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

May 31, 1983

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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
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SKEC 144-82-02

May 27, 1983

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

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

Dear Mr. Fancy:

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

1. Property Boundaries

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

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

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

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

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

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

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

4. Phosphate Rock Dryer Heat Input Rate

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

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

5. Reasons for Use of Alternative Fuels

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

6. Cost and Availability of Alternative Fuels

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

7. Sulfur Dioxide Removal Efficiency

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

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

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

8. Nitrogen Oxide Emission Data

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

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

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

Response to Hillsborough County Environmental Protection Commission Comments

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

1. Secondary Particulate Matter Emissions

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

2. Rail Traffic

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

3. Receptor Locations

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

4. Additional Sulfur Dioxide Sources

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

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

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

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

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

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

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

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

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

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

6. Emission Limitations

AMAX Chemical Corporation has responded to this comment in detail.

7. Sulfur Dioxide Removal Efficiency

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

8. Short-Term Air Quality Modeling

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

9. Wind Instrument Elevation

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

10 & 11. Meteorological Input Data

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

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

Very truly yours,

SHOLTES & KOOGLER,
ENVIRONMENTAL CONSULTANTS, INC.

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

JBK:ldh
Attachments

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

ATTACHMENT 1

REVISED AIR QUALITY REVIEW

TABLE 6-2

SUMMARY OF AIR QUALITY REVIEW

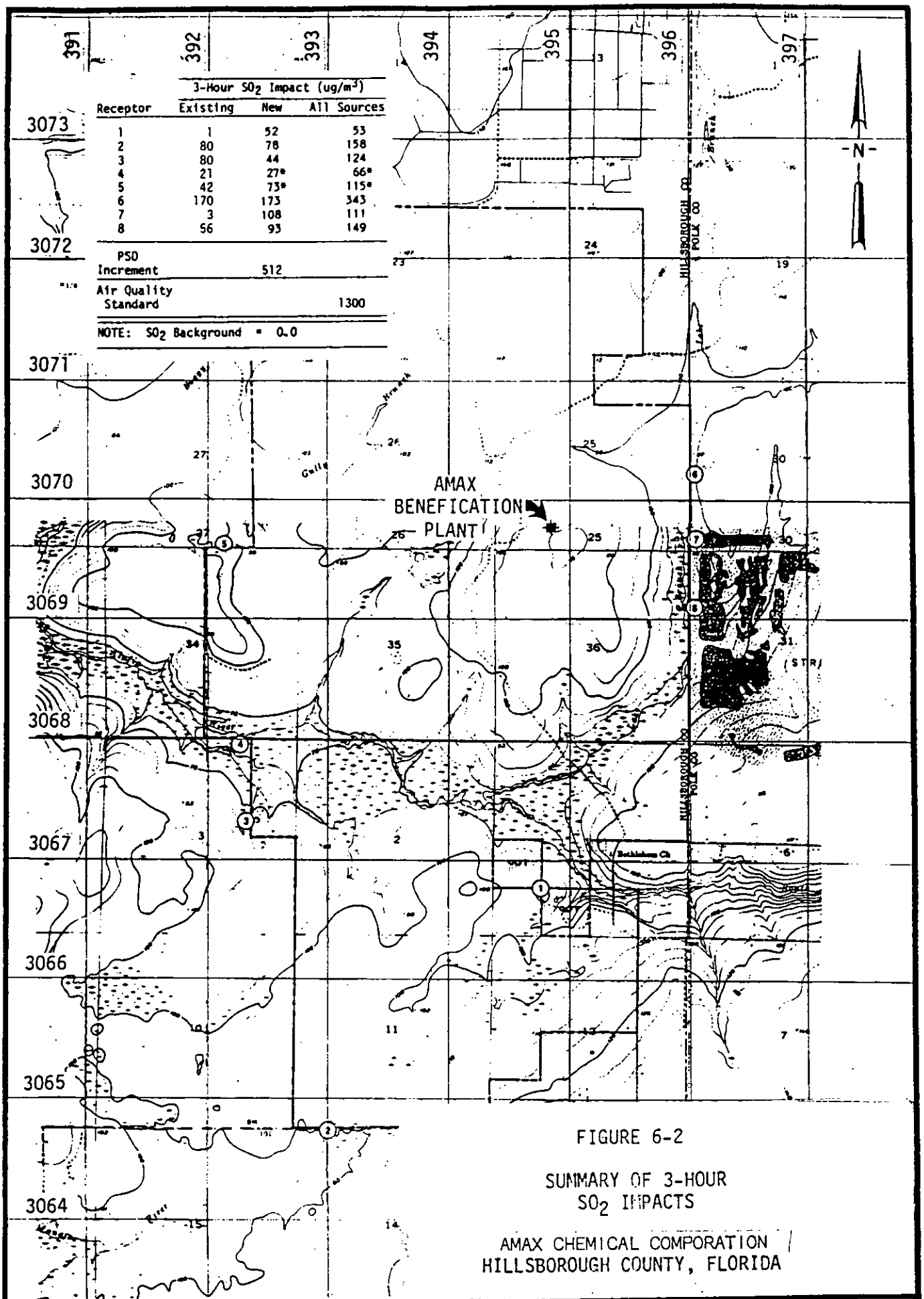
AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

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

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

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

* REVISED 4/29/83



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

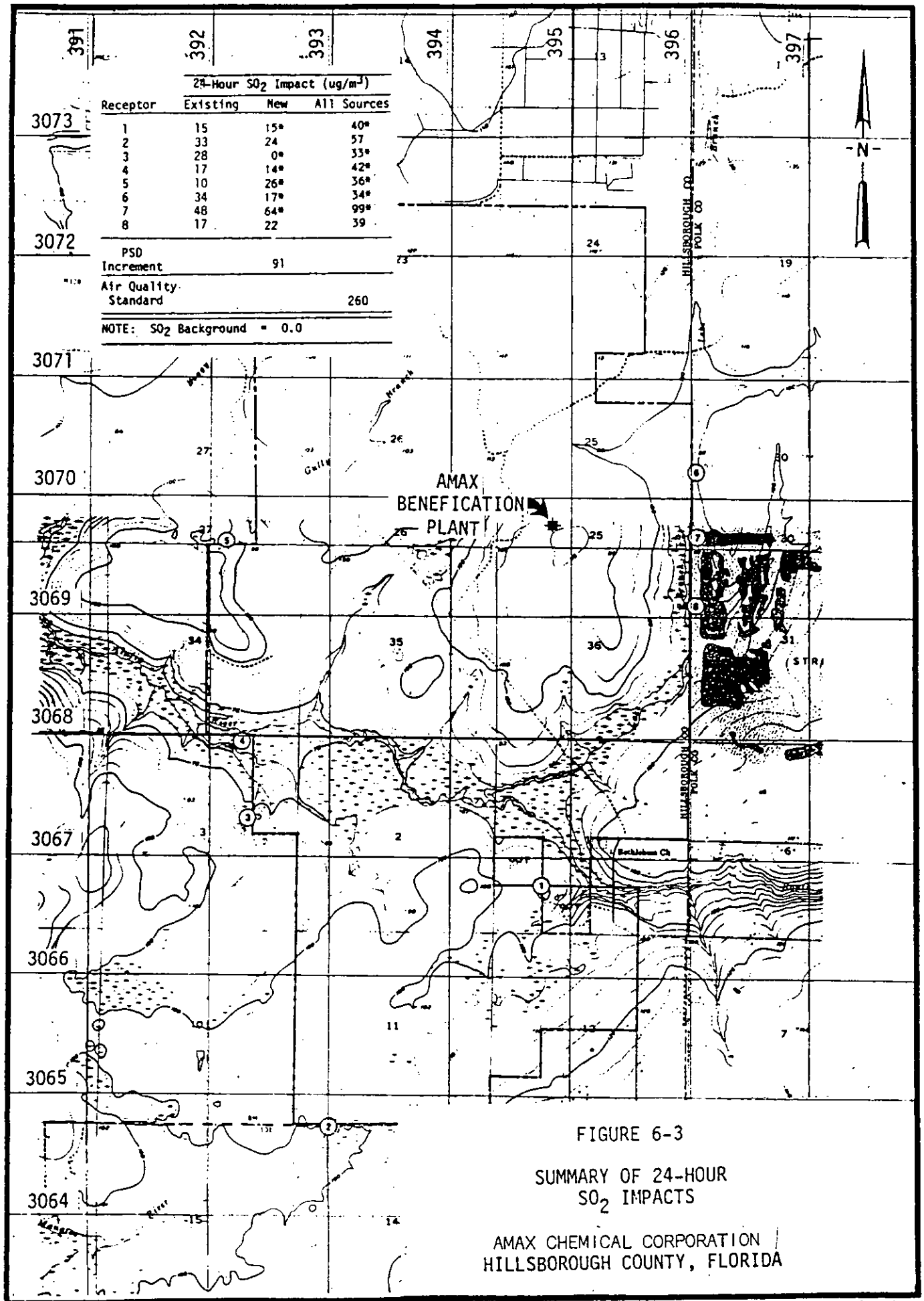


FIGURE 6-3

SUMMARY OF 24-HOUR
SO_2 IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

SHOLTES & KOOGLER

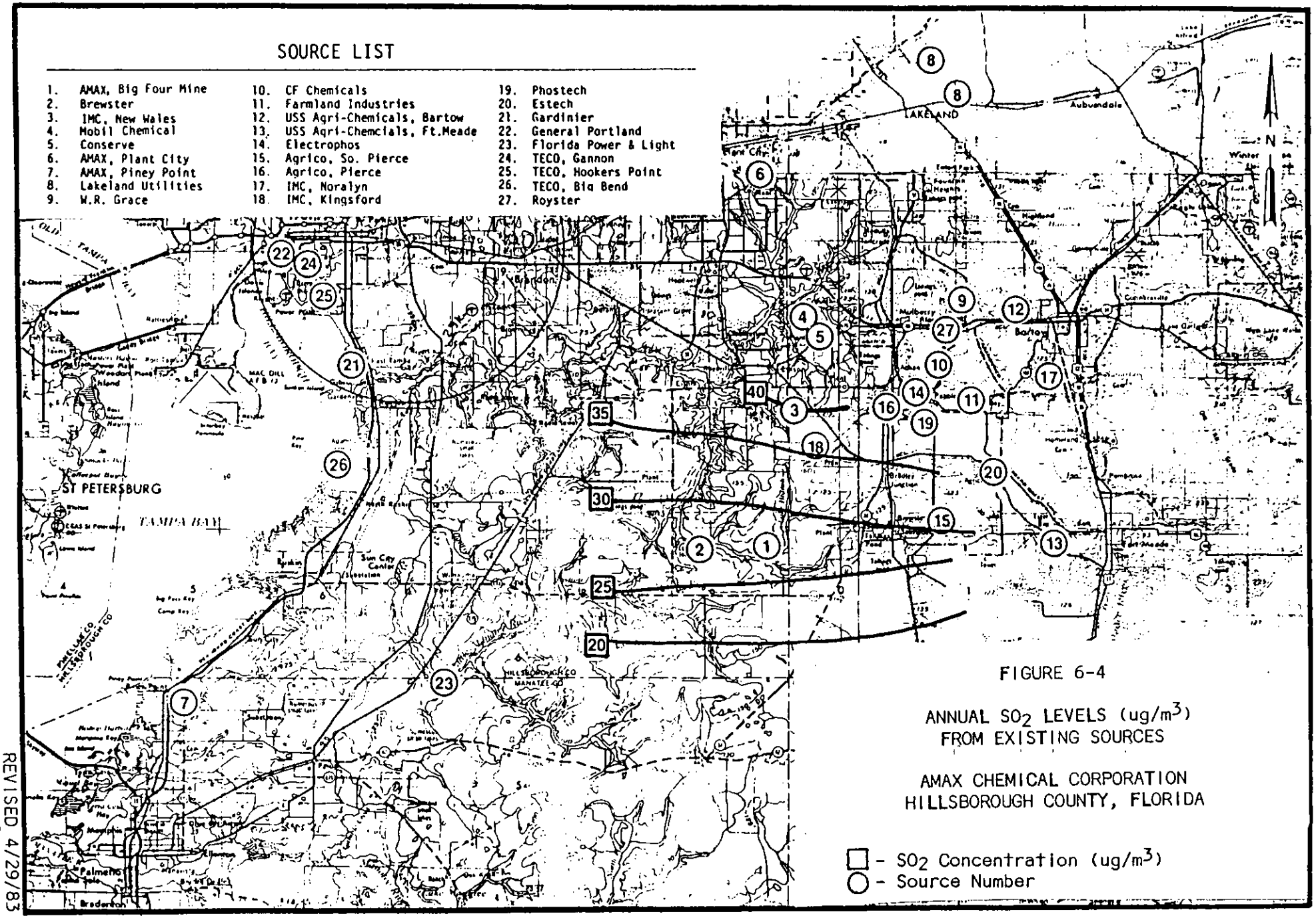


FIGURE 6-4

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

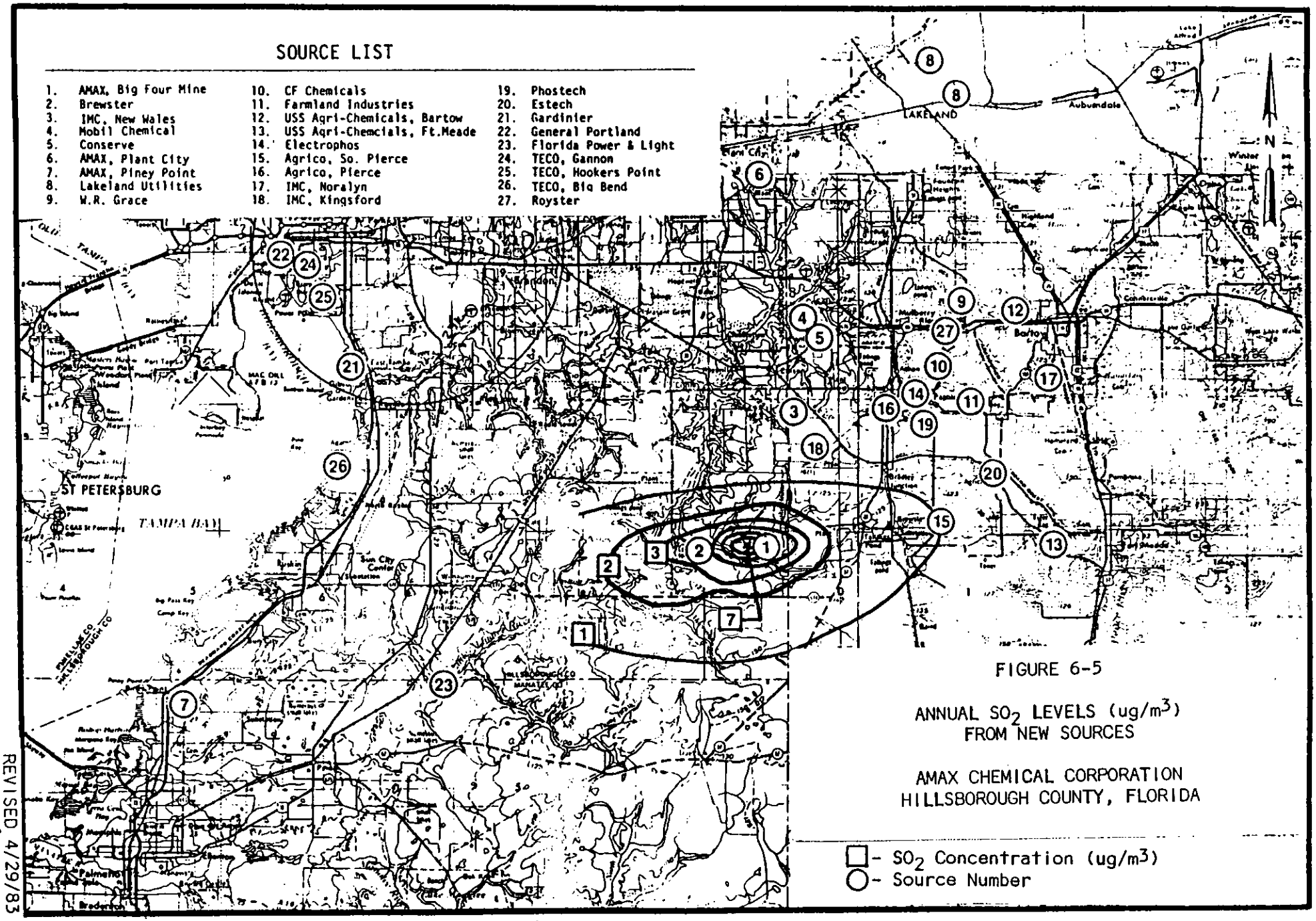


FIGURE 6-5

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83

SHOLTES & KOOGLER

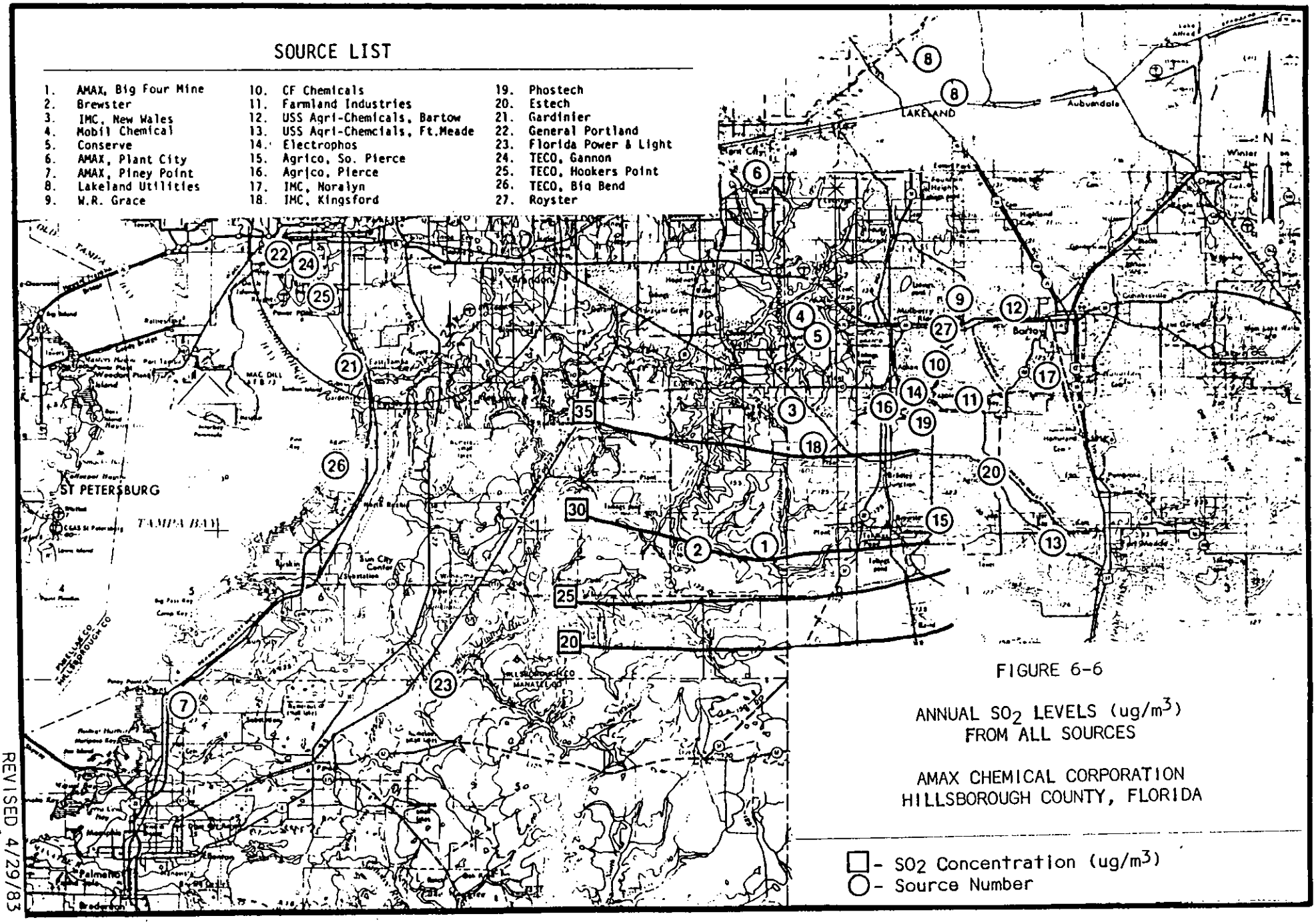
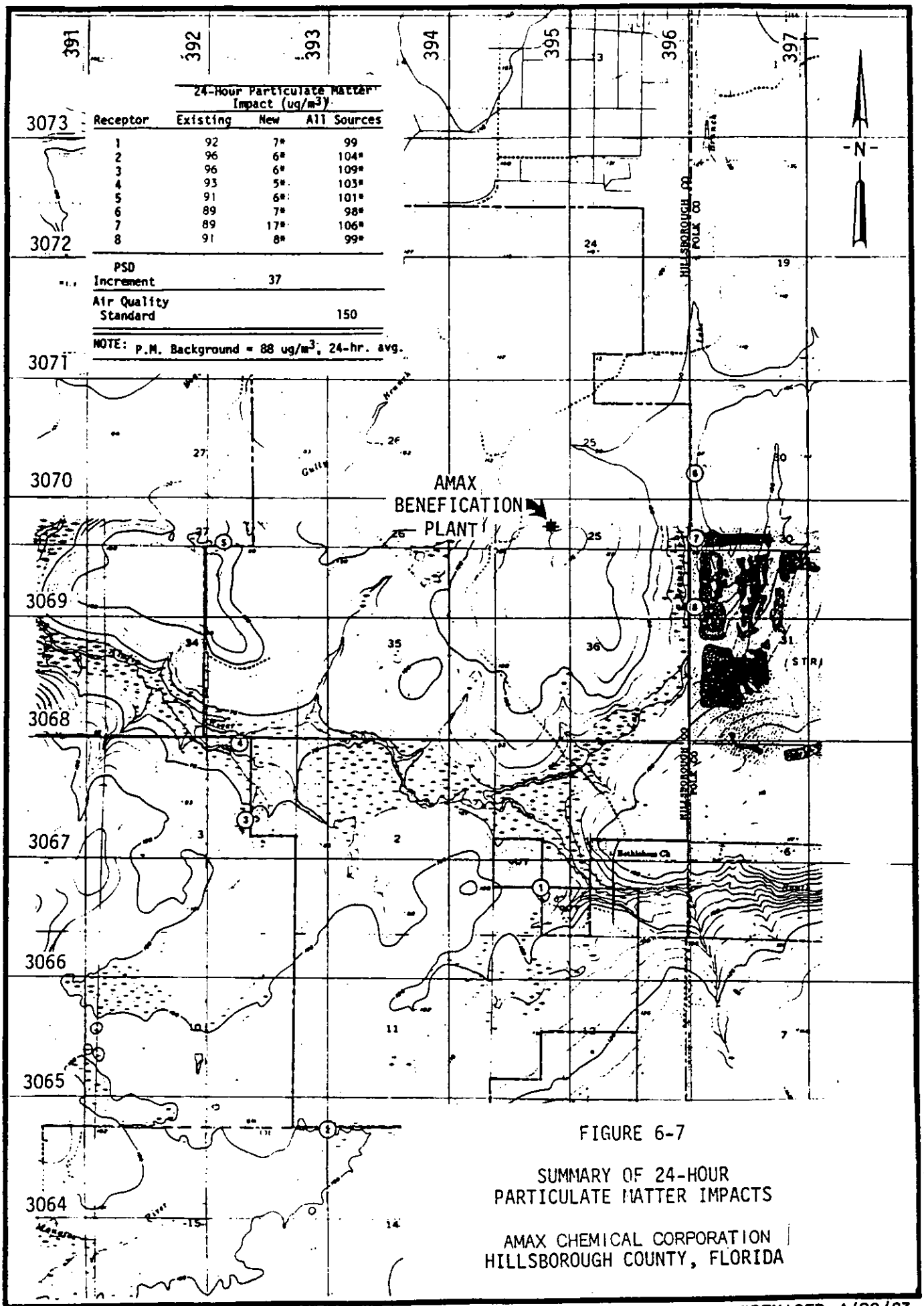


FIGURE 6-6

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

REVISED 4/29/83
SHOLTES & KOOGLER



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

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

FIGURE 6-7

SUMMARY OF 24-HOUR
PARTICULATE MATTER IMPACTS

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

*REVISED 4/28/83

SHOLTES & KOOGLER

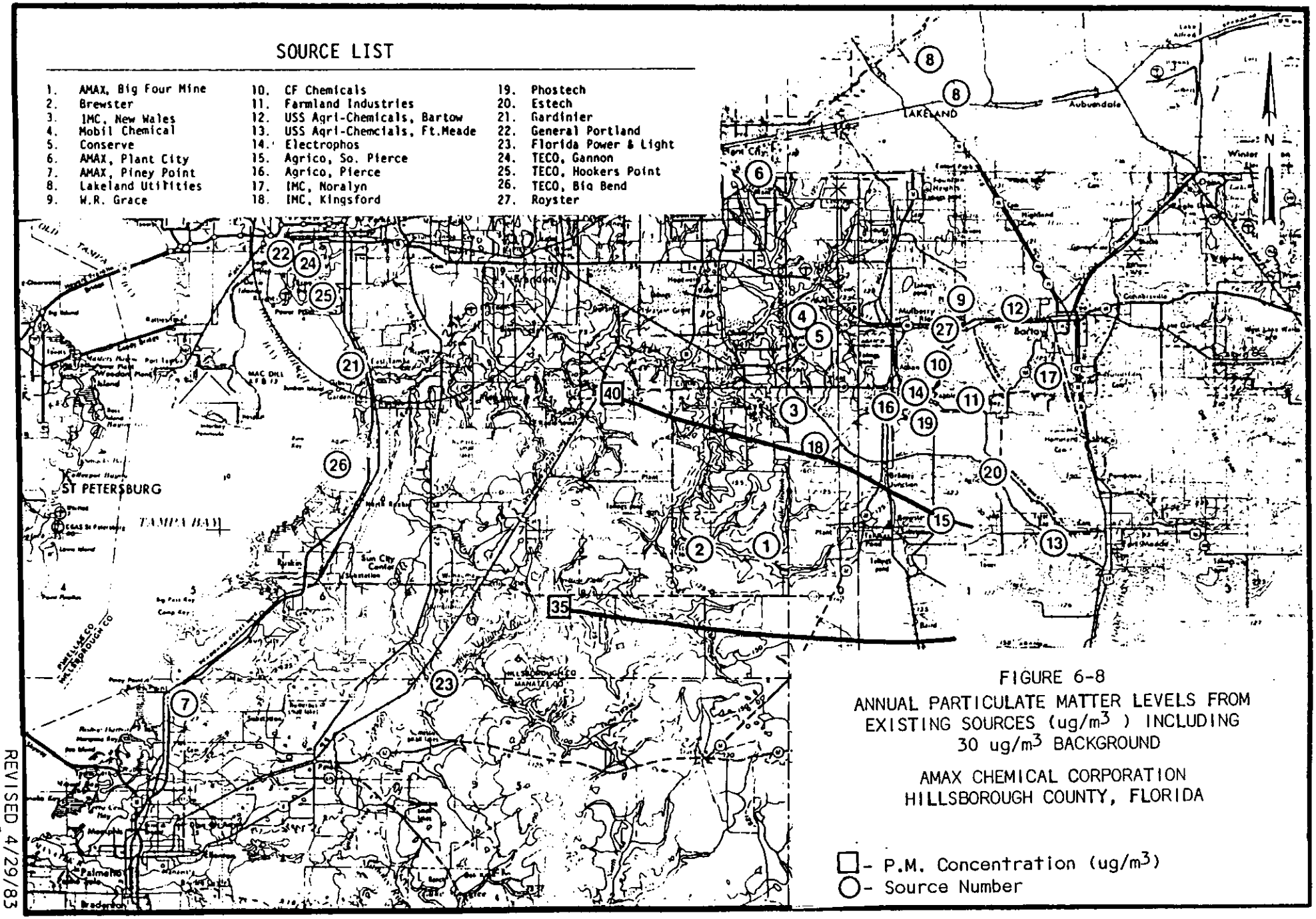


FIGURE 6-8
ANNUAL PARTICULATE MATTER LEVELS FROM EXISTING SOURCES (ug/m^3) INCLUDING 30 ug/m^3 BACKGROUND

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - P.M. Concentration (ug/m^3)
○ - Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

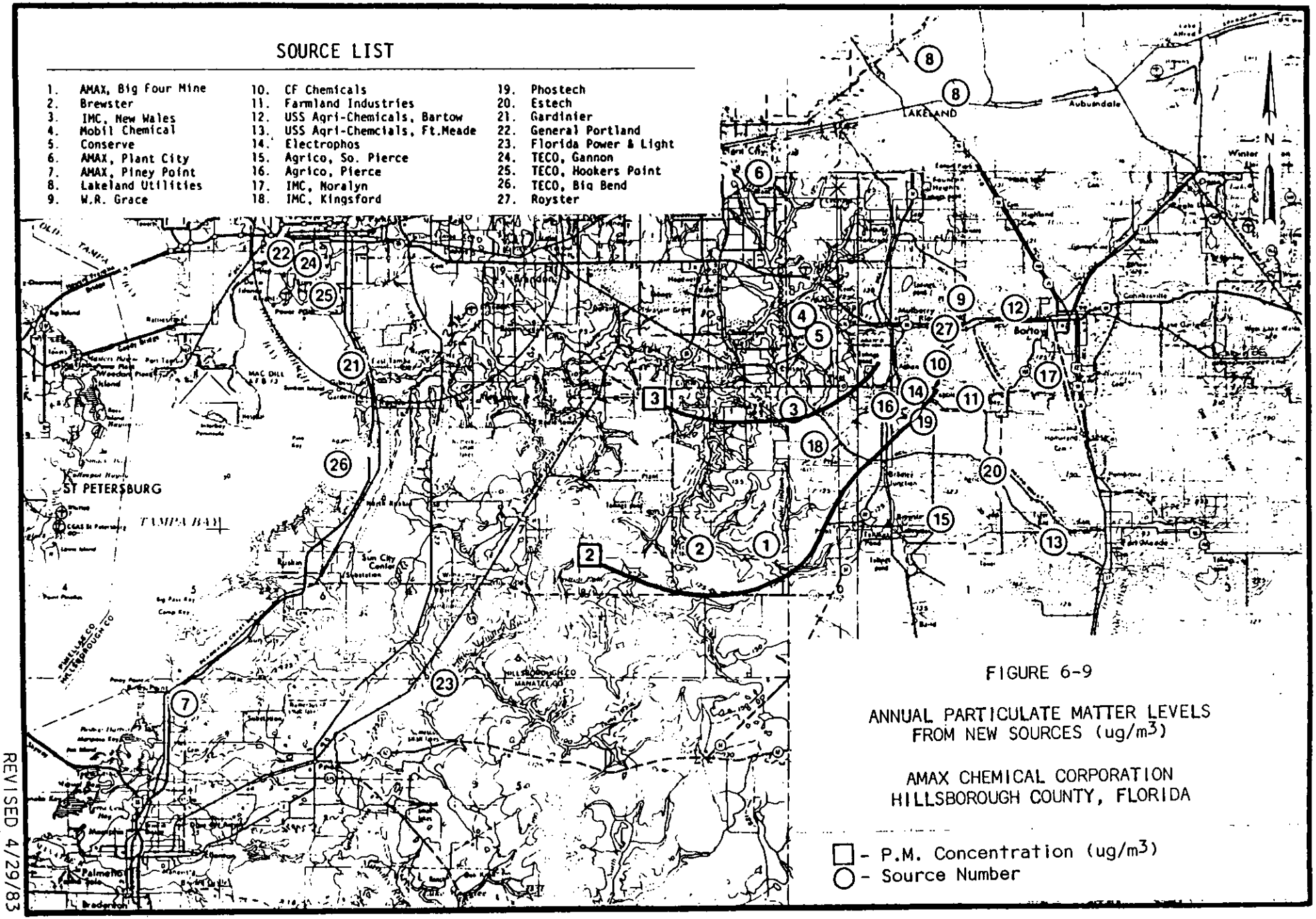


FIGURE 6-9

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

AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - P.M. Concentration (ug/m^3)
○ - Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

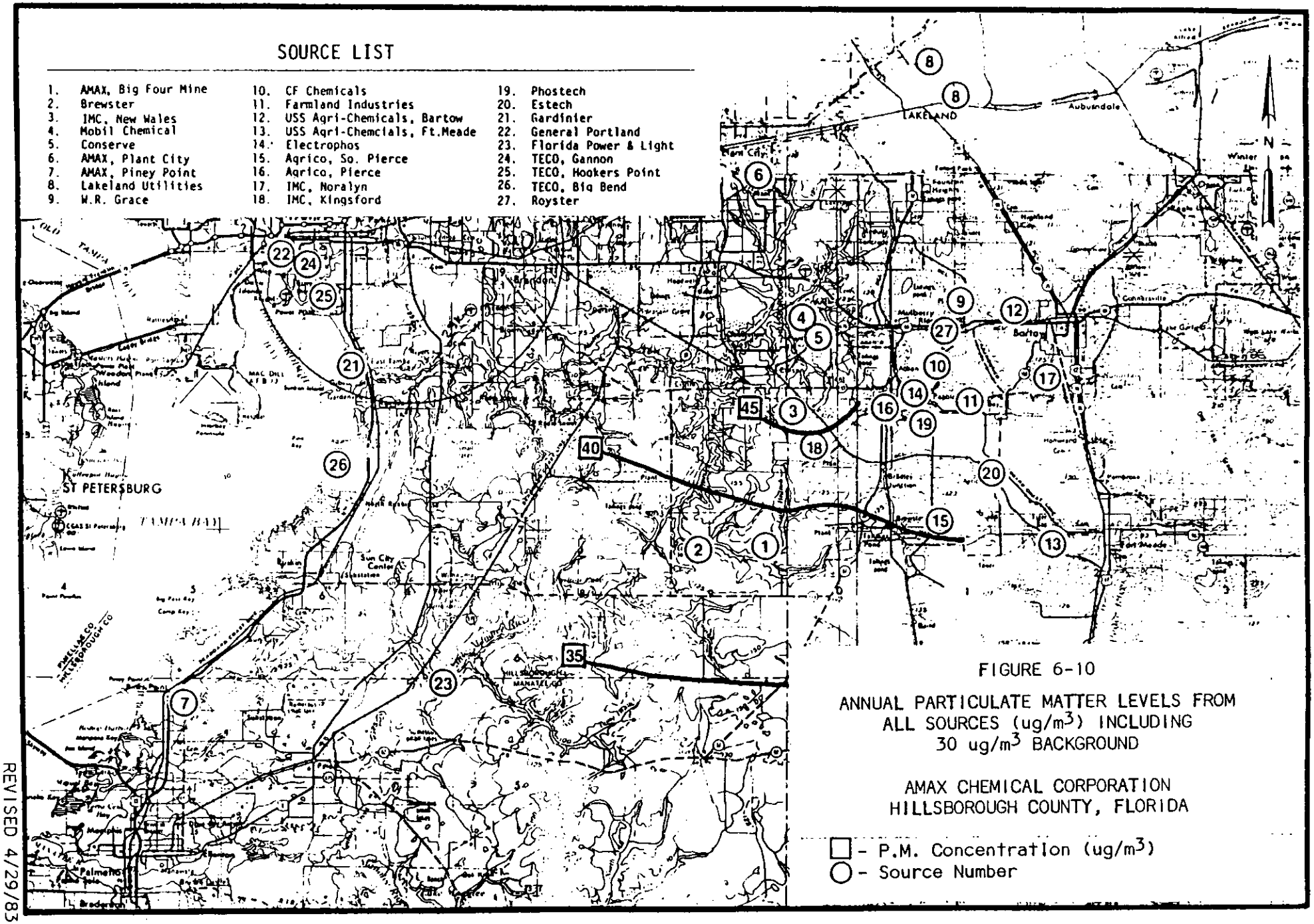


FIGURE 6-10

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

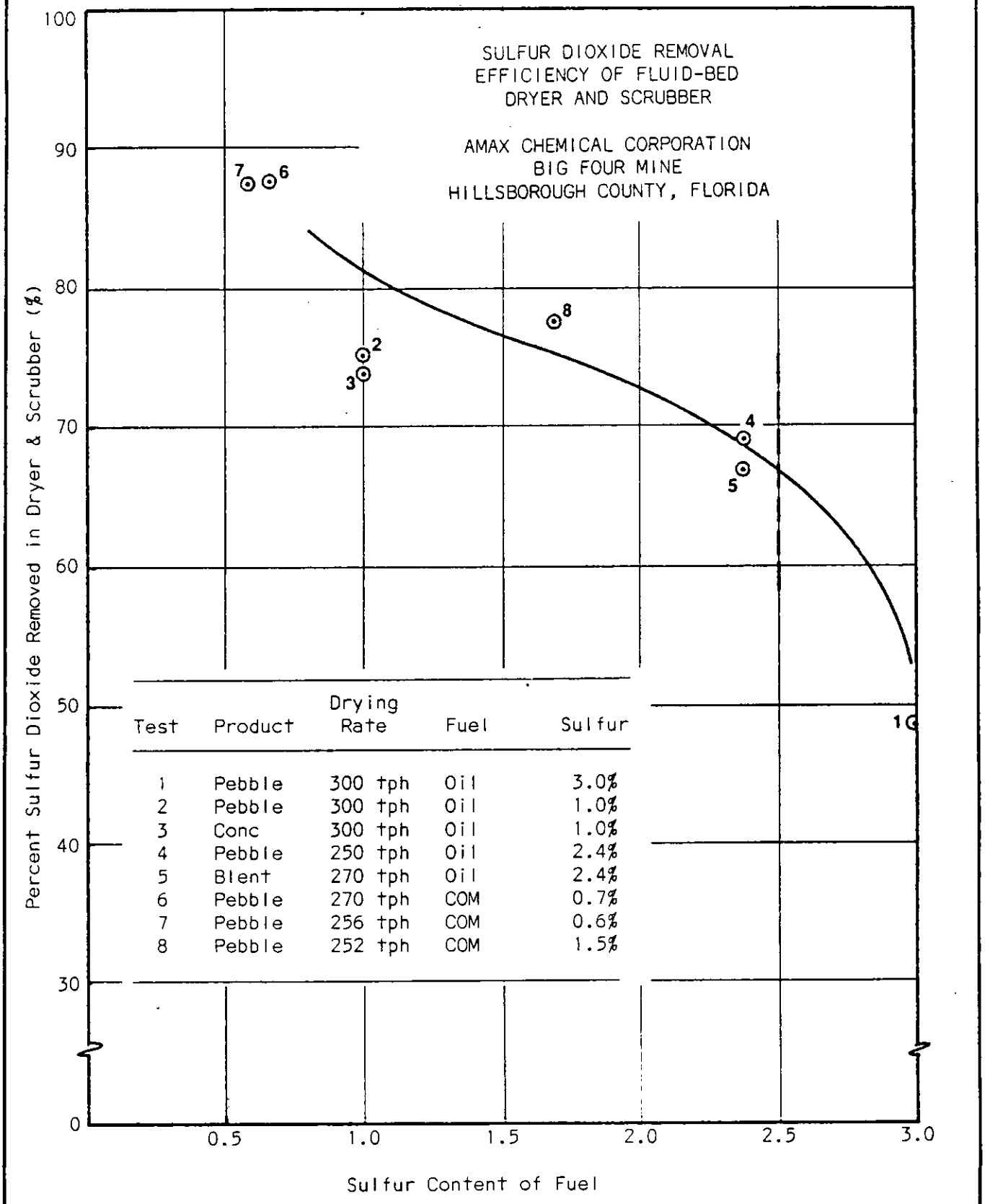
AMAX CHEMICAL CORPORATION
HILLSBOROUGH COUNTY, FLORIDA

□ - P.M. Concentration (ug/m^3)
○ - Source Number

REVISED 4/29/83
SHOLTES & KOOGLER

ATTACHMENT 2

SULFUR DIOXIDE
REMOVAL EFFICIENCY DATA



SHOLTES & KOOGLER

ATTACHMENT 3

NITROGEN OXIDES
EMISSION RATE CALCULATIONS

Emission Rate Calculations

Rock Dryer

Present

Particulate Matter

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

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 81 ppm (see PSD-FL-088; Brewster) *

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

$\times (1/385 \text{ ft}^3 \text{NO}_x/\text{lb-mole})(46 \text{ lb NO}_2/\text{lb-mole})$

= 26.33 lb/hr *

x 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

x 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

x 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
x (1/2000 lb/ton)(1/13350 BTU/lb)(10^6)
= 0.671b 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)

= 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 *
x 8760/2000
= 155.6 tpy *

* Revised 4/28/83