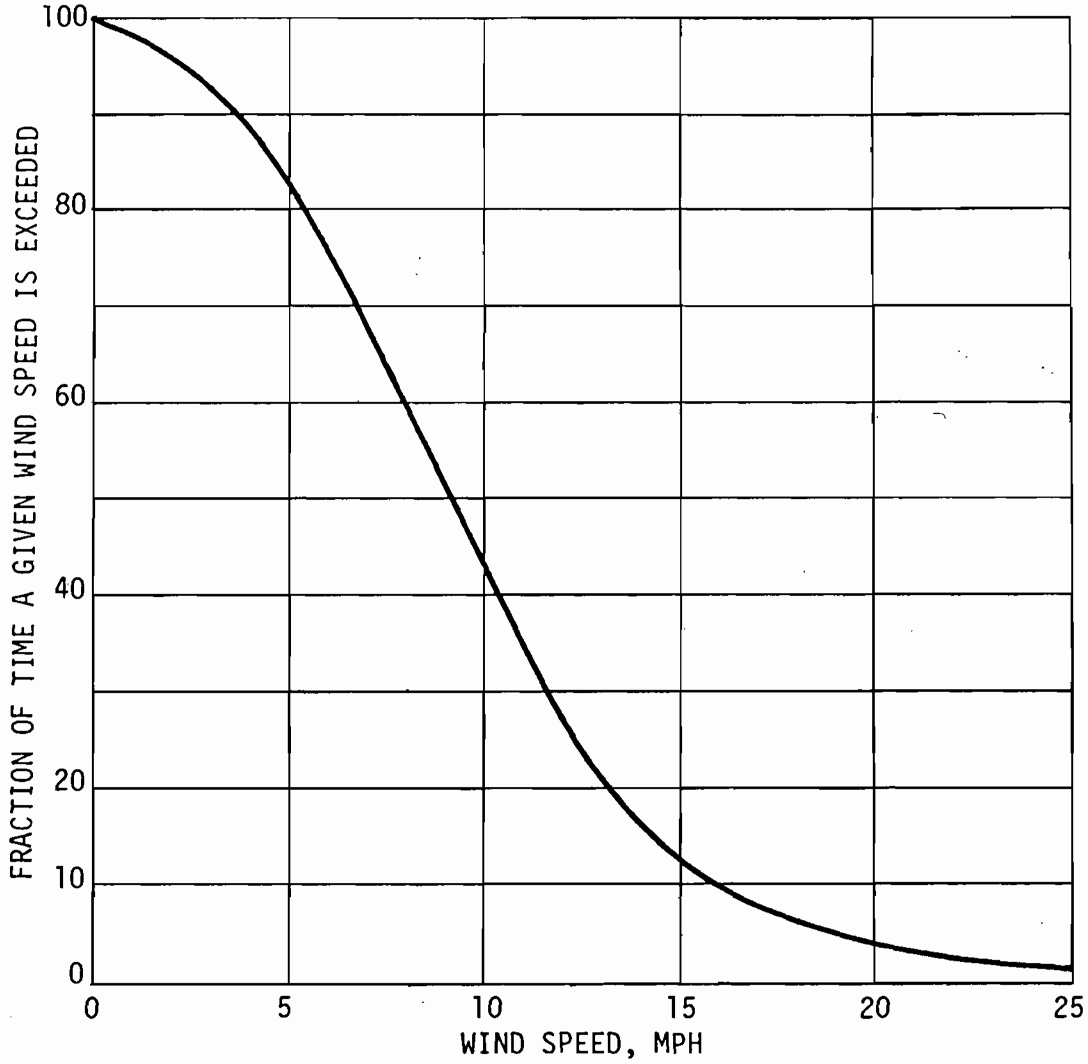


FIGURE 5-2

WIND SPEED DISTRIBUTION
FOR TAMPA, FLORIDA

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

6.0 AIR QUALITY IMPACT ANALYSIS

6.1 Introduction

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

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

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

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

6.2 Meteorological Data

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

6.3 Emission Data

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

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

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

6.4 Air Quality Review

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

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

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

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

6.4.1 Sulfur Dioxide Impact Analysis

6.4.1.1 Short-Term Sulfur Dioxide Impact

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

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

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

6.4.1.2 Long-Term Sulfur Dioxide Impact

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

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

6.4.2 Particulate Matter Impact Analysis

6.4.2.1 Short-Term Particulate Matter Impact

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

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

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

6.4.2.2 Long-Term Particulate Matter Impact

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

6.4.3 Nitrogen Oxides Impact Analysis

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

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

6.5 Impact on Class I Areas and Non-Attainment Areas

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

6.6 Downwash Analysis

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

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

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

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

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

6.7 Impact of Site Preparation and Plant Construction

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

6.8 Air Quality Review Summary

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

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

TABLE 6-1

AIR QUALITY STANDARDS AND INCREMENTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

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

TABLE 6-2

SUMMARY OF AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

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

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

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

Best Available Copy

SOURCE LIST

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

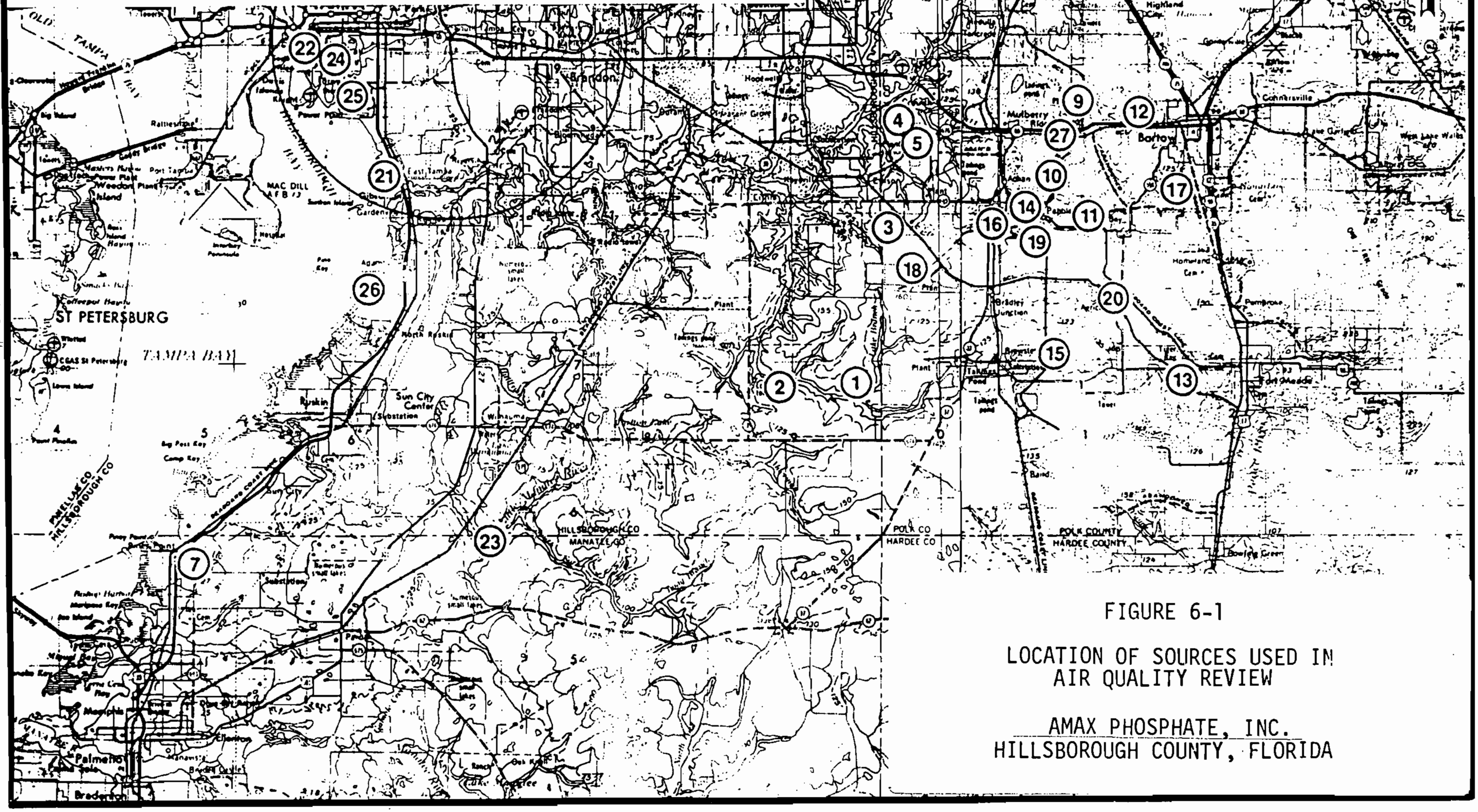
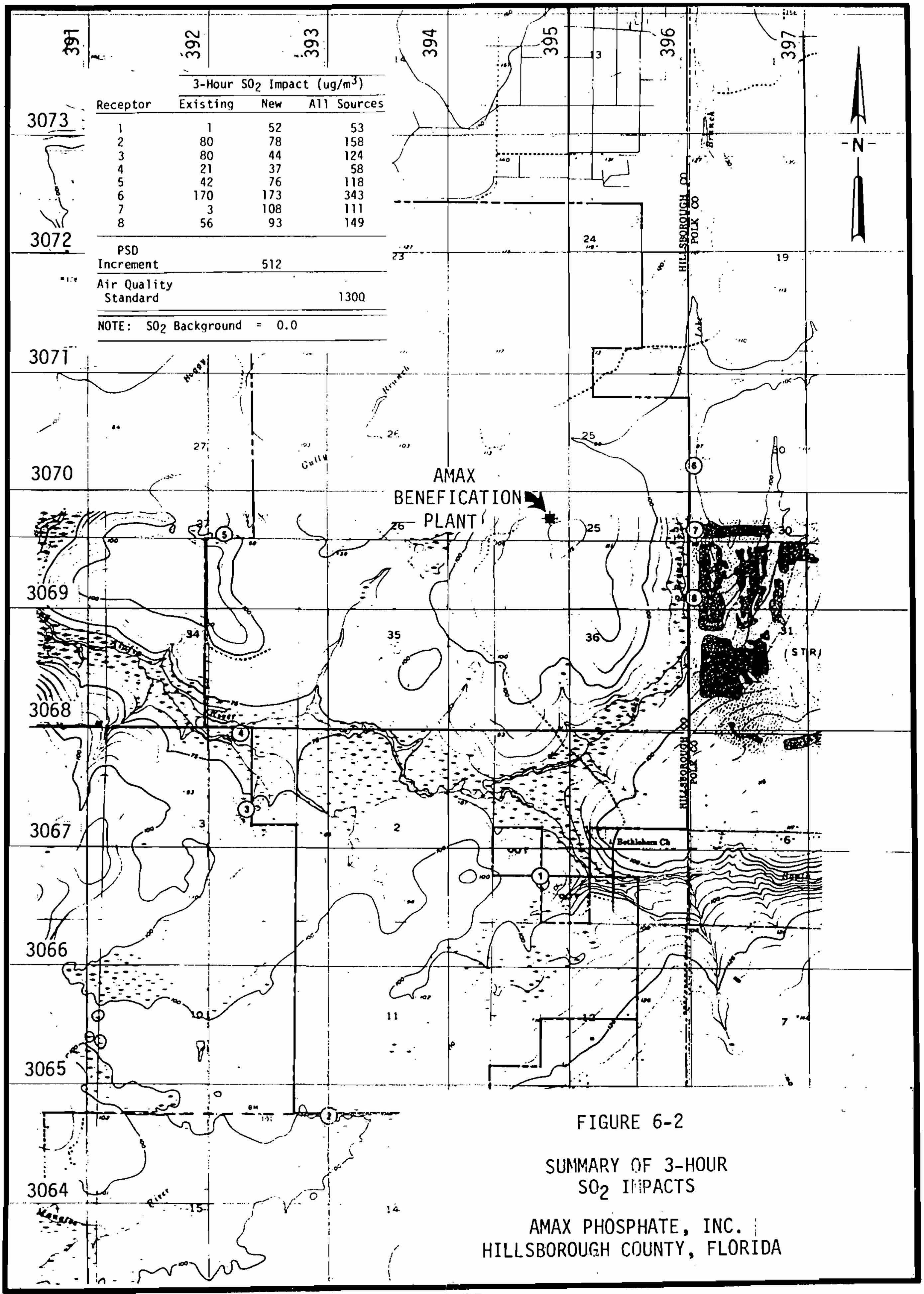


FIGURE 6-1

LOCATION OF SOURCES USED IN AIR QUALITY REVIEW

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA



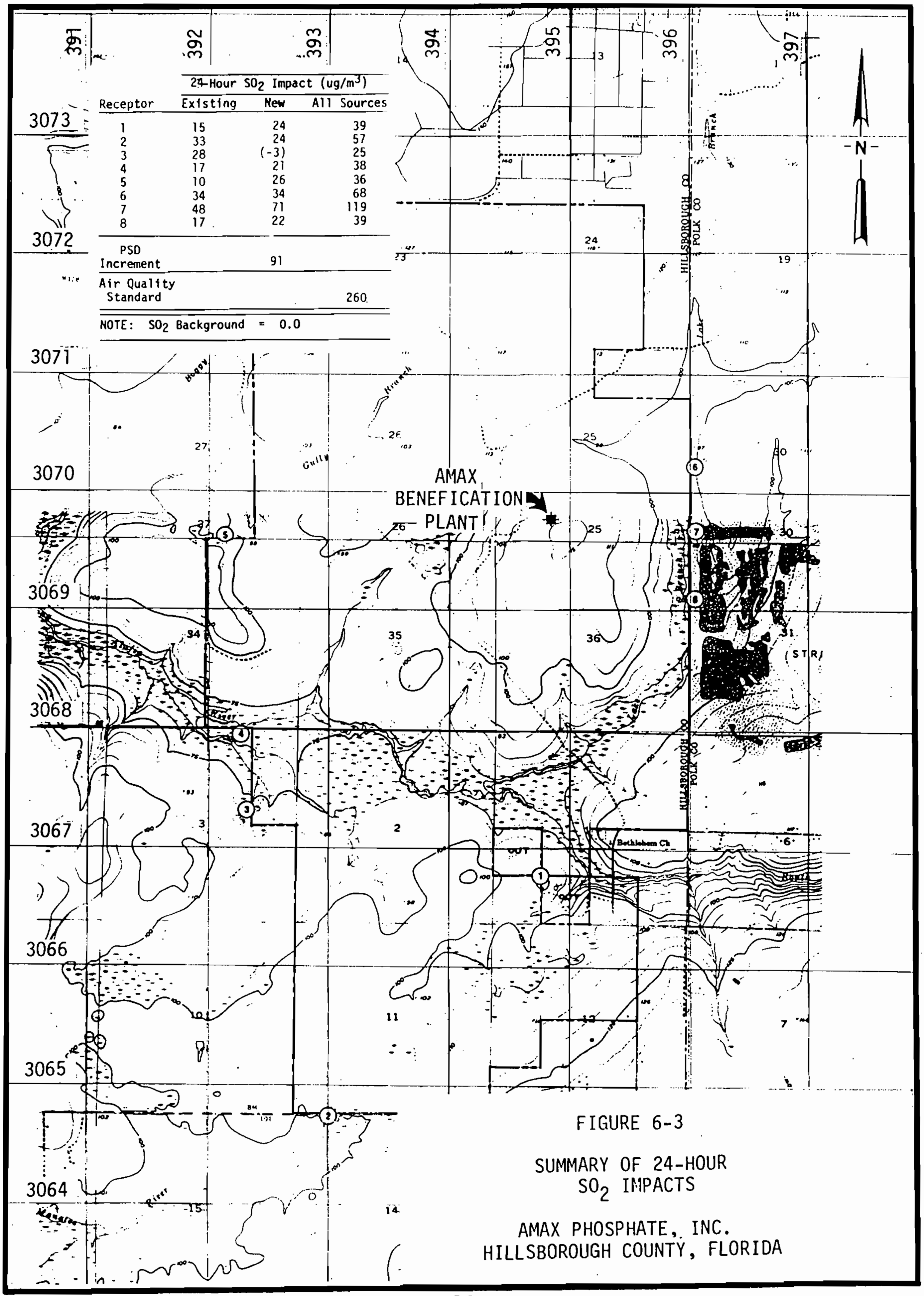
	3-Hour SO2 Impact (ug/m3)		
Receptor	Existing	New	All Sources
1	1	52	53
2	80	78	158
3	80	44	124
4	21	37	58
5	42	76	118
6	170	173	343
7	3	108	111
8	56	93	149
PSD Increment		512	
Air Quality Standard			1300

NOTE: SO_2 Background = 0.0

FIGURE 6-2

SUMMARY OF 3-HOUR SO_2 IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA



	24-Hour SO2 Impact (ug/m3)		
Receptor	Existing	New	All Sources
1	15	24	39
2	33	24	57
3	28	(-3)	25
4	17	21	38
5	10	26	36
6	34	34	68
7	48	71	119
8	17	22	39
PSD Increment		91	
Air Quality Standard			260

NOTE: SO_2 Background = 0.0

FIGURE 6-3

SUMMARY OF 24-HOUR SO_2 IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

Best Available Copy

SOURCE LIST

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

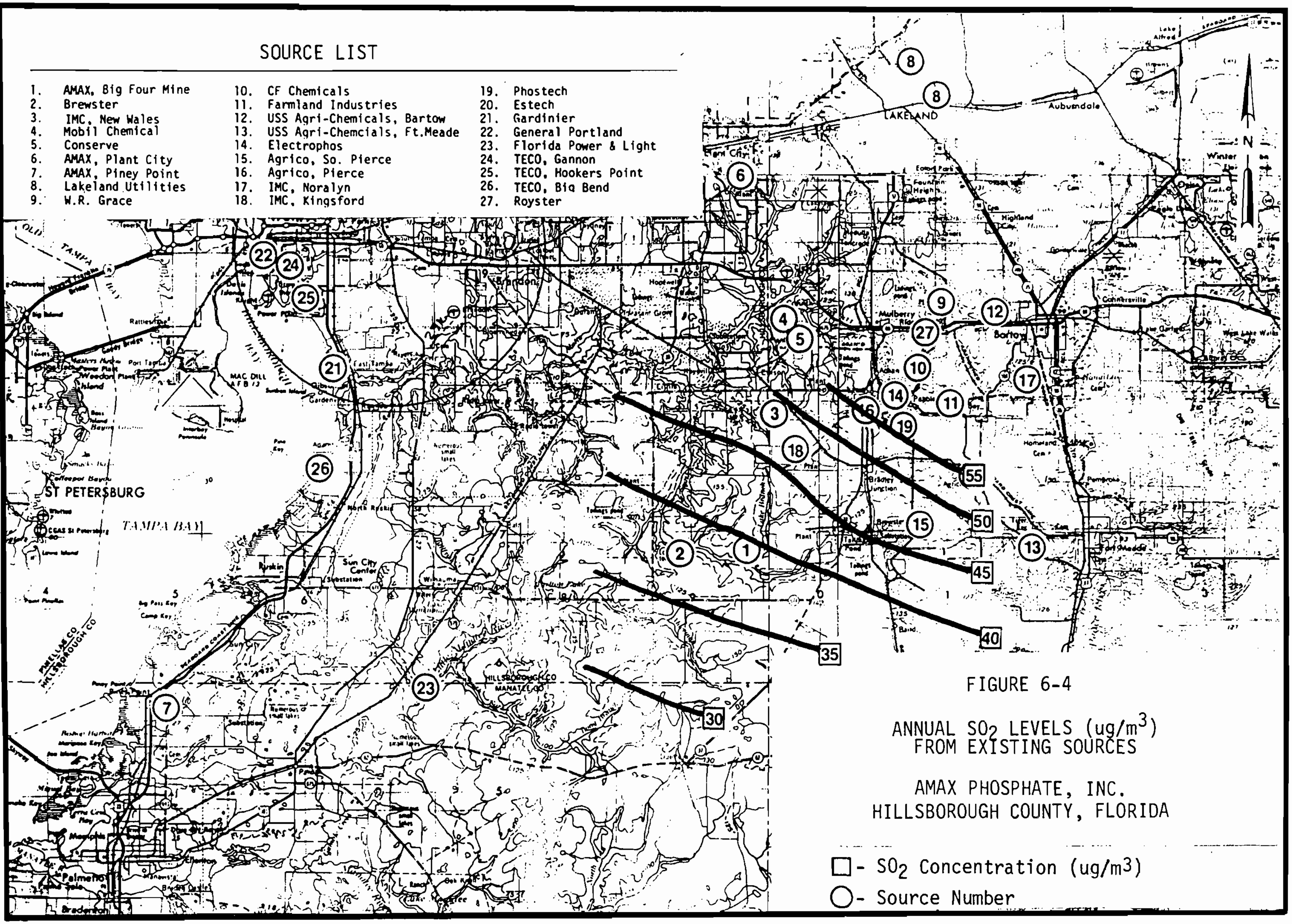


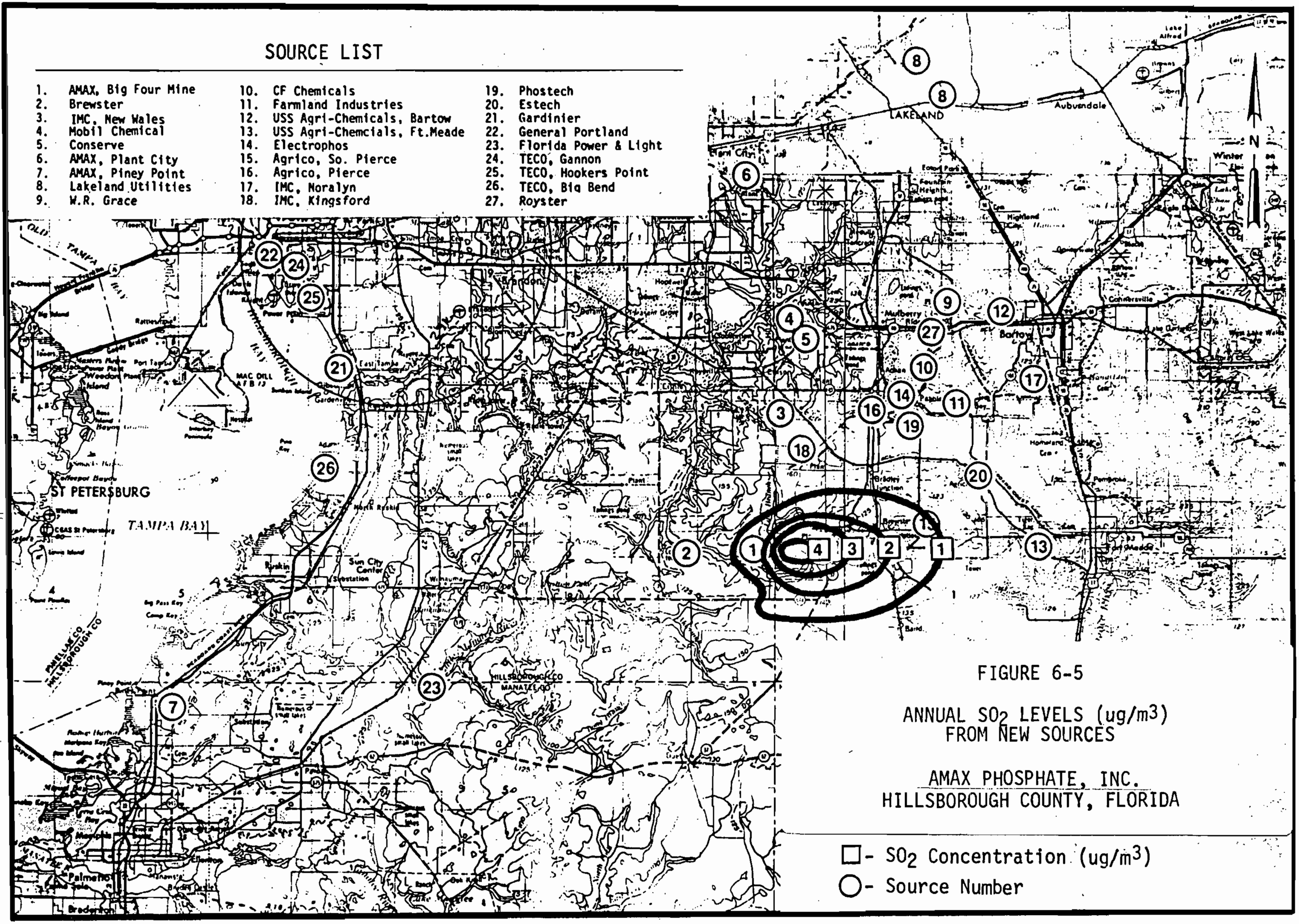
FIGURE 6-4

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

☐ - SO_2 Concentration (ug/m^3)

○ - Source Number



SOURCE LIST

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

FIGURE 6-5

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

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

SOURCE LIST

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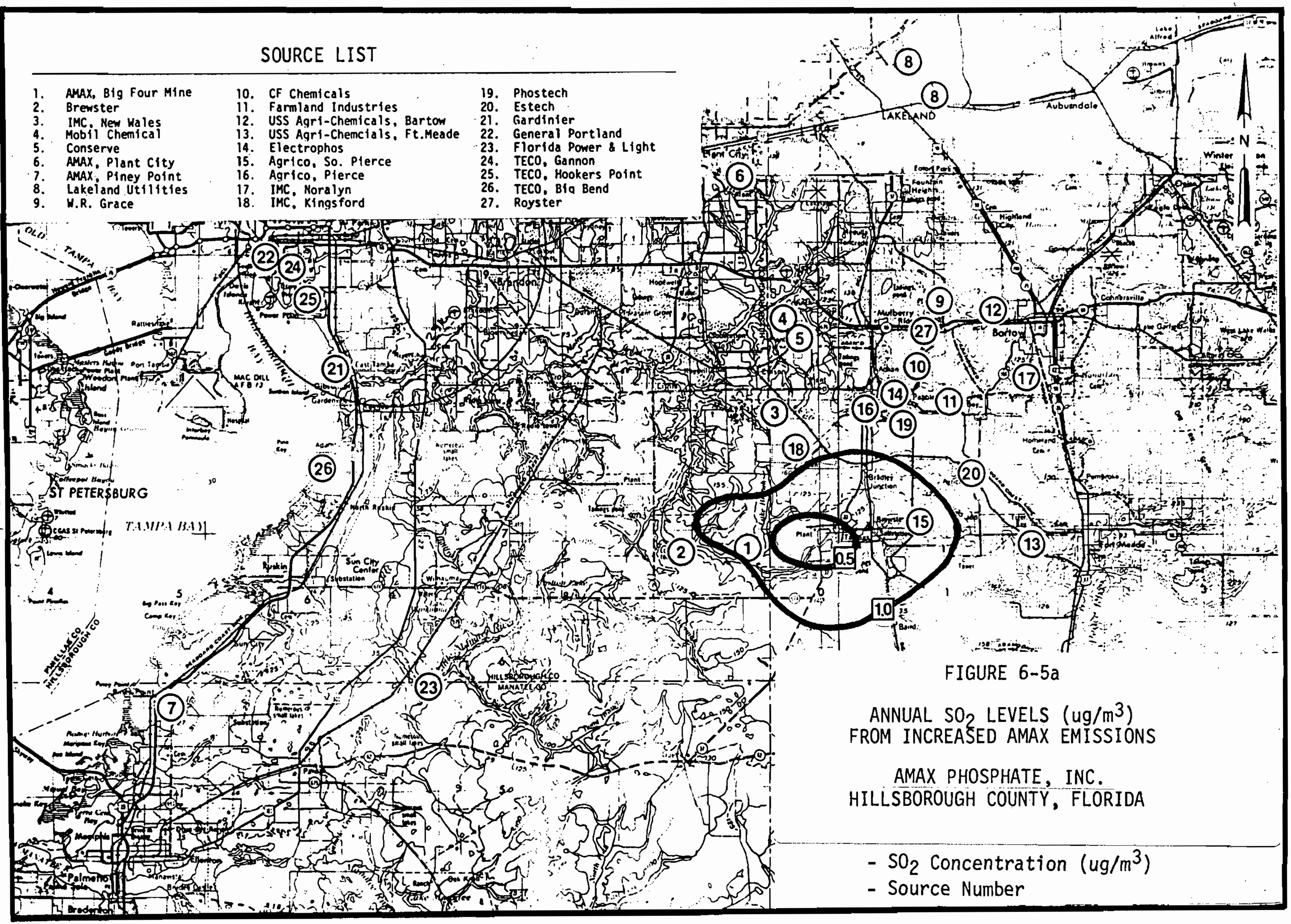
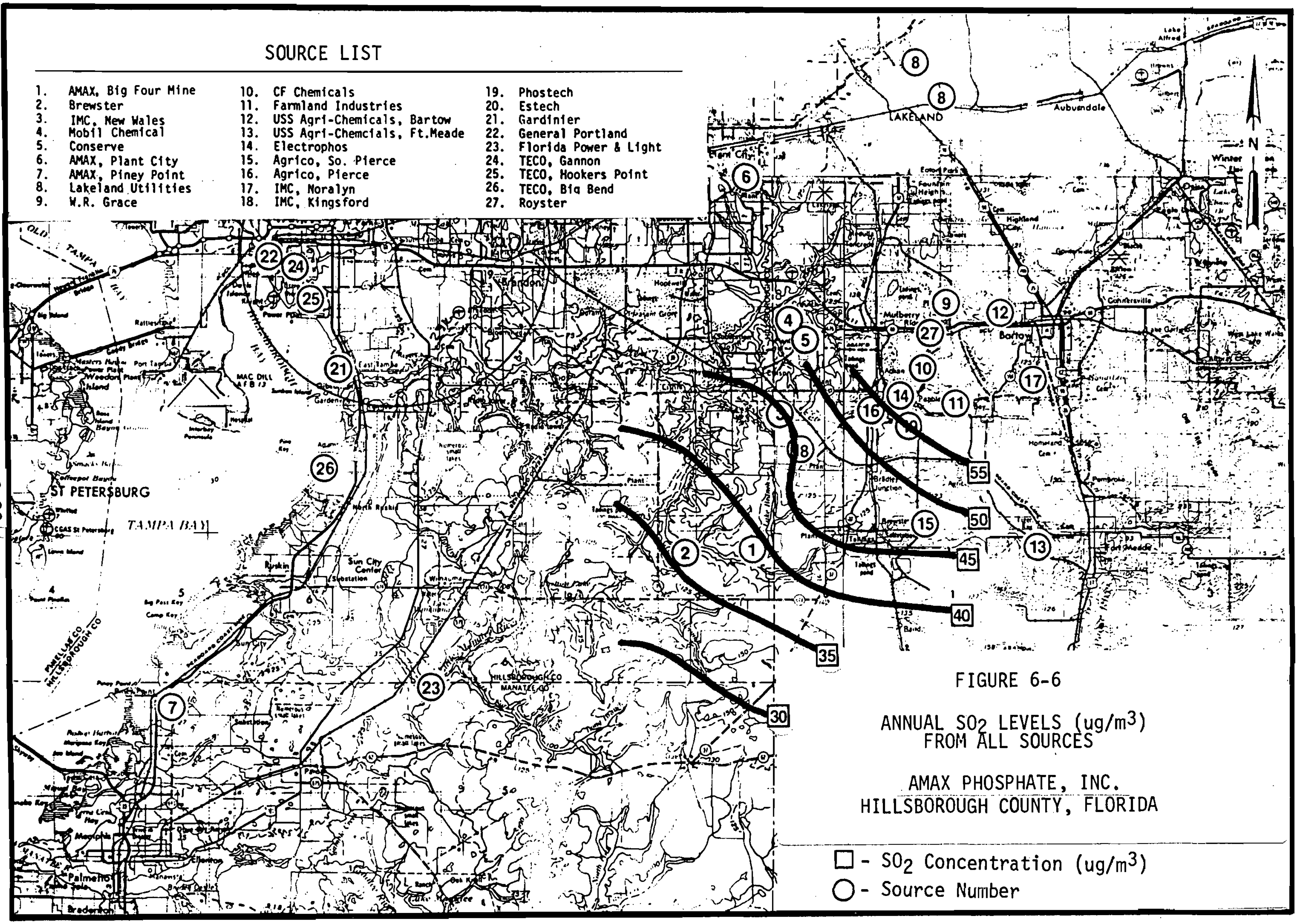


FIGURE 6-5a

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

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



SOURCE LIST

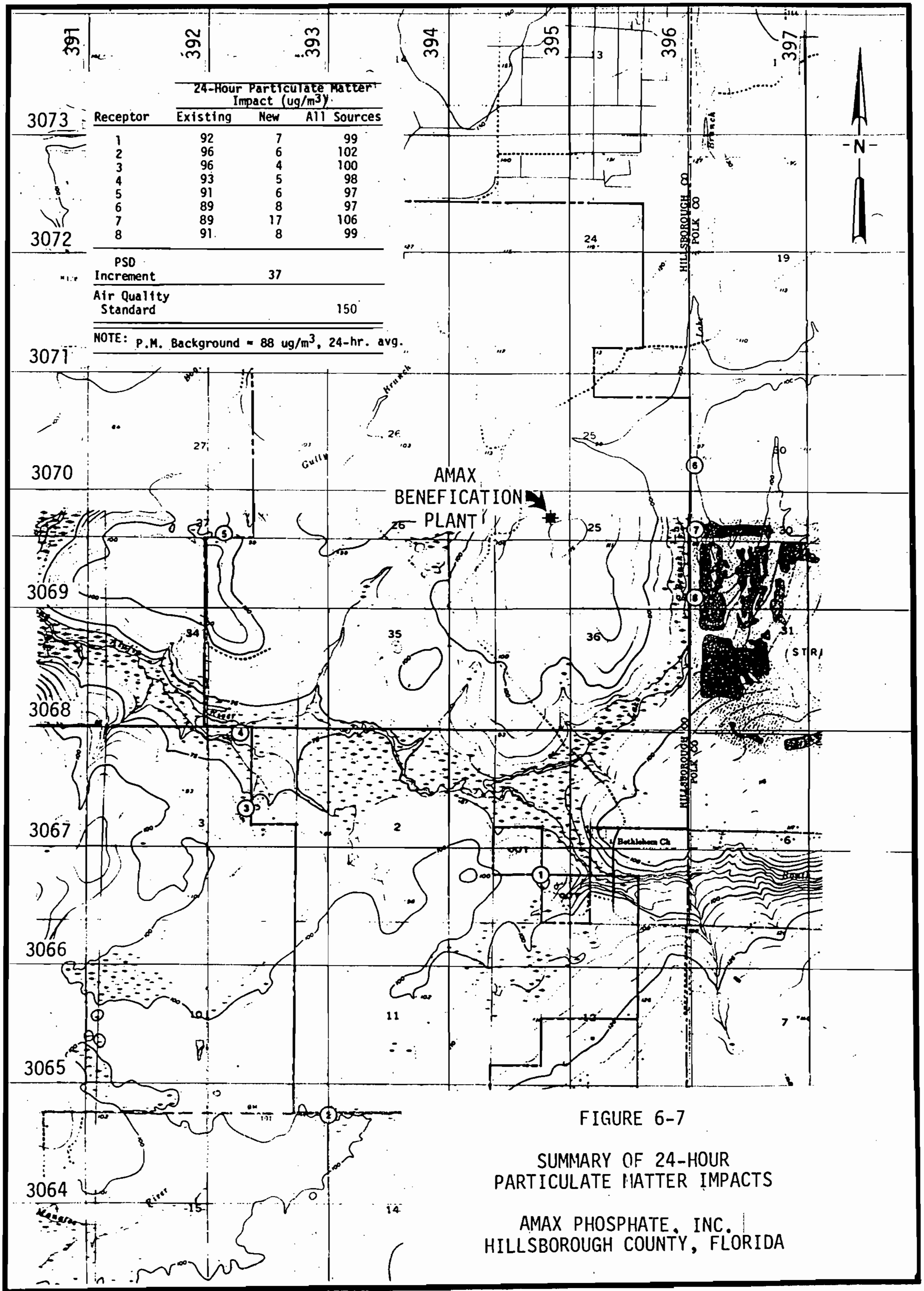
1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce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

FIGURE 6-6

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

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



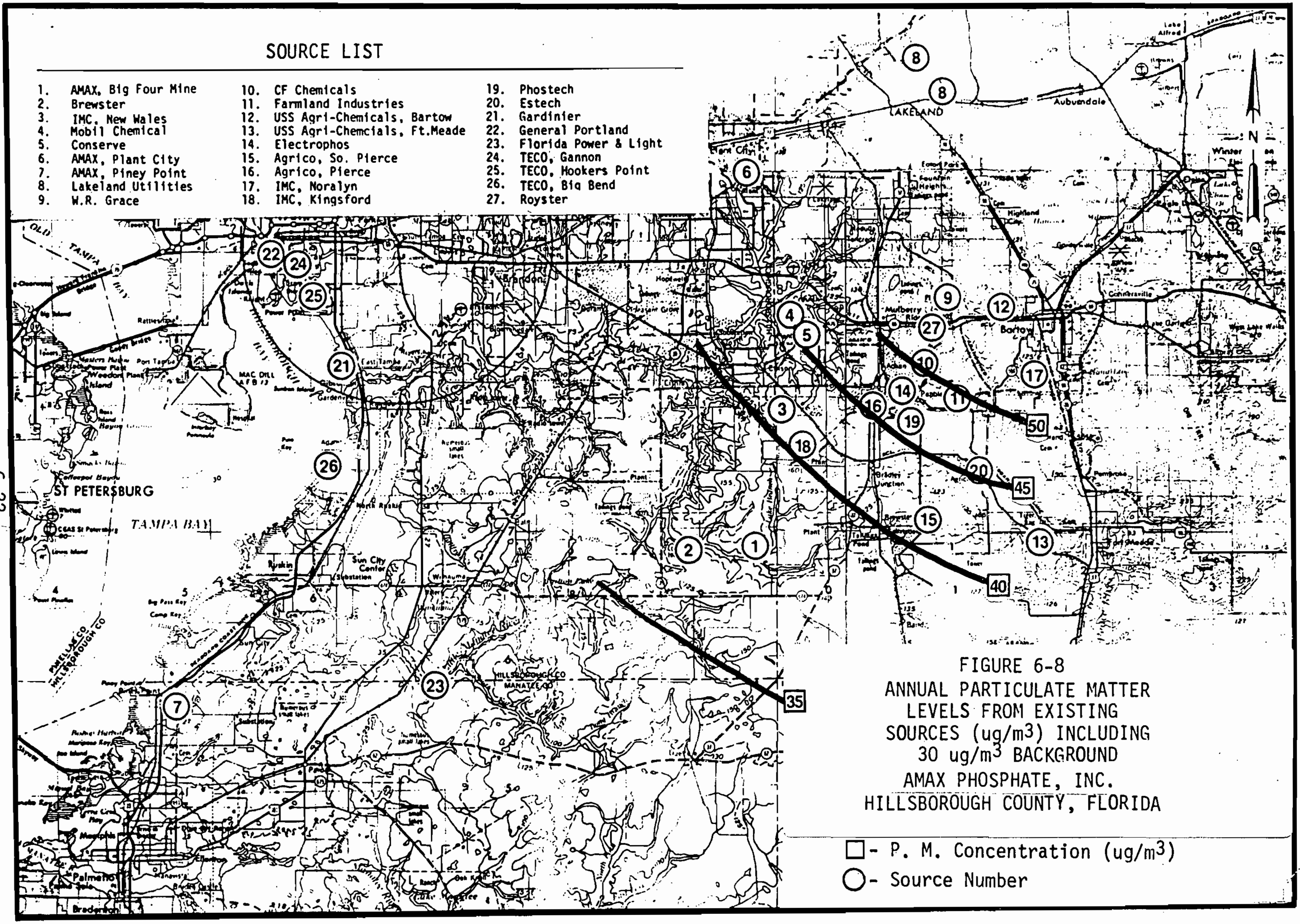
Receptor	24-Hour Particulate Matter Impact (ug/m³) Existing	New	All Sources
1	92	7	99
2	96	6	102
3	96	4	100
4	93	5	98
5	91	6	97
6	89	8	97
7	89	17	106
8	91	8	99
PSD Increment		37	
Air Quality Standard			150

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

FIGURE 6-7

SUMMARY OF 24-HOUR PARTICULATE MATTER IMPACTS

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

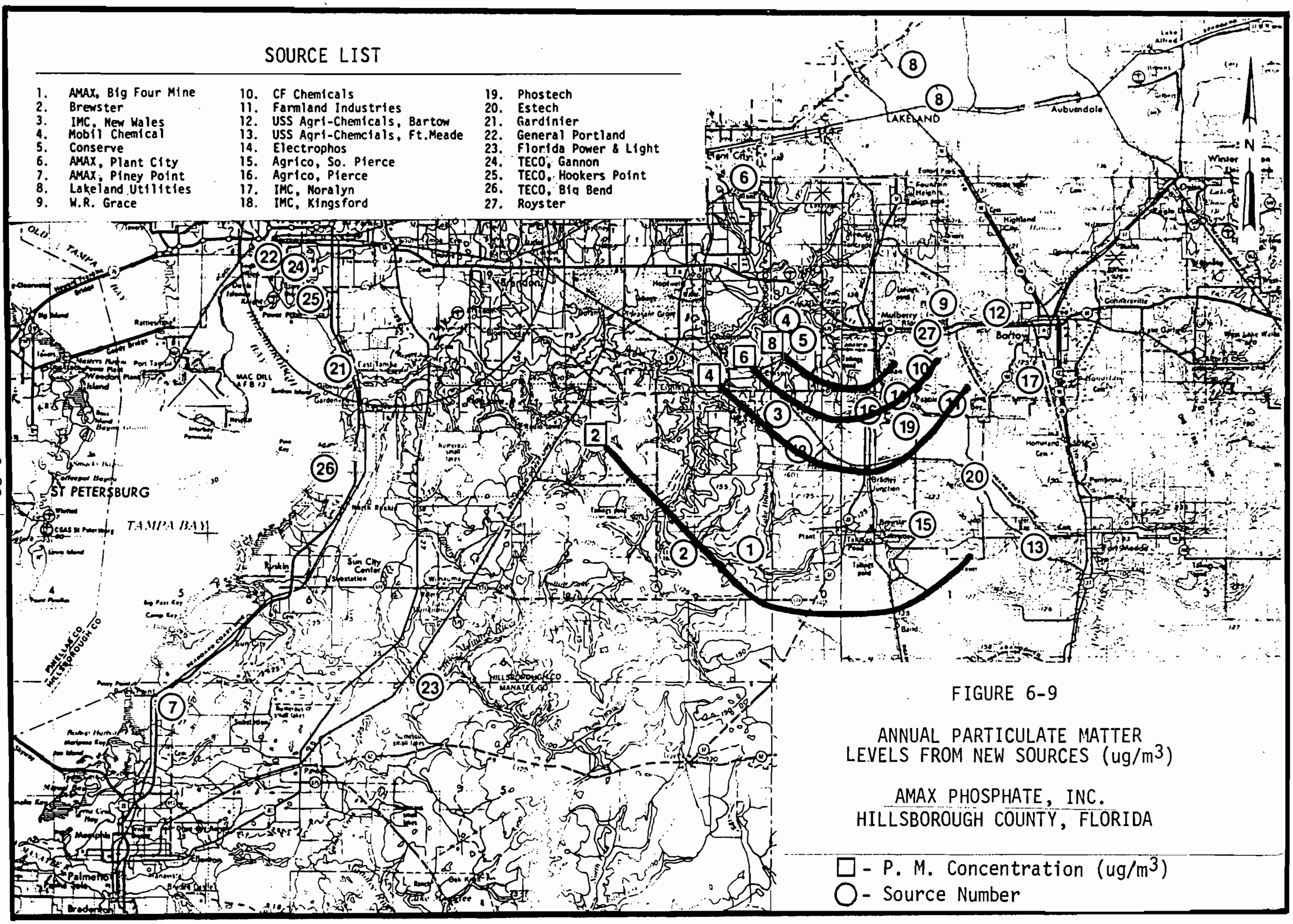


SOURCE LIST

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

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

□ - P. M. Concentration (ug/m^3)
○ - Source Number



SOURCE LIST

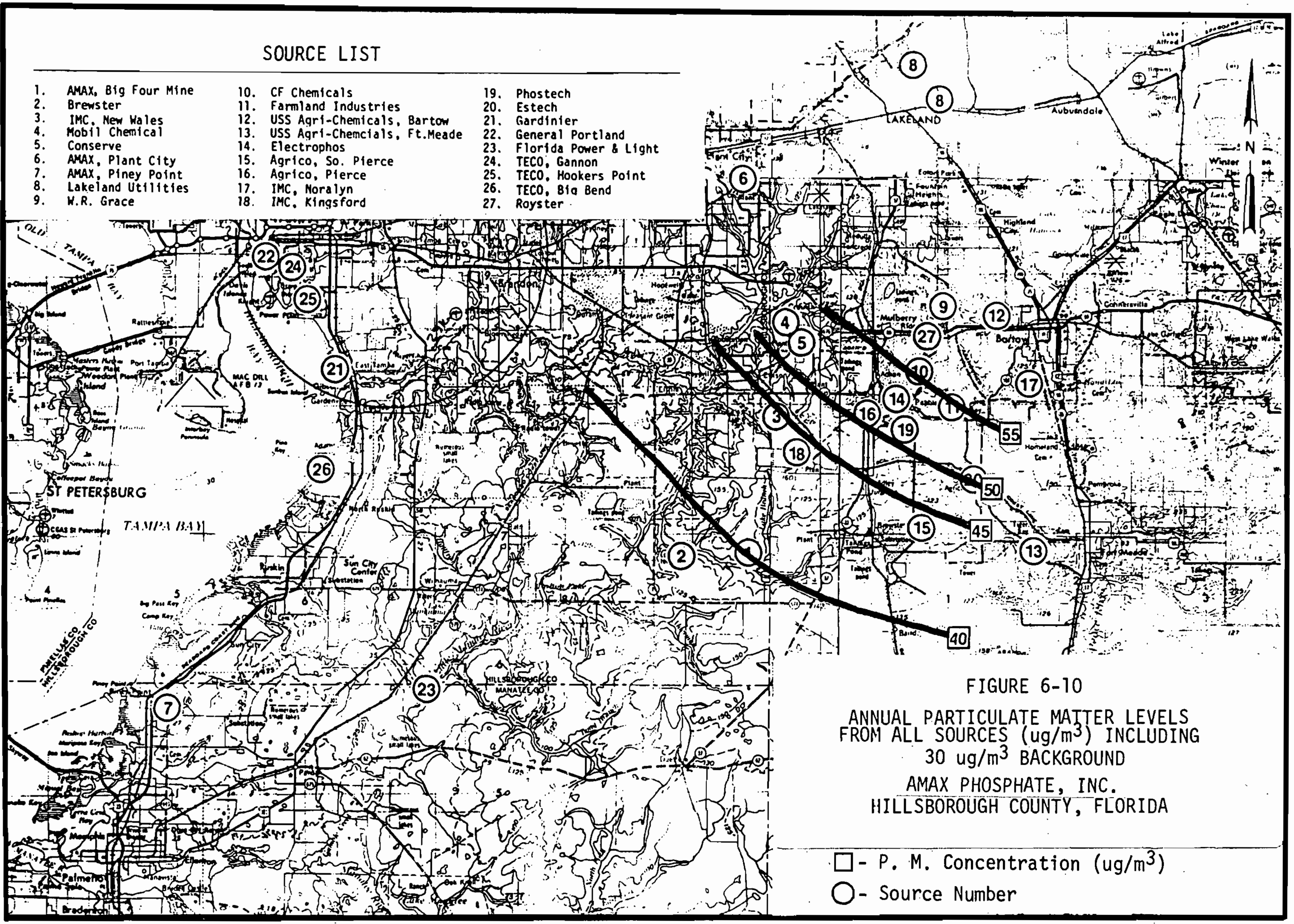
1. AMAX, Big Four Mine
2. Brewster
3. IMC, New Wales
4. Mobil Chemical
5. Conserve
6. AMAX, Plant City
7. AMAX, Piney Point
8. Lakeland Utilities
9. W.R. Grace
10. CF Chemicals
11. Farmland Industries
12. USS Agri-Chemicals, Bartow
13. USS Agri-Chemcials, Ft.Meade
14. Electrophos
15. Agrico, So. Pierce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

FIGURE 6-9

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

□ - P. M. Concentration (ug/m^3)
○ - Source Number



SOURCE LIST

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

FIGURE 6-10

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

AMAX PHOSPHATE, INC.
HILLSBOROUGH COUNTY, FLORIDA

☐ - P. M. Concentration (ug/m^3)

○ - Source Number

APPENDIX 6A-1

SOURCE DATA

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

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

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

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

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

Source	Emission PM (G/Sec)	Rates SO2 (G/Sec)	Stack Height (M)	Stack Diam. (M)	Stack Velocity (MPS)	Gas Temp. (Deg K)	X Coord. (km)	Y Coord. (km)
AMX 7 PP GROUND ROCK UNLOADING	1.85	0.00	22.80	0.30	5.80	315.0	348.500	3057.300
AMX 7 PP QUICK LIME STG	1.42	0.00	23.70	0.10	9.00	315.0	348.500	3057.300
AMX 7 AMAX Piney Point	0.00	37.80	61.00	1.90	13.40	322.0	348.500	3057.300
LKU 8 * Lakeland Utils Composite	6.03	0.00	47.70	2.70	15.10	405.0	409.200	3106.200
LKU 8 * Lakeland Utils Composite	17.45	0.00	60.30	4.00	15.70	371.0	409.200	3106.200
LKU 8 LARSEN 7	0.00	7.52	50.30	3.10	3.40	422.0	409.200	3102.800
LKU 8 MC INTOSH 1	0.00	139.00	47.70	2.70	15.10	405.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES.#1	0.00	393.60	76.20	4.90	19.70	354.0	408.500	3105.800
LKU 8 LAKELAND UTILITIES #2	0.00	21.20	47.70	3.10	11.70	389.0	408.500	3105.800
WRG 9 Dry Mill - Rock Dryers 29004	7.56	0.00	15.20	2.10	8.60	330.0	409.610	3085.860
WRG 9 Dry Mill - Rock Stg 13378	5.80	0.00	16.80	1.10	13.60	315.0	409.600	3085.900
WRG 9 Dry Mill - Rock Convey 14740	2.90	0.00	15.60	0.40	11.40	315.0	409.620	3085.550
WRG 9 Dry Mill - Grind Mill 14739	1.26	0.00	15.00	0.30	18.30	315.0	409.600	3085.900
WRG 9 Dry Mill - Rock Ship 51464	0.91	0.00	15.30	0.90	9.90	315.0	409.800	3086.600
WRG 9 Chem Pl-Rock Grind 25188	4.54	0.00	22.00	0.60	9.60	315.0	409.700	3086.890
WRG 9 Chem Pl-Ball Mill 26977	1.51	0.00	25.30	0.40	10.20	331.0	409.810	3086.890
WRG 9 Chem Pl-300X GTSP DAP 25191	3.48	0.00	32.80	2.20	12.40	320.0	409.980	3086.810
WRG 9 Chem Pl-300Y GTSP&ROP 13210	3.15	0.00	24.40	2.20	12.40	321.0	409.980	3086.830
WRG 9 Chem Pl-GTSP Storage 25192	0.63	0.00	32.80	2.10	11.90	315.0	409.670	3086.900
WRG 9 Chem Pl-GTSP Shipping 27026	1.26	0.00	28.00	0.80	5.30	315.0	409.900	3086.700
WRG 9 Chem Pl-Fert.Plant DAP 06840	3.78	0.00	30.20	2.30	16.00	333.0	409.810	3086.780
WRG 9 Chem Pl-DAP #3 24460	3.77	0.00	40.40	2.10	26.50	322.0	409.290	3086.960
WRG 9 Chem Pl-ROP Belt 14475	0.50	0.00	14.00	0.60	12.90	315.0	409.810	3086.560
WRG 9 Chem Pl-ROP Storage 14674	0.76	0.00	21.30	1.20	12.10	315.0	409.600	3085.900
WRG 9 Chem Pl-ROP Shipping 13449	0.63	0.00	27.00	1.00	6.30	315.0	409.600	3055.900
WRG 9 Chem Pl-DAP Shipping 32628	3.15	0.00	24.40	0.70	9.50	315.0	409.840	3086.630
WRG 9 Chem Pl-NEW DAP Ship 36672	1.95	0.00	30.50	1.50	16.90	315.0	409.410	3086.880
WRG 9 3 46 14 W. R. GRACE	0.00	91.80	61.00	1.50	25.90	346.0	409.700	3086.000
WRG 9 3 46 15 W. R. GRACE	0.00	57.70	45.70	1.50	16.70	322.0	409.700	3086.000
WRG 9 2 46 16 W. R. GRACE	0.00	36.80	61.00	2.80	7.30	346.0	409.700	3086.000
WRG 9 2 46 17 W. R. GRACE	0.00	36.80	61.00	2.80	7.30	346.0	409.700	3086.000
WRG 9 W. R. GRACE	0.00	-216.00	45.70	1.40	16.50	352.0	409.700	3086.000
CF 10 * CF Composite	36.50	0.00	42.20	2.00	12.10	331.0	408.500	3083.000
CF 10 * CF Composite	2.63	0.00	60.00	2.40	10.00	350.0	408.500	3083.000
CF 10 3 52 03 C. F.	0.00	45.40	34.50	1.30	14.20	319.0	408.500	3083.000
CF 10 3 52 04 C. F.	0.00	46.70	34.50	1.30	20.00	319.0	408.500	3083.000
CF 10 3 52 05 C. F.	0.00	56.70	63.40	2.10	6.90	347.0	408.500	3083.000
CF 10 3 52 06 C. F.	0.00	56.70	63.40	2.10	6.90	351.0	408.500	3083.000
CF 10 2 52 14 C. F.	0.00	52.90	67.10	2.40	9.80	351.0	408.500	3083.000
CF 10 2 52 21 C. F.	0.00	4.30	9.10	0.70	22.50	450.0	408.500	3083.000
CF 10 CF	0.00	-110.60	30.50	1.68	4.60	350.0	408.500	3083.000
FAR 11 * Farmland Composite	30.73	0.00	33.80	1.40	17.30	324.0	409.500	3079.500
FAR 11 * Farmland Composite	4.91	0.00	14.00	1.00	2.60	388.0	409.500	3079.500
FAR 11 3 53 01 FARMLAND	0.00	42.00	30.50	1.40	19.80	319.0	409.500	3079.500
FAR 11 3 53 02 FARMLAND	0.00	42.00	30.50	1.40	22.40	319.0	409.500	3079.500
FAR 11 3 53 03 FARMLAND	0.00	57.70	30.50	1.40	24.30	319.0	409.500	3079.500

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

Source	Emission PM (G/Sec)	Rates SO2 (G/Sec)	Stack Height (M)	Stack Diam. (M)	Stack Velocity (MPS)	Gas Temp. (Deg K)	X Coord. (km)	Y Coord. (km)
FAR 11 3 53 03 FARMLAND	0.00	57.70	30.50	1.40	26.50	319.0	409.500	3079.500
FAR 11 2 53 26 FARMLAND	0.00	2.30	14.00	1.20	12.70	444.0	409.500	3079.500
USS 12 Bartow - Rock Dryers (2)	5.04	0.00	17.00	1.80	13.30	342.0	413.300	3086.500
USS 12 Bartow - Rock Silo	5.04	0.00	20.00	1.50	9.40	315.0	413.300	3086.500
USS 12 Bartow - DAP Loading	5.04	0.00	24.00	0.60	48.50	315.0	413.300	3086.500
USS 12 Bartow - DAP Dryer	5.92	0.00	40.00	2.10	15.00	315.0	413.300	3086.500
USS 12 Bartow - Rock Grinding	0.88	0.00	15.00	0.30	27.70	330.0	413.300	3086.500
USS 12 Bartow	0.00	49.20	29.00	2.10	8.00	305.0	413.200	3086.300
USS 13 Ft. Meade - Rock Dryers	5.09	0.00	17.00	1.80	11.30	333.0	416.000	3068.900
USS 13 Ft. Meade - Rock Silo	3.78	0.00	40.00	0.76	21.60	315.0	416.000	3068.900
USS 13 Ft. Meade - GTSP Shipping	5.04	0.00	21.00	0.52	22.20	315.0	416.000	3068.900
USS 13 Ft. Meade - Rock Grinding	0.76	0.00	19.00	0.40	11.30	340.0	416.000	3068.900
USS 13 Ft. Meade	0.00	46.80	28.00	1.50	17.00	330.0	416.000	3069.000
USS 13 Ft. Meade	0.00	-73.50	61.00	3.10	6.50	314.0	416.000	3069.000
USS 13 Ft. Meade	0.00	92.40	53.30	2.60	9.40	355.0	416.000	3069.000
USS 13 Ft. Meade - GTSP 11X,11Y,12	5.42	0.00	28.40	1.50	15.00	325.0	416.000	3068.900
ELE 14 Electro DRYER	4.20	0.00	30.50	1.32	7.40	327.0	405.500	3079.400
ELE 14 Electro CALCINER	3.50	0.00	25.60	2.13	6.90	322.0	405.500	3079.400
ELE 14 Electro DUST COLLECTOR	3.70	0.00	15.20	0.91	24.90	315.0	405.500	3079.400
ELE 14 Electro TAP HOLE SCRUBB	4.10	0.00	29.30	2.13	6.80	338.0	405.500	3079.400
ELE 14 Electro COKE DRYER	1.80	0.00	18.30	0.76	13.80	322.0	405.500	3079.400
ELE 14 Electro BOILER 1	0.20	0.00	6.10	0.91	7.70	464.0	405.500	3079.400
ELE 14 Electro BOILER 2	0.20	0.00	7.30	0.91	5.10	464.0	405.500	3079.400
ELE 14 Electrophos	0.00	6.20	25.60	2.10	8.00	322.0	405.600	3079.400
AGR 15 GTSP Rock Bin Baghouse	3.78	0.00	20.00	0.16	35.21	395.0	407.500	3071.400
AGR 15 #2 Ball Mill Baghouse	4.16	0.00	18.00	0.53	18.58	433.0	407.500	3071.400
AGR 15 Fluoride Production	0.26	0.00	18.00	0.60	2.00	363.0	407.500	3071.400
AGR 15 West Shipping	4.16	0.00	30.00	1.21	7.00	365.0	407.500	3071.400
AGR 15 Ground Rock Unloading	4.31	0.00	10.00	0.50	41.25	360.0	407.500	3071.400
AGR 15 DAP/MAP	3.02	0.00	38.00	3.10	14.60	328.0	407.500	3071.400
AGR 15 DAP Storage & Ship	0.43	0.00	38.00	1.10	15.80	319.0	407.500	3071.400
AGR 15 DAP/MAP #2	0.54	0.00	23.00	1.20	14.20	322.0	407.500	3071.400
AGR 15 AGRICO #12 H2SO4	0.00	42.00	45.70	2.90	9.50	350.0	407.580	3071.340
AGR 15 AGRICO DAP	0.00	7.36	38.10	3.10	14.60	328.0	407.380	3071.700
AGR 15 #10 H2SO4 AGRICO	0.00	37.80	45.70	2.70	9.90	350.0	407.520	3071.240
AGR 15 #11 H2SO4 AGRICO	0.00	37.80	45.70	2.70	9.90	350.0	407.570	3071.240
AGR 15 AUX. BOILER AGRICO	0.00	10.08	10.70	1.50	18.40	491.0	407.520	3071.380
AGR 15 GTSP AGRICO	0.00	23.18	42.70	2.70	12.90	319.0	407.520	3071.520
AGR 16 * Pierce Composite	13.00	0.00	22.50	1.00	22.50	322.0	403.700	3079.000
IMC 17 * IMC Noralyn Composite	22.94	0.00	17.90	0.90	30.50	330.0	415.300	3079.900
IMC 17 IMC Noralyn	0.00	9.00	17.00	1.30	36.70	343.0	414.700	3080.300
IMC 17 IMC Noralyn	0.00	30.64	13.70	1.22	40.40	330.0	414.700	3080.300
IMC 18 * IMC Kingsford Composite	10.43	0.00	24.90	0.90	31.00	324.0	398.000	3075.500
IMC 18 IMC Kingsford 1 34 06	0.30	0.00	10.70	0.80	10.00	319.0	398.000	3075.700
IMC 18 IMC Kingsford	0.00	11.60	21.30	2.10	12.90	344.0	398.200	3075.700
PTI 19 * PhosTech Composite	0.73	0.00	27.40	1.00	27.40	322.0	405.500	3078.500

STACK PARAMETERS AND EMISSION RATES

For All Sources Used in Air Quality Review

	Emission Rates		Stack	Stack	Stack	Gas	X	Y
Source	PM (G/Sec)	SO2 (G/Sec)	Height (M)	Diam. (M)	Velocity (MPS)	Temp. (Deg K)	Coord. (km)	Coord. (km)
PTI 19 Phostech	0.00	2.84	27.40	1.00	29.00	322.0	405.200	3078.500
EST 20 * EsTech Composite	7.31	0.00	17.60	1.80	13.10	332.0	411.500	3074.200
EST 20 Estech SAP	0.00	32.20	30.80	2.10	3.90	358.0	411.500	3074.200
EST 20 Estech Dryer	0.00	51.50	18.50	3.00	7.00	340.0	411.500	3074.200
GAR 21 * Gardinier Composite	66.80	413.60	29.40	2.10	9.10	333.0	363.400	3082.400
GAR 21 * Gardinier Composite	66.80	-210.26	36.50	2.00	11.80	344.0	363.400	3082.400
GPI 22 * Gen'l Portland Composite	59.00	101.00	44.30	4.72	6.60	473.0	358.000	3090.600
FPL 23 * FPL Manatee Composite	133.30	1465.80	152.10	7.90	20.70	425.0	367.100	3053.800
TEC 24 Gannon 1	15.80	174.20	93.30	3.70	22.50	438.0	360.000	3087.500
TEC 24 Gannon 2	15.80	174.20	93.30	3.10	32.40	438.0	360.000	3087.500
TEC 24 Gannon 3	18.00	198.20	93.30	3.20	35.40	427.0	360.000	3087.500
TEC 24 Gannon 4	23.60	260.00	93.30	2.90	24.60	443.0	360.000	3087.500
TEC 24 Gannon 5	28.80	316.60	93.30	4.50	20.70	415.0	360.000	3087.500
TEC 24 Gannon 6	47.80	526.40	93.30	5.40	23.40	415.0	360.000	3087.500
TEC 25 Hookers Pt. 1	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 2	3.80	41.30	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 3	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 4	5.20	57.00	85.40	3.70	11.50	397.0	358.000	3091.000
TEC 25 Hookers Pt. 5	7.70	84.50	85.40	3.40	18.20	402.0	358.000	3091.000
TEC 25 Hookers Pt. 6	9.80	107.80	85.40	2.90	17.90	436.0	358.000	3091.000
TEC 26 Big Bend 1	28.00	2301.50	149.40	7.30	12.90	426.0	361.500	3075.000
TEC 26 Big Bend 2	25.50	1983.60	149.40	7.30	13.60	405.0	361.500	3075.000
TEC 26 Big Bend 3	51.80	3370.20	149.40	7.30	10.80	410.0	361.500	3075.000
TEC 26 Big Bend 4	16.38	654.70	149.40	7.32	20.00	342.0	361.600	3075.000
ROY 27 * Royster Composite	7.60	0.00	30.50	1.40	15.00	340.0	406.700	3085.200
ROY 27 * Royster Composite	0.00	52.50	61.00	2.13	9.90	356.0	406.700	3085.200
ROY 27 * Royster Composite	0.00	-31.50	61.00	2.13	9.90	356.0	406.700	3085.200
ROY 27 ROYSTER #2	0.00	42.00	61.00	2.13	9.93	356.0	406.700	3085.200
ROY 27 ROYSTER #1	0.00	-257.60	51.00	2.13	9.90	356.0	406.700	3085.200

7.0 IMPACT ON SOILS, VEGETATION AND VISIBILITY AND SECONDARY IMPACTS

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

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

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

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

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

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

Best Available Copy

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC
402 SOUTH KENTUCKY AVE., SUITE 600, LAKELAND, FLORIDA 33801

CONTROL NUMBER C 48520

BRANDON STATE BANK
BRANDON, FLORIDA

63-685
631

CHECK DATE	NUMBER
10/28/82	4187

PAY TO THE ORDER OF

CHECK AMOUNT $ *******1,000.00

THE FLORIDA DEPT OF
ENVIRONMENTAL REGULATION

AMAX Phosphate, Inc.

Richard J. Guerreiro

Anthony Gravagna

[redacted]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

№ 33650

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from AMAX Phosphate Inc. Date February 15, 1983

Address 402 S. Kentucky Ave., Suite 600 Lakeland, FL 33801 Dollars $ 1,000.00

Applicant Name & Address Same as above

Source of Revenue

Revenue Code 0101 Application Number AC 29-65834

By Patricia G. Adams

AMAY

29-65834

PSD-FL-094

Received
2-10-83
wml

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

February 2, 1983

D.E.R.
FEB 3 1983
SOUTHWEST DISTRICT
TAMPA

Mr. Dan Williams, P.E.
Air Permitting
Southwest District
Department of Environmental Regulation
7601 Highway 301, North
Tampa, Florida 33610

Dear Mr. Williams:

Please find attached four copies of a PSD (Prevention of Significant Deterioration) review and a check in the amount of $1,000 for the AMAX Phosphate Big Four Mines Dryer. The PSD review was prompted by a change in fuel for the dryer from the present low sulfur number 6 fuel oil to either high sulfur number 6 fuel oil or a high sulfur coal-oil-water mixture.

The fuel conversion will result in emissions in excess of the significance levels for sulfur dioxide, particulate matter and nitrous oxides as defined in Section 17-2 of the Florida Administrative Code.

The attached PSD review includes two volumes and a Construction Modification Permit Application. Volume One of the review includes a description of the conversion and a summary of the results of the review. Volume Two (one copy only) contains all of the supporting technical data and documentation for Volume One.

The application copy required by the Hillsborough County Environmental Protection Commission, along with the required fee, has been transmitted to that agency under a separate letter.

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

Sincerely,

Fred G. Mullins
Compliance Manager

FGM/la

Attachments: As stated above

cc: Mr. R. Sandrik Mr. F. Crabill
Mr. J. Koogler (Sholtes & Koogler Consultants)

AC29-65834

D.E.R.

FEB 3 1983

SOUTHWEST 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[1] ☐ Existing[1] (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 27 ° 44 ' 54 "N Longitude 82 ° 04 ' 04 "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, 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:

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

(Affix Seal) No. 12925

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

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

SECTION II: GENERAL PROJECT INFORMATION

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

SEE ATTACHMENT (Page 2A)

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

Start of Construction Not Applicable Completion of Construction Not Applicable

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

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

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

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

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

8736 hrs/yr

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

if seasonal, describe: 365 d/y x 24 hr/d = 8760 hrs/yr

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

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

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

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

SECTION II: General Project Information (Continued)

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

NO. 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
			(270-255TPH dry rock)	
*Includes 10-15%	moisture			

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

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

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr Pebble	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr 1500#/hr	T/yr 5616TPY	
Particulate	18.0	78.8	0.06 lbs/ton input	18	600* AVG	2626*	D
SO_2	129.8	568.5	1.10 lbs/MM BTU	129.8	373	1634	D
NOx	26.8	117.2	N/A	26.8	27	117	D
CO	4.5	19.5	N/A	4.5	5	20	D
HC	1.1	5.0	N/A	1.1	1	5	D

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

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

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

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[1] See Section V, Item 2.

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

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

2.5 % S, 8.3 #/gal Theor. amount SO_2 per 10^6 BTU from 2.5% S no 6 OIL

$$\frac{2.5\ \cancel{\#S}}{100\ \cancel{\#OIL}} \Big| \frac{2\ \#SO_2}{\cancel{\#S}} \Big| \frac{\cancel{\#OIL} \times 10^6}{17{,}744\ BTU} = 2.82\ \frac{\#SO_2}{10^6\ BTU}$$

Theor. $SO_2/10^6$ BTU from 2.5% S Coal

$$\frac{2.5}{100} \Big| \frac{2 \times 10^6}{14{,}704} = 3.4\ \#SO_2/10^6\ BTU$$

Theo. $SO_2/10^6$ BTU from 0.7% no 5 oil

$$\frac{0.7}{100} \Big| \frac{2 \times 10^6}{18{,}502} = 0.76\ \#SO_2/10^6\ BTU$$

% S fuel oil that equivalent to 1.1 $\#SO_2$/M BTU

$$\%S = \frac{(1.1)(100)(17{,}744)}{(2)(10^6)} = 0.98$$

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 149,500/147,095/135,876* BTU/gal

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

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

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

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

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

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

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

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

Water Vapor Content: 18 % Velocity: 38.79 FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

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

Description of Waste

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

Approximate Number of Hours of Operation per day days/week

Manufacturer

Date Constructed Model No.

	Volume (ft^3)	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

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

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

Type of pollution control device: ☐ Cyclone ☐ Wet Scrubber ☐ Afterburner ☐ Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

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

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

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

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

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

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

Contaminant	Rate or Concentration

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

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

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

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

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

a. Height: ft. b. Diameter: ft.

c. Flow Rate: ACFM d. Temperature: °F

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device: SEE SECTION 3.0 OF PSD APPLICATION.

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space and operate within proposed levels:

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

SEE SECTION 3.0 OF PSD APPLICATION.

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

SECTION VII – PREVENTION OF SIGNIFICANT DETERIORATION

SEE SECTIONS 4.0 AND 5.0 OF PSD APPLICATION.

A. Company Monitored Data

1. ________ no sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

Period of monitoring ___/___/___ to ___/___/___
month day year month day year

Other data recorded ________________________

Attach all data or statistical summaries to this application.

2. Instrumentation, Field and Laboratory

a) Was instrumentation EPA referenced or its equivalent? ____ Yes ____ No

b) Was instrumentation calibrated in accordance with Department procedures? ____ Yes ____ No ____ Unknown

B. Meteorological Data Used for Air Quality Modeling

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

2. Surface data obtained from (location) ________________________

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

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

C. Computer Models Used

1. ________________________ Modified? If yes, attach description.

2. ________________________ Modified? If yes, attach description.

3. ________________________ Modified? If yes, attach description.

4. ________________________ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

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

E. Emission Data Used in Modeling

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

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

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

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

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

ATTACHMENT A

Total Process Input Rate

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

Total Product Weight

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

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

ATTACHMENT B

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

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

prod + % pebble ?
20%
test method? 100%

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

65.06 MMBTU/hr x 1.1 lbs SO_2/MMBTU input

$\frac{71.57}{1.1} = \frac{38.23}{x}$

71.57 lbs SO_2/hour allowable emissions

$x \sim 0.6$ # SO_2/mm BTU input

Actual Emissions = 30.8 lbs/hour SO_2

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

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

Actual Emissions = 17.49 lbs/hr particulate.

LOOKS LIKE DRYER WAS PROCESSING 300 TPH WITH 65,064,318 BTU/hr HEAT INPUT. CO. WANTS MAX. 125,000,000 BTU/hr heat input. THEREFORE, SO_2 STD. NEEDS TO BE IN LBS SO_2 / MBTU - **NOT** **#/hr**

MEMORANDUM

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

TO: Mr. Fred Mullins

DATE: March 12, 1982

FROM: George Townsend

*WHERE IS DATA ON FIRST TEST BURN?

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:

@84% capacity

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

APPLIC, LIST LOWER CFM

0.069 #/T

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 or ash, given similarities of the two tests and if feed quality was relatively similar.

1st TEST

George Townsend
George Townsend

GT/rit

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

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

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 2 6 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
} 1.35% S ~ 1.23% (H_2O)
Water (%): 8.76
BTU/Lb.: 14,704
Sulfur: 1.54
Ash (%): 1.86
Sp. Grav.: 1.13
Lb./Gal.: 9.3
Flash: 257°F
Viscosity (@ 122°F): 16,500 cps
Chlorine 0.11

Percentages are by weight

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000+	140	8,410
60	100,000+	150	6320
70	100,000+	160	3950
80	80,000	170	1440
90	56,000	180	810
100	42,000	190	600
110	33,600	200	475
120	18,800	220	570
130	11,450	240	185

Name William L Brown
Position Quality Control Mgr

4,140 Gallons

ATTACHMENT C

EMISSION RATE CALCULATIONS

PROPOSED ACTUAL

PARTICULATE MATTER

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

SULFUR DIOXIDE

PROPOSED EMISSION LIMIT
= (1.1 lb SO_2/10^6 BTU)(118×10^6 BTU/hr)
= 129.80 lb/hr
x 8760/2000
= 568.5 tpy

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

Uncontrolled with 2.5% Sulfur fuel oil
= (118×10^6 BTU/hr)(1/147095 BTU/gal)(8.29 lb/gal)
x (0.025 × 2 lb SO_2/lb fuel)
= 332.6 lb/hr
Absorption necessary to meet proposed std
= (332.6 − 129.8) × 100/332.6

= 61.0%

Uncontrolled with 2.00% Sulfur COM
= (109×10^6 BTU/hr)(1/135876 BTU/gal)(9.3 lb/gal)
x (0.025 × 2 lb SO_2/lb fuel)
= 373.0 lb/hr
Absorption necessary to meet proposed std
= (373.0 − 129.8) × 100/373.0

= 65.2%

NITROGEN OXIDES

In error?

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

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

NO_x from Coal - AP-42

= 18 lb / ton
x (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)
= 0.67 lb NO_x / 10^6 BTU

NO_x from Oil - AP-42

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

= 0.41 lb NO_x / 10^6 BTU

NO_x emissions from Oil (same as present)

= 19.83 lb/hr

NO_x emissions from Coal (by ratio)

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

NO_x emissions from COM

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

x 8760/2000
= 117.2 tpy

CARBON MONOXIDE

CO from Coal - AP-42
= 1 lb / ton
x(1/2000 lb/ton)(1/13350 BTU/lb)(10^6)
= 0.037 lb CO/10^6 BTU

CO from Oil - AP-42 (Same as present)
= 4.18 lb/hr @ 125 x 10^6 BTU/hr
= 0.033 lb CO / 10^6 BTU

CO emissions from COM
= 4.18(0.45) + 4.18(0.037/0.033)(0.55)
= 4.46 lb/hr
x 8760/2000
= 19.5 tpy

HYDROCARBONS

HC from Coal - AP-42
= 0.3 lb / ton
x (1/2000 lb/ton)(13350 BTU/lb)(10^6)
= 0.011 lb HC / 10^6 BTU

HC from Oil - AP-42 (Same as present)
= 0.84 lb/hr @ 125 x 10^6 BTU / hr
= 0.007 lb HC / 10^6 BTU

HC emissions from COM
= 0.84(0.45) + 0.84(0.011/0.007)(0.55)
= 1.14 lb/hr
x 8760/2000
= 5.0 tpy

PROPOSED Uncontrolled

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

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

= 2626 tpy

SULFUR DIOXIDE

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

= 1634 tpy

NO_x

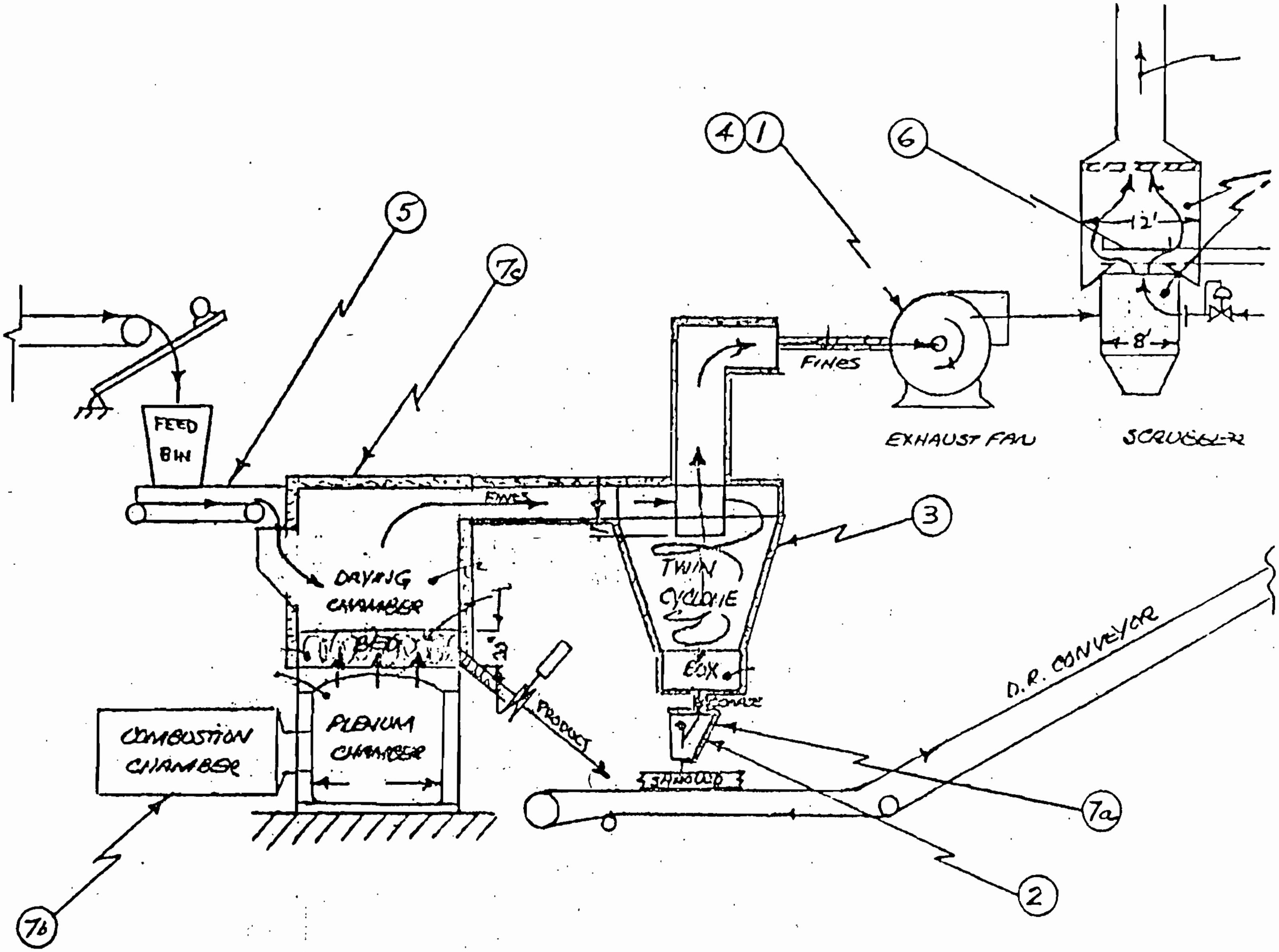
= 26.7 lb/hr and 117.2 tpy
(Same as Actual)

CO

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

HC

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

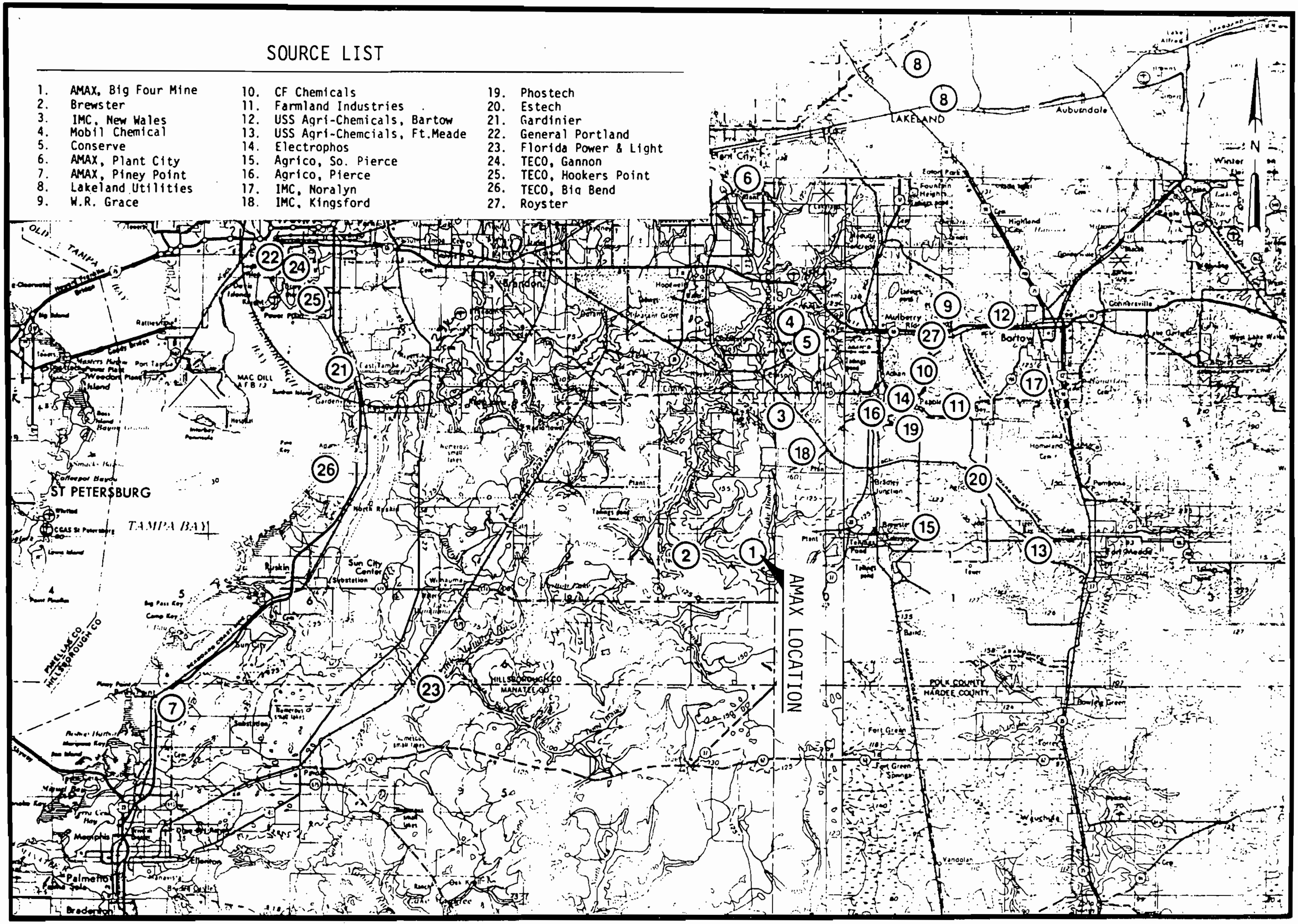


SCHEMATIC DRYER ARRANGEMENT

ATTACHMENT D

⑥

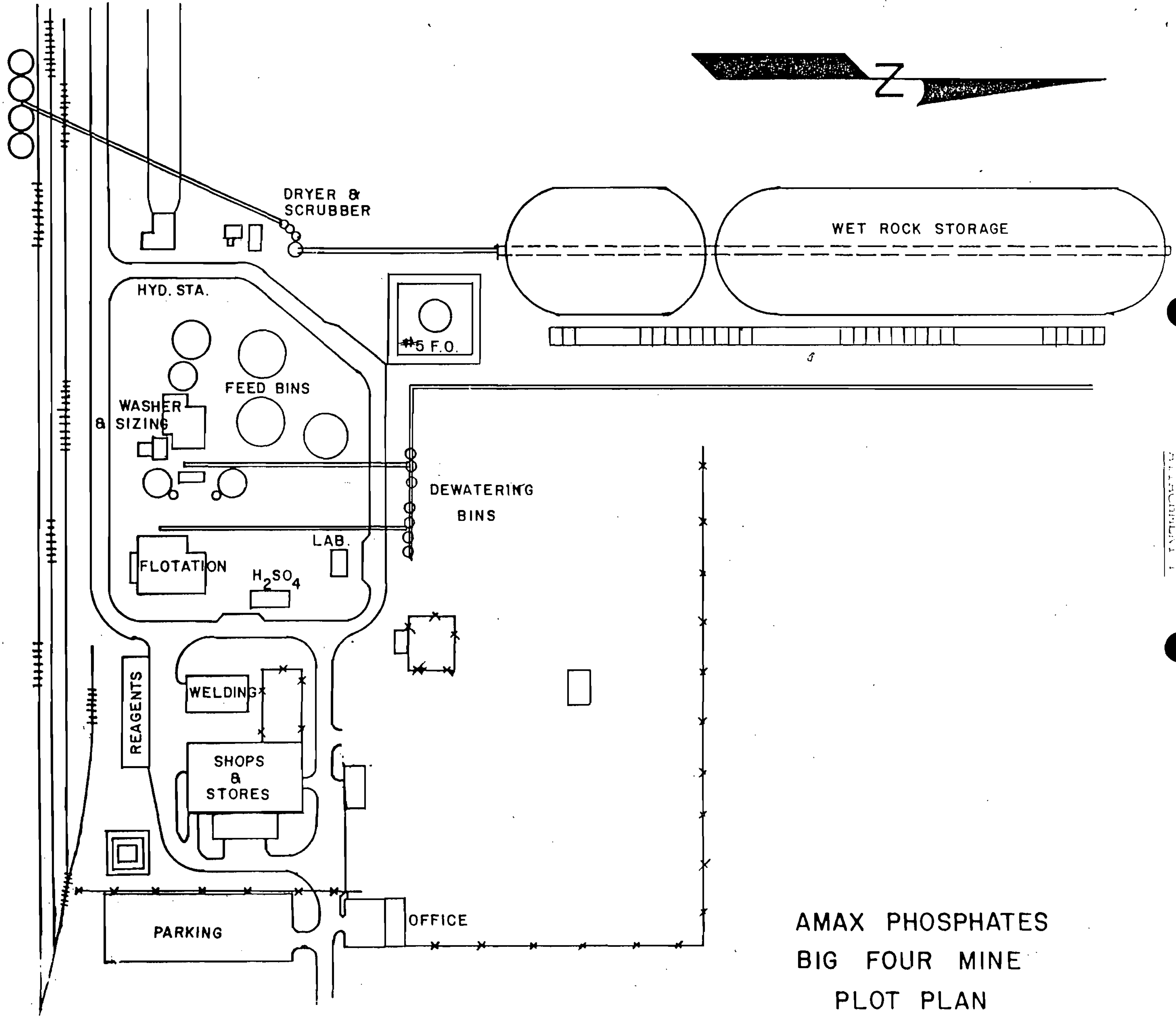
Best Available Copy



SOURCE LIST

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

ATTACHMENT 1



AMAX PHOSPHATES
BIG FOUR MINE
PLOT PLAN

$$\begin{array}{r} 82 \\ 88 \\ \hline 170 \end{array}$$

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
From: ____________ Date: ____________

Reply Optional ☐ Reply Required ☐ Info. Only ☒
Date Due: ________ Date Due: ________

TO: Dan Williams
District Air Engineer, Tampa

THROUGH: Steve Smallwood
Chief, Air Quality Management

FROM: Bill Thomas, Bureau Air Quality Management
Martha Harrell Hall, Assistant General Counsel MHH

DATE: April 21, 1982

SUBJECT: Amax Phosphate, Inc.

In your memorandum of February 19, 1982, you describe various changes underway and planned at the Amax facility in Plant City. The questions you ask will be addressed in the order set out in your memorandum.

1. Amax currently holds an operating permit for two reactors and a kiln with a total allowable emission rate of 20.03 pounds per hour of particulates. This emission rate was calculated by applying the Process Weight Table to the sum of the emissions from the reactors and kiln. DER cannot hold Amax to this emission rate if they request a permit modification since the Process Weight Table is to be applied to each source separately.

2. If Amax does request a modification of its permit and increases production to an emission rate of 41.07 pounds per hour, this could trigger PSD. PSD applicability would depend upon several factors, including: (1) the current <u>actual</u> emissions of the facility; (2) the potential emissions resulting from the increased production; and (3) the availability of any contemporaneous, creditable emissions decreases.

It should be noted that an increase in production is considered a modification only if formally prohibited by a federally enforceable permit condition -- that is, prohibited by a State construction permit.

3. The reduced emissions from other sources might offset the proposed increase in emissions from the reactors. However, reductions in emissions can not be credited unless

they meet the requirements of Florida Administrative Code Rule 17-2.500(2)(e)3 and 4. These provisions require:

(1) that there be decreases in <u>actual</u> emissions;

(2) that the decreases have occurred no earlier than five years before the modification application is filed and no later than the date the modification is to begin operation;

(3) that the decrease hasn't already been relied upon by the Department in issuing a permit;

(4) that the old level of <u>actual</u> emissions exceeds the <u>actual</u> emissions after the modification is completed and operating;

(5) that the decrease is federally enforceable; and

(6) that the emissions which decrease have approximately the same public health and welfare impacts as the emissions proposed to increase.

4. You describe efforts by Amax to control unconfined particulates but relate a fear on their part that such clean-up efforts will make them subject to nonattainment requirements. Chapter 17-2 now differentiates between unconfined emissions and fugitive emissions. Fugitive emissions are defined in Rule 17-2.100(72) to include those emissions which <u>cannot</u> be passed through a stack while unconfined emissions are defined merely as those emissions which escape from unenclosed operations or do not pass through a stack. While some fugitive emissions (those which cannot be quantified) need not be considered when determining the impact of facilities in the area of influence upon the nonattainment area, all unconfined emissions which are not fugitive and all quantifiable fugitive emissions must be considered. Therefore, in adding control devices to reduce unconfined particulate emissions, Amax is not increasing the emissions utilized in calculating its impact upon the nonattainment area. Those particulate emissions should have been considered all along.

5. You state that Amax has verbally agreed to a 0.02 grains per dry standard cubic foot emission limit. If the facility is not subject to PSD, no BACT determination would be made. However, the use of baghouses with the ability to limit emissions to 0.02 gr/dscf could be required of the facility pursuant to Rule 17-2.610(3)(c) which relates to the use of reasonable precautions to control unconfined particulate emissions. If Amax wanted a higher emission rate in the future, it would have to prove that the 0.02 gr/dscf was no longer a reasonable limit.

6. The answer to your final question is discussed above. Basically, emissions which can be controlled but presently are not, are unconfined emissions -- not fugitive emissions. If, through the addition of control devices, Amax decreases its overall particulate emissions, it may be able to escape PSD and NSR permitting.

SS:MHH:jy

cc: Marshall Mott-Smith
Jack Preece
Tom Moody
Johnny Cole
J. Ketteringham
Chuck Collins
Dan Williams
Dave Knowles
Jim Williams

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
From: ____________ Date: ____________
Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: ____________ Date Due: ____________

TO: Martha Hall, Office of General Counsel
Steve Smallwood, Chief, BAQM

FROM: Dan A. Williams DAW

DATE: February 19, 1982

SUBJECT: Hillsborough County AP
AMAX Phosphate, Inc.

Attached are two letters concerning the AMAX Phosphate facility in Plant City. Several legal and/or policy questions have been brought up which need answering.

The first letter is from Ms. Rhea Law, Attorney for AMAX, discussing a request for a revision to an existing operating permit. As detailed in her letter, Operating Permit AO29-6778 is for Fluid Bed Reactors #1 and #2 and Paragon Kiln #2. Each source has its own separate control system with a common stack containing the emissions from all three sources. The allowable emission rate on the operating permit is 20.03 lbs/hr of particulates and was calculated by summing the input weight rates to each process (4 + 4 + 8 = 16 T/Hr.) and then applying the process rate formula $E = 3.59\ (16)^{0.62} = 20.03$ lb/hour.

AMAX is requesting two things. One is that individual permits be issued for each source with the allowable emission rate being calculated by separating the input process rate for each source. Using this method the allowable emission rates would be 8.48 lbs/hour for each reactor and 13.03 lbs/hour for the kiln. The total emission rate from the common stack would be 30 lbs/hour. Second is that AMAX is requesting the input process rates for the two reactors be increased to 9 tons/hour each. The allowable emission rate, using the process rate formula, would then be 14.02 lbs/hour for each reactor or a total of 41.07 lbs/hour from the common stack.

The increase over current allowable emissions with the increased production rates would be 92 tons per year. The increase over allowable emissions using separate input rates and the increased production would be 48 tons/year. AMAX has offered internal offsets from two other → sources resulting in a net overall reduction of emissions.

My question on the above request are several:

NO 1. Can DER hold them to the existing emission rate of 20.03 lbs/hour?

maybe — depending on major/minor & contemporaneous changes

yes

2. If not, would the increase in allowable emissions for the increased production trigger a PSD review and new source permitting since the increased emission rate would be 48 tons/year of particulates? The question of increased fluoride emissions has not been considered.

yes — but allowable/actual must be ~~considered~~ established including sources of quantifiable fug + unconfined part. emissions

3. Can we accept the offer of reduced emissions from other sources as a method to offset increased emissions thereby negating the PSD and NSR requirements?

The second letter is from Fred Mullins of AMAX Phosphates. They have undertaken a major voluntary effort to reduce fugitive particulate emissions at the Plant City facility. The entire program will require an expenditure of several million dollars before completion. Their concern is that each time a new baghouse or other control device is added the facility comes closer to being a significant impactor on the Hillsborough County nonattainment area. The current modelling work doesn't include anything for fugitive emissions. They don't want the facility to come under the RACT rules. — ∴ it is invalid (ss)

My questions on the second letter are:

Yes — act. of conj. fucig will reduce

1. If additional point sources are added at the facility to reduce fugitive dust emissions and through these additions they cause the facility to have a significant impact on a nonattainment area; does the facility then have to comply with RACT?

2. AMAX has verbally agreed to a BACT determination of 0.02 grains/dscf for each new control device installed to reduce fugitive emissions. Under what condition could BACT be applied in this case? If BACT can't be applied but if AMAX agrees to 0.02 grains/dscf as the emission standard for these sources, can it be made legally enforceable by permit proviso? Also, at some future date, if AMAX came back and ask for a higher allowable emission rate, what rule would apply?

no

3. If AMAX can quantify the fugitive emissions and verify a net reduction in emissions after control devices are added would PSD, NSR, BACT, LAER, or RACT be applicable?

AMAX has requested an answer as soon as possible because some of the answers may impact their further actions.

If my questions are unclear or if you need any additional information, please let me know.

DAW/rkt

cc: Hillsborough County EPC
Fred Mullins
Rhea F. Law

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P. A.
ATTORNEYS AT LAW

FREEDOM SAVINGS BUILDING
TAMPA, FLORIDA 33602
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601 FLORIDA NATIONAL BANK BUILDING
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LAKELAND, FLORIDA 33802
(813) 688-8517

CABLE ADDRESS
"FOWHITE"
TELEX 052776

PLEASE REPLY TO:
P. O. BOX 1438
TAMPA, FLORIDA 33601

February 10, 1982

Mr. Dan Williams
Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

D.E.R.
FEB 16 1982
SOUTHWEST DISTRICT
TAMPA

Re: Revision of Permit #AO29-6778
for operation of Defluorinating Units,
Reactors #1 & #2 and Paragon Kiln #2.

Dear Dan:

This letter is being sent as a followup to our meeting of February 4, 1982, wherein we discussed the subject permit. Primarily, this revision is requested as a result of Amax's commitment to critically review and revise all permits previously procured and held by Borden, Inc. The purpose of these revisions is to secure a permit which more accurately reflects the actual operating conditions of the facilities. As I mentioned, this program is ongoing and hopefully will be completed as expeditiously and painlessly as possible to the benefit of both the regulatory agencies and Amax.

As for the subject permit, Amax is requesting a revision which would recognize the independent nature of the equipment. Reactors #1 and #2 and the Kiln are in actuality three separate and distinct facilities. Each has its own scrubber and each is capable of independent operation. The only point of commonality is the single stack. It is on this basis that Amax is requesting that the conglomerate permit for these facilities be broken down to provide a separate permit for each facility.

There are several reasons for this request. The first, the recognition of each facilities' independent character, is fundamental permitting policy. In fact, the original inclusion of these three facilities under a common permit was probably an oversight. Secondly, this revision would serve to resolve collateral difficulties with the current permit.

Originally, the permit was issued for the operation of Reactor #1 at an input rate of four tons/hour, Reactor #2 at an input rate of four tons/hour, and the Kiln at an input rate of 8 tons/hour. These permitted input figures , however, are not reflective of the actual input rates utilized for the facilities. In fact, Reactor #1 is currently operating at an input rate of 8 tons/hour and Reactor #2 is operating at 8 tons/hour. The Paragon Kiln is currently not operating, having been shut down since February, 1981.

This is not to say, however, that these departures from the permitted input rates constitute violation of the permit. This is true because the facilities were grouped together under the terms of the current permit, thereby allowing, under Condition #9, a total input of 16 tons/hour. Therefore, because the Kiln is shut down, the total current input of 16 tons/hour into the reactors is within the permitted allowable.

Needless to say, this temporary condition is totally fortuitous, and therefore requires that steps be taken now to accomodate the future startup of the Kiln. It is on this basis that Amax requests a further revision of the individual permit input rates to maximum operating capacity;i.e.,

Reactor #1 9 tons/hour

Reactor #2 9 tons/hour

and Paragon Kiln 8 tons/hour.

There are other effects resulting from a revision of this nature. The most obvious being the recalculation of emission rates. As we discussed, the input rates are currently summed for all three facilities and then subjected to the Process Weight Table. The result of this method is a lower emission rate than would be possible under separate consideration for each facility. In this particular instance, this method of calculation results in a cummulative emission rate of 20.03 pounds/hour.

If the facilities were permitted separately, the maximum allowable emission rate for the common stack would be the sum of the individual maximum allowable emission rates for each source. In this case, the total allowable rate would be 41.05 pounds/hour.

While this rate is, in fact, higher than that previously permitted, it is comparable with that originally imposed by EPA in the Consent Order of May 9, 1977. That Order fixed an emission rate of no greater than 37 pounds/hour for the joint facilities at a total input rate of 16 tons/hour.

Further, in recognition of the increased emission rate, Amax is prepared to offer internal offsets as follows:

#5 Based on?

Permit No.	Facility	Permitted Emission Rate	Proposed Emission Rate	Total Reduction
A029-6315	Phosphate Feed Preparation Plant	34.57 lbs/hour	20 lbs/hour	14.57
A029-6316	#6 and #7 Defluorinating Kilns	25.00 lbs/hour	15 lbs/hour	10.00
			TOTAL	24.57

These changes would result in a net reduction of 3.55 lbs/hour. (41.05 - 20.03= 21.02 increase for Reactors #1 and #2 and Paragon Kiln; 24.57(offset) - 21.02(increase) = 3.55 net reduction in emissions.)

Thank you for your consideration of these requests. If I can provide any additional information, please let me know.

Sincerely yours,

RHEA F. LAW

RFL/wr

cc: Mr. Fred Mullins

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

February 17, 1982

Mr. Dan Williams
Department of Environmental Regulation
7601 Highway 301 North
Tampa, Florida 33610

Dear Dan:

In response to your question regarding RACT applicability raised at our meeting of February 4, 1982, we are submitting a report by Sholtes and Koogler wherein an air quality model was conducted to determine the impact of our current (including the proposed changes discussed at our meeting) particulate matter emitting sources on the Hillsborough County non-attainment area. Their report, attached as Exhibit A, indicates an insignificant impact of 0.6 ug/cu. m, annual average and 4.2 ug/cu. m, 24-hour average. These figures are well below those specified for a significant impact thereby exempting this facility under Rule 17-2.650(2)(b)2., F.A.C. from the imposition of RACT.

As you are aware, however, Amax is undertaking a massive voluntary "clean-up" program at its Plant City - Coronet Facility. Specifically, the program calls for the installation of baghouses and wet scrubbers to reduce and/or alleviate fugitive dust emissions. Each of these changes are being made solely for the purposes of enhancing air quality and efficiency.

The purpose for this letter, therefore, is to define our position relative to specific emission standards which may be imposed as a result of this "clean-up" effort. Obviously, Amax is not interested in becoming liable for compliance with an economically prohibitive requirement.

According to Rule 17-4.23(1)(c) "New control devices installed on existing process equipment for the purpose of decreasing air pollutant mass emission rates shall comply with the existing source limitations pursuant to Chapter 17-2, F.A.C."

Under 17-2, General and Specific Air Quality Standards are enumerated in Parts II and III. Part IV contains Specific Emission Limiting and Performance Standards. The installation of the new control devices will not negatively impact any of these standards.

Other limitations contained in 17-2 include:

1)	17-2.500	PSD
2)	17-2.510	New Source Review
3)	17.2-630	BACT
4)	17-2.640	LAER
5)	17-2.650	RACT

As mentioned previously, RACT is inapplicable to our facility. Further, because the changes envisioned do not fall within the definition of "modification" in that the net result will be a decrease in emissions for the facility, and the changes do not rise to the level of a "New Source," the New Source Review and LAER criteria appears inapplicable. Similarly, because the facility is not located in an area of attainment or unclassifiable area, PSD criteria should not be applied.

A BACT determination, however, may be required at the time of each application for construction. If the Department determines that there is the necessity for a BACT determination, Amax would request that they be so notified as expeditiously as possible in order to avoid any delay in the "clean-up" effort.

If I can provide any additional information to assist in this determination, please do not hesitate to call.

Sincerely yours,

Fred G. Mullins
Manager
Regulatory Compliance

/kaw

cc: Rhea F. Law
Hillsborough County EPC

TO : William Thomas
FROM : Teresa M. Heron
DATE : March 19, 1982
SUBJECT : AMAX Phosphate, Inc.

In your memorandum of February 19, 1982, yo ask the fallowing questions :

I (Question)

Can DER hold them to the existing emission rate of 20.03 lbs/hour?

-ANSWER

The Department can not deny AMAX's request of recognizing the independent nature of the equipment. Operating permit Nº AO29-6778 shall be broken down to an individual permi for each unit (Reactor #1 & #2 and Paragon Kil #2).

The allowable maximum input rate shall be :

Reactor # 1	9 tons per hour
Reactor # 2	9 tons per hour
Paragon Kiln	8 tons per hour.

The allowable emission rate using the process rate formula, shall not exceed 41.05 lbs per hour from the common stack.

II Question

If not, would the increase in allowable emissions for the increased production trigger a PSD review and new source permitting since the increased emission rate would be 48 tons/year of particulates? The question of increased fluoride emissions has not been considered.

ANSWER

AMAX phosphate rock processing plant shall be considered a major facility (17.2.500(2)(4) Table 500-2), if the sum of the quantifiable fugitive emissions and the potential emissions of all sources at the facility would be equal to or greater than 100 tons per year.
A net significant increase of 25 tons per year of particulate matter would subject this facility to a PSD review for this pollutant.

III Question

Can we accept the offer of reduced emissions from other sources as a method to offset increased emissions thereby negating the PSD and NSR requirements?

ANSWER

In estimating emissions increases - decreases, it is imperative to assess only actual emissions from equipment which are to be credited as contemporaneous emission reductions. This should be done using most recent operational data, including average production capacity within the two years prior to the actual reductions.
The proposed modification to this facility would not be subject to PSD review, only

if the net emission increase is under Th
PSD significance emission level. The Departme
can accept the offer of reduced emissions from othe
sources if these emissions are calculated as abo
mentioned.

IV Question

If additional point sources are added at the facility to reduce fugitive dust emissions and through these additions they cause the facility to have a significant impact on a nonattainment area; does the facility then have to comply with RACT?

ANSWER

This facility would have to comply with Th
RACT rule, unless exempted under
17-2.650(2)(a) and 17-2.650(2)(b).

V Question

AMAX has verbally agreed to a BACT determination of 0.02 grains/dsc for each new control device installed to reduce fugitive emissions. Under what condition could BACT be applied in this case? If BACT can't be applied but if AMAX agrees to 0.02 grains/dscf as the emission standard for these sources, can it be made legally enforceable by permit proviso? Also, at some future date, if AMAX came back and ask for a higher allowable emission rate, what rule would apply?

ANSWER

If this facility is a major facility and a B
is required, BACT would apply under Th
PSD provisions.
If a net significant increase is expected
BACT would also apply.
If there is a reduction, the Department can
give potential emissions based on actual
performance.

VI Question

If AMAX can quantify the fugitive emissions and verify a net reduction in emissions after control devices are added would PSD, NSR, BACT, LAER, or RACT be applicable?

ANSWER

If fugitive emissions can be quantified and a net reduction is verified, the Department can modify the existing operating permits.

PSD, NSR, BACT, LAER or RACT would only be applicable depending of nature of future modifications.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

April 20, 1982

Mr. Fred G. Mullins, III
Regulatory Compliance Manager
Amax Phosphate, Inc.
Suite 600
402 South Kentucky Avenue
Lakeland, Florida 33801

Dear Mr. Mullins:

Thank you for the emission data from the phosphate rock dryer COM fuel conversion test burn and the two stack tests. Willard Hanks, CAPS review engineer, has some questions concerning test procedures which he has discussed with you and Amax environmental personnel. A copy of his memorandum is enclosed for your information.

Enclosed is a copy of the requested BACT determination for Brewster Phosphates. The preliminary determination (PSD) for Brewster Phosphates is presently on public notice at Hillsborough County Environmental Commission and DER Southwest District office in Tampa. The information may be reviewed at either location.

If I can be of further assistance, please call me at (904) 488-1344.

Sincerely,

Edward Palagyi
BACT Coordinator

EP/bjm
Enclosures:

BACT Determination
Memorandum

TO: Ed Palagyi
FROM: Willard Hanks wmh
DATE: April 16, 1982
SUBJECT: Amax Phosphate, Inc.

During the test burn of COM fuel at Amax Phosphate, the emissions of particulate matter and sulfur dioxide were measured. The correspondence that was sent to you stated the two pollutants were measured simultaneously. EPA allows this simultaneous test procedure in Method 6, 40 CFR 60 Appendix A, but it is specifically prohibited by DER regulations (Chapter 17-2.700(6)(a)6.). Thus, the emission data collected during the test burn cannot be used for determination of compliance with Florida regulations.

If Amax wants to test for particulate matter and sulfur dioxide simultaneously for compliance verification with State regulations, they will have to obtain a waiver from DER Method 6 by the procedure described in Chapter 17-2.700(3), Exceptions and Approval of Alternate Procedures and Requirements. To obtain the waiver, Amax Phosphate would have to furnish data showing a correlation between the emission measured by the official and proposed test methods. I understand that the Company has some data that could be used for this study. If Amax makes a comparison of the two test methods, the Department should try to obtain a copy of the calculations and results.

Test data sent to you by Amax listed sulfuric acid mist concentration (including SO_3) as 0. The only reference method that measures SO_3 is the sulfuric acid plant test procedure, Method 8. It uses alcohol to trap SO_3. If the alcohol is contanimated, it can also trap SO_2 and, for that reason, should only be used when SO_3 emissions are required. Environmental personnel at Amax told me alcohol was not used in the test they reported to you.

Amax should also be testing for NO_x during the test burn as COM fuel may cause a significant emission increase (40 TPY) of this pollutant. Any modification that causes a significant emission increase of a criteria pollutant is subject to state and federal PSD regulations.

CC: Fred Mullins

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

April 6, 1982

DER
APR 13 1982
BAQM

Mr. Edward Palagy
BACT Coordinator
The Florida Dept. of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Palagy:

As promised in our telephone conversation of March 26th, I have enclosed the information you requested for the AMAX Big Four Mine coal-oil mixture tests. This material provides a history of the coal-oil test burns for the phosphate rock dryer which services the Big Four Phosphate Mine. Along with the history of the test burns, there are two stack tests which were conducted in February and March of this year.

Also, as we discussed, I would like to have a copy of the Brewster Phosphate's BACT and PSD when it becomes available. AMAX is in the process of exploring alternate fuels for the Big Four rock dryer and would find this BACT/PSD information very useful in our future planning.

If you have any questions about the attached information or the request for information, please let me know.

Sincerely,

Fred G. Mullins
Regulatory Compliance Manager

FGM/rit

Enclosure

cc: Ms. R. Law
Mr. S. R. Sandrik
Mr. R. H. Swanson

FRED G. MULLINS, III
REGULATORY COMPLIANCE MANAGER

AMAX Phosphate, Inc.
SUITE 600
402 SOUTH KENTUCKY AVENUE
LAKELAND, FLORIDA 33801
(813) 687-2561

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

March 16, 1982

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Florida 33605

Dear Ms. Stevenson:

Attached are the results of the stack sampling conducted at the Big Four Mine dryer during the coal-oil-water mix (COM) fuel tests. The COM tests were undertaken on February 22, 1982 and March 2, 1982, with the approval of HCEPC and FDER. The initial test was run using low sulfur content fuel and the latter test was run using a high sulfur content fuel. Fuel analyses for each test, including sulfur content, is included in the attached information.

The five-day test burn of this fuel that was tentatively scheduled for sometime during the last half of March 1982 has now been scheduled to begin on March 30, 1982. Low sulfur content fuel, similar to that used in the March 2 test, will be burned during this test. As stated in my letter of December 14, 1981, AMAX's stack testing team will perform an emissions test during this test burn. They will use the Modified Method #5 sampling procedure for particulate and sulfur emissions and the results of this sampling will be submitted to HCEPC and FDER. In addition to emissions data, this five-day test will also allow AMAX to determine the effect of the fuel on the dryer facility and the product.

At this time, AMAX does not anticipate that additional testing of the COM fuel will be necessary to determine if it is a viable alternative to the fuel (#6 fuel oil) presently being used at the dryer. However, a final decision on this matter cannot be made until the results of the above described test have been analyzed.

If you should have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

R. H. Swanson

R. H. Swanson
Environmental Supervisor
Big Four Mine

RS/rit

cc: (All With Attachments)
Ms. Rhea Law
Mr. Harold Mott
Mr. Fred Mullins
Mr. Randy Sandrik
Mr. George Townsend
Mr. Gary Uebelhoer
Mr. Ken Wagner
Mr. Dan Williams

MEMORANDUM

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

RECEIVED
AMAX Phosphate
MAR 15 1982

TO: Mr. Fred Mullins

DATE: March 12, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

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

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

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

George Townsend
George Townsend

GT/rit

cc: Mr. H. P. Mott
Mr. S. R. Sandrik
Mr. R. S. Swanson
[redacted]

BEST AVAILABLE COPY

Analysis - (ppm)

Date:

	Description	P_2O_5	F	SOLIDS	SO_4	Fe_2O_3	Al_2O_3	CaO	MgO	Na_2O	SiO_2	H_2O		
1	Scrubber H_2O In	7.60	2.70	26	176	0.30	0.4	78	-		5			
2	#6 Fuel Oil 2/18/82													
3														
4	Scrubber H_2O In	11.10	2.40	95	190	.85	4.2	80	33.7		24			
5	COM 2/22/82													
6														
7														
8														
9	Scrubber H_2O Out													
10	#6 Fuel Oil 2/18/82	282.00	31.00	833	265	11.00	19.0	420	-		72			
11														
12	Scrubber H_2O Out													
13	COM 2/22/82	445	53.00	1492	264	16.4	50.0	574	52.8		118			
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
3-2-82 R 1
12:45-1:31


DATA SUMMARY:

BAR. PRESS.?
        30.04
AVG DELTA H?
       3.2125
METERED VOL?
        36.40
METER TEMP?
        66.40
STACK TEMP?
       123.30
SQRT DELTA P?
       0.6558
ML. H2O INC?
        45.00
SIL GEL WT GAIN?
        10.80
STACK AREA?
      27.8831
PROBE AREA?
         5.03 -04
PROBE WASH PART?
        23.80
FILTER WT GAIN?
        54.90
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
    36.96 S.C.F.

VOLUME OF
H2O VAPOR=
     2.63 S.C.F.

MOISTURE
CONTENT=  0.0664
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0328
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
     4.6951 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  38.7537 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
    3.3017  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
        55028.35
S.C.F.M.

VOLUMETRIC FLOW
RATE=
        64834.33
A.C.F.M.

PARTICULATE
OUTPUT=
    15.50 LBS/HR

ISOKINETIC
CONDITION=
         103.63%
```

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
3-2-82 R 2
2:16-2:59


DATA SUMMARY:

BAR. PRESS.?
        30.04
AVG DELTA H?
       3.1083
METERED VOL?
        35.30
METER TEMP?
        74.60
STACK TEMP?
       122.80
SQRT DELTA P?
       0.6566
ML. H2O INC?
        55.00
SIL GEL WT GAIN?
        12.70
STACK AREA?
      27.8831
PROBE AREA?
       5.03 -04
PROBE WASH PART?
        27.30
FILTER WT GAIN?
        42.00
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
    35.28 S.C.F.

VOLUME OF
H2O VAPOR=
     3.19 S.C.F.

MOISTURE
CONTENT=  0.0829
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0302
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
      4.3307 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  38.9091 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
      3.2591  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
        54318.84
S.C.F.M.

VOLUMETRIC FLOW
RATE=
        65094.33
A.C.F.M.

PARTICULATE
OUTPUT=
    14.11 LBS/HR

ISOKINETIC
CONDITION=
         100.22%
```

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
3-2-82 R 3
3:57-4:43


DATA SUMMARY:

BAR. PRESS.?
        30.04
AVG DELTA H?
       3.2958
METERED VOL?
        37.40
METER TEMP?
        77.70
STACK TEMP?
       126.00
SQRT DELTA P?
       0.6630
ML. H2O INC?
        55.00
SIL GEL WT GAIN?
         7.50
STACK AREA?
      27.8831
PROBE AREA?
     5.03 -04
PROBE WASH PART?
        64.30
FILTER WT GAIN?
        52.10
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
   37.19 S.C.F.

VOLUME OF
H2O VAPOR=
    2.95 S.C.F.

MOISTURE
CONTENT=  0.0734
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0482
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
     6.9023 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  39.3230 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
     3.3098  06
S.D.F.H.

VOLUMETRIC FLOW
RATE DRY=
        55164.09
S.D.F.M.

VOLUMETRIC FLOW
RATE=
        65786.83
A.C.F.M.

PARTICULATE
OUTPUT=
    22.85 LBS/HR

ISOKINETIC
CONDITION=
         104.00%
```

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```
TE - 3,2,82                          ********** [redacted] **********                                   PAGE 1 OF 2
                                          [redacted] SULFUR DIOXIDE EMISSIONS
```

Run #1

```
ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  66.4          AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  3.2125

ACK STATIC PRESSURE(IN.HG.)=  .37                               AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  123.3

LC   TY HEAD OF STACK GAS(IN. H2O)=  .4301                      AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .655749

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  36.4    DRY GAS METER CALIBRATION FACTOR=  1.003

AMETER OF SAMPLE NOZZLE(INCHES)=  .3037                         AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

AMETER OF THE STACK(FT)=  5.958                                 AREA OF THE STACK(SQ FT)=  27.8799

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  30.035             TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  55.8

TAL VOLUME OF SAMPLE(ML)=  2000                                 VOLUME OF ALIQUOT(ML)=  25

TOT TUBE COEFFICIENT=  .8336                                    TOTAL SAMPLING TIME(MIN.)=  36

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.8E-03

LU   OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0       VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

LUM OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  5.275    VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


Y GAS VOLUME(DSCF)=  37.0352

TANDARD VOLUME OF H2O VAPOR(CF)=  2.62651

ISTURE CONTENT=  .0912227

LFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

LFUR DIOXIDE CONCENTRATION(LB/DSCF)=  7.73531E-06

RCENT OF ISOKINETIC SAMPLING=  102.349%
```

Run 1

BEST AVAILABLE COPY

```
TE - 3,2,82                     ********** FUEL INFORMATION **********                          PAGE 2 OF 2


GH HEATING VALUE OF FUEL(BTU/GAL)=  14704                 AVERAGE TEMPERATURE OF FUEL(DEG F)=  216

EL FIRING RATE (GPM)=  7.93                               AVERAGE %TOTAL SULFUR AS S IN FUEL=  1.54

NSITY OF OIL(LB/GAL)=  9.3


S. OF SULFUR IN PER MIN.=  1.13573

S. [illegible] SO2 IN PER MIN.=  2.2692

S. OF SO2 OUT PER MIN.=  .418443

MOVAL EFFICIENCY IN PERCENT=  81.5599%

M. BTU'S PER MIN.=  .116603

S. OF SO2 EMITTED/10^6 BTU'S INPUT=  3.58862
```

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```
TE - 3,2,82                                 **********[redacted]**********                                        PAGE 1 OF 2
```

Run #2

```
                                    [redacted] SULFUR DIOXIDE EMISSIONS

ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  74.6         AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  3.1083

ACK STATIC PRESSURE(IN.HG.)=  .37                              AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  122.8

LOCITY HEAD OF STACK GAS(IN. H2O)=  .4311                      AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H2O^.5)= .656576

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  35.3   DRY GAS METER CALIBRATION FACTOR=  1.003

AMETER OF SAMPLE NOZZLE(INCHES)=  .3037                        AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

AMETER OF THE STACK(FT)=  5.958                                AREA OF THE STACK(SQ FT)=  27.8799

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  30.035            TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  67.7

TAL VOLUME OF SAMPLE(ML)=  2000                                VOLUME OF ALIQUOT(ML)=  25

TOT TUBE COEFFICIENT=  .8336                                   TOTAL SAMPLING TIME(MIN.)=  36

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.88E-03

LUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0      VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

LUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  5.775  VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


Y GAS VOLUME(DSCF)=  35.3562

ANDARD VOLUME OF H2O VAPOR(CF)=  3.18664

ISTURE CONTENT=  .107678

LFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

LFUR DIOXIDE CONCENTRATION(LB/DSCF)=  8.95806E-06

RCENT OF ISOKINETIC SAMPLING=  98.9818%
```

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```
TE - 3,2,82                        ********** FUEL INFORMATION **********                                   PAGE 2 OF 2
```

Run #2

```
GH HEATING VALUE OF FUEL(BTU/GAL)=  14704                 AVERAGE TEMPERATURE OF FUEL(DEG F)=  216

EL FIRING RATE (GPM)=  7.93                               AVERAGE %TOTAL SULFUR AS S IN FUEL=  1.54

NSITY OF OIL(LB/GAL)=  9.3

S. OF SULFUR IN PER MIN.=  1.13573

S. [illegible] SO2 IN PER MIN.=  2.2692

S. OF SO2 OUT PER MIN.=  .478165

MOVAL EFFICIENCY IN PERCENT=  78.928%

M. BTU'S PER MIN.=  .116603

S. OF SO2 EMITTED/10^6 BTU'S INPUT=  4.10081
```

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```
TE - 3,2,82                              **********[redacted]**********                                    PAGE 1 OF 2

                                    [redacted] SULFUR DIOXIDE EMISSIONS
```

Run # 3

```
ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  77.7          AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  3.2958

ACK STATIC PRESSURE(IN.HG.)=  .37                               AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  126

LOCITY HEAD OF STACK GAS(IN. H20)=  .4396                       AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .663026

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  37.4    DRY GAS METER CALIBRATION FACTOR=  1.003

AMETER OF SAMPLE NOZZLE(INCHES)=  .3037                         AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

AMETER OF THE STACK(FT)=  5.958                                 AREA OF THE STACK(SQ FT)=  27.8799

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  30.035             TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  62.5

TAL VOLUME OF SAMPLE(ML)=  2000                                 VOLUME OF ALIQUOT(ML)=  25

TOT TUBE COEFFICIENT=  .8336                                    TOTAL SAMPLING TIME(MIN.)=  36

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.8E-03

LUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0       VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

LUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  8.05    VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


Y GAS VOLUME(DSCF)=  37.2605

TANDARD VOLUME OF H20 VAPOR(CF)=  2.94187

ISTURE CONTENT=  .0731766

LFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

LFUR DIOXIDE CONCENTRATION(LB/DSCF)=  1.18114E-05

ERCENT OF ISOKINETIC SAMPLING=  102.707%
```

```
E - 3,2,82                     ********** FUEL INFORMATION **********                          PAGE 2 OF 2
```

Run #3

```
H HEATING VALUE OF FUEL(BTU/GAL)=  14704            AVERAGE TEMPERATURE OF FUEL(DEG F)=  216

L FIRING RATE (GPM)=  7.93                          AVERAGE %TOTAL SULFUR AS S IN FUEL=  1.54

SITY OF OIL(LB/GAL)=  9.3

. OF SULFUR IN PER MIN.=  1.13573

. OF SO2 IN PER MIN.=  2.2692

. OF SO2 OUT PER MIN.=  .640481

IOVAL EFFICIENCY IN PERCENT=  71.775%

I. BTU'S PER MIN.=  .116603

. OF SO2 EMITTED/10^6 BTU'S INPUT=  5.49285
```

Best Available Copy

737 Executive Park, Louisville, Kentucky 40207
(502) 293-0106

COALIQUID, INC

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 2 6 1982

CUSTOMER Amax Phosphate

COAL USED 0.24 Chlorine

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

OIL USED

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

COM

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

Percentages are by weight

4,140 Gallons

BROOKFIELD VISCOSITY (COM)

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

Name William L Brown

Position Quality Control

Best Available Copy

DRYER LOG

OPERATOR: *T. Adams* SHIFT: *Pollution Test* DATE: *3-2-82*

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
1	1000	240	530	530	92	70	230	100	1250	28	185	10	10	4.6	16	55	51	23	220	180	B	A	TEST START 1100
2	1240	240			98	52	200	9	1250	32	190	15	15	4.4	16	54	53	22	220	190	B	A	
3	1480	240	1550		75	100	250	100+	1300	32	170	15	15	4.5	13	52	52	23	215	170	B	A	
4	1650	270	2380 —	830	97	70	200	100+	1200	32	175	15	15	4.8	16	55	52	22	220	170	B	A	
5	1920	270	3400	1020	97	70	200	100+	1200	32	170	15	15	4.6	14	56	55	22	220	170	B	A	
6																							
7	Avg TPH	252																					
8																							
9																							
10																							

Avg. Fuel Firing - 476 GPH → 7.93 GPM

SCALE STOP: ____________________

SCALE START: ____________________

TOTAL: ____________________

OIL STOP: ____________________

OIL START: ____________________

TOTAL: ____________________

water pressure 740 GPM

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

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223040M

DATE FEB. 26 1982

CUSTOMER Amax Phosphate

COAL USED 0.24 Chlorine

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

OIL USED

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

COM

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

Percentages are by weight

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000+	140	8,410
60	100,000+	150	6320
70	100,000+	160	3950
80	80,000	170	1440
90	56,000	180	810
100	42,000	190	600
110	33,600	200	475
120	18,800	220	380
130	11,450	240	185

Name William L Brown
Position Quality Control Mgr.

4,140 Gallons

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

TO: Mr. Fred Mullins

DATE: March 1, 1982

FROM: George Townsend

SUBJECT: Coal-Oil Test Burn

During the first coal-oil mixture test burn at the Big Four Mine dryer on February 22, 1982, we conducted tests to determine particulate and sulfur dioxide emission rates. During the test, pebble was being dried at an average rate of 256 TPH.

Test results were as follows:

	Stack Conditions		Particulate Emissions		Sulfur Dioxide Emissions	
Run	DSCFM	Temp°F	Lbs/Hr	Grains/DSCF	Lbs/Hr	
1	48,781	118	17.06	0.0407	6.05	
2	46,249	120	15.80	0.0398	5.73	
3	44,677	125	19.95	0.0520	6.03	
Avg.	46,569	121	17.60	0.0442	5.94	26 TPY

The average sulfur dioxide removal efficiency during the three tests was 87.54% ash contribution, per calculated basis, to total scrubber loading was 77.33 lbs/hr. Ash removal efficiency could not be calculated; as it's contribution to total particulate emissions could not be determined.

$\frac{5.94}{12.46}$ = 48#/hr SO2

George Townsend

George Townsend

$\frac{7.53 \text{ gal}}{\text{min}} \Big| \frac{60 \text{ min}}{\text{HR}} \; \frac{(157)(.58)}{1000}$ = 41#/HR SO2

GT:kb

cc: Mr. H. P. Mott
Mr. S. R. Sandrik
[redacted]
Mr. G. P. Uebelhoer

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
2-22-82 R 1
10:05-10:50



DATA SUMMARY:

BAR. PRESS.?
        29.92
AVG DELTA H?
       2.3325
METERED VOL?
        31.10
METER TEMP?
        63.20
STACK TEMP?
       118.40
SQRT DELTA P?
       0.5937
ML. H2O INC?
        58.00
SIL GEL WT GAIN?
        10.30
STACK AREA?
      27.8831
PROBE AREA?
        5.03 -04
PROBE WASH PART?
        31.20
FILTER WT GAIN?
        52.30
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
    31.58 S.C.F.

VOLUME OF
H2O VAPOR=
     3.22 S.C.F.

MOISTURE
CONTENT=  0.0925
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0407
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
     5.8305 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  35.1847 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
     2.9268  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
        48780.60
S.C.F.M.

VOLUMETRIC FLOW
RATE=
        58863.48
A.C.F.M.

PARTICULATE
OUTPUT=
    17.06 LBS/HR

ISOKINETIC
CONDITION=
          99.88%
```

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
2-22-82 R 2
11:20-12:03


DATA SUMMARY:

BAR. PRESS.?
        29.92
AVG DELTA H?
       2.1858
METERED VOL?
        30.00
METER TEMP?
        66.00
STACK TEMP?
       119.90
SQRT DELTA P?
       0.5733
ML. H2O INC?
        70.00
SIL GEL WT GAIN?
        10.30
STACK AREA?
      27.8831
PROBE AREA?
        5.03 -04
PROBE WASH PART?
        31.90
FILTER WT GAIN?
        46.30
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
    30.29 S.C.F.

VOLUME OF
H2O VAPOR=
     3.79 S.C.F.

MOISTURE
CONTENT=  0.1111
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0398
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
      5.6929 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  34.1442 FT/SEC

VOLUMETRIC FLOW
RATE DRY=
      2.7750  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
        46249.49
S.C.F.M.

VOLUMETRIC FLOW
RATE=
        57122.83
A.C.F.M.

PARTICULATE
OUTPUT=
    15.80 LBS/HR

ISOKINETIC
CONDITION=
         101.04%
```

```
FLA STATE DER
GENERAL
PARTICULATE
METHOD


TEST?


BIG FOUR DRYER
2-22-82 R 3
12:23-1:32


DATA SUMMARY:

BAR. PRESS.?
        29.92
AVG DELTA H?
       2.0533
METERED VOL?
        29.10
METER TEMP?
        72.70
STACK TEMP?
       124.60
SQRT DELTA P?
       0.5548
ML. H20 INC?
        67.00
SIL GEL WT GAIN?
         8.00
STACK AREA?
      27.8831
PROBE AREA?
         5.03 -04
PROEE WASH PART?
        38.10
FILTER WT GAIN?
        59.80
TIME THETA?
        36.00
PITOT FACTOR?
         0.83
```

```
DRY GAS VOL=
    29.00 S.C.F.

VOLUME OF
H20 VAPOR=
     3.54 S.C.F.

MOISTURE
CONTENT=  0.1087
PROPORTION BY
VOLUME

PARTICULATE
CONCENTRATION=
          0.0520
GRAINS/S.C.F.

PARTICULATE
CONCENTRATION=
      7.4436 -06
LBS/S.C.F.

AVG STACK GAS
VELOCITY=
  33.1602 FT/SEC

VOLUMETRIC_FLOW
RATE DRY=
      2.6806  06
S.C.F.H.

VOLUMETRIC FLOW
RATE DRY=
        44677.06
S.C.F.M.

VOLUMETRIC FLOW
RATE=
        55476.61
A.C.F.M.

PARTICULATE
OUTPUT=
    19.95 LBS/HR

ISOKINETIC
CONDITION=
         100.15%
```

uN #1

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```
TE - 2,22,82                              ********** [redacted] **********                                  PAGE 1 OF 2

                                    [redacted] SULFUR DIOXIDE EMISSIONS


ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  63.2        AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  2.3325

ACK STATIC PRESSURE(IN.HG.)=  0                               AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  118.4

L^^CITY HEAD OF STACK GAS(IN. H20)=  .3525                    AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .593659

LUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  31.1  DRY GAS METER CALIBRATION FACTOR=  1.003

AMETER OF SAMPLE NOZZLE(INCHES)=  .3037                       AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

AMETER OF THE STACK(FT)=  5.958                               AREA OF THE STACK(SQ FT)=  27.8799

ROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.915           TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  68.3

TAL VOLUME OF SAMPLE(ML)=  2000                               VOLUME OF ALIQUOT(ML)=  25

TOT TUBE COEFFICIENT=  .8336                                  TOTAL SAMPLING TIME(MIN.)=  36

RMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.88E-03

L''ME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0   VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

LUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  1.3  VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


Y GAS VOLUME(DSCF)=  31.642

TANDARD VOLUME OF H20 VAPOR(CF)=  3.21488

OISTURE CONTENT=  .117231

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)=  2.11656E-06

ERCENT OF ISOKINETIC SAMPLING=  99.2508%
```

Run #1

BEST AVAILABLE COPY

```
ATE - 2,22,82                         ********** FUEL INFORMATION **********                                PAGE 2 OF 2


IGH HEATING VALUE OF FUEL(BTU/GAL)=  14901                  AVERAGE TEMPERATURE OF FUEL(DEG F)=  233

UEL FIRING RATE (GPM)=  7.53                                AVERAGE %TOTAL SULFUR AS S IN FUEL=  .58

ENSITY OF OIL(LB/GAL)=  9.1


BS. OF SULFUR IN PER MIN.=  .397433

BS. [illegible] SO2 IN PER MIN.=  .794072

BS. OF SO2 OUT PER MIN.=  .100812

EMOVAL EFFICIENCY IN PERCENT=  87.30457%

.M. BTU'S PER MIN.=  .112205

BS. OF SO2 EMITTED/10^6 BTU'S INPUT=  .898465
```

Run #2

BEST AVAILABLE COPY

```
TE - 2,22,82                  ********** [redacted] **********                                   PAGE 1 OF 2

                             [redacted] SULFUR DIOXIDE EMISSIONS


ERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  66        AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  2.1858

ACK STATIC PRESSURE(IN.HG.)=  0                              AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  119.9

ELOCITY HEAD OF STACK GAS(IN. H20)=  .3287                   AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .573334

OLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  30  DRY GAS METER CALIBRATION FACTOR=  1.003

IAMETER OF SAMPLE NOZZLE(INCHES)=  .3037                     AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

IAMETER OF THE STACK(FT)=  5.958                             AREA OF THE STACK(SQ FT)=  27.8799

AROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.915         TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  80.3

OTAL VOLUME OF SAMPLE(ML)=  2000                             VOLUME OF ALIQUOT(ML)=  25

ITOT TUBE COEFFICIENT=  .8336                                TOTAL SAMPLING TIME(MIN.)=  36

ORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.88E-03

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0   VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

OLU[illegible]OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  1.25  VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


RY GAS VOLUME(DSCF)=  30.3495

TANDARD VOLUME OF H20 VAPOR(CF)=  3.77972

OISTURE CONTENT=  .135747

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)=  2.11475E-06

ERCENT OF ISOKINETIC SAMPLING=  100.394%
```

Run #2

BEST AVAILABLE COPY

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DATE - 2,22,82                    ********** FUEL INFORMATION **********                    PAGE 2 OF 2


HIGH HEATING VALUE OF FUEL(BTU/GAL)=  14901           AVERAGE TEMPERATURE OF FUEL(DEG F)=  233

FUEL FIRING RATE (GPM)=  7.53                         AVERAGE %TOTAL SULFUR AS S IN FUEL=  .58

DENSITY OF OIL(LB/GAL)=  9.1


LBS. OF SULFUR IN PER MIN.=  .397433

LBS[illegible]F SO2 IN PER MIN.=  .794072

LBS. OF SO2 OUT PER MIN.=  .0954652

REMOVAL EFFICIENCY IN PERCENT=  87.9778%

M.M. BTU'S PER MIN.=  .112205

LBS. OF SO2 EMITTED/10^6 BTU'S INPUT=  .850814
```

Run #3

BEST AVAILABLE COPY

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ATE - 2,22,82                        ********** [redacted] **********                              PAGE 1 OF 2

                                     [redacted] SULFUR DIOXIDE EMISSIONS


VERAGE ABSOLUTE DRY GAS METER TEMPERATURE(DEG F)=  72.7         AVERAGE PRESSURE DROP ACROSS ORIFICE METER(IN.HG.)=  2.0533

TACK STATIC PRESSURE(IN.HG.)=  0                                AVERAGE ABSOLUTE STACK GAS TEMPERATURE(DEG F)=  124.6

ELOCITY HEAD OF STACK GAS(IN. H20)=  .3078                      AVERAGE SQRT OF STACK GAS VELOCITY HEAD(IN H20^.5)= .554795

OLUME OF GAS SAMPLE MEASURED BY THE DRY GAS METER(DCF)=  29.1   DRY GAS METER CALIBRATION FACTOR=  1.003

IAMETER OF SAMPLE NOZZLE(INCHES)=  .3037                        AREA OF SAMPLE NOZZLE(SQ FT)=  5.03058E-04

IAMETER OF THE STACK(FT)=  5.958                                AREA OF THE STACK(SQ FT)=  27.8799

AROMETRIC PRESSURE AT SAMPLING SITE(IN.HG.)=  29.915            TOTAL LIQUID VOLUME FROM IMPINGERS & SILICA GEL(ML)=  75

OTAL VOLUME OF SAMPLE(ML)=  2000                                VOLUME OF ALIQUOT(ML)=  25

ITOT TUBE COEFFICIENT=  .8336                                   TOTAL SAMPLING TIME(MIN.)=  36

ORMALITY OF BARIUM PERCHLORATE TITRANT(EQ/L)=  9.88E-03

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR H2SO4(ML)=  0      VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  0

OLUME OF BARIUM PERCHLORATE TITRANT USED FOR  SO2 (ML)=  1.3    VOLUME OF BARIUM PERCHLORATE TITRANT USED FOR BLANK(ML)=  .1


RY GAS VOLUME(DSCF)=  29.0593

TANDARD VOLUME OF H20 VAPOR(CF)=  3.53025

OISTURE CONTENT=  .133325

ULFURIC ACID MIST CONCENTRATION (INCLUDING SO3)(LB/DSCF)=  0

ULFUR DIOXIDE CONCENTRATION(LB/DSCF)=  2.30467E-06

ERCENT OF ISOKINETIC SAMPLING=  99.5159%
```

Run #3

```
ATE - 2,22,82                    ********** FUEL INFORMATION **********                    PAGE 2 OF 2


IGH HEATING VALUE OF FUEL(BTU/GAL)=  14901          AVERAGE TEMPERATURE OF FUEL(DEG F)=  233

UEL FIRING RATE (GPM)=  7.53                        AVERAGE %TOTAL SULFUR AS S IN FUEL=  .58

ENSITY OF OIL(LB/GAL)=  9.1


BS. OF SULFUR IN PER MIN.=  .397433

BS. [illegible] SO2 IN PER MIN.=  .794072

BS. OF SO2 OUT PER MIN.=  .100501

EMOVAL EFFICIENCY IN PERCENT=  87.3436%

M.M. BTU'S PER MIN.=  .112205

BS. OF SO2 EMITTED/10^6 BTU'S INPUT=  .895497
```

DRYER LOG

OPERATOR: R. Guion SHIFT: Pollution DATE: 2-22-82

HOUR	SCALE READING	TONS PER HOUR	FUEL OIL READING	GALLONS PER HOUR	OIL PRESSURE-1	OIL PRESSURE-2	OIL TEMPERATURE	STEAM PRESS. BURNER	PLENIM TEMPERATURE	PLENIM PRESSURE	BED TEMPERATURE	BED PRESSURE	BED LEVEL	EXHAUST FAN INLET PRESS.	SCRUBBER INLET PRESS.	EXHAUST FAN AMPS	PRIMARY FAN AMPS	COMBUSTION FAN AMPS	PRODUCT TEMPERATURE	EXHAUST TEMPERATURE	TYPE ROCK	SILO	REMARKS
10	720	280				49	230	95	1150	30	175	15	15	4	13	51	49	22	200	160	B	B	[illegible] 55 lb
11	990	270				49	235	95	1175	30	175	15	15	4	13	51	49	22	200	165	B	B	water [illegible]
12	1260	270				49	235	93	1250	30	175	15	15	4	13	51	49	22	205	165	F	B	[illegible] 780
1	1470	210	approx.								KNIFE		GATE		CHOKE	UP		DOWN	15	MIN			Water discharge
2	1720	250	4294 usg	452		50	240	93	1250	30	185	15	15	4.6	15	56	51	22	220	175	B	B	[illegible]
			Test Burn	Avg																			
		Total	Test Burn	Time		9.5 Hr.																	

Fuel Firing rate 7.53 gal/min

SCALE STOP:

SCALE START:

TOTAL:

OIL STOP:

OIL START:

TOTAL:

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

COALIQUID, INC.

FUEL ANALYSIS SHEET

SAMPLE # 8223010 4

DATE 1/13/82

CUSTOMER AMAX PHOSPHATE

COAL USED [redacted]

Seam: Blue Gem, Jackson Co, Ky
Source: G & G Coal & Energy Co
BTU/Lb.: 14,757
Ash (%): 2.41
Sulfur (%): 0.69
Moisture (%): 5.79
Hardness: 46
Fusion(Ash): 2500°F +
Volatiles (%): 39.69
Fixed Carbon (%): 57.90
Percent Passing 200 Mesh: 83.1

OIL USED

Type: Fuel Oil 6
Source: Allied Oil Co
BTU/Lb.: 18,790
Ash (%): 0.36
Sulfur (%): 0.68
B. S. & W: < 0.1
Sp. Grav.: 0.9779
API: 13.2
Lb./Gal.: 8.144
Viscosity (@ 122°F): 1380 SUS
Flash: 316 F

COM

Coal (%): 50.06
Oil (%): 42.85
Water (%): 7.09
BTU/Lb.: 14,901
Sulfur: 0.58
Ash (%): 1.88
Sp. Grav.: 1.12
Lb./Gal.: 9.1
Flash: 318°F
Viscosity (@ 122°F): 11,950

BROOKFIELD VISCOSITY (COM)

Temp. (f)	Centipoise	Temp. (F)	Centipoise
50	100,000	140	6,870
60	"	150	4,000
70	86,610	160	2,910
80	53,820	170	2,380
90	42,100	180	1,550
100	29,990	190	1,100
110	18,480	200	980
120	12,200	220	840
130	9,800	240	760

Percentages are by weight

1,000 Gallons

Temp: (com) 102°F

Name William L Brown
Position Quality Control Mgr.

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

February 17, 1982

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Florida 33605

Dear Ms. Stevenson:

As we discussed on the telephone yesterday, AMAX would like to perform an additional eight hour test burn of the coal-oil-mixture (COM) fuel on February 22, 1982. The original testing program and fuel description were transmitted to you in my letter of December 14, 1982 which is attached for your reference. The January 18 and January 25 tests detailed in the December letter failed due to ignition problems. No stack sampling was achieved as the dryer did not reach normal operating temperature and phosphate rock throughput was held at less than 20 percent of design.

The additional test would be run using low sulfur, approximately 0.8 percent, COM fuel. This fuel was scheduled to be burned during the unsuccessful January 18 test and has been onsite in a Coaliquid, Inc. truck tanker, since that time. Also, the existing Eclipse burner assembly would be replaced, for testing purposes only, with a Forney oil gun design. Coaliquid, Inc. believes the Forney gun will alleviate the ignition problems that plagued the first two tests. If this test is successful, AMAX's stack testing team will perform emissions tests using the modified Method #5 sampling procedure for particulate and sulfur emissions. The results of the stack tests will be submitted to your office and the Florida Department of Environmental Regulation.

An analysis of the first two unsuccessful tests and details of the proposed additional test are presented in Coaliquid, Inc.'s correspondence to AMAX dated February 4, 1982 and February 5, 1982, respectively. This correspondence is attached for your review.

During our telephone conversation you stated that HCEPC has no objection to AMAX proceding with the additional test of COM fuel as described above. Further, it was my understanding that you would notify FDER as to this test. I am also sending Mr. Dan Williams of FDER a copy of this letter for his perusal.

I thank you for your attention to this matter.

Sincerely,

R. H. Swanson

R. H. Swanson
Environmental Supervisor
Big Four Mine

RHS/rit

cc: (all with attachments)
Ms. Rhea Law
Mr. Harold Mott
Mr. Fred Mullins
Mr. Randy Sandrik
Mr. George Townsend
Mr. Gary Uebelhoer
Mr. Dan Williams

AMAX Phosphate, Inc.
A SUBSIDIARY OF AMAX INC.
402 SOUTH KENTUCKY AVENUE · SUITE 600 · LAKELAND, FLORIDA 33801 · (813) 687-2561

December 14, 1981

Ms. Lynne Stevenson
Air Engineering Department
Hillsborough County
Environmental Protection Commission
1900 9th Avenue
Tampa, Fl. 33605

Dear Ms. Stevenson:

The purpose of this letter is to inform you of AMAX's intent to expand the alternate fuel testing program at the Big Four Mine dryer facility to include a coal-oil-mixture (COM) fuel. By weight, this fuel is made up of 50 percent coal, 40 percent fuel oil and 10 percent water. If the use of COM is found to be a viable alternative the fuel oil consumption rate at the dryer would be reduced by about 55 percent. In turn, this would result in a cost savings of approximately $400,000.00 per year. The attached CoaLiquid, Inc. brochure further describes this fuel.

AMAX plans to test burn this fuel for approximately 8 hours on January 18, 1982, for 8 hours on January 25, 1982 and for 5 days during the last half of March, 1982. The first 2 tests will allow AMAX to determine emission rates from low and high sulfur content fuel. Low sulfur (0.8 percent) fuel will be utilized during the January 18, 1982 test and high sulfur (1.5 percent) fuel will be burned during the January 25, 1982 test. The 5 day test burn will allow AMAX to determine the effect of the fuel on the dryer facility and the product.

AMAX's stack testing team will perform emissions tests during the use of this fuel. They will use the modified Method #5 sampling procedure for particulate and sulfur emissions. The results of these tests will be submitted to the Hillsborough County Environmental Protection Commission and the Florida Department of Environmental Regulation.

I have discussed this matter with the FDER and they have no objection to the plans presented herein for the testing of COM. If HCEPC is also agreeable to these plans, please notify me as soon as possible so I can confirm the test dates with CoaLiquid, Inc.

I appreciate your attention to this matter and if you should have any questions regarding the same, please do not hesitate to contact me.

Sincerely,

R.H. Swanson

R. H. Swanson
Environmental Supervisor
Big Four Mine

RHS:st
Attachment

cc: Ms. Rhea Law/with attachment
Mr. Fred Mullins/without attachment
Mr. Randy Sandrik/without attachment
Mr. George Townsend/without attachment
Mr. Gary Uebelhoer/without attachment
Mr. Dan Williams/with attachment

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

COALIQUID, INC.

February 4, 1982

Mr. Randy Sandrik
Mine Manager
Big Four Mine
AMAX Phosphate, Inc.
P.O. Box 508
Bradley, Florida 33835

Subject: COM Test Burn In Phosphate Rock Dryer
CLI Project 8120

Dear Mr. Sandrik:

This letter will summarize the results to date of our attempts to burn CoaLiquid COM in your phosphate rock dryer and convey our commitment to conduct additional testing as considered necessary to demonstrate the practical feasibility of burning COM in this process application.

On January 17, CLI attempted to burn the COM fuel using the existing Eclipse oil gun assembly, modified to include a replacement "crud" nozzle tip with wide open bore which was specifically designed for burning waste liquid fuels and heavy oils. The test was curtailed after burning approximately 300 gallons of COM due to failure to achieve acceptable atomization at low fire conditions.

On January 24, after consultation with the burner manufacturer, CLI returned with a modified version of the existing Eclipse Mark IV oil nozzle tip. Based on results of the initial test firing from the preceeding week, both Eclipse and CLI felt that the poor atomization characteristics could best be resolved by using a conventional oil tip with size and number of orifices changed to accommodate the more viscous COM fuel. The subsequent attempts at burning COM were successful in that good fuel atomization and flame pattern were obtained; however, the nozzle consistently plugged at low fire conditions. After 4 hours of attempting to burn the COM, AMAX requested that the test effort be called off pending further improvement in burner design. Subsequent analysis of this test burn indicates that fuel stoppage probably was due to an

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overheated nozzle tip and the inability to control temperature at this critical section of the burner assembly during initial light off conditions.

In reviewing the results of the two test burns, we believe the following observations are appropriate:

1. The attempts to burn COM in this application were confined to an existing burner system with minimum equipment modifications and disruption of process operation (reference CLI letter of November 9, 1981 and attached test burn program). CLI acknowledged at the outset that COM had not been previously fired in this burner system and the burner selection might not be the most efficient design for optimum combustion. The test was to be conducted on the basis of determining if COM could be fired using this burner design and what initial observations could be identified in terms of impact of COM combustion on phosphate rock product and dryer facilities and resultant emission characteristics.

2. The results of COM test firing to date are indicative only of improper burner design/calibration to accept the COM fuel. Insufficient data has been generated to verify impact of COM on product material or dryer facilities, or to identify emission characteristics.

3. To date there is no indication of unacceptable COM fuel characteristics. Test observations to date indicate ability to burn the fuel if properly atomized and without fuel stoppages in the nozzle tip.

4. CLI does not believe that sufficient time has been allocated for proving or disproving the merits of the Eclipse burner system to burn COM fuel in this dryer application. However, we recognize the practical need to honor production requirements which limit the available down time to experiment with different burner tip selections and adjustments which are obviously needed to adapt this burner to burn COM. Based on the significance of minimizing dryer down time and limiting burner development work, CLI acknowledges that additional attempts to use the Eclipse burner system must be curtailed.

We appreciate the cooperation and interest extended to date by AMAX Phosphate, and understand that CLI will be afforded an additional opportunity to utilize a different burner assembly having demonstrated capacity for burning COM. Based on this arrangement, CLI proposes an additional test burn in the same dryer facility using a different oil gun design in an effort to burn the same CoaLiquid COM fuel to satisfy the same test objectives as originally established for the initial 5,000 gallon test burn demonstration. The details as to new burner selection and necessary arrangements for installation will be addressed in a separate forthcoming letter. We wish to emphasize, however, our commitment to AMAX Phosphate to provide the necessary resources to effectively burn the CoaLiquid COM fuel in your phosphate dryer installation as required for a fair analysis of the practical utilization of CoaLiquid COM fuel as an acceptable atlernate fuel in this energy intensive process application.

Very truly yours,

Charles J Lauer

Charles J. Lauer
Senior Project Engineer

CJL/ce

cc: Mr. Harold Mott - AMAX Phosphate ✓

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

COALIQUID, INC.

February 5, 1982

Mr. Randy Sandrik
Mine Manager
Big Four Mine
AMAX Phosphate, Inc.
P.O. Box 508
Bradley, Florida 33835

Subject: COM Test Burn in Phosphate Rock Dryer
CLI Project 8120

This letter will outline the requirements associated with a proposed forthcoming test burn of COM using a different oil gun assembly from the existing Eclipse burner which failed to produce acceptable results in previous attempts of January 17, and 24 (reference separate CLI letter of February 5, 1982).

The major requirements and/or commitments for completing a test burn using a new oil gun design are as follows:

1. As a replacement for the existing Eclipse oil burner assembly, which utilizes an outside or external mix type atomizer, CLI proposes to install an oil gun designed by Forney Engineering which employs a Y-jet internal mix type atomizer which uses a smaller quantity of saturated steam for atomization plus high pressure air to cool the nozzle assembly. The Forney oil gun design has been successfully used on other applications to burn the CoaLiquid COM fuel. The proposed oil gun assembly is compatible with the existing fuel train, using the same ignitor and flame scan sensor. The only significant change from the existing burner requirements involves the need for high pressure cooling air which for purposes of the test burn would be satisfied by a portable air compressor.

2. To mount the Forney oil gun into the existing Eclipse burner throat, CLI proposes to utilize a separate front mounting plate (approximately 48" diameter) as shown by attached Figure 1. The

plate and all accessories for mounting the oil gun, ignitor, flame scan sensor and peep sight will be fabricated in advance for installation as soon as the existing oil gun can be removed from the dryer. Once the new burner plate is bolted to the front of the burner housing, it will not be necessary to remove the plate to clean or inspect the oil gun or reposition the gun assembly (as is currently required with the Eclipse gun) since the Forney gun can be completely removed through a sleeve in the mounting plate.

3. It is our understanding that the support assembly for the existing Eclipse burner will allow the burner to be swung to one side to allow access to the open front of the burner housing (reference attached Figure 2). This open access to the front of the burner housing probably will be adequate for installation of the new Forney gun assembly; however, the Eclipse burner in its recessed position would block access to the burner control panel and restrict available working space on the burner platform. Due to the limited space, CLI acknowledges that the Eclipse burner may have to be disconnected from the support frame and set to one side while the Forney burner is in place.

   Note: To satisfy AMAX concern about possible need to revert to oil firing and reinstallation of the original Eclipse gun, CLI will agree to install the new Forney gun and immediately light off with fuel oil prior to dismounting the Eclipse gun assembly and any attempt to burn COM. Once it has been demonstrated to AMAX satisfaction that the new oil gun assembly will operate satisfactorily on fuel oil, we believe AMAX will be more confident in allowing CLI to proceed with the COM test burn program. If the new Forney gun does not perform satisfactorily on fuel oil, CLI will agree to remove the Forney installation and immediately reinstall the original Eclipse burner assembly.

4. CLI will provide the complete Forney oil gun assembly to include replaceable nozzle tips and mounting hardware for connecting to existing steam and oil supply lines. CLI will also arrange for rental of a portable air compressor and the necessary hose for

connecting to the oil burner assembly. The Forney oil gun can be used for burning the existing residual fuel oil as well as the COM fuel supplied by CLI.

5. Based on verbal conversations with your Mr. Harold Mott on Feb. 4, it is our understanding that the following materials/services can be provided by AMAX Phosphate for the execution of this test burn:

   a. AMAX to provide a 4' x 4' (or 48" dia.) flat sheet of 5/16" carbon steel plate for use as the rear mounting plate. CLI responsible for trimming the plate, mounting the oil gun assembly, and cutting all openings as required for burner accessories and to bolt the mounting plate to the burner housing.

   b. AMAX to provide the use of a welding machine, welding rods and cutting torch for use by qualified CLI personnel to mount the Forney burner unit.

   c. AMAX to provide use of small crane and operator as might be necessary to dismount and reinstall the Eclipse oil gun assembly.

   d. AMAX to arrange for the necessary environmental permitting requirements and stack sampling teams which will be utilized during the burning of apprixmately 5000 gallons of COM.

6. CLI proposes to provide CLI personnel to remove the existing Eclipse oil gun, install the Forney gun for the test burn, and remove the Forney gun and reinstall the Eclipse burner at the conclusion of the test burn. It is our understanding that this labor arrangement will not interfere with the local operating and maintenance program.

7. For the execution of this test burn, CLI requests adequate time for installation of the burner and test firing to calibrate and adjust the burner prior to the formal test burn program. We propose a 3 day test period, with the first two days (typically Saturday and Sunday) used to remove the Eclipse oil gun, install

the Forney gun, and conduct necessary burner adjustments, and the third and final day (Monday) devoted to continuous burning of the main fuel supply at typical dryer operating conditions.

In proposing this additional test burn, we wish to convey our sincere commitment to provide the necessary resources to adequately demonstrate that CoaLiquid COM can be burned in your dryer operation. We will complete all necessary arrangements to assure that the new burner assembly is ready to be installed as soon as the facility is made available. We anticipate that the complete burner transition can be completed within a 4 to 8 hour span which should allow adequate time over a weekend shutdown schedule to demonstrate the operation of the burner on fuel oil as well as COM. Based on an acceptable burner operation, we would propose to complete the balance of the test program in accordance with basic provisions as outlined in our previous letter of January 7.

We would like to complete the forthcoming test program as soon as possible to free our equipment presently committed to this project and to establish the basis for future application of COM as a viable alternate fuel for your phosphate dryer operation. To expedite this program we have already made arrangements for use of a Forney oil gun assembly which will be delivered to the Big Four Mine during the week of February 8.

We acknowledge your support and cooperation in this endeavor and look forward with confidence to the successful burning of COM using this new burner assembly. Please advise as to the earliest realistic date for rescheduling this test program.

Very truly yours,

Charles J Lauer

Charles J. Lauer
Senior Project Engineer

CJL/ce

cc: Mr. Harold Mott - AMAX Phosphate

Enclosure

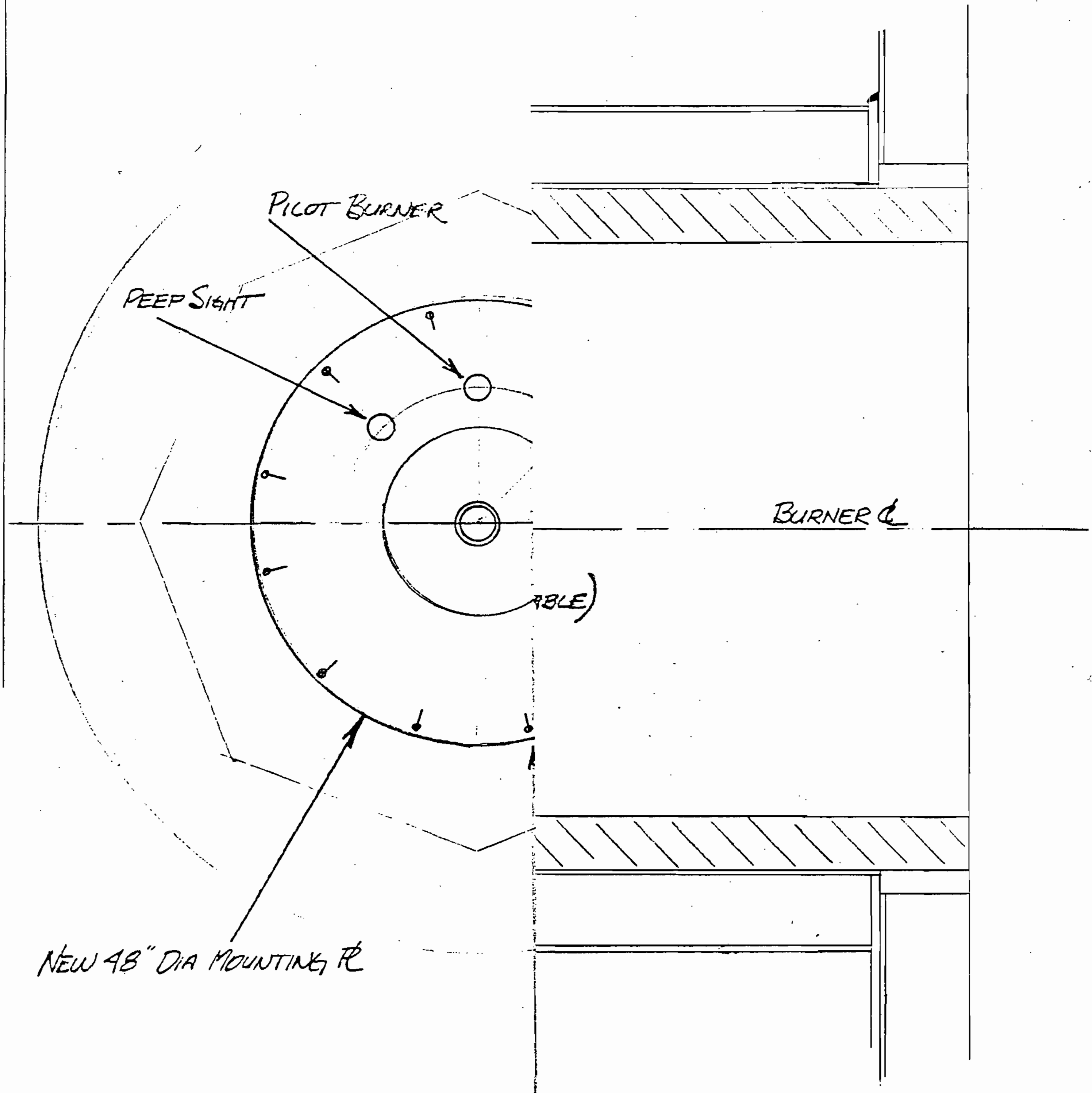
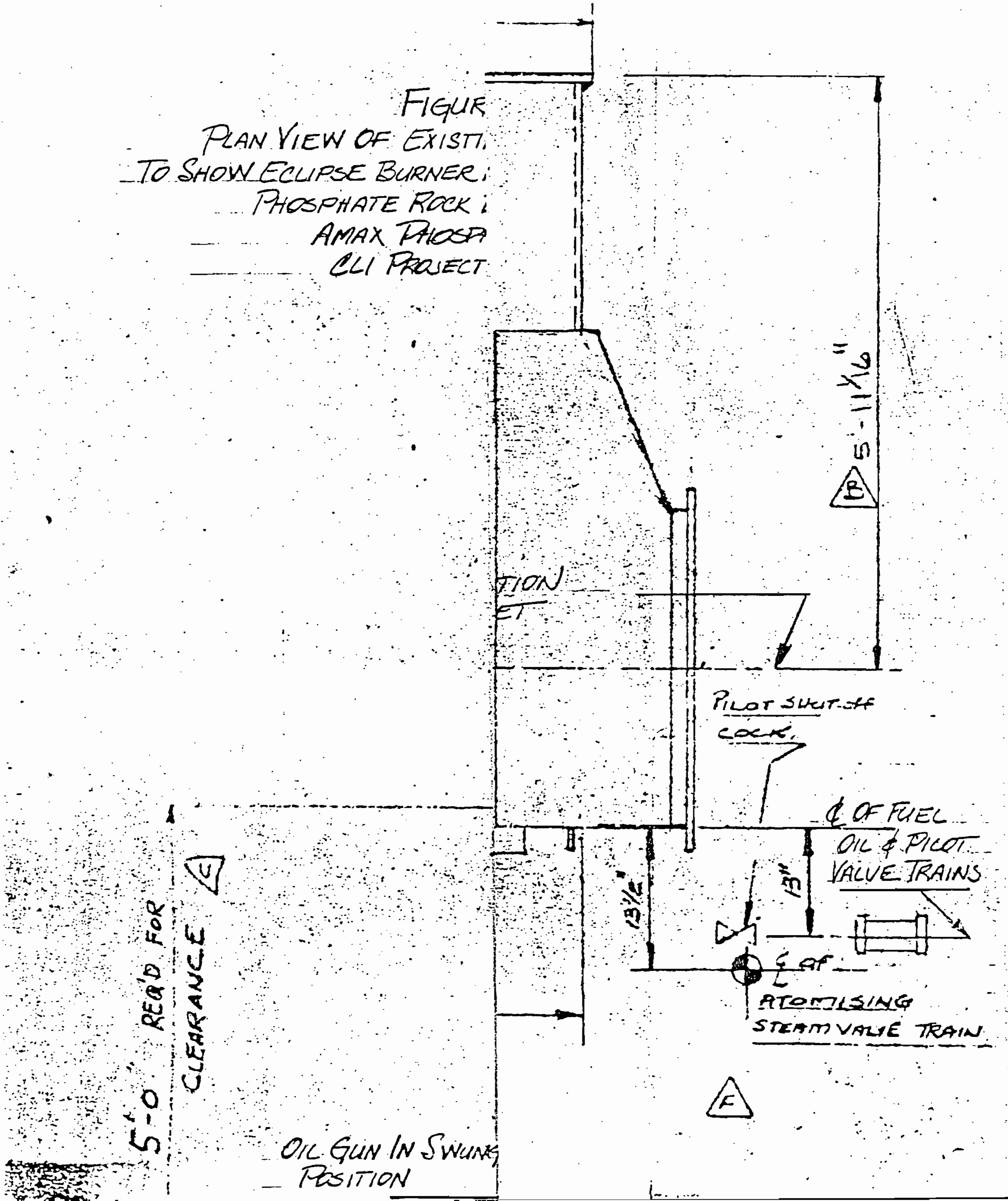


FIGURE 1
D OIL GUN ASSEMBLY
EXISTING ECLIPSE BURNER HOUSING
ROCK DRYER OPERATION
PHOSPHATE, INC
PROJECT 8120


FIGUR
PLAN VIEW OF EXISTI
TO SHOW ECLIPSE BURNER
PHOSPHATE ROCK
AMAX PHOSPA
CLI PROJECT
5'-11 1/16"
B
TION
ET
PILOT SHUT-OFF
COCK
¢ OF FUEL
OIL & PILOT
VALVE TRAINS
13 1/2"
13"
¢ OF
ATOMISING
STEAM VALVE TRAIN
C
5'-0" REQ'D FOR
CLEARANCE
F
OIL GUN IN SWUNG
POSITION