TECHNICAL EVALUATION

and

PRELIMINARY DETERMINATION

BREWSTER PHOSPHATES

HILLSBOROUGH COUNTY, FLORIDA

PHOSPHATE ROCK DRYERS

PERMIT NUMBERS:

AC29-49692

AC29-49694

PSD-FL-088

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

BUREAU OF AIR QUALITY MANAGEMENT

CENTRAL AIR PERMITTING

APRIL 14, 1982

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NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to Brewster Phosphates to make modifications and install new facilities required to burn alternate fuels in two existing phosphate rock dryers near Ft. Lonesome in Hillsborough County, Florida. The alternate fuels will increase emissions of sulfur dioxide by up to 571.7 tpy and nitrogen oxides by up to 351.3 tpy.

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 17-2 and 29-5, 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 application is available for public inspection during normal business hours, 8:00 am to 5:00 pm, Monday through Friday, except legal holidays at:

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

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

I. PROJECT DESCRIPTION

A. Applicant

Brewster Phosphates
Bradley, Florida 33835

B. Project and Locations

Brewster Phosphates operates two existing No. 6 fuel oil fired fluid-bed phosphate rock dryers, rated at 450 TPH product each, at its existing mining complex located 2 miles NNE of Ft. Lonesome in the southeast section of Hillsborough County, Florida. The UTM coordinates of the plant are 389.55 E and 3067.93 N. The company proposes to modify the fuel systems to these dryers to allow them to use COM fuel (mixture of coal and oil) and/or coal along with a higher sulfur content No. 6 fuel oil than they are presently.

The lower quality fuel oil (higher sulfur content) can be used by the existing dryers without any physical modifications to the fuel system.

The COM fuel will be prepared off-site by an independent fuel supplier, delivered to the plant by tank truck and stored in existing fuel tanks. The dryer burners will be modified to give optimum performance with this alternate fuel.

To use coal in the existing dryers will require new coal handling facilities and dryer burners. The coal handling facilities require the construction of a new railroad spur, a bottom dump rail car unloading facility, a rotary stacker with an adjustable discharge chute to minimize the free fall distance of the coal, a paved and curbed area for coal storage, a rainfall run-off water disposal system for the storage area, a coal reclamation system, two day-storage bins, two sealed coal pulverizers and two Peabody coal firing burners. Water sprays will be used to control fugitive emissions from the railroad car dumping, storage piles and transfer points.

C. Process and Controls

The moisture content of 6.3 million tons per year of wet phosphate rock (up to 15 percent pebble and 25 percent blend with the remainder being concentrate) will be reduced from approximately 14 to 2 percent moisture in two fluid bed dryers, each equipped with a centri field scrubber manufactured by Entoleter Inc. Each dryer can reduce the moisture content of

513 TPH wet phosphate rock with 177.1 mmBTU/hr. of fuel to 450 TPH of dry rock.

The product will then be transported to the dry rock silos where it will be stored prior to shipment from the site. No changes to the dry rock handling and storage system are planned or covered by the proposed permits to construct.

The lower grade fuel oil and COM fuel will be stored and burned in equipment similar to that presently being used by the dryers.

Coal shipments will be received twice weekly in approximately ten 100-ton train cars on spur tracks to be constructed for that purpose. Cars will be unloaded in a bottom dump unloading system that will be equipped with side wall, roof and water sprays to minimize fugitive dust. It and all coal handling equipment will be designed to handle 200 TPH of coal.

After unloading, the coal will be stacked in 10,000 ton storage piles located on a sealed and curbed area designed to contain and then dispose of the contaminated water that contacts the coal. A rotary stacker, equipped with an adjustable discharge chute to reduce free fall distance and water spray, will be used to store the coal. Coal will be loaded on the storage pile for two 5-hour periods per week.

The coal will be removed from the storage piles with a front end loader and placed on a 375 foot long conveyor belt that will transport it to one of the two 200-ton coal day bins. Water sprays at the receiving hopper will minimize fugitive dust during this operation. This activity will occur during a 2 hour period approximately 240 days per year.

Coal from the day bins will be fed to one of the two coal pulverizers and the ground coal will be blown into the Peabody burners for the dryers. Each dryer will operate up to 7,000 hours per year.

Ash from the coal will be trapped in the product or by the scrubber serving the dryer. Significant amounts of sulfur dioxide produced from burning fuel containing sulfur will be absorbed in the phosphate rock. The remaining sulfur dioxide, along with nitrogen dioxide produced during the combustion process, will pass through the scrubber and out the stack to mix with the ambient air.

II. RULE APPLICABILITY

A. Federal Regulations

The proposed project, modification of two existing phosphate rock dryers and construction of a coal handling facility to allow the use of alternate fuels, 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 modified phosphate rock dryers constitute 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 a significant net emissions increase of 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 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 this modification, the review is required for sulfur dioxide and nitrogen oxides. The review consists of a determination of best available control technology (BACT) and an analysis of the air quality impact of the increased emissions. The review also includes an analysis of the impact of the proposed project on soils, vegetation, visibility and the air quality impacts resulting from associated commercial, residential and industrial growth.

B. State Regulations

The proposed project, construction and modifications required to burn alternate fuels in two existing phosphate rock dryers, is subject to preconstruction review under the provisions of Chapter 403, FS, and Chapter 17-2, F.A.C.

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 modification is exempt from the provisions of Section 17-2.510, New Source Review for Nonattainment Areas, because there will be no significant increase in actual particulate matter emissions.

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 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. SUMMARY OF EMISSIONS AND AIR QUALITY IMPACT

A. Emission Limitations

Table I summarizes the emissions of all criteria pollutants regulated under the Act which are changed by the proposed modification. The table shows that the increase in emissions of sulfur dioxide and nitrogen oxides will exceed the significant levels set in the PSD regulations. The particulate matter emission rate from the dryers will not change. The increase in emissions of the other criteria pollutants are less than the significant levels.

TABLE I

SUMMARY OF EMISSION CHANGES RESULTING FROM THE USE OF ALTERNATIVE FUELS

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

	Pollutant Increase (tons/year)				
Source	Part. Matter	SO_2	NO_x	CO	HC
Dryers (2)					
Present	175	794	396.2	41.0	8.2
Proposed-oil	175	1365	396.2	41.0	8.2
-coal	175	1365	742.9	51.6	15.5
-COM	175	1365	576.5	40.5	12.0
Max Increase	0	571	346.7	10.6	7.3
Coal Handling					
Present	0				
Proposed-oil	0	NO CHANGE			
-coal	17.9				
-COM	0				
Max Increase	17.9				
Rail (Fugitive)					
Max Increase (for coal)	0.3	0.7	4.6	1.6	1.2
Rock Loading		NO CHANGE			
Auto and Truck Traffic		NO CHANGE			
Total Increase	18.2	571.7	351.3	12.2	8.5
Significant Increase	25	40	40	100	40

Best Available Control Technology (BACT) has been determined for sulfur dioxide and nitrogen oxides. The emission limiting standards selected as BACT and made a condition of this permit are listed in Table II as the proposed emissions. Justification for the standards selected is included in Technical Appendix A. The calculated emission values of other criteria pollutants shown in Table II will be the limits specified in the construction permits. The limits on percent sulfur in the fuels are based on the calculated potential sulfur dioxide emissions and percent absorption of sulfur dioxide by pebble phosphate rock predicted by the applicant. The percent sulfur limits on the fuels will be adjusted by the Department if operational data shows greater sulfur dioxide removal than was originally predicted.

The permitted emissions, including those subject to BACT, are in compliance with county, state and federal regulations.

B. Air Quality Impacts

Air quality analyses have been performed to evaluate the impacts of the proposed project on the ambient

TABLE II

Emissions of Criteria Pollutants from Each Modified Dryer

Pollutant	lb/hr	lb/MMBtu	PPM	Other	TPY
PM	25	--	--	--	87.5
SO_2	195	1.1			682.5
Sulfur					
Oil				1.7%S	
Coal				1.33%S	
COM				1.5%S	
NO_x					
Oil	56.6	--	81	--	198.1
Coal	106.6	--	152	--	371.5
COM	82.3	--	118	--	288.3
CO	5.8	--	--	--	41.0
VOC	1.2	--	--	--	8.2
VE	--	--	--	20% opacity	--

air concentrations of sulfur dioxide and nitrogen oxides.

An analysis, using dispersion modeling, predicted the impact of all sulfur dioxide emitting sources from Brewster Phosphates in combination with those from surrounding plants, that may add to the impact from Brewster Phosphate. The results of the study showed that no PSD increment or ambient air standard for sulfur dioxide would be violated.

An analysis for nitrogen oxides using the increase in emissions by this modification showed the impact would be less than the de minimus ambient impact (Chapter 17-2, Table 500-3). Extrapolation of the ambient air concentration from existing nitrogen oxide monitors in Hillsborough County to the area of impact of the modified plant showed the nitrogen oxide ambient air standard would not be violated.

In conclusion, the analyses provided reasonable assurance that the project, as described in this permit and subject to the conditions herein, will not lead to any violation of the National Ambient Air Quality Standards or PSD increments.

Details of the analyses are discussed in Technical Appendix B.

C. Additional Impact Analysis

An additional analysis has been performed to assess the impact of the proposed project on soils, vegetation, and visibility and any air quality impacts resulting from associated commercial, residential, or industrial growth. No adverse impacts are expected.

Details of the analysis are discussed in Technical Appendix C.

IV. CONCLUSIONS

Based on a review of the data submitted by Brewster Phosphates, FDER concludes that the company can reduce fuel cost by using alternate fuels of a quality that will meet the emission limits specified in the BACT. These emission limits are in compliance with all applicable county, state and federal regulations.

The General and Specific Conditions listed in the proposed permits (attached) will assure compliance with all applicable air pollution control regulations.

The Department therefore proposes that Brewster Phosphates be authorized to modify their two existing phosphate rock dryers and construct a coal handling facility subject to the specific conditions in the attached draft state permits.

Best Available Control Technology (BACT) Determination

Brewster Phosphates

Hillsborough County

The applicant proposes to modify two existing dryers at their phosphate rock plant located in southeastern Hillsborough County two miles northeast by north of Fort Lonesome, Florida. The dryers presently fire No. 6 oil and are to be modified to also fire coal or COM (coal-oil mixture). COM is a homogenized mixture containing an approximate ratio of 10% water, 50% oil, and 40% coal. This mixture is free flowing without the tendency to separate and is characterized as a liquid fuel.

The applicant also proposes to construct coal handling facilities, to include; a new rail spur; a rail car unloading facility; coal-storage, pile rotary stacker; a coal reclamation system; conveyors; two day-coal-storage bins; two coal pulverizers and a coal pile run-off water disposal system.

The COM fuel will be prepared off-site by an independent supplier and delivered to the plant in tank trucks.

The two dryers, each with a product rate of 450 tons per hour, presently operate approximately a total of 8,500 hours per year, but, total hours are not limited by a permit restriction. Present air pollutant emission limits are: 45.8 pounds particulate matter per hour per dryer, and the use of 0.8 percent sulfur content fuel oil to control SO_2 emissions.

The permit condition reads "The fuel used in this process must have a sulfur content not to exceed 0.8% by weight. After satisfactory test results are submitted showing a significant removal of sulfur dioxide from the flue gases, the Hillsborough County Environmental Protection Commission will consider permitting the use of lower grade fuel."

The applicant has run a series of tests to determine the percent SO_2 removed by the product being dried. The percent SO_2 removed in the process is a function of the type of material being dried (Concentrate, pebble or a concentrate-pebble blend) and the sulfur content of the oil fired. This data was submitted in graph form as part of the construction application indexed as "Attachment 2." This graph is made part of this BACT determination as Fig. 1.

The applicant has submitted data for a two year period which indicates the average SO_2 emission reduction is 48.7%. This equates to a 302.25 lbs. SO_2/hr/dryer emission rate and at maximum firing rate would allow the use of oil with a 1.64% sulfur content (AP-42). At the average fuel usage rate the sulfur content of the oil would be 1.8%.

The applicant has included in the application a request to fire higher sulfur content fuel oil. The price per barrel of low sulfur content fuel oil is presently $29.10 and the higher (2.5%) sulfur content fuel oil is $24.63, which represents an annual fuel cost savings in the millions of dollars.

The firing of coal, COM or high sulfur content oil would result in a significant net increase in SO_2 and NO_x emissions. This is subject to Prevention of Significant Deterioration (PSD) review and requires a BACT determination for the pollutants SO_2 and NO_x.

BACT Determination Requested by the Applicant:

Rock Dryer

SO_2	Use of oil or COM with an equivalent sulfur content of 1.3%. Coal with an equivalent sulfur content of 1.1%.
NO_x	Emission Limit
Oil	56.6 lb/hr/dryer
Coal	106.6 lb/hr/dryer
COM	82.3 lb/hr/dryer

Each dryer will operate a maximum of 7,000 hours per year and not to exceed 450 tons per hour of product.

Date of Receipt of a BACT Application:

November 16, 1981

Review Group Members:

Bob Garrett - DER Southwest District

Dan Williams - DER Southwest District

Anthony Jones - Hillsborough County (HCEPC)

Frank Shindle - Hillsborough County (HCEPC)

Willard Hanks - DER New Source Review

Tom Rogers - DER Air Modeling Section

The emission limits determined as BACT are based upon the review group's recommendations.

BACT Determined by DER:

Rock Dryers:

Pollutant	Emission Limit
SO_2	195 pounds per hour per dryer
NO_x	
(oil)	56.6 lb/hr/dryer
(Coal)	106.6 lb/hr/dryer
(COM)	82.3 lb/hr/dryer

Compliance with the emission limitations of all emission points will be in accordance with 40 CFR 60, Appendix A; Methods 1,2,3,4,5,6,7 and 9.

Justification of DER Determination:

The intent of the original sulfur dioxide emission level was to limit SO_2 emissions to 147.2 lb/hr dryer (AP-42). Compliance with the SO_2 emission limitation would be the use of low sulfur oil, with the proviso the sulfur content of the fuel oil could be increased once the SO_2 removal efficiency inherent in the process was determined.

The applicant ran SO_2 sorbtion tests, the results of which were tabulated in graph form and attached to this determination as Fig. 1. The test results indicated the SO_2 removal efficiency was a function of the product being dried and the sulfur content of the fuel fired.

The applicant provided data of the fuel consumption and sulfur content for a two year period. The SO_2 emissions were reduced 48.7% by the sorbability mechanism inherent in the process. Using AP-42 emission factors this equated to the firing of 1.6% sulfur content oil at maximum fuel consumption rate or 1.8% at the average fuel consumption rate.

The Department has determined as BACT an SO_2 emission limit of 195 pounds per hour per dryer. This SO_2 emission limit is equivalent to the firing of fuel oil containing one percent sulfur, or 1.1 pounds SO_2 per million Btu at maximum dryer capacity of 177.1 million Btu per hour.

The SO_2 emission limit 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. For example, the firing of various sulfur content fuels depending upon the SO_2 sorbility of the product being processed, determined either by tests or the use of a continuous SO_2 monitoring system, or the use of a FGD system.

The applicant presently uses a wet scrubber system to control particulate emissions. The scrubber liquid is not chemically treated so as to absorb SO_2 from the combustion gases. This BACT determination was made based only upon the SO_2 removal mechanism inherent in the rock drying process.

The SO_2 removal efficiency inherent in the process was determined when firing No. 6 oil. The data may or may not be valid when the fuel is coal or COM. A project summary (EPA-600-57-81-090), "Evaluation of Emissions and Control Technology for Industrial Stoker Boiler", indicated a limestone/coal pellet (Ca/S=7) was successfully fired achieving a 75% reduction in SO_2 emissions. Although the processes are different, the chemistry is similar, therefore, there is reasonable assurance the graph is valid for coal firing.

A practical method to remove NO_x from rock dryer combustion gases is yet to be demonstrated. The use of state-of-the-art burners designed for minimum NO_x emissions is determined as BACT.

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:

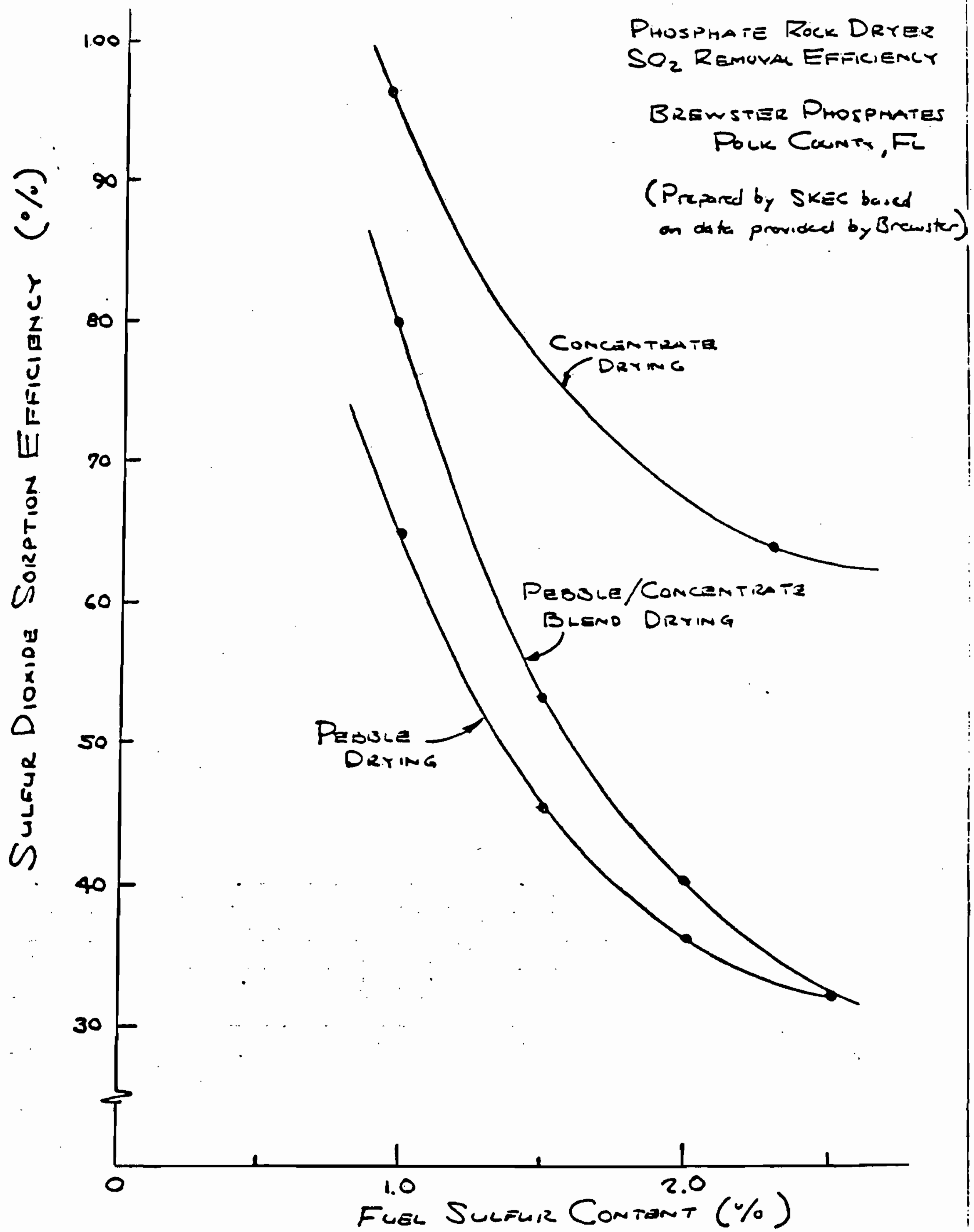
Steve Smallwood, Chief, BAQM

Date: 4/14/82

Approved:

Victoria Tschinkel, Secretary

Date:



Phosphate Rock Dryer
SO2 Removal Efficiency
Brewster Phosphates
Polk County, FL
(Prepared by SKEC based on data provided by Brewster)
Concentrate Drying
Pebble/Concentrate Blend Drying
Pebble Drying
Sulfur Dioxide Sorption Efficiency (%)
100
90
80
70
60
50
40
30
0
1.0
2.0
Fuel Sulfur Content (%)

FIGURE 1

APPENDIX B

AIR QUALITY IMPACT ANALYSIS

A. Summary

The state and federal PSD review process requires an air quality impact analysis to be completed for all applicable pollutants. This analysis would include the use of FDER and EPA-approved air quality dispersion models in conjunction with ambient air monitoring data. Estimates of maximum ground-level concentrations are determined for comparison with state and federal standards. The analysis requires:

- An analysis of existing air quality;
- A PSD increment analysis (for PM and SO_2 only);
- A National Ambient Air Quality Standards (NAAQS) analysis; and,
- An analysis of impact on soils, vegetation, and visibility and growth-related air quality impacts.

In addition, preconstruction monitoring may be necessary to establish air quality conditions if valid monitoring data do not presently exist.

Brewster Phosphates is a major emitting source with the proposed project having significant emission increases (and therefore subject to PSD review for each) of SO_2 and NO_x. Emissions of particulate matter, carbon monoxide, and hydrocarbons will be less than the de minimus emission rate increases established by the state and federal PSD regulations.

Based on these required state and federal air quality impact analyses, FDER has reasonable assurance that the subject facility as described in this permit and subject to the conditions of approval proposed herein, will not cause or contribute to a violation of any state or federal PSD increment or ambient air quality standard. A discussion of the required analyses follows.

B. Discussion

1. Modeling Methodology

Four FDER and EPA-approved atmospheric dispersion models were used in the state and federal air quality impact analyses. These were the Air Quality Display Model (AQDM) used to predict maximum concentrations on an annual average, the Single-Source (CRSTER) and Point-Multiple Point (PTMTPN) models used to predict maximum short-term (24-hour and 3-hour) concentrations, and the Industrial Source Complex Short-term (ISCSI) model used in the analysis of potential downwash problems.

For the short-term averaging periods the CRSTER model was used to identify the days of absolute worst-case meteorological conditions associated with high concentrations. These conditions included days for which other sources located directly upwind might interact. This model was also used to determine the maximum area of impact of the proposed modification. The maximum short-term impacts due to emissions from the proposed modification and all major interacting sources were analyzed for the critical days with PTMTPW. A refined, receptor grid spacing of 0.1 kilometers was used with the receptors located on or outside of the plant property. Emissions of the subject pollutants were based on the burning of 2.3% sulfur coal, the worst-case fuel.

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

The stack parameters and emission rates used in evaluating the proposed modification are contained in Tables B1 and B2.

Table B-1

Emission Unit	Stack Height(m)	Stack Diameter(m)	Stack Gas Temperature(k)	Stack Gas Velocity(m/s)
Dryer 1	38.1	2.44	339.	15.20
Dryer 2	38.1	2.44	339.	15.20

Table B-2

Emission Unit	SO_2 (existing)(g/s)	SO_2 (new)(g/s)	NO_x (existing)(g/s)	NO_x (new)(g/s)
Dryer 1	17.85	6.72	7.13	6.24
Dryer 2	17.85	6.72	7.13	6.24

2. Analysis of Existing Air Quality

In order to evaluate existing air quality in the area of a proposed project, FDER may require a period of continuous preconstruction monitoring for any pollutant subject to PSD review. An exemption from this requirement may be obtained if the net emissions increase of the pollutant from the modification would cause an air quality impact less than a certain de minimus level as defined in 40 CFR 52.21(i)(8) and 17-2.500(3)(e), FAC. Based on the modeling results shown in the following table, this exemption is applicable to NO_x, but not to SO_2.

Projected Air Quality Impacts From Dryers 1 and 2

Pollutant	Averaging Time	Projected Impact (ug m^3)	De Minimus Level (ug/m^3)
SO_2	24-hour	14.8	13
NO_x	24-hour	13.7	14

Four months of continuous preconstruction monitoring at one location was required for SO_2. This monitoring was completed by the applicant in full accordance with the proper procedures required by FDER and EPA. The following table presents the results of the SO_2 preconstruction monitoring results, along with an estimate of the NO_x background concentration based on existing monitoring data.

Existing Air Quality Estimates

Pollutant	Averaging Time	Maximum Concentration (ug/m^3)
SO_2	Annual (1)	3.8
SO_2	24-hour(1)	35
SO_2	3-hour(1)	112
NO_x	Annual	16

(1) based on four months of preconstruction monitoring

3. PSD Increment Analysis

The state and federal PSD increment analysis pertain to PM and SO_2 for which maximum allowable increases (increments) are defined. The proposed modification will be located in an area where the Class II increments apply. The nearest Class I area is greater than 100 kilometers away from the proposed site. The proposed modification is subject to increment analysis for SO_2 only.

The maximum predicted SO_2 increment consumption is predominantly due to the proposed modification itself. Interaction from other increment consuming facilities accounts for a small fraction of the total.

As shown in the following table, modeling results predict that the maximum SO_2 increment consumption will not exceed allowable increments. The highest, second-highest short-term predicted concentrations are given in the table since five years of meteorological data were used in the modeling.

Maximum Increment Consumption (ug/m^3)

Pollutant	Averaging Time	Predicted Increment Consumption(ug/m^3)	Allowed Increment Consumption(ug/m^3)
SO_2	Annual	4	20
	24-hour	16.8	91
	3-hour	29.5	512

The nearest Class I area is the Chassahowitza National Wilderness Area which is 108.6 kilometers Northwest of the facility. At this distance, it can be assumed that no Class I increment will be significantly consumed as a result of the proposed modification.

4. Ambient Air Quality Standards Analysis

The state and federal PSD regulations require the permit applicant to demonstrate that, given existing air quality in an area, a proposed emissions increase subject to PSD review will not cause or contribute to any violation of ambient air quality standards. For the proposed modification, an ambient air quality standards analysis is required for SO_2 and NO_x.

As shown in the following table, modeling results predict that maximum ground-level concentrations for each of these pollutants will be below the FAAQS and NAAQS. The highest, second-highest short-term predicted values are used in this table since five years of meteorological data were used in the modeling. In addition a background concentration, based on monitoring data, has been included. These background values are conservatively high as they include impacts from the modeled facility.

Pollutant	Averaging Time	Projected Air[(1)] Quality (ug/m^3)	NAAQS (ug/m^3)	FAAQS (ug/m^3)
SO_2	Annual	7.8	80	60
	24-hour	121.8	365	260
	3-hour	231.5	1300	1300
NO_2	Annual	17	100	100

(1) Includes background concentrations as given in previous Section 2.

5. Good Engineering Practice Stack Height Evaluation

A "good engineering practice" (GEP) stack height evaluation is required to ensure that the maximum stack height credit to be used in air quality modeling does not exceed GEP. The GEP stack height may be calculated using the dimensions of a nearby structure, two rock storage silos. These structures are 120 feet in height leading to a GEP stack height of 300 feet. This is less than the height of the emission units subject to the modification.

A downwash analysis was performed to insure that excessive concentrations will not occur as a result of wakes and eddies in the lee of nearby structures. The ISCST dispersion model, which contains the Hubes and Synder downwash formula, was used in the evaluation. Results indicate that a maximum increase in concentration of eight percent may be realized. As such, downwash is not considered to be a problem.

6. Impact on Nonattainment Areas

The nearest SO_2 nonattainment area is located in Pinellas county approximately 75 kilometers from the site. The significant impact area for SO_2 extends less than 30 kilometers. As such, no significant impact is predicted in the nonattainment area.

There are no NO_2 nonattainment areas in the State.

APPENDIX C

ANALYSIS OF IMPACT ON SOILS, VEGETATION AND VISIBILITY AND GROWTH-RELATED AIR QUALITY IMPACTS

The maximum impact of the proposed modification, as demonstrated through the air quality analysis, will be below the national secondary air quality standards for SO_2. These standards were established to protect public welfare related values. The maximum impact on NO_2 concentrations in the area is less than 1 ug/m^3. Therefore, no adverse effect on soils, vegetation and visibility is expected.

There will be no significant increase in plant personnel or traffic to or from the plant as a result of the proposed modification. Therefore no secondary residential, commerical, or industrial growth which will adversely affect air quality in the area is expected.

BEST AVAILABLE COPY

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

APPLICANT: Brewster Phosphates
Bradley, Florida 33835

PERMIT/CERTIFICATION NO. AC 29-49692

COUNTY: Hillsborough

PROJECT: Converting Dryer to alternate fuels.

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Chapter 17-2, Florida Administrative Code. The above named applicant, hereinafter called Permittee, is hereby authorized to perform the work or operate the facility shown on the approved drawing(s), plans, documents, and specifications attached hereto and made a part hereof and specifically described as follows:

Modification of an existing 450 TPH (product) phosphate rock dryer/scrubber and construction of fuel storage and handling facilities required for the use of COM, coal and/or fuel oil in the phosphate rock dryer. The coal handling system consists of a new railroad spur on the plant property, a bottom dump rail car unloading facility with water sprays to control fugitive particulate emission, a rotary stacker with an adjustable discharge chute to minimize the free fall distance, a paved and curbed area for coal storage with water sprays to minimize fugitive particulate emission, a rainfall run-off water disposal system for the storage area, a coal reclamation system using pay-loaders and a conveyor belt with water spray to control fugitive emission, two day storage bins, a sealed coal pulverizer and a Peabody coal firing burner. The dryer is located 2 miles NNE of Ft. Lonesome in Hillsborough County, Florida. The UTM coordinates of the site are 389.55E and 3067.93N.

Construction shall be in accordance with the attached permit application and documents and drawings except as otherwise noted on page 3 through 5, Specific Conditions".

Attachments: November 1981 application
January 1982 Supplemental Information

PERMIT NO.: AC 29-49692
APPLICANT: Brewster Phosphates

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 Section 403.161(1), Florida Statutes. Permittee is hereby placed on notice that the department will review this permit periodically and may initiate court 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 indicated in the attached drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit shall constitute grounds for revocation and enforcement action by the department.

3. 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 non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. 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.

4. As provided in subsection 403.087(6), 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.

5. This permit is required to be posted in a conspicuous location at the work site or source during the entire period of construction or operation.

6. 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 Section 403.111, F.S.

7. In the case of an operation permit, 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.

8. 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 penalities 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, except where specifically authorized by an order from the department granting a variance or exception from department rules or state statutes.

9. This permit is not transferable. Upon sale or legal transfer of the property or facility covered by this permit, the permittee shall notify the department within thirty (30) days. The new owner must apply for a permit transfer within thirty (30) days. The permittee shall be liable for any non-compliance of the permitted source until the transferee applies for and receives a transfer of permit.

10. The permittee, by acceptance of this permit, specifically agrees to allow access to permitted source at reasonable times by department personnel presenting credentials for the purposes of inspection and testing to determine compliance with this permit and department rules.

11. This permit does not indicate a waiver of or approval of any other department permit that may be required for other aspects of the total project.

12. This permit conveys no title to land or water, nor constitutes state recognition or acknowledgement of title, and does not constitute authority for the reclamation 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.

13. This permit also constitutes:

[X] Determination of Best Available Control Technology (BACT)
[X] Determination of Prevention of Significant Deterioration (PSD)
[ ] Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)

BEST AVAILABLE COPY

PERMIT NO.: AC 29-49692
APPLICANT: Brewster Phosphates

SPECIFIC CONDITIONS:

A029-17813

1. This permit replaces permit no. for the number 2 fluid bed dryer.

2. This permit is not valid until EPA issues a permit authorizing the proposed modification. In event of a difference in any specific condition in the state and federal permits, Brewster Phosphates must comply with the most restrictive operation or emission limit in either permit.

3. Construction of the coal handling facility must begin within 180 days of receiving the state and federal permits for the modification. The applicant shall report any delays in construction and completion of this projec to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

4. Construction shall reasonably conform to the plans submitted in the application.

5. Maximum production rate for this dryer shall not exceed 450 TPH dried product and 3.15 million tons per year.

6. Maximum operation time for the dryer is limited to 7,000 hours per year.

7. Particulate matter emission, determined by reference method 5 as specified in 40 CFR 60, Appendix A, shall not exceed 25 pounds per hour. Test for this pollutant while the dryer is operating at 90 to 100 percent capacity on coal or COM and processing the maximum percentage of pebble rock anticipated to be in the product. Test reports will be submitted semiannually to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

8. Sulfur dioxide emission, determined by reference method 6 as specified in 40 CFR 60, Appendix A, shall not exceed 195 lb/hr. or 1.1 lb/MMBTU heat input, whichever is more restrictive. Test for this pollutant while the dryer is operating at 90 to 100 percent capacity. Test reports will be submitted semiannually to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

9. Sulfur content of the fuels shall not exceed:
   - 1.7 percent in the No. 6 fuel oil;
   - 1.5 percent in the COM fuel;
   - 1.33 percent in the coal.

   To use fuels with higher sulfur contents, Brewster Phosphates must obtain the Department's approval. This can be accomplished by modifying the scrubber and providing data showing its sulfur dioxide removal efficiency or by providing data showing a greater removal of sulfur dioxide by the pebble phosphate rock and coal ash than was predicted in the application.

PERMIT NO.: AC 29-49692
APPLICANT: Brewster Phosphates

SPECIFIC CONDITIONS:

10. Visible emissions from the dryer, as determined semiannually by reference Method 9 described in 40 CFR 60, Appendix A, shall not exceed 20 percent opacity. Visible emission test will be conducted and reported simultaneously with the particulate matter test.

11. Nitrogen oxide emission shall not exceed:

    56.6 lb/hr or 81 ppm when the dryer is firing No. 6 oil.
    106.6 lb/hr or 152 ppm when the dryer is firing coal.
    82.3 lb/hr or 118 ppm when the dryer is firing COM fuel.

    Compliance will be determined by reference Method 7 as described in 40 CFR 60, Appendix A. Tests will be conducted when the dryer is operating at 90 to 100 percent of permitted production with each fuel used by the dryer. Periodic tests will not be required for this pollutant unless requested in writing by the Department.

12. Water sprays will be installed at all transfer points of the coal conveying system. Visible emissions from the coal handling system shall not exceed 10 percent opacity as determined by reference Method 9 of 40 CFR 60, Appendix A.

13. Carbon monoxide emission shall not exceed 5.8 lb/hr or 41.0 TPY. Complianc tests are required when requested in writing by the Department.

14. Volatile Organic Compounds emissions shall not exceed 1.2 lb/hr or 8.2 TPY Compliance tests are required when requested in writing by the Department.

15. Reasonable precautions to prevent fugitive particulate emissions during construction, such as coating or spraying roads and construction sites used by contractors, will be taken by the applicant.

16. 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 operating permit.

17. 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 minimum: type and quantity of phosphate rock processed; type, quantity and sulfur content (average and maximum for each type) of fuel used;and total hours of operation of the dryer.

18. Stack test facilities will meet the minimum specifications in Chapter 17-2 700 (4), FAC.

PERMIT NO.: AC 29-49692
APPLICANT: Brewster Phosphates

19. The following data from the Entoleter Centri Field Scrubber will be obtained each day the dryer operates and records of the data kept for 2 years for regulatory agency inspection.

    a. Pressure drop of the gas in inches of water;
    b. flow rate of scrubber water in volume per time, i.e. GPM. A weir or similar device may be used to obtain this flow;
    c. pH of the scrubber water;
    d. pressure of the scrubber water.

20. Brewster Phosphates' NPDES permit shall be modified before any discharge is allowed from the rainfall run-off water disposal system or scrubber water system that contains chemical additives to the surface waters of Florida.

Expiration Date: April 15, 1984

Issued this ______ day of ________________, 19______.

______ Pages Attached.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

____
Signature

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

APPLICANT: Brewster Phosphates
Bradley, Florida 33835

PERMIT/CERTIFICATION
NO. AC 29-49694

COUNTY: Hillsborough

PROJECT: Converting Dryer to alternate fuels.

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Chapter 17-2, Florida Administrative Code. The above named applicant, hereinafter called Permittee, is hereby authorized to perform the work or operate the facility shown on the approved drawing(s), plans, documents, and specifications attached hereto and made a part hereof and specifically described as follows:

Modification of an existing 450 TPH (product) phosphate rock dryer/scrubber and construction of fuel storage and handling facilities required for the use of COM, coal and/or fuel oil in the phosphate rock dryer. The coal handling system consists of a new railroad spur on the plant property, a bottom dump rail car unloading facility with water sprays to control fugitive particulate emission, a rotary stacker with an adjustable discharge chute to minimize the free fall distance, a paved and curbed area for coal storage with water sprays to minimize fugitive particulate emission, a rainfall run-off water disposal system for the storage area, a coal reclamation system using pay-loaders and a conveyor belt with water spray to control fugitive emission, two day storage bins, a sealed coal pulverizer and a Peabody coal firing burner. The dryer is located 2 miles NNE of Ft. Lonesome in Hillsborough County, Florida. The UTM coordinates of the site are 389.55E and 3067.93N.

Construction shall be in accordance with the attached permit application and documents and drawings except as otherwise noted on page 3 through 5, Specific Conditions".

Attachments: November 1981 application
January 1982 Supplemental Information

PERMIT NO.: AC 29-49694
APPLICANT: Brewster Phosphates

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 Section 403.161(1), Florida Statutes. Permittee is hereby placed on notice that the department will review this permit periodically and may initiate court 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 indicated in the attached drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit shall constitute grounds for revocation and enforcement action by the department.

3. 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 non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance. 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.

4. As provided in subsection 403.087(6), 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.

5. This permit is required to be posted in a conspicuous location at the work site or source during the entire period of construction or operation.

6. 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 Section 403.111, F.S.

7. In the case of an operation permit, 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.

8. 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 penalities 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, except where specifically authorized by an order from the department granting a variance or exception from department rules or state statutes.

9. This permit is not transferable. Upon sale or legal transfer of the property or facility covered by this permit, the permittee shall notify the department within thirty (30) days. The new owner must apply for a permit transfer within thirty (30) days. The permittee shall be liable for any non-compliance of the permitted source until the transferee applies for and receives a transfer of permit.

10. The permittee, by acceptance of this permit, specifically agrees to allow access to permitted source at reasonable times by department personnel presenting credentials for the purposes of inspection and testing to determine compliance with this permit and department rules.

11. This permit does not indicate a waiver of or approval of any other department permit that may be required for other aspects of the total project.

12. This permit conveys no title to land or water, nor constitutes state recognition or acknowledgement of title, and does not constitute authority for the reclamation 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.

13. This permit also constitutes:

[X] Determination of Best Available Control Technology (BACT)
[X] Determination of Prevention of Significant Deterioration (PSD)
[ ] Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)

PERMIT NO.: AC 29-49694
APPLICANT: Brewster Phosphates

SPECIFIC CONDITIONS:

1. This permit replaces permit no. A029-25324 for the number 1 fluid bed dryer.

2. This permit is not valid until EPA issues a permit authorizing the proposed modification. In event of a difference in any specific condition in the state and federal permits, Brewster Phosphates must comply with the most restrictive operation or emission limit in either permit.

3. Construction of the coal handling facility must begin within 180 days of receiving the state and federal permits for the modification. The applicant shall report any delays in construction and completion of this projec to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

4. Construction shall reasonably conform to the plans submitted in the application.

5. Maximum production rate for this dryer shall not exceed 450 TPH dried product and 3.15 million tons per year.

6. Maximum operation time for the dryer is limited to 7,000 hours per year.

7. Particulate matter emission, determined by reference method 5 as specified in 40 CFR 60, Appendix A, shall not exceed 25 pounds per hour. Test for this pollutant while the dryer is operating at 90 to 100 percent capacity on coal or COM and processing the maximum percentage of pebble rock anticipated to be in the product. Test reports will be submitted semiannually to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

8. Sulfur dioxide emission, determined by reference method 6 as specified in 40 CFR 60, Appendix A, shall not exceed 195 lb/hr. or 1.1 lb/MMBTU heat input, whichever is more restrictive. Test for this pollutant while the dryer is operating at 90 to 100 percent capacity. Test reports will be submitted semiannually to the Department's Southwest District Office and Hillsborough County Environmental Protection Commission.

9. Sulfur content of the fuels shall not exceed:
   1.7 percent in the No. 6 fuel oil;
   1.5 percent in the COM fuel;
   1.33 percent in the coal.

   To use fuels with higher sulfur contents, Brewster Phosphates must obtain the Department's approval. This can be accomplished by modifying the scrubber and providing data showing its sulfur dioxide removal efficiency or by providing data showing a greater removal of sulfur dioxide by the pebble phosphate rock and coal ash than was predicted in the application.

PERMIT NO.: AC 29-49694
APPLICANT: Brewster Phosphates

SPECIFIC CONDITIONS:

10. Visible emissions from the dryer, as determined semiannually by reference Method 9 described in 40 CFR 60, Appendix A, shall not exceed 20 percent opacity. Visible emission test will be conducted and reported simultaneously with the particulate matter test.

11. Nitrogen oxide emission shall not exceed:

    56.6 lb/hr or 81 ppm when the dryer is firing No. 6 oil.
    106.6 lb/hr or 152 ppm when the dryer is firing coal.
    82.3 lb/hr or 118 ppm when the dryer is firing COM fuel.

    Compliance will be determined by reference Method 7 as described in 40 CFR 60, Appendix A. Tests will be conducted when the dryer is operating at 90 to 100 percent of permitted production with each fuel used by the dryer. Periodic tests will not be required for this pollutant unless requested in writing by the Department.

12. Water sprays will be installed at all transfer points of the coal conveying system. Visible emissions from the coal handling system shall not exceed 10 percent opacity as determined by reference Method 9 of 40 CFR 60, Appendix A.

13. Carbon monoxide emission shall not exceed 5.8 lb/hr or 41.0 TPY. Compliance tests are required when requested in writing by the Department.

14. Volatile Organic Compounds emissions shall not exceed 1.2 lb/hr or 8.2 TPY Compliance tests are required when requested in writing by the Department.

15. Reasonable precautions to prevent fugitive particulate emissions during construction, such as coating or spraying roads and construction sites used by contractors, will be taken by the applicant.

16. 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 operating permit.

17. 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 minimum: type and quantity of phosphate rock processed; type, quantity and sulfur content (average and maximum for each type) of fuel used; and total hours of operation of the dryer.

18. Stack test facilities will meet the minimum specifications in Chapter 17-2 700 (4), FAC.

PERMIT NO.: AC 29-49694
APPLICANT: Brewster Phosphates

19. The following data from the Entoleter Centri Field Scrubber will be obtained each day the dryer operates and records of the data kept for 2 years for regulatory agency inspection.

    a. Pressure drop of the gas in inches of water;
    b. flow rate of scrubber water in volume per time, i.e. GPM. A weir or similar device may be used to obtain this flow;
    c. pH of the scrubber water;
    d. pressure of the scrubber water.

20. Brewster Phosphates' NPDES permit shall be modified before any discharge is allowed from the rainfall run-off water disposal system or scrubber water system that contains chemical additives to the surface waters of Florida.

Expiration Date: April 15, 1984

Issued this ______ day of ______________, 19______.

______ Pages Attached.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

____
Signature

APPENDIX D

FEDERAL PSD PERMIT PSD-FL-088

FDER proposes a preliminary determination of approval with conditions for the project (modifications to burn alternate fuels in two existing 450 TPH product phosphate rock dryers) requested by Brewster Phosphates in their state and federal applications for permits to construct that were completed on February 9, 1982.

Special conditions listed in the draft state permits (AC29-49692 and AC29-49694) are adopted as special conditions for the draft federal permit, PSD-FL-088 for this source.

The attached General Conditions are also made a part of the proposed federal permit PSD-FL-088.

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 limitation 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 specifed 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 provide the permitting authority with the following information in writing within five (5) days of such conditions:

   (a) description of 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 violationof 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 increases 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 methods 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 by this permit to the permitting agency shall be mailed to:

   Chief, Air Facilities Branch
   Air and Hazardous Materials Division
   U. S. Environmental Protection Agency
   Region IV
   345 Courtland Street
   Atlanta, Georgia 30308

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.


SHOLTES & KOOGLER
Environmental Consultants

SUPPLEMENTAL INFORMATION

APPLICATION FOR FEDERAL
PSD APPROVAL
PSD-FL-088
AND
FDER AIR POLLUTION SOURCE
CONSTRUCTION PERMITS
AC29-49692
AC29-49694

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

JANUARY 1982

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS
1213 NW 6TH STREET
GAINESVILLE, FLORIDA 32601
904/377-5822

1.0 BASELINE SULFUR DIOXIDE EMISSIONS

During the period March 1979 through March 1981, Brewster used a total of 16.6 million gallons of fuel oil to provide heat to two fluid-bed phosphate rock dryers. The average sulfur content of the oil was 2.37 percent. The heat content of the fuel oil averaged 17,920 BTU per pound and the average weight of the fuel oil was 8.45 pounds per gallon. The average sulfur dioixde absorption rate in the dryer/scrubber system taking into consideration the average product mix, was 52.3 percent. The conditions under which the two dryers were operated during this two-year period were in accordance with approvals granted by the FDER, Southwest District Office in Tampa. The data cited in this paragraph are summarized in Attachment 1.

Based on the data in Attachment 1, it has been calculated that the sulfur dioxide emission rate over the two-year period, March 1979 through March 1981, averaged 1.26 pounds of sulfur dioxide per million BTU heat input. Since the actual sulfur dioxide emission rate during the two-year period prior to the submission of the PSD application exceeded the sulfur dioxide emission rate used for calculating baseline sulfur dioxide emissions from the two rock dryers for purposes of the subject PSD application no modifications to the PSD application are necessary.

2.0 NET PARTICULATE MATTER EMISSION INCREASE

In preparing the subject PSD Application it was calculated that there would be a net particulate matter increase of 17.9 tons per year from the coal handling operations and a net particulate matter increase of 0.3 tons per year from rail traffic necesary to import coal to the site. It was estimated that there would be no particulate matter emissions increase from the two dryers as a result of burning either a higher sulfur fuel oil, a coal/oil mix fuel or coal.

The fact that no particulate matter increase will be expected from the two dryers is based on communications with the scrubber manufacturer (Entoleter) and a letter from Heyl & Patterson Engineers and Constructors, the contractor responsible for specifying and installing the Entoleter scrubbers. In a letter to American Cyanamid (the operating partner of the Brewster Phosphates partnership) dated September 25, 1981, Heyl & Patterson states . . "it can, therefore, be concluded that the particulate emission levels will remain unchanged on your dryers without making any changes to the scrubber operating conditions". This letter was referring to the use of coal as a fuel in the dryers.

The total net particulate matter increase, as a result of a conversion to a higher sulfur oil, a coal/oil mix or coal, will therefore be entirely the result of fugitive particulate matter emission increases. These increases will be greatest if coal is used as a fuel. In this case the maximum net particulate matter increase will be 18.2 tons per year; all from fugitive sources related to coal transport, handling and transfer. If a higher sulfur oil or a coal/oil mix is used as a fuel, there will be no net increase in particulate matter emissions.

The construction permits for the two dryers allow a maximum particulate matter emission rate of 45.8 pounds per hour per dryer with no limit on the hours of operation.

The request by Brewster to use alternative dryer fuels in terms of the above stated conditions and the requirements of Chapter 17-2 of the Florida Administrative Code will be reviewed. In paragraph 17-2.500(2)(d)4a(ii) it is stated the a modification to a major facility is subject to new source review if the modification would result in a significant net emission increase of any pollutant regulated under the Act. In paragraph 17-2.500(2)(e)1 it states that a modification to a facility results in a net emission increase when the contemporaneous increases and decreases in actual emissions, including increases and decrease in fugitive emissions, is greater than zero. In paragraph 17-2.500(2)(e)2 a significant net increase is defined as an increase equal to or greater than de minimus increases specified in the Chapter; an increase of 25 tons per year for particulate matter and 40 tons per year for sulfur dioxide and nitrogen oxides. Based on the three referenced paragraphs of Chapter 17-2, the modification to the Brewster facility is subject to new source review since there will be a significant net increase in the emission rate of two pollutants regulated under the act; sulfur dioxide and nitrogen oxides.

Pursuing Chapter 17-2 further, it states in 17-2.500(2)(f)1 that new source review requirements of this section shall apply to all pollutants regulated under the act for which there is a significant net increase. It has been calculated that the net increase in particulate matter emissions will be no greater than 18.2 tons per year; an increase which is less than the 25 tons per year de minimus increase established for this pollutant in Table 500-2 of Chapter 17-2. This increase will result entirely from fugitive emissions resulting from the transport and handling of coal. If higher sulfur oil or a coal/oil mix used a fuel, there will be no increase in particulate matter emissions.

Regarding emissions from the rock dryers, it is the opinion of Brewster Phosphates and its consultants that the use of alternative fuels will result in no increase in the hourly particulate matter emission rate from the two dryers as stated earlier in this section.

The question was raised by FDER about the applicability of PSD or new source review for particulate matter to the modification requested by Brewster since, in the PSD Application, a request is made to operate the two dryers a total of 14,000 hours per year whereas the actual hours of operation for the two dryers over a representative historic two year period averaged only 8500 hours per year, total for both dryers. It was suggested that the increase in actual annual emissions resulting from increasing the actual hours of operation from 8500 hours per year to 14,000 hours per year, even though there was to be no increase actual hourly particulate matter emissions, might trigger a new source review for particulate matter.

Pursuing this matter in the requirements of Chapter 17-2, it states in paragraph 17-2.100(102) that a modification is any physical change or change in method of operation of, or addition to a stationary facility which increases the actual emissions of any air pollutant regulated under this Chapter from any source from within such a facility. It further states, however, that a modification shall not include an increase in hours of operation or production rate unless the change would be prohibited under any federally enforcable permit condition established after January 6, 1975. There have been no such permit conditions attached to the operation of the Brewster dryers.

Hence, the potential increase in particulate matter emissions resulting from increasing the operating hours of the dryers from an actual time of 8500 hours per year to a requested permit time of 14,000 hours per year are not to be considered in evaluating applicability of the PSD regulations.

It is the position of Brewster of that the only increase in particulate matter emission that are to be considered in evaluating the applicability of PSD regulations are the fugitive particulate matter emissions resulting from coal handling. The particulate matter emission increase therefore is only 18.2 tons per year; an increase which is less than the de minimus increase defined in Table 500-2 of Chapter 17-2 FAC. Since this increase is not significant the fuels modification is not subject to new source review for particulate matter [17-2.500(2)(f)1].

Even though the project proposed by Brewster is not subject to PSD for particulate matter, FDER is of the opinion that the new permits that will be issued for the dryers will have to include a revised particulate matter emission limiting standard that will assure there will be no actual increase in particulate matter emissions. That is, a standard that will limit future hourly particulate matter emissions to a rate no greater than historic actual hourly emission rates.

Brewster has particulate matter emission data from the two rock dryers covering the period 1976 (start-up date) through mid-1981. These data represent the results of 23 emission measurement tests conducted on both dryers under a variety of conditions representing various drying rates and product types. The particulate matter emission rates measured ranged from 2.7 to 43.0 pounds per hour. The emission rate exceeded 90 percent $(\bar{x} + 1.28\sigma)$ was 24.8 pounds per hour and the average emission rate $(\bar{x})$ was 14.0 pounds per hour.

Based on these test data, Brewster suggests a particulate matter emission limiting standard for the modified dryer permits of 25.0 pounds per hour per dryer.

3.0 AMBIENT MONITORING REQUIREMENTS FOR SULFUR DIOXIDE

As stated in Section 4.0 of the PSD Application, ambient air quality monitoring for sulfur dioxide is being conducted by Brewster Phosphates in accordance with the requirements for a monitoring network agreed upon between Brewster and the Florida Department of Environmental Regulation during the meeting on September 9, 1981. The monitoring program commenced on October 1, 1981 and will terminate, for purposes of this PSD Application on January 31, 1982. The monitoring data collected from this monitoring network are being compiled and will be presented to FDER during the first week of February, 1982.

4.0 BACKGROUND AMBIENT AIR LEVELS FOR AIR POLLUTANTS

A request was made for background levels of the pollutants subject to PSD review as a result of the fuel modification requested by Brewster. These pollutants are sulfur dioxide and nitrogen oxides. The background data for sulfur dioxide are being collected by ambient monitoring, as addressed in the previous section, and will be forwarded to FDER in February, 1982.

Monitoring for nitrogen oxides is not required under either State or Federal PSD regulations since air quality modeling has demonstrated that the impact of increased nitrogen oxides emissions are less than the established de minimus impact levels for this pollutant. For purposes of PSD review, however, FDER has requested that Brewster Phosphates estimate the existing ambient background level of nitrogen oxides at the site of the rock dryers.

The annual average nitrogen oxides concentration at the site is estimated to be 16.0 micrograms per cubic meter, annual average (standard is 100 micrograms per cubic meter, annual average). This concentration was estimated using ambient monitoring data collected by the Hillsborough County Environmental Protection Commission at their monitoring Site 7 in Brandon, Florida. The Brandon monitor is 15.2 kilometers from the central Tampa area; the assumed source of major nitrogen oxides emitting sources in the area. The annual average nitrogen oxide level at the Brandon site for the three year period 1979-1981 was 28.0 micrograms per cubic meter, including a Hillsborough County Environmental Protection Commission estimated 12 micrograms per cubic meter background.

The Brewster site is 39.4 kilometers from the central Tampa area. To estimate the nitrogen oxides level at this site, the nitrogen oxides contributed by point sources to the Brandon monitoring site were decreased using the Guassian dispersion equation (Attachment 2) to account for the increased distance from Tampa to the Brewster site. To this decreased point source impact, the background concentration of 12 micrograms per cubic meter was again added, resulting in a site estimated nitrogen oxides level of 16.0 micrograms per cubic meter, annual average. The calculations leading to this estimate are included in Attachment 2.

5.0 SCRUBBER MODIFICATION

The cost of $450,000.00 stated in Section IIC of the FDER Construction Permit Applications for the cost of pollution control systems represents the original costs of each of the Entoleter scrubbers. The proposed fuels modification requested by Brewster will require no modifications to the existing scrubbers. This is the opinion of Brewster and its consultants as documented in Section 2.0 of this response.

6.0 DRYER OPERATING PARAMETERS

In the Construction Permit Applications submitted by Brewster for the modifications to the two rock dryers and in the PSD Application addressing the modifications it is stated that the product distribution over an annual period would be 5 percent pebble rock, 60 percent concentrate rock and 35 percent a blend of pebble and concentrate rock. Also, in the Construction Permit Application an operating time of 14,000 dry hours per year, total, for the two dryers was requested and allowable particulate matter emission rates of 45.8 pounds per hour for each of the two dryers is specified at a maximum design rate of 450 tons per hour per dryer.

Product Distribution. The production distribution stated in the applications is a reasonable product distribution for a long-term average. Since the absorption of sulfur dioxide in the dryer, and hence the sulfur dioxide emission rate, is dependent upon the type of product being dried, however, it was suggested by FDER that the worst case distribution of products be estimated for purposes of calculating the annual sulfur dioxide emissions. It should be noted that the product distribution will have no effect on the short-term sulfur dioxide impacts addressed in the FDER Construction Permit Applications and the PSD Application since the lowest sulfur dioxide absorption rate, and hence the highest sulfur dioxide emission rate, was used in evaluating these impacts.

In Attachment 3 the revised annual sulfur dioxide emissions are calculated for an annual period with a worst case product distribution of 15 percent pebble rock, 60 percent concentrate rock and 25 percent a blend of pebble and concentrate. Also in Attachment 3 the estimated increase in the annual average ambient sulfur dioxide impact resulting from the revised product distribution is estimated based on a ratio of the original sulfur dioxide impact, the original annual sulfur dioxide emission rate and the revised annual sulfur dioxide emission rate. These figures show there will be a 1.7 percent increase in annual sulfur dioxide when coal is used as a fuel; the "worst case" condition (from 2238 tpy to 2276 tpy). There will also be a corresponding 1.7 percent increase in the 3.0 micrograms per cubic meter annual average impact of sulfur dioxide emissions resulting from the Brewster fuels modification; an insignificant increase in ambient impact.

Hours of Operation and Production Rate. Regarding the hours of operation, Brewster feels that it is reasonable to limit the annual operating hours of each dryer to 7,000 hours per year rather than stating that there will be a total of 14,000 dryer hours partitioned between the two dryers. The maximum dryer production in either case is requested to be 450 tons of dry rock per hour per dryer. The change resulting from specifying 7,000 operating hours per year per dryer instead of 14,000 hours per year for both dryers will not have any effect on the PSD Application.

Particulate Matter Emission Limits. As addressed in Section 2.0 of this response, particulate matter emissions from the Brewster facility are not subject to new source review. To assure that there will be no emissions increase in particulate matter emissions as a result of the fuel change, in accordance with the requirements of State and Federal regulations, Brewster is suggesting a particulate matter emission limiting standard of 25.0 pounds per hour for each dryer for the modified permits (See Section 2.0 for justification).

7.0 FUEL AVAILABILITY

During the evaluation of BACT for sulfur dioxide emissions from the two existing rock dryers, it is extremely important that the sulfur dioxide adsorption inherent to the system be taken into consideration. The two phosphate rock dryers operated by Brewster have inherent sulfur dioxide adsorption characteristics which are dependent upon the sulfur content of the fuel and the product being dried (see Attachment 2, Appendix 2A-1 of the Federal PSD Application).

Assuming an annual product mix of 15 percent pebble rock, 60 percent concentrate rock and 25 percent a blended pebble and concentrate, the annual sulfur dioxide adsorption rate varies from 91.9 percent with a 0.8 percent sulfur fuel to 50.0 percent with a 2.6 percent sulfur fuel. The significance of this is that actual sulfur dioxide emissions from the dryers are much less than the potential sulfur dioxide emissions.

As permitted at the time of construction, the two dryers were limited to fuel oil with a 0.8 percent sulfur content until such time that the sulfur dioxide adsorption rate could be documented. Under these permitted conditions the potential sulfur dioxide emission rate from the two dryers, assuming 14,000 dryer hours per year total, would be 1,087 tons per year. This is equivalent to a sulfur dioxide emission rate of 0.88 pounds of sulfur dioxide per million BTU heat input. The actual sulfur dioxide emission rate from the two dryers under these conditions, however, was only 88 tons per year. This resulted in an actual sulfur dioxide emission rate of 0.07 pounds of sulfur dioxide per million BTU heat input or the use of a fuel oil with an equivalent sulfur content of 0.06 percent.

With fuel oil with a 2.6 percent sulfur content, as requested in the FDER Construction Permit Applications and the PSD Application, there will be a potential sulfur dioxide emission rate of 3,597 tons per year. The annual average sulfur dioxide adsorption rate with this fuel will be 50.0 percent. Taking into consideration this adsorption, the actual annual sulfur dioxide emissions will be reduced to 1,798 tons per year. These emissions are equivalent to a sulfur dioxide emission rate of 1.45 tons of sulfur dioxide per million BTU heat input or the use of a fuel oil with a sulfur content of 1.3 percent sulfur.

With the use of a coal/oil mix with a 2.6 percent sulfur content the annual average adsorption rate is again 50.0 percent. The potential emissions from the use of this fuel will be 4,370 tons of sulfur dioxide per year. Taking into consideration the inherent adsorption within the system, the actual sulfur dioxide emissions will be 2,185 tons per year. These emissions are equivalent to a sulfur dioxide emission rate of 1.76 pounds of sulfur dioxide per million BTU of heat input. This is equivalent to burning a coal/oil mix with a sulfur content of 1.3 percent sulfur.

If coal with a 2.3 percent sulfur content is used as a fuel the annual average adsorption rate will be 52.1 percent. This inherent adsorption will reduce the potential emissions of 4,752 tons per year to an actual sulfur dioxide emission rate of 2,276 tons per year. These emissions are equivalent to a sulfur dioxide emission rate of 1.84 pounds of sulfur dioxide per million BTU heat input or the use of a coal with a 1.1 percent sulfur content.

The data cited in the above paragraphs are summarized in Attachment 5.

Emission standards applicable in Florida to sulfur dioxide emitting sources include Performance Standards for fossil fuel fired power plants. FDER emission regualtions for existing power plants within the State limit sulfur dioxide emissions when a liquid fuel is being burned to between 1.1 and 2.5 pounds per million BTU for specified plants throughout the state and to 2.75 pounds per million BTU for all plants not specified. When solid fuel is burned, the FDER emission regulations for existing power plants limit sulfur dioxide emissions to between 2.4 and 6.5 pounds per million BTU at specified power plants and to 6.17 pounds per million BTU for all plants not specified. Some of these standards were adopted after Federal PSD regulations, including BACT review, became effective.

The dryers operated by Brewster have a heat input of 177 million BTU per hour each. This heat input rate is considerably less than the 250 million BTU per hour limit which determines the applicability of the New Source Performance Standards to power plants. In addition, the dryers operated by Brewster are located in a remote area well away from any population center whereas power plants are usually located in or near urban areas with a high population density.

One other matter to consider is the fact that the maximum sulfur dioxide impacts in the vicinity of the two Brewster dryers are only 27 percent of the annual standard, under annual average conditions and only 61 percent of the 24-hour standard and 20 percent of the 3-hour standard during periods with the highest sulfur dioxide emission rate requested in the PSD application (the periods when pebble rock is being dried with coal as a fuel). This condition can be expected to occur a maximum of 15 percent of the time over an annual period. For 25 percent of the time the maximum expected sulfur dioxide impacts will be 59 percent and 19 percent of the 24-hour and 3-hour air quality standards, respectively (when a blend of rock is being dried). And, for 60 percent of the time the maximum expected sulfur dioxide impacts will be 15 percent of the 3-hour standard and 34 percent of the 24-hour standard (when concentrate is being dried).

It is Brewsters opinion that when the three mitigating factors stated in the previous paragraphs are taken into consideration, plus the economic data presented in Section 8.0 of this response and in Section 3.0 of the PSD application, the use of fuel oil or a coal/oil mix with an equivalent sulfur content of 1.3 percent or the use of coal with an equivalent sulfur content of 1.1 percent represents Best Available Control Technology for sulfur dioxide emissions.

In response to an FDER question regarding the availability of fuel oil, Brewster is applying for a modification to existing operating permits to allow the use of a higher sulfur fuel oil, a coal/oil mix or coal as dryer fuels because of a concern over the availability of low sulfur fuel and the cost of burning low sulfur fuel. Brewster has requested a letter from its fuel supplier addressing the availability of low sulfur fuel oil in the future. A copy of this correspondence is included in this response as Attachment 4.

Regarding the availability of fuel if fuel with 0.8 percent sulfur or less becomes unavailable, Brewster's fuel supplier communicated that in such a situation, oil with a 2.0 to 2.5 percent sulfur fuel would be the best grade of fuel available. The supplier further communicated that fuels with a sulfur content between 0.8 and 2.0-2.5 percent are obtained by blending fuel oil with a 0.8 percent sulfur content and a fuel oil with a 2.0-2.5 percent sulfur content; hence the jump to a high sulfur fuel if the 0.8 percent sulfur oil is not available.

8.0 ECONOMIC CONSIDERATIONS RELATED TO PHOSPHATE ROCK DRYING

Cost Of Dried Phosphate Rock. The production cost that Brewster places on ton of dried phosphate rock, dried with fuel oil with a 0.8 percent sulfur content is approximately $20.00. Of this amount, fuel cost represent $1.86 per ton or 9.3 percent of the value of the dried rock.

The fuel cost for the fuels requested by Brewster in the PSD application, as determined from Table 3-1 of the PSD application, are $1.55 per ton for fuel oil with 2.6 percent sulfur content, $1.46 per ton for coal/oil mix with 2.6 percent sulfur content and $0.93 per ton for coal with a 2.3 percent sulfur content.

If oil with 2.6 percent sulfur content is used to dry a rock, the value of the rock would be $19.69 per ton with fuel cost representing 7.9 percent of the value. If coal/oil mix with a 2.6 percent sulfur content is used to dry the rock, the value of the dried rock would be $19.60 per ton with the cost of fuel representing 7.5 percent of this value. For coal dried rock, the value of the rock would be $19.07 per ton with fuel costs representing 4.9 percent of this value.

Scrubber Water Additives For Sulfur Dioxide Removal. Brewster has obtained estimates for adding lime, soda ash and caustic to the scrubber water use in the existing Entoleter scrubbers to enhance sulfur dioxide removal. These estimates included the utilization rate of each of the additives necessary to reduce the sulfur dioxide emissions from the emission rate resulting from the combustion of 2.6 percent sulfur fuel oil or coal/oil mix or the combustion of 2.3 percent coal to a sulfur dioxide emission rate equivalent to 0.8 pounds of sulfur dioxide per million BTU heat input, the annual cost of each of the additives based on a total of 14,000 dryer hours per year and the capital expenditures for the storage and feed systems necessary for feeding each of the three additives.

Another matter related to scrubber water additives that Brewster will need to evaluate in more detail is the impact of these additives on the quality of water discharged under Brewsters existing NPDES Discharge Permit. The terms of this permit are such that the addition of materials not presently contained in the discharge are prohibited. If scrubber water additives are required as a condition for buring a higher sulfur fuel, Brewster will have to evaluate in detail the impact of these additives on the quality of water discharged.

If water treatment is necessary it has been estimated that the capital cost of a water treatment system will be approximately $400,000 and the annual operating cost, including chemicals, labor and electric power, will be in the range of $250,000.

The utilization rates of the three scrubber water additives and all of the costs associated with the scrubber water additives are summarized in Attachment 6.

Scrubber Modifications. Brewster's consultants Heyl & Patterson and the scrubber manufacturer, Entoleter, are both of the opinion that no modification to the existing scrubbers are necessary to control emissions resulting from the modified fuels. Brewster and its consultant are also of the opinion that the Entoleter scrubber has performed extremely well in the past and that no better scrubber could be specified for controlling emissions from the rock dryers. Because of this Brewster is not considering a replacement scrubber as an alternative for controlling emissions from the dryers.

9.0 SULFUR DIOXIDE ABSORPTION DATA

Test conducted by Entoleter in January of 1980 indicate that virtually all (99+ percent) of the sulfur dioxide absorption takes place in the fluid-bed dryer. The tests indicated that the scrubber, with a scrubber water flow rate of 415 gallons per minute, 65 gallons per minute of which are recycled, has essentially zero efficiency for sulfur dioxide removal.

10.0 NITROGEN OXIDES EMISSION DATA

During the emission test conducted by Entoleter in January, 1980, Sholtes & Koogler Environmental Consultants of Gainesville, Florida conducted nitrogen oxides emission tests on the two rock dryers. Nitrogen oxide tests were conducted both at the exit of the dryer and the exit of the scrubber. These tests showed that the Entoleter scrubber had a zero efficiency for removing nitrogen oxides from the dryer exhaust gases.

During the period in which the test were conducted the production rate of the dryer tested was 333 tons per hour (450 tons per hour is the design rate). The fuel oil use rate in the dryer averaged 2.53 gallons per ton of rock dried and the sulfur content of the fuel was 2.38 percent. The nitrogen content of the fuel oil was estimated by the fuel supplier to be between 0.27 and 0.29 percent.

The concentration of nitrogen oxides in the dryer exhaust gases measured by SKEC was 61 parts per million. When using this concentration to calculate a nitrogen oxide mass emission rate (Appendix 2A-1 of the PSD Application) the actual stack gas flow rate was not corrected for moisture when converting to the stack gas flow rate standard conditions. The moisture content of the stack gas emitting from the Entoleter scrubbers is normally 25 percent (saturated at 150°F). Since this correction was not made the mass emission rate of nitrogen oxides calculated in Appendix 2A-1 (56.6 pounds per hour per dryer) was high by 25 percent. The correct mass emission rate based on a standard stack gas flow rate and a nitrogen oxides concentration of 61 parts per million would have been 42.5 pounds per hour.

This mass emission rate, however, was measured at a production rate of 333 tons per hour rather than the rated dryer capacity of 450 tons per hour. If one assumes that the nitrogen oxide emission rate is proportional to the dryer production rate, the 42.5 pound per hour emission rate at 333 tons per hour would project to a nitrogen oxides emission rate of 57.4 pounds per hour at a production rate of 450 tons per hour; an emission rate very close to the 56.6 pounds per hour used in the PSD application.

Back calculating from a nitrogen oxides emission rate 56.6 pounds per hour and a standard stack gas flow rate of 97,200 cubic feet per minute (150,000 ACFM at 151°F and 25 percent moisture) a stack gas nitrogen oxides concentration of 81 parts per million is obtained for fuel oil combustion with the dryers operating at 100 percent of rated capacity.

Since the nitrogen oxides mass emission rate used in the PSD Application for oil firing is correct (within 1.4 percent) the mass emission rates for coal firing and coal/oil mix firing are similarily correct. Nitrogen oxides concentrations in the exhaust gases have been calculated for each of these fuels using the mass emission rates stated in the PSD application and the standard stack gas flow rate documented in the above paragraph. For coal firing a exhaust gas nitrogen oxide level of 152 parts per million was calculated and for a coal/oil mix a exhaust gas nitrogen oxide level of 118 parts per million was calculated. As stated previously, the nitrogen oxides concentration in the stack gas stream during oil firing will be 81 parts per million. All of these concentrations are based on a measured stack gas flow rate and a design dryer production rate of 450 tons per hour.

11.0 FUEL USE

The ratio for firing oil, coal or the coal/oil mix fuel has not been determined by Brewster. The fuel use will be highly dependent upon the conditions attached to the permits presently under consideration by FDER.

In all probability Brewster will decide upon a primary fuel, such as coal. This fuel will be used to supply the entire heat requirements of the dryer except in the case of a fuel supply system malfunction. In the case of a malfunction, a backup fuel, such as oil, will be used until the primary fuel system malfunction can be rectified.

For permitting purposes, the PSD Application assumed that coal would be fired 100 percent of the time. This resulted in the worst case emission rates for the pollutants subject to the New Source Review.

If a coal/oil mix fuel is used by Brewster the fuel will be prepared off-site by an independent fuel supplier and delivered to Brewster in tank trucks. This is the means by which fuel oil was presently delivered to the site.

The ratio of coal to oil in the coal/oil mix fuel will depend upon the contract finally negotiated by Brewster, if this fuel is to be used. In all probability the ratio of coal to oil in the fuel will be 52 to 55 percent coal and 48 to 45 percent oil.

12.0 COAL USE

Start of Construction. It is anticipated that construction will begin on the coal handling facilities as soon as the necessary construction permits (State and Federal) are obtained and corporate expenditures are approved. It is expected that construction will begin in June, 1982 and will be completed in March, 1983.

Permits for Coal Handling Facilities. The use of coal as a dryer fuel will necessitate a significant capital expenditure by Brewster Phosphates. The project will require the construction of a new rail spur; a rail car unloading facility; a rotary stacker to transfer coal from the rail car unloading facility to the coal-storage pile; a paved and curbed area for coal storage to contain and collect rainfall run-off; a run-off water disposal system; a coal reclamation system, including a conveyor, to transfer the reclaimed coal from the coal-storage pile to the day-bins; two day-storage-bins; two coal pulverizers and modifications to the two rock dryers involving the replacement of the existing combustion chambers and the installation of Peabody coal firing burners. The capital cost of this project, excluding the use of scrubber water additives to enhance sulfur dioxide control and the cost of a scrubber water treatment system, has been estimated to be six million dollars.

The air pollutant emissions from the use of coal will be fugitive particulate matter resulting from the import and handling of coal, the coal pile activities (on-loading, traffic, wind errosion, and off-loading), the transfer and conveying of coal from the coal-storage pile to the day-bins and the emission of combustion by-products from the dryers. These emissions have been addressed in the subject PSD application.

The coal discharged from the day-bins will be fed in an enclosed system to Atrita pulverizers. From the pulverizers the coal will be blown directly to the Peabody burners in the dryers. The Atrita pulverizers (See Attachment 7) are totally enclosed units and will have no emissions. The Peabody burners (Attachment 8) will likewise result in no fugitive emissions.

The only activities related to the use of coal that will result in an increase in pollutant emissions have been addressed in the subject PSD application. It will be unnecessary, therefore, to apply for any additional permits for facilities related to coal handling.

Location of Coal Handling Facilities. The locations of coal handling facilities, with the exception of the day-storage-bins, were shown in Figure 2-3 of the subject PSD application. This Figure is attached hereto as Attachment 9. In this Figure are shown the location of the new rail spur, the rail car unloading facility, the coal-storage pile and the day-storage-bins. The pulverizers will be located adjacent to the existing dryers.

Coal Pulverizer Emissions. The coal pulverizers are totally enclosed units as described in Attachment 7. There will be no air pollutant emissions from this equipment.

Burner Assembly For Coal Firing. A single Peabody pulverized coal burner, using low pressure atomization of the pulverized coal, will be installed in each of the two dryers. These burners are described in Attachment 8.

Ash Disposal. The majority of the ash produced as a result of coal combustion will remain with the dried phosphate rock. This fraction of the ash will be shipped from the site combined with the product. The small fraction of ash passing through the fluid-bed dryers will combine with the phosphate rock fines in the scrubber water. It is anticipated that the scrubber water will be recirculated through the fine feed tank at the benefication plant, thence through the thickener and will then be disposed of with clays in a reclamation area or the clay settling pond.

Annual Coal Consumption. The annual coal consumption, as used in calculating figutive particulate matter emissions in Appendix 2A-2, will be 103,308 tons per year.

ATTACHMENTS

Historic Fuel Use

Month	Fuel Used (gallons)	Fuel Oil Sulfur Content (%)
3/79	843707	2.41
4	889011	2.32
5	732099	2.23
6	689250	2.14
7	529086	2.31
8	646391	2.48
9	732422	2.54
10	598792	2.60
11	776443	2.74
12/79	837155	2.88
1/80	817986	2.79
2	668266	2.69
3	602737	2.52
4	566489	2.34
5	498702	2.34
6	557434	0.99
7	635962	2.26
8	681410	2.26
9	770939	2.28
10	709391	2.31
11	553346	2.33
12/80	705427	2.36
1/81	527660	2.38
2	547119	2.37
3/81	489712	2.36
Total	16,626,936 gal	Avg 2.37%

Average SO_2 Absorption Rate

Absorption data from Appendix 2A-1, Attachment 2

Product	SO_2 Absorption	Use Factor	Annual Absorption
Pebble	33%	5%	0.017
Concentrate	64%	60%	0.384
Blend	35%	35%	0.123
			Total - 0.523

SO_2 Emissions (2 year total)

= (16,626,936 gal) × (8.45 lb/gal) × (0.0237 × 2 lb SO_2/lb) × (1 − 0.523)
= 3,176,623 lb SO_2

Heat Input (2 year total)

= (16,626,936 gal) × (17,920 BTU/lb) × (8.45 lb/gal) = 2,517,717 × 10^6 BTU

SO_2 Emission Rate (2yr Average)

= 3,176,623 / 2,517,717 = 1.26 lb SO_2 / 10^6 BTU

ATTACHMENT 2

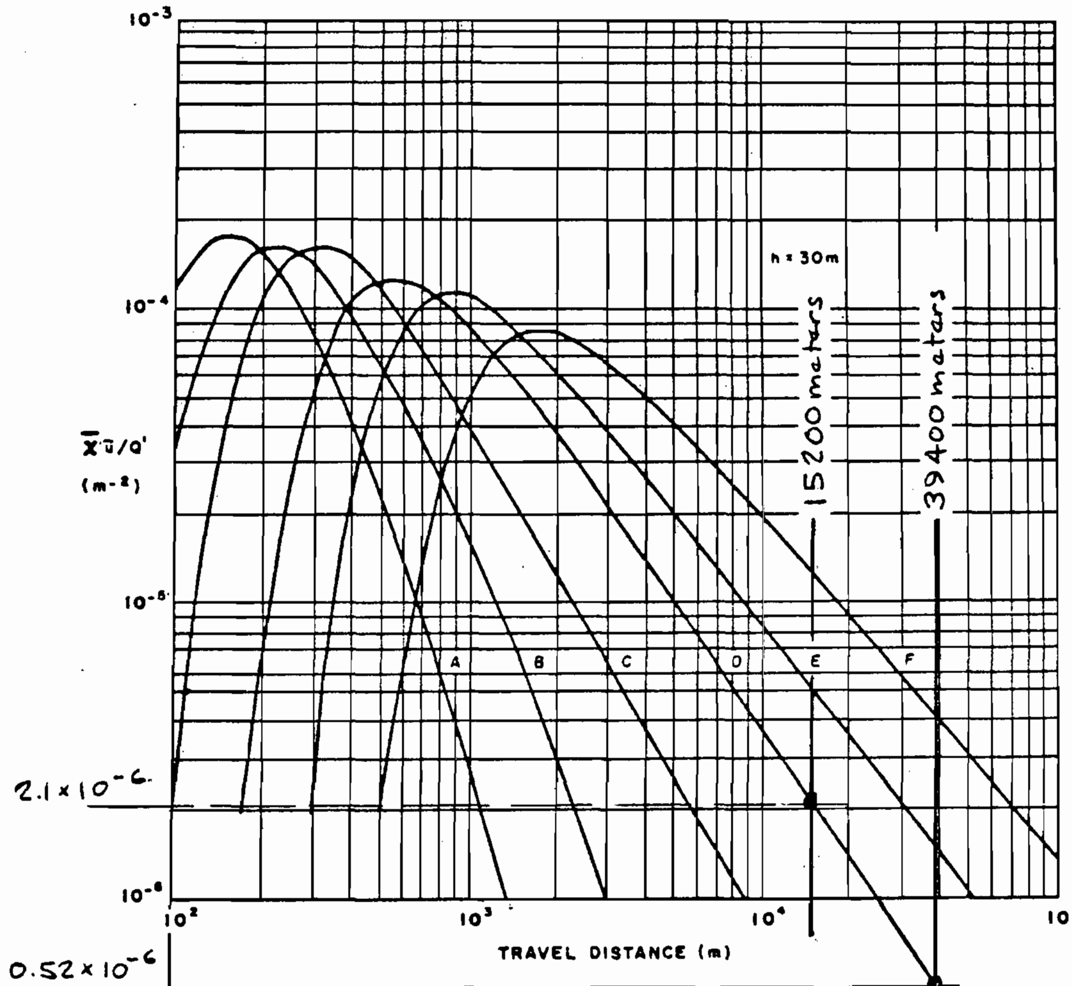


Fig. A.6 — Normalized ground-level average concentration for an effective source height of 30 m as a function of distance from the source (Hilsmeier and Gifford, 1962). A–F are Pasquill's diffusion categories.

Distance Tampa - Brandon — 15200 meters

Relative Impact @ Brandon (D stability) — 2.1×10^{-6}

Actual NO_x level @ Brandon (HCEPC Site 7) — 28.0 μg/m³, annual avg (1979-81 avg)

Bkgnd NO_x level estimated by HCEPC — 12 μg/m³

Distance Tampa - Brewster — 39400 meters

Relative Impact @ Brewster (D stability) — 0.52×10^{-6}

Actual NO_x level @ Brewster

$$= \left[(28.0 - 12)\left(\frac{0.52 \times 10^{-6}}{2.1 \times 10^{-6}}\right)\right] + 12 = \underline{\underline{16.0\ \mu g/m^3\text{, annual avg}}}$$

Revised Annual SO_2 Emission Rate

"Worst Case" from coal combustion

Revision to data on page 5/8, Appendix 2A-1 of PSD application

Revised annual SO_2 absorption rate

Product	"Worst Case" Use Factor	SO_2 Absorption Rate *	Annual Absorption
Pebble	15%	33%	0.050
Concentrate	60%	64%	0.384
Blend	25%	35%	0.088
		Total	0.521

* From Attachment 2, Appendix 2A-1 for 2.3% Sulfur fuel

Annual SO_2 Emissions, Revised

— Coal @ 2.3% Sulfur and 12,000 BTU/lb

$$SO_2 = 177.1 \times 10^6 \text{ BTU/hr} \times 1/12000 \text{ lb/BTU} \times (0.023 \times 2) \text{ lb } SO_2/\text{lb fuel} \times (1 - 0.521) \times (7000 \times 2) \text{ dryer hrs/yr} \times 1/2000 \text{ ton/lb}$$

$$= 2276.3 \text{ tons } SO_2/\text{yr}$$

(2238.3 tons/yr, original calculation)

Annual SO_2 Impact, Revised

From Table 5-4, PSD Application the maximum annual impact of SO_2 emissions from Brewster sources is 3.0 µg/m³.

$$\text{Revised impact} = 3.0 \times (2276.3/2238.3)$$

$$= 3.05 \ \mu g/m^3$$

Note: Short-term impacts remain unchanged since they were based on Pebble drying, ie the lowest SO_2 absorption rate

ATTACHMENT 4

Union 76 Division: Eastern Region

Union Oil Company of California
P.O. Box 1630, Tampa, Florida 33601
Telephone (813) 248-1961

union 76

BREWSTER
JAN 12 1981
H. K. JOHNSON

RECEIVED
JAN 12 1982
HOYT CHARLES

J.H. Smith
Supervisor, Regional Sales - Tampa

January 11, 1982

Mr. Homer K. Johnson
American Cyanamid Company
P. O. Box 208
Bradley, Florida 33835

Dear Mr. Johnson:

This is in response to your inquiry concerning availability of No. 6 Fuel Oil having maximum 1% Sulfur content, for delivery to your plant at Ft. Lonesome, Florida.

Because of limited storage facilities for this product, we have some reservations about giving positive assurance of an adequate supply at all times, since it is conceivable that logistical problems could arise in connection with partial cargo receipts. Due to the relatively low demand for low sulfur fuel in the Tampa area, we consider it unlikely that additional storage will be provided.

We appreciate your interest in our products, and thank you for your valued business.

Sincerely,

John H. Smith

John H. Smith

JHS:tl

Union 76 Division: Eastern Region
Union Oil Company of California
P.O. Box 1630, Tampa, Florida 33601
Telephone (813) 248-1961

RE ... BREWSTER
JAN 25 1982
H. K. JOHNSON

union 76

J.H. Smith
Supervisor, Regional Sales · Tampa

January 20, 1982

Mr. Homer K Johnson
American Cyanamid Company
P. O. Box 208
Bradley, Florida 33835

Dear Mr Johnson:

Supplementing our letter of January 11th concerning availability of No. 6 Fuel Oil for use at your Ft. Lonesome plant, we would like to advise that the alternative to Maximum 1% Sulfur fuel would be our regular No. 6 Fuel, having a guaranteed maximum sulfur content of 2.5%, with typical sulfur being 2.3%.

The nitrogen content of both grades of fuel is typically .27% to .29%.

Because of the greater storage capacity for our maximum 2.5% fuel, we are fully confident of our ability to supply this product at all times. If you have any questions, please give me a call.

Sincerely,

John H. Smith

John H. Smith

JHS:tl

SUMMARY OF NET SULFUR DIOXIDE EMISSIONS

BREWSTER PHOSPHATES, INC.
BRADLEY, FLORIDA

Dryer Heat Input = 177.1×10^6 BTU/hr, each dryer
= 2.48×10^{12} BTU/yr, both dryers

Fuel	Sulfur Content (%)	Heat Content (BTU/lb)	Annual SO_2 Sorption (%)[1]	Sulfur Dioxide Emissions Potential (tons/yr)[2]	Sulfur Dioxide Emissions Actual (tons/yr)[3]	Sulfur Dioxide Emission Rate (lb/10^6 BTU)	Equivalent Sulfur Content of Fuel (%)[4]
Oil	0.8	18250	0.919	1087	88	0.07	0.06
Oil	2.6	17920	0.500	3597	1798	1.45	1.30
COM	2.6	14750	0.500	4370	2185	1.76	1.30
Coal	2.3	12000	0.521	4752	2276	1.84	1.10

(1) Based on sulfur content of fuel and product mix of 15% Pebble, 25% Blend and 60% Concentrate.

(2) Potential emissions (no SO_2 sorption) assuming 14000 dryer hours/year.

(3) Accounting for Sulfur Dioxide sorption.

(4) Based on Acutal fuel use and actual emissions.

SHOLTES & KOOGLER

ATTACHMENT 5

SUMMARY OF COSTS ASSOCIATED WITH THE USE OF
SCRUBBER WATER ADDITIVES

BREWSTER PHOSPHATES, INC.
BFADLEY, FLORIDA

Scrubber Water Additives

Additive	Use Rate[1] (lb/hr)	Chemical Costs ($/ton)[2]	Chemical Costs ($/yr)[3]	Capital Cost[4] ($)	Annual Cost[5] ($)
Lime[6]	1,680	71.50	420,420	600,000	523,920
Caustic[7]	1,320	152.50	704,550	220,000	742,500
Soda Ash	864	92.00	278,208	350,000	338,583

Scrubber Water Treatment System

Capital Cost[1]	Chemicals & Labor ($/year)	Annual Cost[5]
$400,000	$250,000	$279,000

(1) Use rate for both scrubbers to reduce stack gas SO_2 concentration from approximately 500 ppm to approximately 150 ppm (70% reduction).

(2) Delivered cost to Lonesome Mine.

(3) Assuming 7,000 hours per year per dryer.

(4) Capital cost of storage and feed system.

(5) Annual cost of capital, labor and maintenance (at 10% of capital cost), and chemicals; 1982 costs.

(6) Quick lime.

(7) 50% NaOH in water.

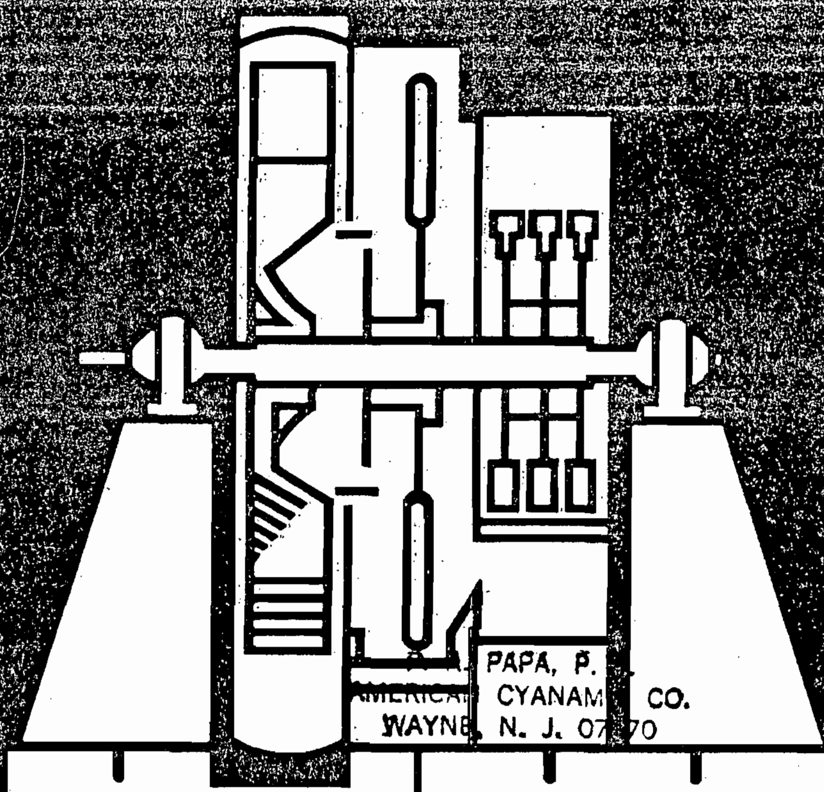
ATTACHMENT 6

SHOLTES & KOOGLER

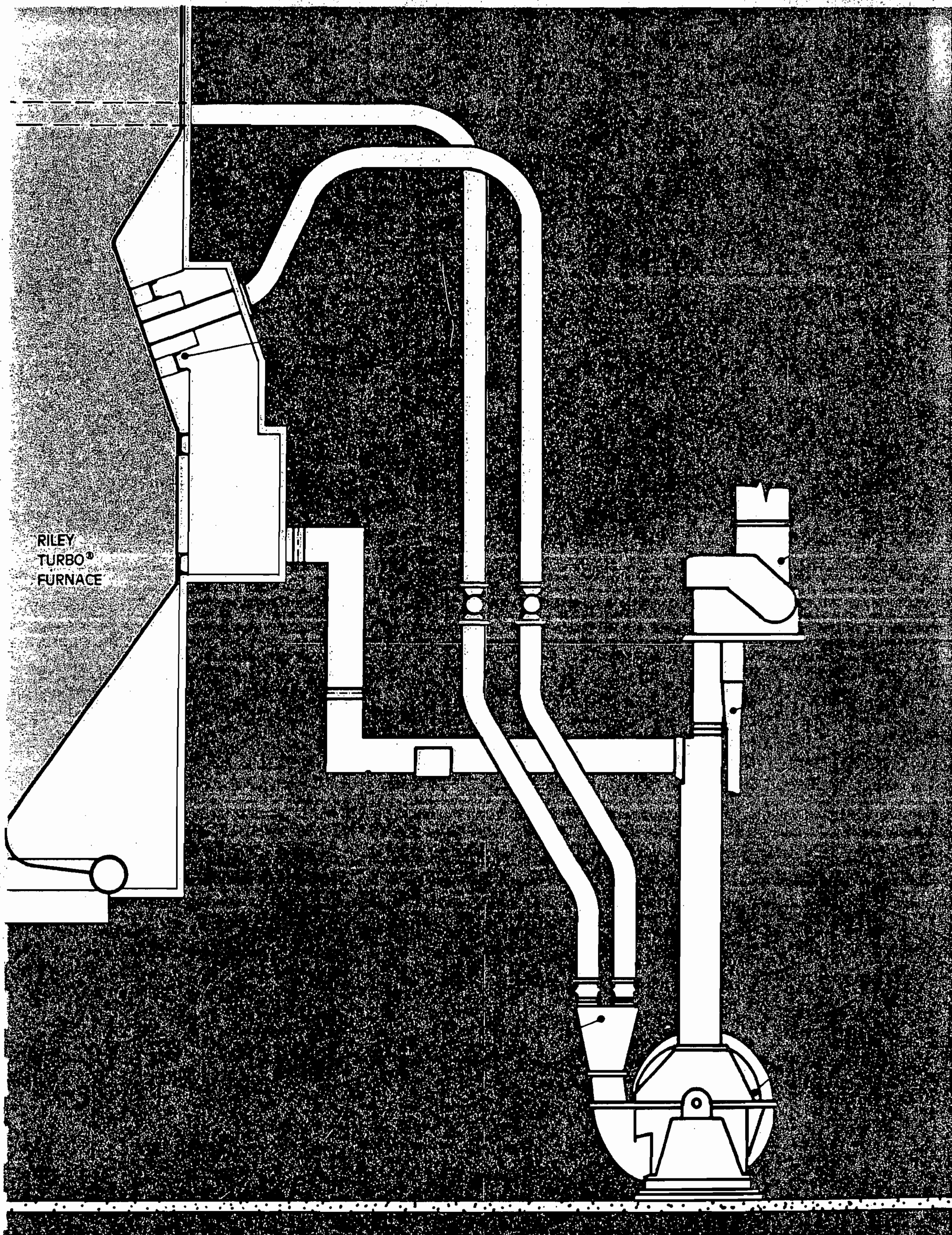
ATTACHMENT 7

From the energy-wise engineers at Riley...

ATRITA PULVERIZERS



RILEY STOKER CORPORATION

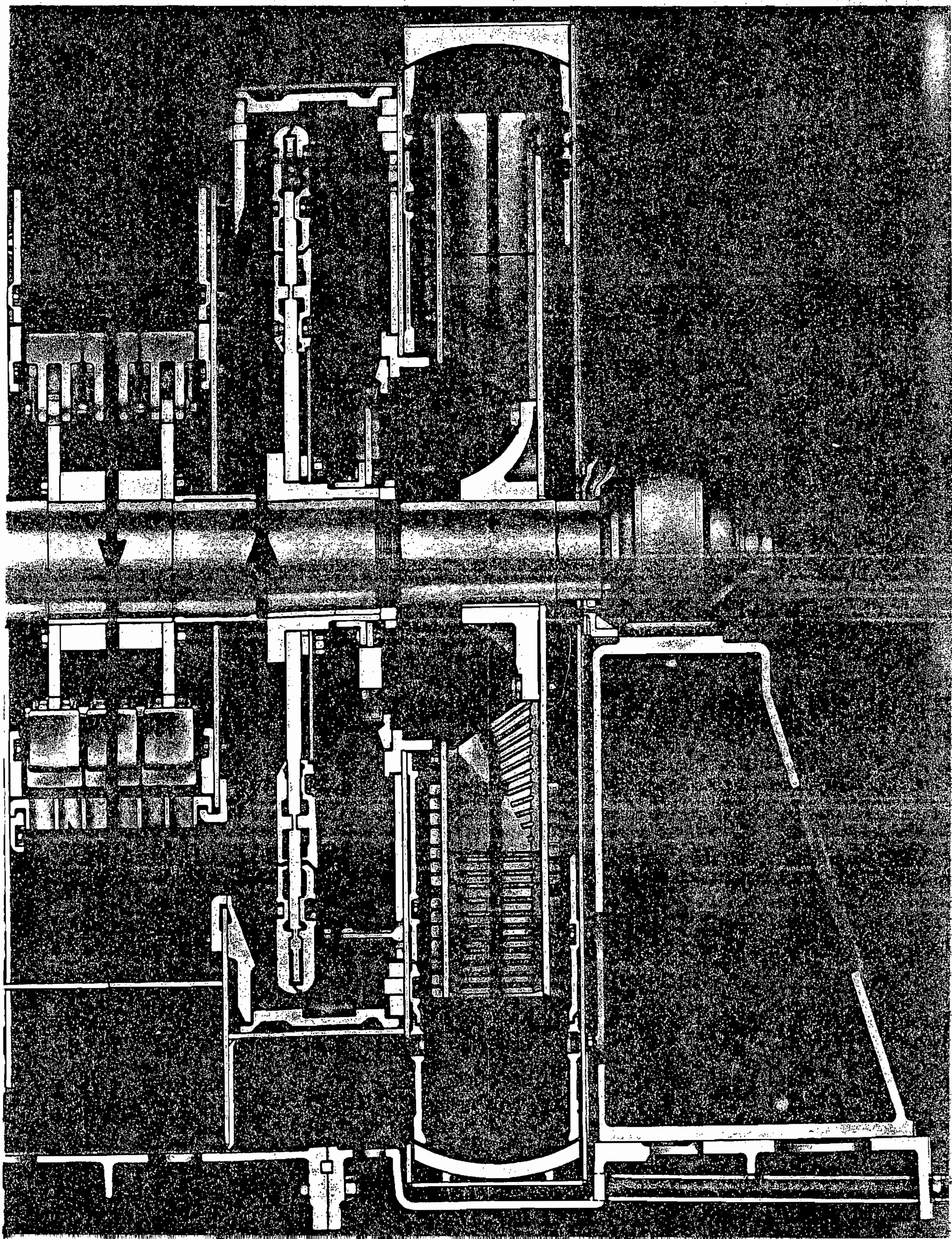

RILEY
TURBO®
FURNACE

RILEY ATRITA PULVERIZERS

Riley Atrita Pulverizers installed in electric generating central stations and industrial plants throughout the world during the past half century are known for their quiet, smooth-running operation, their ability to handle wet coal and their ability to maintain fineness of pulverization without adjustments over long periods of operation.

OPERATING AND DESIGN CHARACTERISTICS

- Extremely wide throttling range
- Maintains fineness without adjustments between overhauls
- Pulverizes high and low moisture coals efficiently
- Accepts high temperature primary air
- Primary air fan, crusher-dryer, and pulverizer are an integral unit
- Easy access for maintenance without dismantling pulverizer
- Nearly zero coal leakage
- Quick response to throttle changes
- Quiet and smooth running
- Power consumption proportional to output throughout load range
- Compact
- Tramp materials automatically rejected and easy to remove
- Shop assembly simplifies installation



OPERATION OF THE ATRITA PULVERIZER

The Atrita Pulverizer combines the function of primary air fan, crusher-dryer, and pulverizer in a compact unit. It is a simple and economical approach to pulverized coal firing without sacrificing the advantages of more complicated pulverized coal systems. Atrita Pulverizers feature rapid response to load changes, ease of control, simplified installation, and ease of maintenance in a space saving package. When combined with the Riley drum type feeder, the Atrita Pulverizer is a virtually complete pulverized coal system.

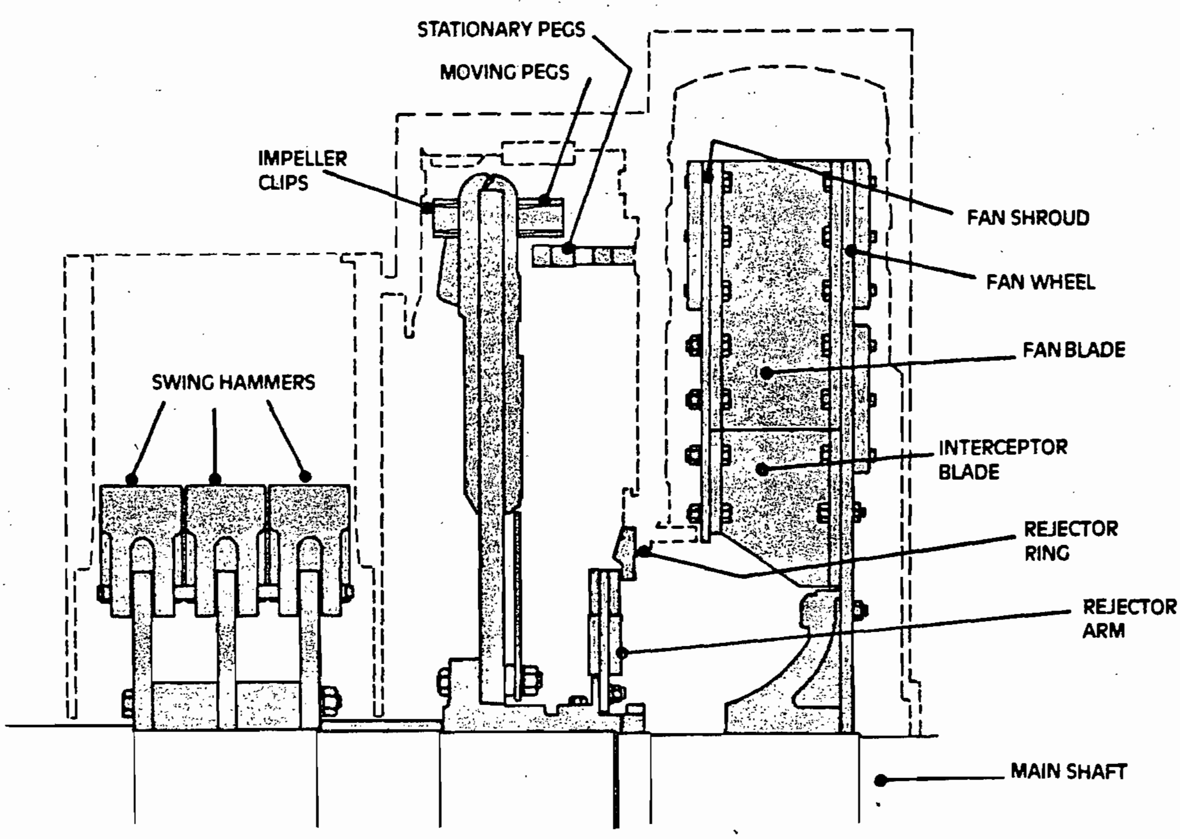
Riley drum type feeders, which also magnetically separate ferrous impurities in the coal, accurately meter coal feed. Hot primary air is introduced into the system just beyond the Riley feeders, providing some removal of surface moisture as the coal and air are conveyed to the pulverizer.

Referring to the cross section on the accompanying page, the raw coal and preheated air first enter the crusher-dryer zone (A) of the pulverizer where coal is granulated by impact against swing-hammers. Here much of the remaining surface moisture of the coal is removed by flash drying. Foreign materials in the coal are rejected to a tramp metal pocket where they can be easily removed.

The coal, when reduced to the proper size to pass through the integral grid section travels to the pulverizer section. Oversized particles remain in the crusher-dryer section for further reduction to the proper granular size.

The rapid attrition of the crushed coal to the proper size takes place in the pulverizer section (B).

The pulverized coal passes through the fan section (C) and is propelled to the burners.

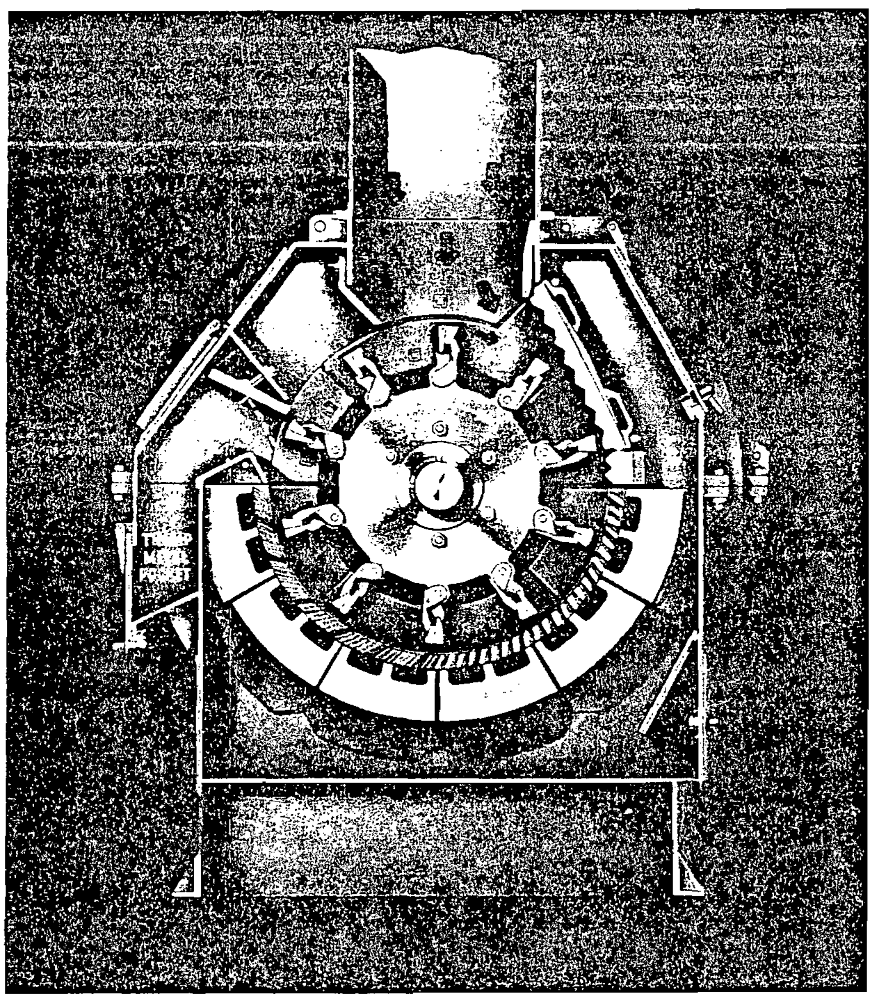


CRUSHER - DRYER SECTION

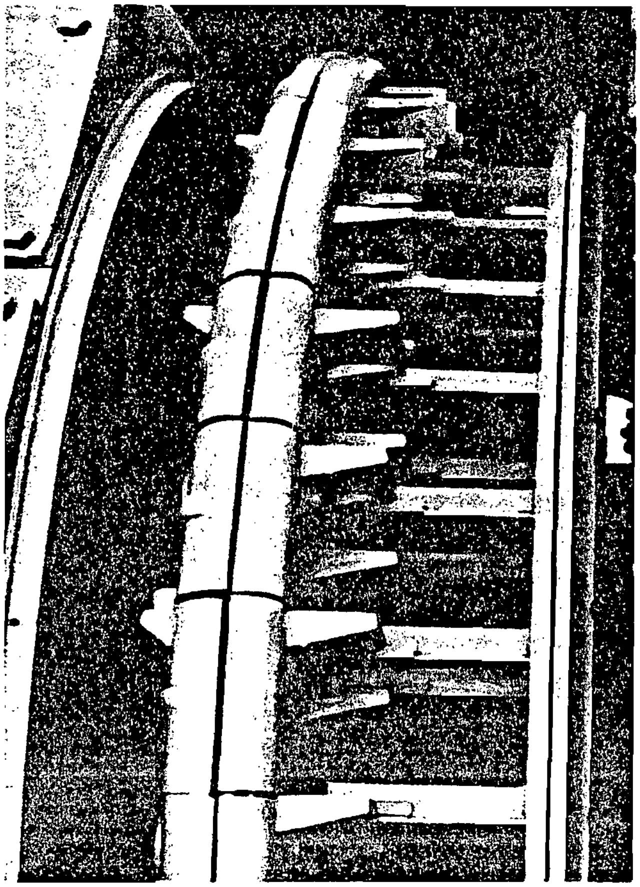
Coal is crushed by impact to a fine, granular state with 95% passing through an 8-mesh screen. Tramp iron and other non-crushable foreign materials are rejected in this section. All material must pass through a grid with 1/4 inch openings before entering the pulverization stage.

The crusher-dryer section also acts as a flash dryer evaporating surface moisture. Surface moisture therefore has no effect upon capacity, power consumption, or fineness provided inlet air temperatures are adequate.

The possibility of fire is reduced in the Atrita because the coal is dried before pulverization.



PULVERIZER SECTION

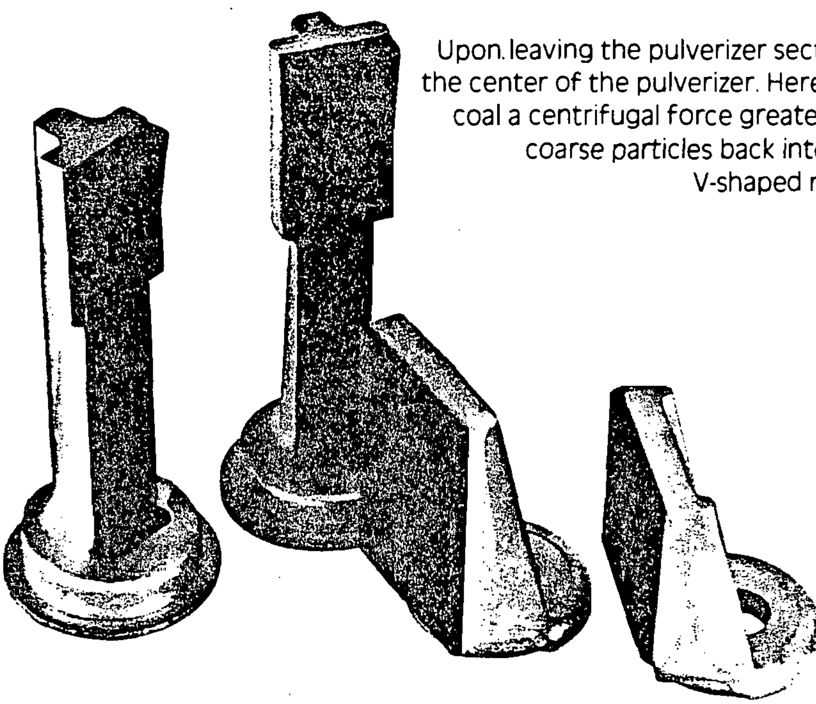


Attrition, the impact of coal on coal, and on tungsten-carbide-faced moving and stationary parts, is employed in pulverization.

With Atrita Pulverizers there is no metal-to-metal contact of pulverizing elements. The Atrita Pulverizer has no springs or wear compensating devices which require shut-down for adjustment.

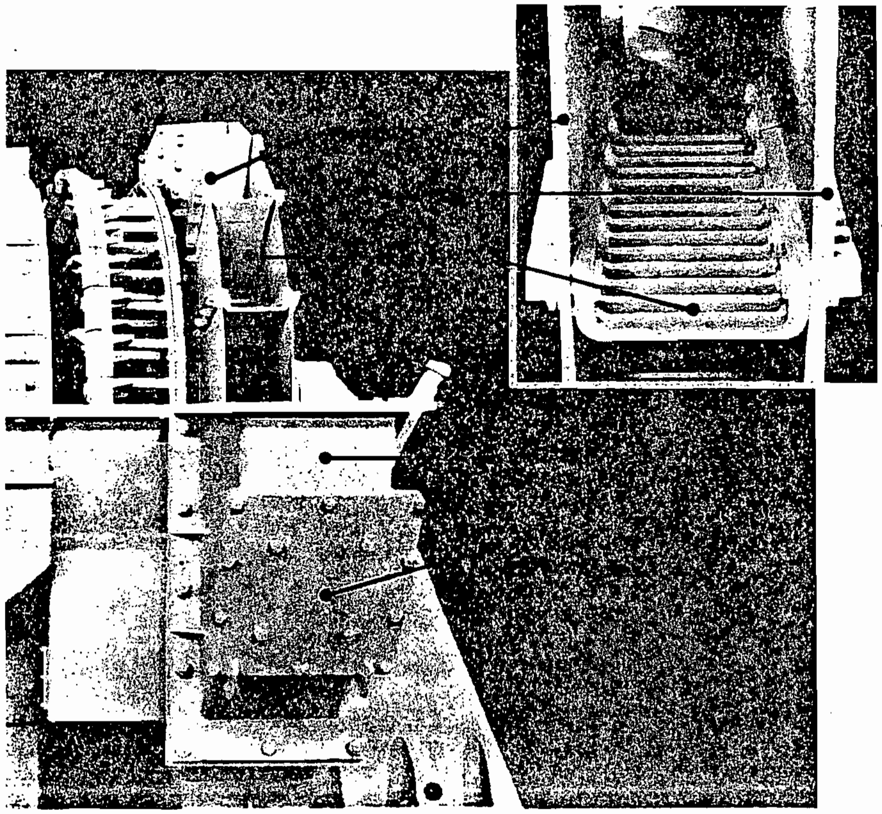
Tungsten carbide facings are applied to all pulverizing elements. Effective pulverizing area does not decrease with wear and coal fineness is sustained over a long period of continuous operation.

Upon leaving the pulverizer section, the coal is drawn to the fan section through the center of the pulverizer. Here, rejector arms impart to the heavier particles of coal a centrifugal force greater than the force of the fan suction, throwing the coarse particles back into the pulverizer section for further pulverization. V-shaped rejector arms also are clad with tungsten carbide.



Tungsten carbide faced stationary and moving pegs used in the pulverizer section.

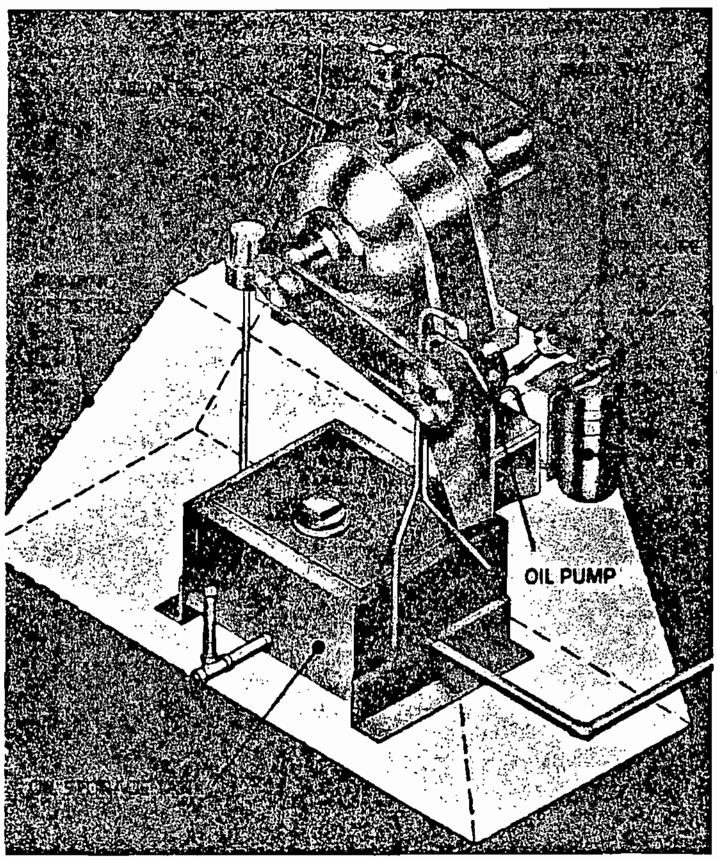
FAN SECTION



The primary air fan is integral with the pulverizer. A fan wheel with cast abrasion-resistant alloy fan blades is mounted on the main pulverizer shaft. A separate primary air fan is not required. This should be considered when comparing the Atrita pulverizer with other types.

The pulverized coal is transported by the primary air directly to the burners. Riley Atrita Pulverizers produce rich mixtures of coal and air over wide load ranges, assuring easy ignition and stable combustion.

BEARINGS and LUBRICATION

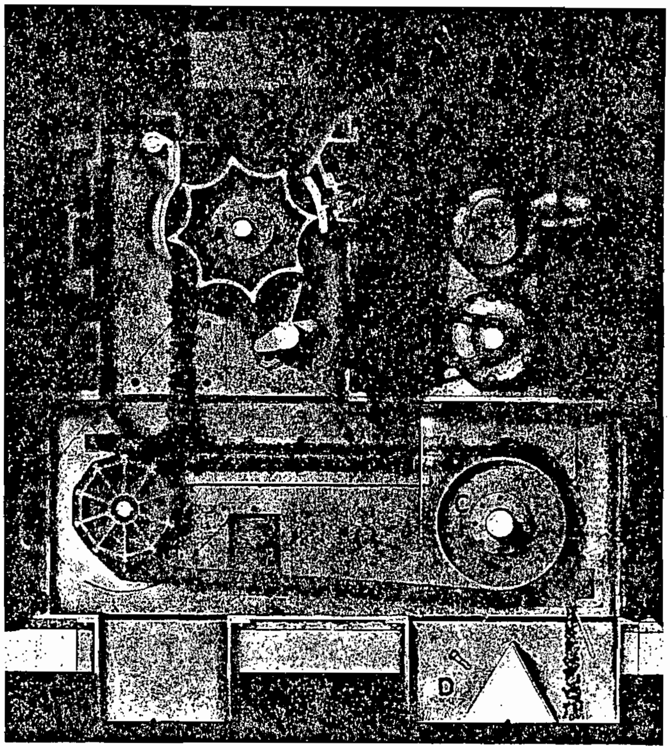


BEARINGS

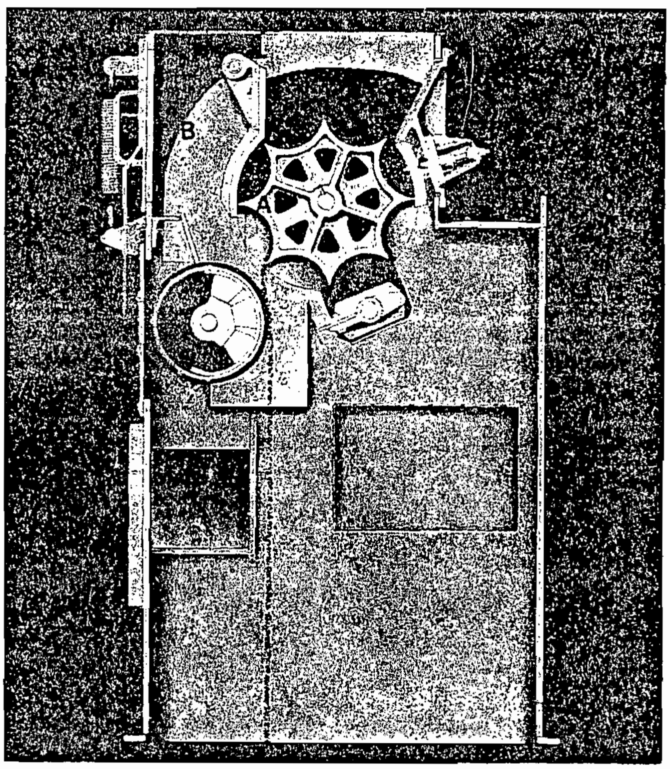
Atrita Pulverizers are equipped with two heavy-duty roller bearings, mounted on separate pedestals located at each end of the pulverizer. Bearings are isolated from the pulverizer housing to minimize transfer of heat. Seals protect the bearings from dust and dirt. A unique design feature of the Riley bearing housing permits ready access to bearings without disturbing the shaft or bearing pedestals.

FORCED FEED LUBRICATION

Atrita Pulverizer bearings are equipped with an efficient forced feed oiling system. A heavy duty oil pump, an oil filter and a pressure gauge are provided. The oil tank is an integral part of the bearing pedestal.



Offset Feeder After leaving the metering drum, the coal is carried over the magnetic pulley on a continuous belt. The standard offset distance from inlet to discharge is two feet. Where required, other offset distances are available up to five feet in increments of one foot.



Pulverizer Mounted Feeder The pulverizer mounted feeder is designed to be mounted on the pulverizer inlet flange, or vertically over the inlet with a straight connecting duct.

RILEY DRUM TYPE FEEDER

Riley drum type feeders are offered in two configurations to suit the physical requirements of individual installations.

FEEDER OPERATION

As raw coal enters the feeder, it is dropped into the pockets of the rotating feeder drum (A). A spring-loaded leveling gate (B), located on the discharge side of the drum, levels the coal in each pocket before it discharges onto the revolving magnetic separator (C). Here, ferrous tramp metal is removed and deposited into a hopper (D) for easy disposal. An adjustable rotating wiper blade (E) is synchronized with the feeder drum and cleans each pocket during each drum revolution. The assembly insures that coal is fed accurately and uniformly to the pulverizer. Provision for adjustment of rear apron (F) compensates for wear.

Riley drum type feeders have these features:

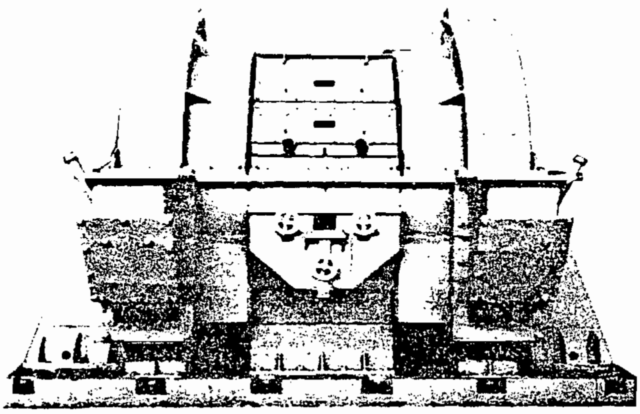
- Magnetic separation of tramp iron.
- Safety shear pin to prevent major damage should foreign material jam the rotating internal parts.
- Sealed bearings with accessible fittings for lubrication.
- Access and observation doors for inspection and service.
- Continuous recording of total feed quantities.

OPERATION AND DESIGN FEATURES

Shop assembled easily and quickly installed

Shop-assembled Atrita Pulverizers are easily and quickly installed. The base plate provides a rigid assembly which is easily leveled and positioned. Accurate alignment of the pulverizer and motor drive is easily established during installation.

The large bearing area of the cast iron base plate requires a minimum foundation. After the pulverizer is positioned and secured to the foundation, the base plate is filled with grout through conveniently located openings to provide a dampening effect and to further limit vibration.



Separate pedestals are shop-aligned and positioned with dowel pins on the base plate. One of these pedestals houses the oil tank of the forced feed lubrication system.

Pedestal mounting of force-lubricated bearings eliminates heat transfer problems, retains accurate alignment.

Low foundation cost

Because Riley Pulverizers are smooth running and have a low loading factor, massive deep foundations are not required. The depth of a foundation for an Atrita Pulverizer of 54,000 lbs/hr capacity is only 4'6". In evaluating pulverizer proposals the savings in costs of excavation and foundations required for Atrita Pulverizers should be given strong consideration.

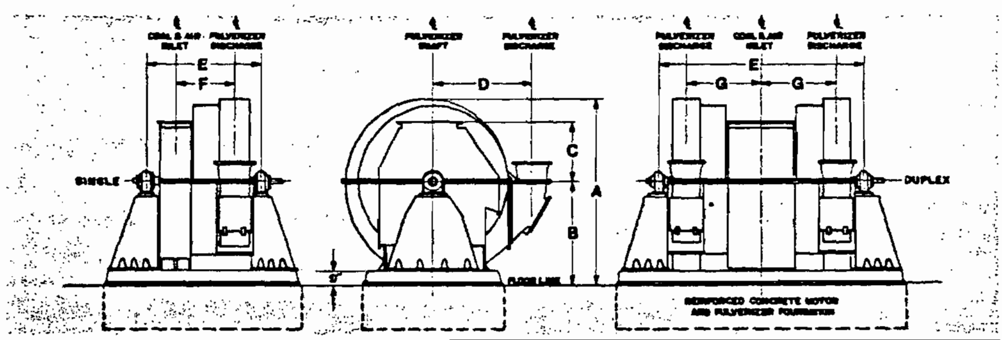
Compact and space saving design

Atrita Pulverizers occupy the least space per ton capacity of any pulverizer made making possible their installation with adequate access even under restricted space conditions.

Atrita Pulverizers are dependable

Atrita Pulverizers are rugged in construction and simple in design. All moving parts are on a single shaft rotating on two bearings which are externally mounted on separate bearing pedestals. A high degree of rejection of foreign material normally prevents damage to pulverizer parts.

MILL DIMENSIONS



DIMENSION		A	B	C	D	E	F	G
450 SINGLE	in. mm	7'–0-3/16" 2138	3'–11-1/2" 1207	2'–4-1/4" 718	3'–7-13/16" 1113	4'–10" 1473	2'–7-1/4" 794	– –
552 SINGLE	in. mm	8'–9-1/8" 2670	4'–11" 1499	3'–0" 914	4'–10" 1473	5'–10-7/8" 1800	3'–0-1/4" 921	– –
556 SINGLE	in. mm	9'–6-1/4" 2902	5'–4" 1626	3'–0" 914	5'–2-7/8" 1597	5'–11" 1803	3'–0-1/4" 921	– –
556 DUPLEX	in. mm	9'–6-1/4" 2902	5'–4" 1626	3'–0" 914	5'–2-7/8" 1597	10'–6-1/2" 3213	– –	3'–10-1/4" 1175

Dimensions in millimeters rounded off to nearest mm.

Wide range of fuels

Atrita Pulverizers handle a wide variety of fuels. In addition to pulverizing various grades of eastern and mid-western bituminous coals, low grades of sub-bituminous coals are easily handled. Other fuels pulverized include lignite, fluid coke, delayed coke and petroleum coke.

High primary air temperatures used

Atrita Pulverizers operate with discharge temperatures up to 200°F. to increase boiler efficiency. High temperature aids burner light-off and combustion.

No coal dust leakage

Atrita Pulverizers with balanced draft furnace operation operate under suction, preventing coal dust leakage. When installed with pressurized boilers Atrita Pulverizers are equipped with special air seals.

Ease of lighting and flame stability

Because Atrita Pulverizers produce quick response to load changes, and because a relatively small amount of primary air is required for proper pulverization, a rich and quickly ignitable mixture of coal and air is obtained resulting in a stable flame at lowest load limits.

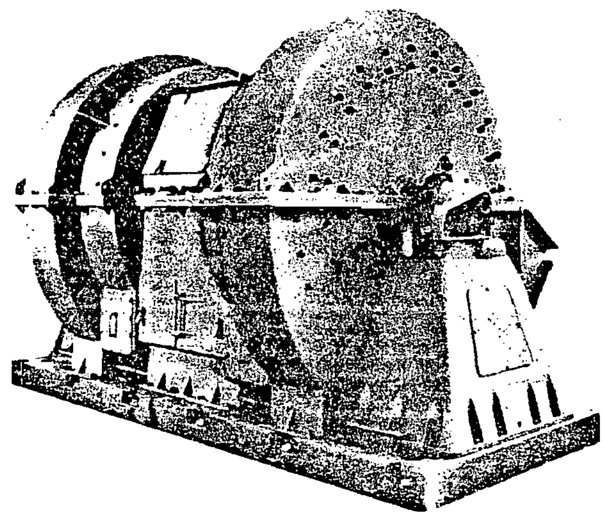
Quick response to load change

With Atrita Pulverizers a change in rate of coal feed gives almost instantaneous change in pulverized coal output. This is because primary air flow is adjusted simultaneously with coal feed rate. Tests show that coal travels from feeder to burner in less than four seconds.

Parts easily removed and replaced

With the average size Atrita Pulverizer the flange of the lower housing is low enough so that repairs, changes to parts and thorough inspection can be made easily from a standing position. All parts of the pulverizer rotor are accessible from one vantage point by hand rotating the entire assembly. All pulverizer parts are accessible by removing the top half of the pulverizer housing. Crusher-dryer parts can be replaced by removing access doors. Lubrication is required only in main shaft bearings.

Shown on these pages are views of Size 556 Duplex Pulverizers



ATRITA PULVERIZER SIZE AND CAPACITY RATING

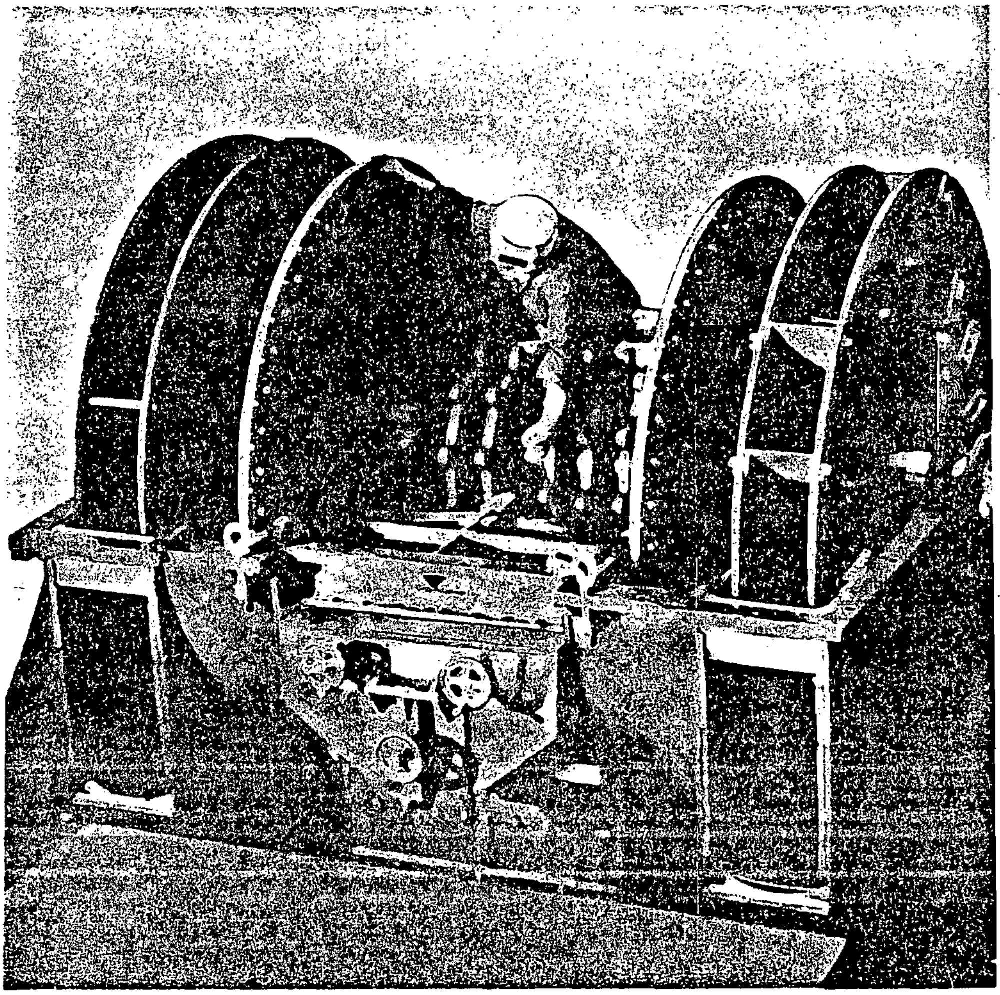
SIZE	SURFACE MOISTURE MAX. % (1)	MIXTURE AIR FLOW 160°F, 29.92" Hg. POUNDS PER HOUR (2)	GRINDING CAPACITY 50 GRIND (HARDGROVE) POUNDS PER HOUR (3)
450 SINGLE	4	10,600	9,600
	10	13,100	9,600
552 SINGLE	4	22,000	20,000
	10	25,000	18,350
556 SINGLE	4	29,700	27,000
	10	34,300	25,200
556 DUPLEX	4	59,400	54,000
	10	68,600	50,400

(1) Minimum primary air inlet temp. 375°F for drying 4% surface moisture
(2) Flows based on 600°F primary air temperature.
(3) All pulverizer capacities based on 70%/200 mesh min.

QUALITY CONTROL

High standards of quality control and workmanship are maintained throughout the manufacture of Atrita Pulverizers to ensure quiet, smooth running operation.

Pulverizers undergo rigid shop tests before shipment. In addition to balancing of the Atrita rotor with sensitive electronic equipment, rotor components are carefully checked with Zyglo and/or radiographic inspection for possible defects.



We are always ready to help.

Like all equipment which bears a Riley nameplate, your Atrita Pulverizer is backed by our Maintenance and Repairs Division. Renewal parts and maintenance service are only as far away as your telephone at any time. We are also ready to undertake fuel conversions, boiler overhaul, or other major projects which will ensure that your plant is in top operating condition to meet the efficiency demands of today.

RILEY

POST OFFICE BOX 547, WORCESTER, MASS. 01613
A SUBSIDIARY OF THE RILEY COMPANY

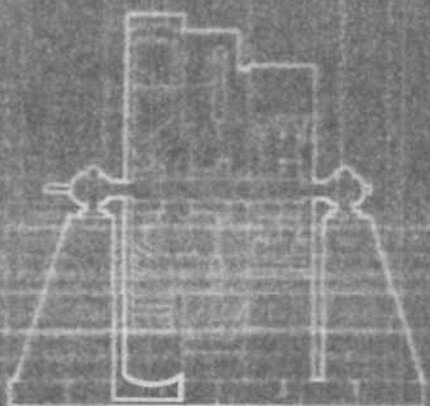
Call your nearest Riley Sales Office: Atlanta, Baton Rouge, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, Jacksonville, Kansas City, New York, Philadelphia, Pittsburgh, Portland, San Juan (Puerto Rico), St. Louis, St. Paul, San Francisco

ATTACHMENT 8

2

Coal Efficiency

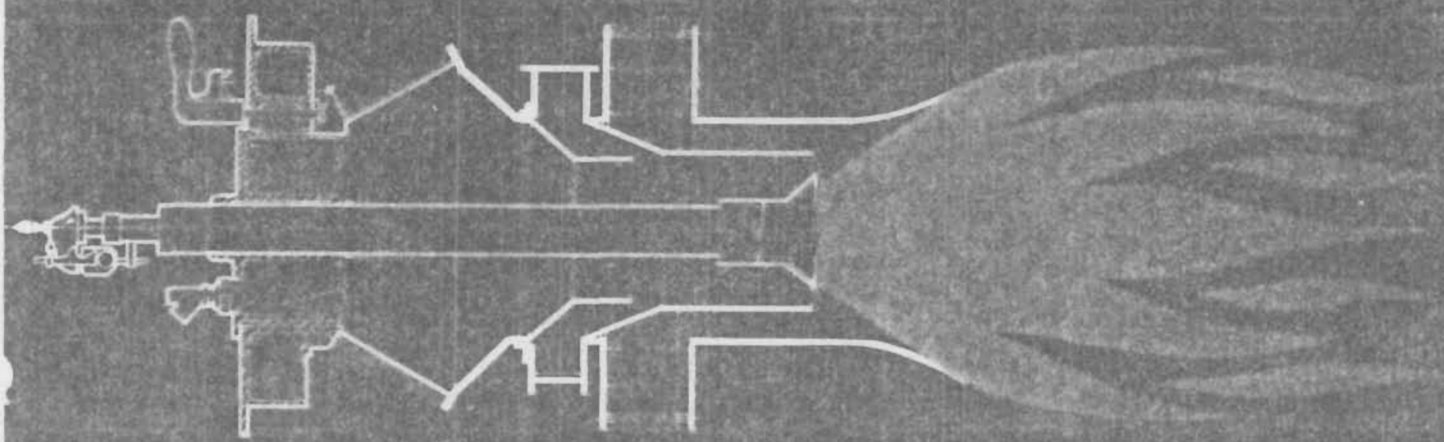
From coal pile to burner— Peabody goes all the way.



Coal pulverizer

Peabody Engineering

The Peabody Idea:
More Energy. Less

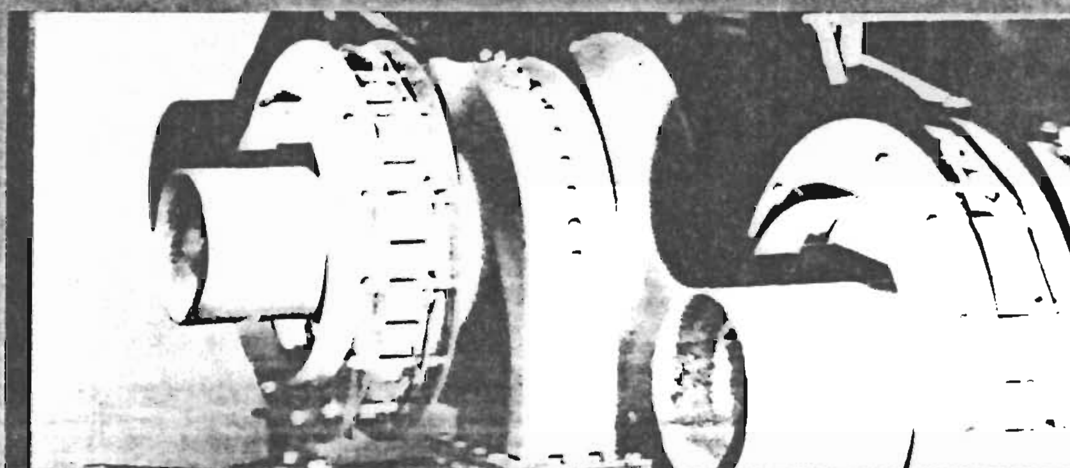


Peabody scroll-type tertiary coal burner

Peabody Engineering

Peabody Pulverized Coal Burners

Pulverized coal burners offer an alternative to high-priced less abundant fuels and are particularly suited for conversions in central power plants and large industrial boilers. A schematic diagram illustrates the burner design and operation.



When coal is the fuel of choice, Peabody pulverized coal burners offer a wide range of burner capacities with a proven design.

The burners can handle semi-bituminous, bituminous, or lignite coals with volatile contents ranging from 18 to 35%. Coal is ground to a fineness such that 75% will pass through a 200 mesh screen with not more than 2% retained on a 50 mesh screen.

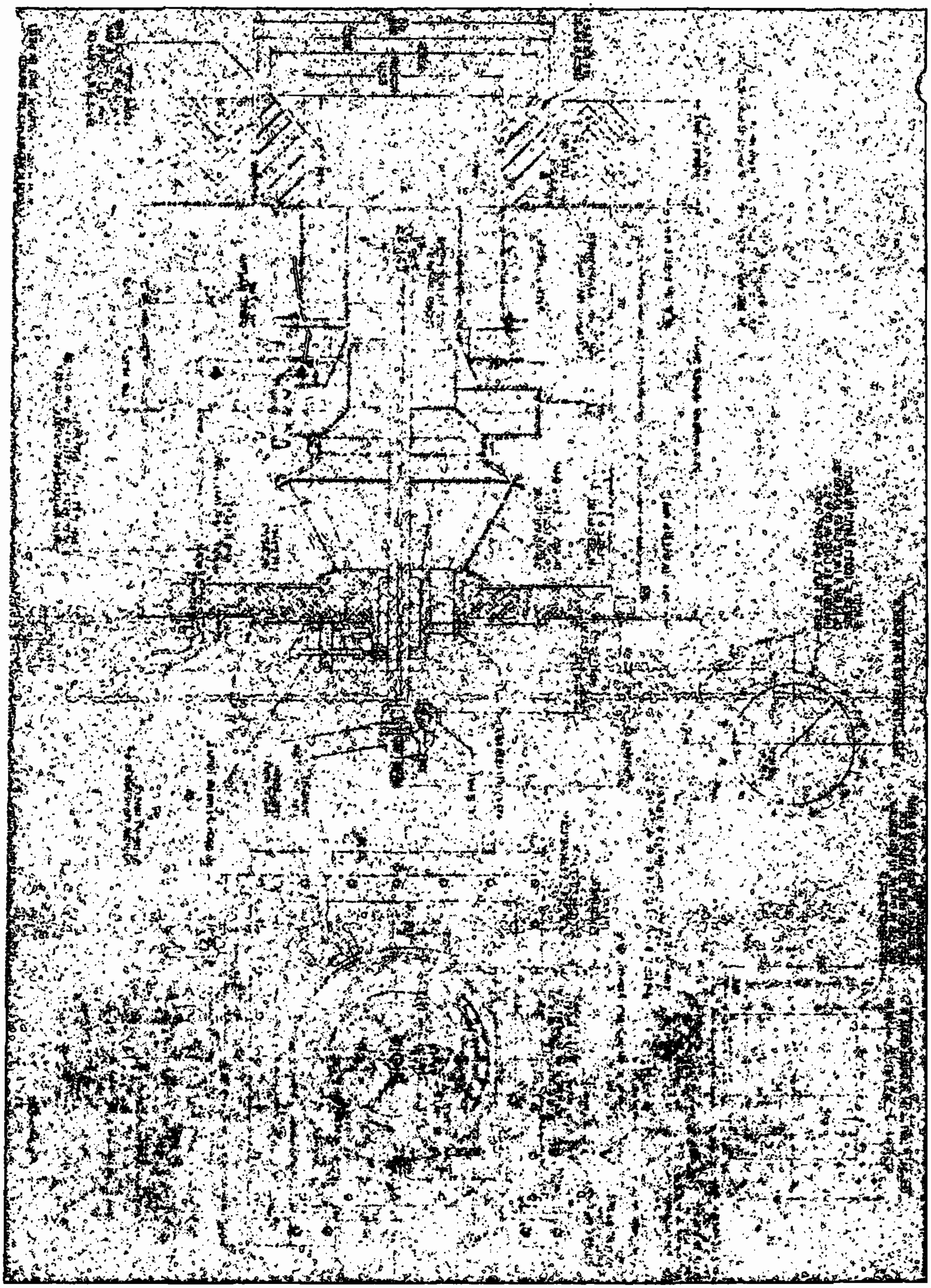
Extensive Burner Experience
Peabody has had extensive experience producing dependable burners for pulverized coal firing. Today, a range of burners is available with capacities from 30-million to 250-million BTU/hour in registers ranging from 15- to 30-inch throats. Typical applications include conversions in central power plants and large industrial boilers. The diagram on the other side of this sheet illustrates the design of a typical Peabody pulverized coal burner.

Pulverized coal firing is adaptable to boilers having a relatively constant load. A four-to-one range can be expected with good operating conditions. As the furnace cools, instability occurs. Coal must be ignited by means of gas/electric, high-energy electric, or oil/electric ignitors.

The pulverized coal burners are available for pressurized and non-pressurized operation. They feature proven Peabody ignitors, flame failure equipment, and simple operating controls that can be adapted to automated operation.

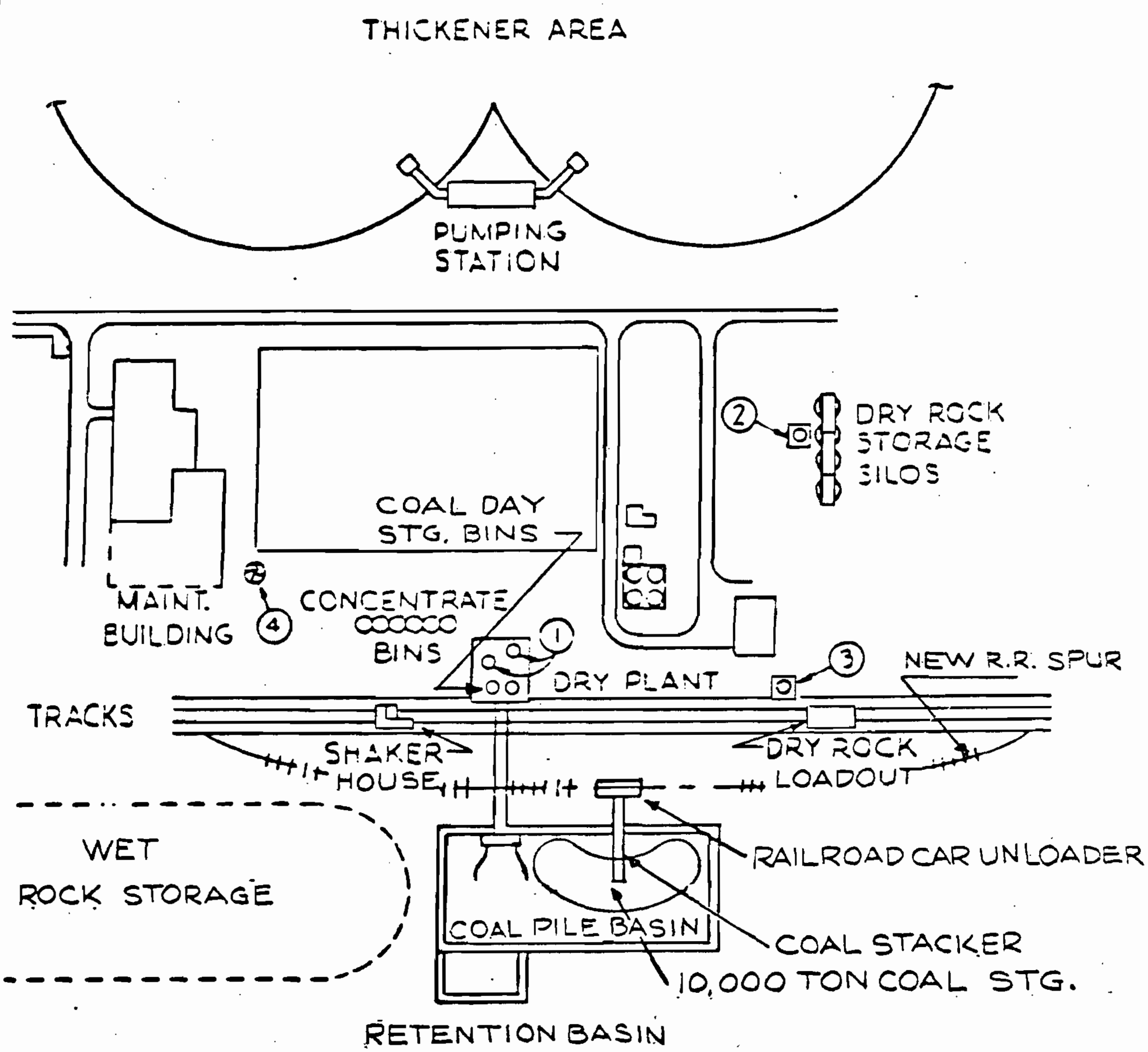
Wide Range of Operation
Pulverized coal burners can be operated successfully over a wide range of primary air quantity and pressure. In most cases, operation is simplified by maintaining a constant quantity of primary air and adjusting secondary air. Primary air quantity is dependent on the particular requirements of each installation and may vary from 10% in the case of a bin feed system to as much as 40% with direct-fired units.

Peabody pulverized coal burners are in use with many types of pulverizers. Primary air can be varied by means of dampers or speed control of the primary air fan. Both register (secondary) air and tertiary air are controllable at the burner front.



Peabody Engineering

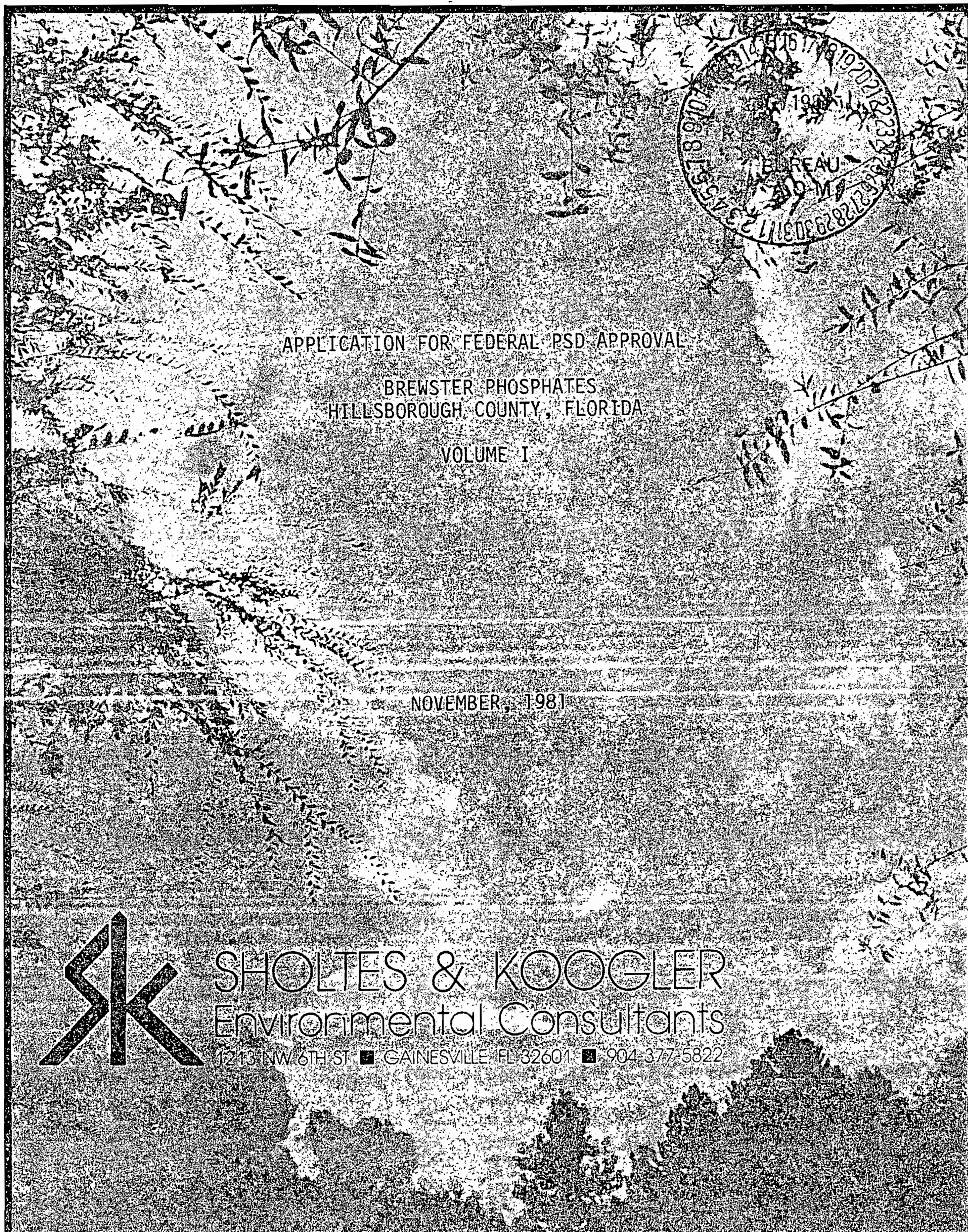
Peabody Engineering Corp
835 Hope Street | Stamford, Connecticut 06907 | Telephone 203 327-7000



1. DRYER SCRUBBERS
2. STORAGE SCRUBBER
3. LOADING SCRUBBER
4. BASE POINT CO-ORDINATES:

FIGURE 2-3

ROCK DRYER AREA PLOT PLAN
BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA



APPLICATION FOR FEDERAL PSD APPROVAL

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

VOLUME I

NOVEMBER, 1981

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

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

SKEC 119-81-01

November 16, 1981

Mr. Steve Smallwood
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Subject: Application for Federal PSD Approval
Brewster Phosphates
Hillsborough County, Florida

Dear Steve:

Enclosed are four (4) copies of Volumes I and II of the Application for Federal PSD Approval for Brewster Phosphates. Also enclosed are four (4) copies of State Construction Permit Applications for the No. 1 and No. 2 dryers along with our check in the amount of $40.00. These applications request the use of alternative fuels in existing phosphate rock dryers operated by Brewster in southeastern Hillsborough County.

Preconstruction monitoring for sulfur dioxide is being conducted in accordance with an agreement with FDER for this project. The monitoring, for purposes of this application, will terminate on January 31, 1982 and results will be forwarded to you immediately thereafter.

If you have any questions or comments concerning any of the above materials, please give me a call at your earliest convenience.

Very truly yours,

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS

George F. Allen For
John B. Koogler, Ph.D., P.E.

JBK:sc
Enclosures

cc: Mr. R. A. Leitzman
Mr. Hoyt Charles

APPLICATION FOR FEDERAL PSD APPROVAL

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

VOLUME I

NOVEMBER, 1981

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS
1213 NW 6TH STREET
GAINESVILLE, FLORIDA 32601
904/377-5822

TABLE OF CONTENTS

1.0 INTRODUCTION

Brewster Phosphates, a producer of phosphate rock, is located in southeastern Hillsborough County. The company is a partnership of the American Cyanamid Company, the operating partner and 75 percent owner, and the Kerr-McGee Corporation.

The company operates two phosphate rock mines in southeastern Hillsborough County; the Lonesome Mine consisting 18,843 acres and the Haynsworth Mine consisting of 14,252 acres. The two mines, which are located between State Roads 39 and 37 and north of State Road 674, presently produce approximately 5.3 million tons per year of phosphate rock.

The phosphate matrix from the Haynsworth mine is transported hydraulically to an existing benefication plant at that mine. Here the phosphate rock is separted from the matrix using conventional separation techniques. After separation the rock is transported by rail to the wet rock storage area at the Lonesome Mine. The clay in the matrix from the Lonesome Mine is separated from the rock and sand in hydroclones located near the mining activity and pumped to a clay settling area. The phosphate rock and sand are transported wet by conveyor to an existing benefication plant at the Lonesome Mine. At this plant the phosphate rock is separated from the sand and is then conveyed to the open wet rock storage area.

From the wet rock storage pile the rock is either dried in one of two existing fluidbed rock dryers and shipped from the site as dry rock or it is shipped from the site as wet rock. All rock, whether wet or dry, is shipped by rail.

The benefication plant, the phosphate rock dryers and the dry rock storage and shipping facility operated by Brewster at the Lonesome Mine were permitted in December, 1974. The facility, therefore, is considered an existing air pollution source for purposes of State and Federal PSD Regulations.

The air pollution sources at the facility are the two fluid-bed phosphate rock dryers each with a rated capacity of 450 tons per hour, the dry rock storage silos and the dry rock shipping facility. All four sources emit particulate matter. In addition, the rock dryers, which are permitted to be fired with fuel oil are sources of sulfur dioxide, nitrogen oxides, carbon monoxide and hydrocarbons.

Calculations indicate that the facility presently emits more than 100 tons per year of particulate matter, sulfur dioxide and nitrogen oxides. The existing carbon monoxide emission rate is approximately 41 tons per year and the existing hydrocarbon emission rate is approximately 8 tons per year.

Brewster is submitting this document as a PSD Application requesting approval to use alternative fuels in the two fluid-bed phosphate rock dryers. Brewster is requesting to be permitted to use any of three alternative fuels:

1. Fuel oil with a sulfur content not to exceed 2.6 percent,
2. Coal with a sulfur content not to exceed 2.3 percent, monthly average, and
3. A coal/oil mix (COM) fuel with a sulfur content not to exceed 2.6 percent.

The production rate of the dryers used for evaluating the impact of the alternative fuels is 6.3 million tons per year, total production. This is equivalent to each of the two dryers operating at rated capacity (450 tons per hour) for 7,000 hours per year. Under present permit conditions the two dryers are permitted a total annual production of 6.70 million tons of rock per year, or 310 days per year operation.

The use of all alternative fuels will result in significant increases in the sulfur dioxide emission rate. In addition, the use of coal and the coal/oil mix fuels will result in a significant increase in nitrogen oxides emissions. Increases in the emission rates of carbon monoxide and hydrocarbons will not be significant.

Particulate matter emissions from the rock dryers will not increase above the presently permitted hourly emission rates as a result of the use of alternative fuels. Since there are no State or Federal permit conditions limiting the capacities of the dryers, and since State permit conditions are based on 7440 hours per year operation, the proposed action will not result in increased annual emissions from the dryers. Likewise, fugitive particulate matter emissions generated as a result of transferring, storing and shipping dry phosphate rock at the rate of 6.3 million ton per year will not result in an increase in emissions over the presently permitted production rate of 6.7 million tons per year.

Fugitive particulate matter emissions generated as a result of coal receiving and handling have been estimated using EPA emission factors and were found to be less than the 25 tons per year de minimus emission rate increase established by State and Federal PSD Regulations.

In summary, the use of alternative fuels in the existing rock dryers as requested by Brewster will result in significant increases in sulfur dioxide and nitrogen oxides emission rates. The emission rate increases of particulate matter, carbon monoxide and hydrocarbons will be less than de minimus emission rate increases established by State and Federal PSD Regulations. Air quality modeling has indicated that the increased sulfur dioxide emissions will have a significant impact on ambient air quality but that the increased nitrogen oxides emissions will not have a significant impact. None of the project impacts will be significant on particulate matter or sulfur dioxide non-attainment areas or on Class I PSD areas.

Included in the following sections of this application, in accordance with State and Federal PSD Regulations, are a description of the existing facility; a description of the proposed action; a review of Best Available Control Technology for the proposed sources; an air quality review describing the impact of air pollutant emissions from the proposed action on ambient air quality; and a review of the secondary impacts of the proposed action.

2.0 FACILITY DESCRIPTION

Brewster Phosphates operates two phosphate rock mines in southeastern Hillsborough County; the Lonesome Mine which includes 18,843 acres and the Haynsworth Mine which contains 14,252 acres. The two mines presently produce 5.3 million tons per year of phosphate rock.

The phosphate matrix from the Haynsworth mine, consisting of approximately one-third phosphate rock, one-third clay and one-third sand, is transported hydraulically to an existing benefication plant located at that mine where the phosphate rock is separated from the matrix. The wet rock is then shipped by rail to the wet rock storage area at the Lonesome Mine or it is shipped off-site as wet rock.

The clay in the matrix mined at the Lonesome mine is separated in the field and the sand and phosphate rock are transported by conveyor to an existing benefication plant at the Lonesome Mine. At the benefication plant the pebble phosphate rock and phosphate rock concentrate are separated from the sand and are stored in the open wet rock storage areas. No storage building is required for these materials since the materials are coarse and wet.

The clays and sand from the matrix mined at both mines are pumped to settling areas and clear water overflow is recycled to the mine water circuit.

The wet phosphate rock from the Lonesome Mine wet rock storage areas is reclaimed and shipped from the site wet or it is dried in one of two fluid-bed rock dryers, stored, and shipped from the site as dried rock. All rock shipment is by rail.

The Lonesome Mine benefication plant and rock dryers are located in the south central portion of the 18,843 acre Lonesome Mine (Figure 2-1 and 2-2). The plant is 2.0 kilometers from the nearest property line, 24.5 kilometers from the boundary of the Hillsborough County Particulate Matter Non-Attainment Area, 74.2 kilometers from the boundary of the Pinellas County Sulfur Dioxide Non-Attainment Area and 108.6 kilometers from the Chassahowitzka National Wildlife Refuge; the Class I PSD Area nearest the site.

The rock drying facility operated by Brewster Phosphates consist of two fluid-bed phosphate rock dryers. These dryers are designed to reduce the moisture content of the wet phosphate rock from approximately 14 percent to 2 percent. After drying the rock is transported to dry rock storage silos where it is stored prior to shipment from the site. Figure 2-3 is a plot plan of the Lonesome Mine rock drying area.

The activities associated with the phosphate rock handling and processing from the time the rock is mined through reclamation from the wet rock storage piles generate no potential air pollutant emissions since the rock is wet (14 percent moisture or greater) and coarse. The air pollutants are generated during rock drying and during the subsequent transfer, storage and shipment of the dry rock. Particulate matter emissions are associated with all of these activies and sulfur dioxide, nitrogen oxides, carbon monoxide and hydrocarbon emissions are associated with the rock drying.

The rock dryers operated by Brewster, the dry rock storage silos and the dry rock shipping facility were permitted in December, 1974. The sources, therefore, are considered existing air pollution sources for purposes of State and Federal PSD Regulations.

The existing rock dryers are fluid-bed dryers each rated at a capacity of 450 tons per hour. The dryers are permitted to be fired with fuel oil which results in a potential sulfur dioxide emission rate of not more than 0.8 pounds of sulfur dioxide per million BTU input. Particulate matter emissions from the rock dryers are limited to a mass emission rate of 45.8 pounds per hour from each rock dryer. The dry rock bins and the dry rock shipping facility have permitted allowable particulate matter emissions rates of 55 pounds per hour and 53 pounds per hour of particulate matter, respectively. There are no State or Federal permit conditions assigned to any of the sources within the Brewster facility which would limit the production rate of the facility or any of the sources within the facility. State operating permits for the dryers are based on 310 days per year, or 7440 hours per year, operation. This translates to a 6.7 million ton per year dry rock production capacity at presently permitted conditions.

At this time, Brewster is filing a PSD Application requesting approval to use alternative fuels in the rock dryers. Brewster is requesting to be permitted to use any of three alternative fuels:

1. Fuel oil with a sulfur content not to exceed 2.6 percent,
2. Coal with a sulfur content not to exceed 2.3 percent, monthly average, and
3. A coal/oil mix (COM) fuel with a sulfur content not to exceed 2.6 percent.

The production rate of the dryers used for evaluating the impact of the alternative fuels is 6.3 million tons per year, total production. This is equivalant to each of the two dryers operating at rated capacity for 7,000 hours per year and takes into consideration increases in mining capacity that might be expected in future years.

The use of alternative fuels in the rock dryers will result in significant increases in sulfur dioxide and nitrogen oxides emission rates. Particulate matter emission rates will not increase over the presently permitted emission rates as a result of using the alternative fuels. Increases in the emission rates of carbon monoxide and hydrocarbons have been determined not to be significant.

The use of coal as an alternative fuel will result in the generation of additional fugitive particulate matter emissions. These emissions were estimated using EPA Emission Factors and were found less than the 25 tons per year de minimus emission rate increase established by State and Federal PSD Regulations.

2.1 Point Source Emission Estimates

The use of alternative fuels in the existing rock dryers will result in increases in sulfur dioxide, nitrogen oxides, carbon monoxide and hydrocarbon emissions from the dryers, depending upon the alternative fuel burned. Particulate matter emissions from the rock dryers will not increase over presently permitted emission rates.

In estimating current and proposed air pollutant emission rate increases two criteria were used. For combustion products that; is sulfur dioxide, nitrogen oxides, carbon monoxides and hydrocarbons, an operating factor based on the proposed operating factor (7,000 hours per year per dryer) was used since this factor is less than the currently permitted operating factor. This operating factor was then multiplied by permitted allowable, measured or estimated pollutant emission rates to obtain annual average emission rates of the combustion products. For particulate matter emissions, since the use of the alternative fuels will not increase emission rates and since existing permits include no State or Federal permit conditions that will limit hours of operations, it was assumed that the use of the alternative fuels will not result in an increase in annual particulate matter emissions.

2.1.1 Sulfur Dioxide Emission Estimates

The two existing rock dryers are permitted to operate at a production rate of 450 tons of rock per hour and to use a fuel oil that results in a potential sulfur dioxide emission rate of not more than 0.8 pounds of sulfur dioxide per million BTU heat input. The proposed hours of operation are 14,000 dryer hours per year and the anticipated heat requirements are 177.1 million BTU per dryer hour. Based upon these conditions it was calculated that the current allowable emission rate of sulfur dioxide from each dryer is 141.7 pounds per hour and that the annual sulfur dioxide emission rate from both dryers combined is 991.8 tons per year. The calculation of these emission rates is presented in Appendix 2A-1.

During the past two years Brewster has conducted several tests to determine the sulfur dioxide sorption rate in the fluid-bed rock dryers and scrubbers which control emissions from the dryers. These test have been run under a variety of conditions including the use of fuel oils with sulfur contents ranging between 0.8 and 2.6 percent and dryer products consisting of phosphate rock concentrate, pebble phosphate rock and blends of pebble and concentrate. Based upon these tests sulfur dioxide sorption rates ranging from 32 to 96 percent have been developed and are presented as Attachment 2 to Appendix 2A-1.

The calculation of sulfur dioxide emission rates from the alternative fuels take into consideration the emperically derived sulfur dioxide sorption rates. These calculations were also based upon a fuel consumption of 2.6 gallons per ton of rock dried or an equivalent heat input to each dryer of 177.1 million BTU per hour. For purposes of proposed emissions it was also projected that each of the two dryers would operate 7,000 hours per year at a production rate of 450 tons of rock per hour each. This would result in an annual drying capacity of 6.3 million tons of rock per year, total for the two dryers.

The alternative fuels considered were No. 6 fuel oil with a 2.6 sulfur content, coal with a 2.3 percent sulfur content and a coal/oil mix with a 2.6 percent sulfur content. The calculated hourly and annual emissions rates for these three fuels are summarized in Table 2-1 and detailed calculations are presented in Appendix 2A-1.

2.1.2 Nitrogen Oxides Emissions

Existing nitrogen oxides emissions from the rock dryers were calculated based on the proposed rock production rate of 6.3 million tons or rock per year and measured rock dryer stack gas flow rates and measured stack gas nitrogen oxides concentrations. The measured stack gas flow rate from each of the dryers is 150,000 actual cubic feet per minute at 151°F. Emission measurements conducted on the rock dryers in January 1981, with the dryers burning fuel oil with a sulfur content of approximately 2.4 percent, averaged 61 parts per million nitrogen oxides (see Attachment 1, Appendix 2A-1). Based upon these conditions, hourly and annual nitrogen oxides emission rates were calculated. These rates are summarized in Table 2-1 and detailed in Appendix 2A-1.

Proposed nitrogen oxides emission rates were calculated for each of the alternative fuels being considered by Brewster. These emission rates were calculated based upon the assumption that the dryers would operate at rated capacity for 7,000 hours per year, each dryer. Emission factors were based upon the January 1981 measurements and factors from EPA Document AP-42. The calculations showing the hourly and annual emission rates for each of the alternative fuels are presented in Appendix 2A-1. These emission rates are summarized in Table 2-1.

2.1.3 Carbon Monoxide Emissions

Carbon emissions were calculated for present and proposed conditions assuming a dryer production rate of 6.3 million tons of rocks per year. Emission factors from EPA Publication AP-42 were used to estimate carbon monoxide emission for oil and coal fuels. The emission factor for the coal/oil mix was calculated from the oil and coal emission factors based upon the proportion of coal and oil in the coal/oil mix fuel. The detailed emission calculations are presented in Appendix 2A-1 and are summarized in Table 2-1.

2.1.4 Hydrocarbon Emissions

Hydrocarbon emissions were calculated for present and proposed conditions using the same assumptions that were used in calculating carbon monoxide emissions. Hydrocarbon emission factors were obtained from EPA Publication AP-42 for oil and coal. The emission factor for coal/oil mix was calculated by proportioning the emission factors for oil and coal. The detailed calculations of the hourly and annual hydrocarbon emissions are presented in Appendix 2A-1 and are summarized in Table 2-1.

2.2 Fugitive Particulate Matter Emission Estimates

Fugitive air pollutant emissions will result from coal receiving, coal handling, and from the rail traffic transporting the coal on-site. It was assumed that fugitive emissions from the transfer, storage and shipment of 6.3 million tons per year of dry phosphate rock would not be PSD increment consuming since existing permits do not limit the production rate or annual capacity of the facility.

Brewster proposes to receive coal twice weekly by rail, to stack the coal in a 10,000 ton open storage pile, to reclaim the coal from the pile by front-end loader and transfer it by open belt conveyor to day storage bins which feed through coal pulverizers into the rock dryers. Nominally, the coal will be received twice weekly in ten 100 ton train cars. The coal will be unloaded through a bottom dump car unloading system at the rate of approximately 200 tons per hour. The car dump will have side walls and a roof. The ends of the car dump will be open for ingress and egress in the rail cars.

From the car dump the coal will be stacked by a rotary stacker with an adjustable discharge chute onto the 10,000 ton coal storage pile. The bottom of the pile will be sealed and curbs will be constructed around the storage area to contain rainfall runoff. Coal will be reclaimed from the coal storage pile by front-end loader at the rate of 200 tons per hour and loaded onto a conveyor belt for transport to one of two coal day-bins. The transfer distance will be approximately 375 feet and will include no intermediate transfer points. From the day-bins the coal will feed into coal pulverizers and from the pulverizers directly into the rock dryers.

Fugitive emissions will be minimized by using bottom dump unloading rather than a rotary car dump. This unloading procedure will decrease the unloading rate from approximately 1200 tons per hour to 200 tons per hour thus reducing mechanical agitation which, in turn, will reduce fugitive emissions. Water sprays will also be used as necessary at the car dump to control fugitive emissions. An emission factor of 0.136 pounds of particulate matter per ton of coal unloaded has been estimated using information from the document Technical Guidance for Control of Industrial Process Fugitive Particulate Emissions, EPA 450/3-77-010, March 1977. The derivation of this emission factor is detailed in Appendix 2A-2.

The coal storage pile activities resulting in fugitive emissions include loading onto the pile, equipment traffic around the pile, off-loading from the pile and wind erosion. Brewster will take all reasonable precautions to minimize these emissions. Coal will be stacked onto the pile at the rate of 200 tons per hour using a rotary stacker with an adjustable chute. The adjustable chute on the stacker will reduce the free-fall distance of the coal and thus reduce fugitive particulate emissions. Water sprays will be used on the pile to reduce windblown emissions and to minimize emissions during subsequent handling activities.

The coal will be off-loaded from the pile with a front-end loader at the rate of 200 tons per hour and discharged onto a conveyor belt from which it will be transferred to the rock dryer area.

Coal will loaded onto the pile only during two five-hour periods in each week. Coal will be off-loaded from the pile during a two hour period on approximately 80 percent of the days in a year. A coal storage pile particulate matter emission factor of 0.08 pounds of particulate matter per ton of coal placed into storage was calculated using information cited in the EPA Technical Guidance Document. The calculations leading to this emission factor are presented in Appendix 2A-2.

The coal which is off-loaded from the coal pile will be discharged into a hopper which feeds an open conveyor belt that will be approximately 375 feet long. The belt will transfer the coal to one of two 200 ton day-bins. There will be no intermediate transfer points on the belt. Brewster proposes to use water sprays at the receiving hopper to minimize fugitive emissions. The moisture in the coal from the coal pile water sprays and the water sprays at the conveyor receiving hopper will provide enough moisture to the coal to minimize emissions during the coal transfer. A transfer and conveying emission factor of 0.13 pounds of particulate matter per ton of coal transferred was estimated by using information from the EPA Technical Guidance Document. The derivation of this emission factor is presented in Appendix 2A-2.

The total estimated fugitive particulate matter emission burden resulting from coal receiving, coal storage pile activities and coal transfer and conveying was estimated to be 17.9 tons per year. This emission burden was calculated using the previously described emission factors and an annual coal consumption of 103,308 tons per year. The calculation of this emission burden is detailed in Appendix 2A-2.

In addition to fugitive emissions from coal handling, a small contribution to the fugitive emission burden will be made by the rail traffic necessary to transfer the coal on-site. To estimate these emissions it was assumed one locomotive would operate on-site for six hours per day during the two days each week that coal will be received. If was further assumed that the locomotive would have a fuel consumption rate of 40 gallons of No. 2 diesel fuel per hour. Based on these assumptions it was estimated that the annual fugitive emission rate of various pollutants would be as follows:

Particulate Matter - 0.3 tons per year,
Carbon Monoxide - 1.6 tons per year,
Hydrocarbons - 1.2 tons per year,
Nitrogen Oxides - 4.6 tons per year, and
Sulfur Dioxide - 0.7 tons per year.

The details of these calculations are presented in Appendix 2A-2.

2.3 Good Engineering Practice Stack Heights

The two dryer stacks, each 125 feet tall, are the only stack for which good engineering practice stack height must be evaluated.

According to Federal guidelines on stack height reguirements, good engineering practice stack height is defined "that stack height necessary to ensure that emissions from the stack do not results excess concentrations of any pollutant in the immediate vicinity of the source as a result of atmospheric downwash." The proposed regulation suggests that good engineering practice stack height (H_g) for most sources can be determined by the following equation:

$$Hg = H + 1.5 L$$

where: H = height of the structure potentially causing downwash, and
L = lesser dimension (height or width) of the structure

In the rock drying area the dry rock storage silos, located approximately 600 feet from the rock dryers, are 120 feet in height, the dry rock loading facility, located approximately 400 feet from the rock dryers, are 75 feet in height and the rock dryer building is 50 feet in height. Using these structures as potential causes of downwash, the calculated good engineering practice stack height ranges between 125 and 300 feet. These heights are either equal to or greater than the existing 125 foot dryer stacks indicating good engineering practice stack height is not exceeded by the actual dryer stack height.

The effect of downwash created by the dry rock silos and the dry rock loading facility have been evaluated and the results presented in Section 5.0.

2.4 Construction Permit Application

Florida Department of Environmental Regulation Air Pollution Source Construction Permits, reflecting the modified fuel requirements for each of the two dryers, are attached to this document as Appendix 2A-3.

TABLE 2-1

SUMMARY OF EMISSION CHANGES RESULTING FROM THE USE OF ALTERNATIVE FUELS

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

Source	Pollutant Increase (tons/year)				
	Part. Matter	SO_2	NO_x	CO	HC
Dryers (2)					
Present	320.6	991.8	396.2	41.0	8.2
Proposed-oil	320.6	1813.7	396.2	41.0	8.2
-coal	320.6	2238.3	742.9	51.6	15.5
-COM	320.6	2202.7	576.5	46.5	12.0
Max Increase	0	1246.5	346.7	10.6	7.3
Coal Handling					
Present	0	NO CHANGE			
Proposed-oil	0				
-coal	17.9				
-COM	0				
Max Increase	17.9				
Rail (Fugitive)					
Max Increase (for coal)	0.3	0.7	4.6	1.6	1.2
Rock Loading		NO CHANGE			
Auto and Truck Traffic		NO CHANGE			
Total Increase	18.2	1247.2	351.3	12.2	8.5
Significant Increase	25	40	40	100	40

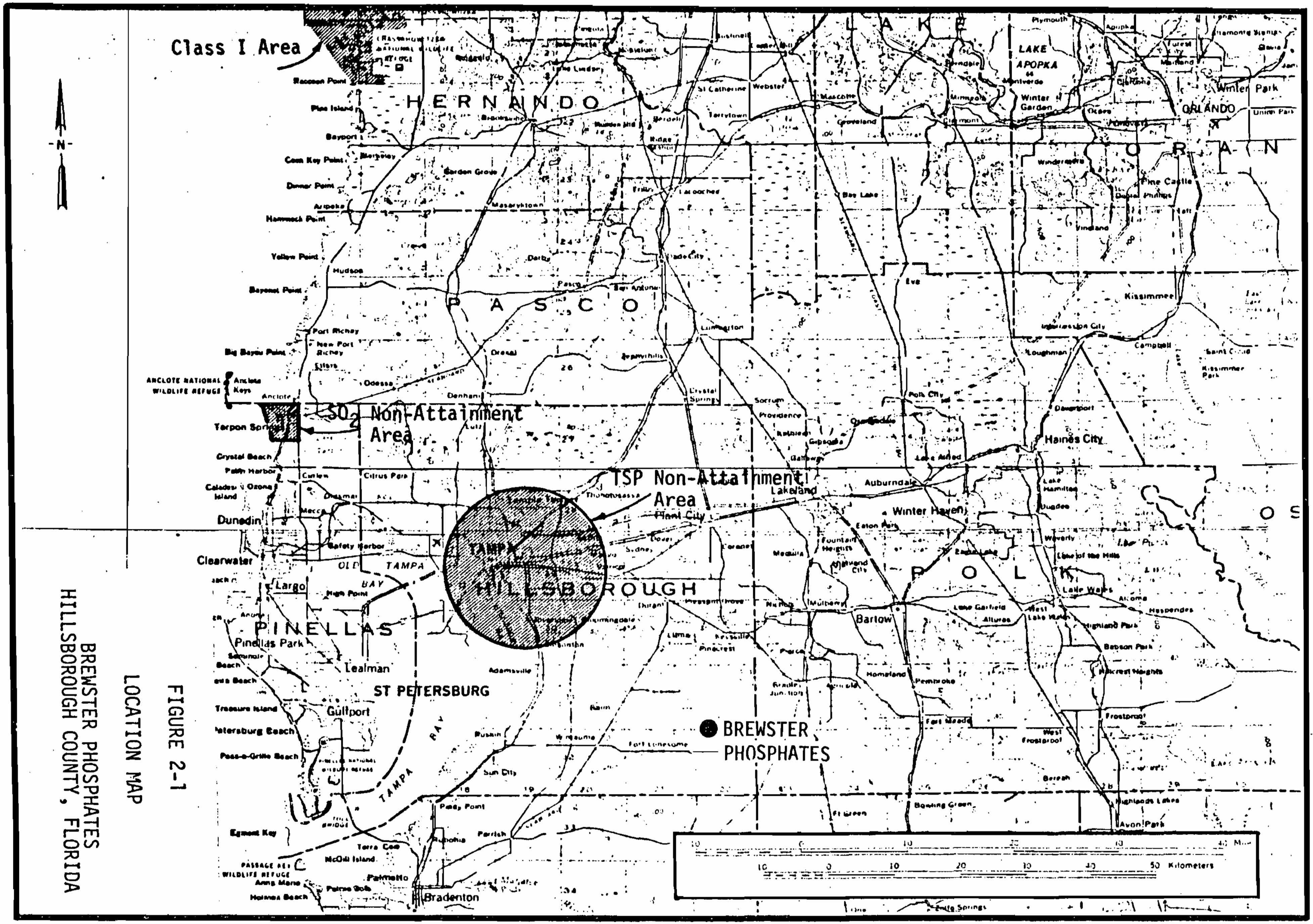


FIGURE 2-1

LOCATION MAP

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

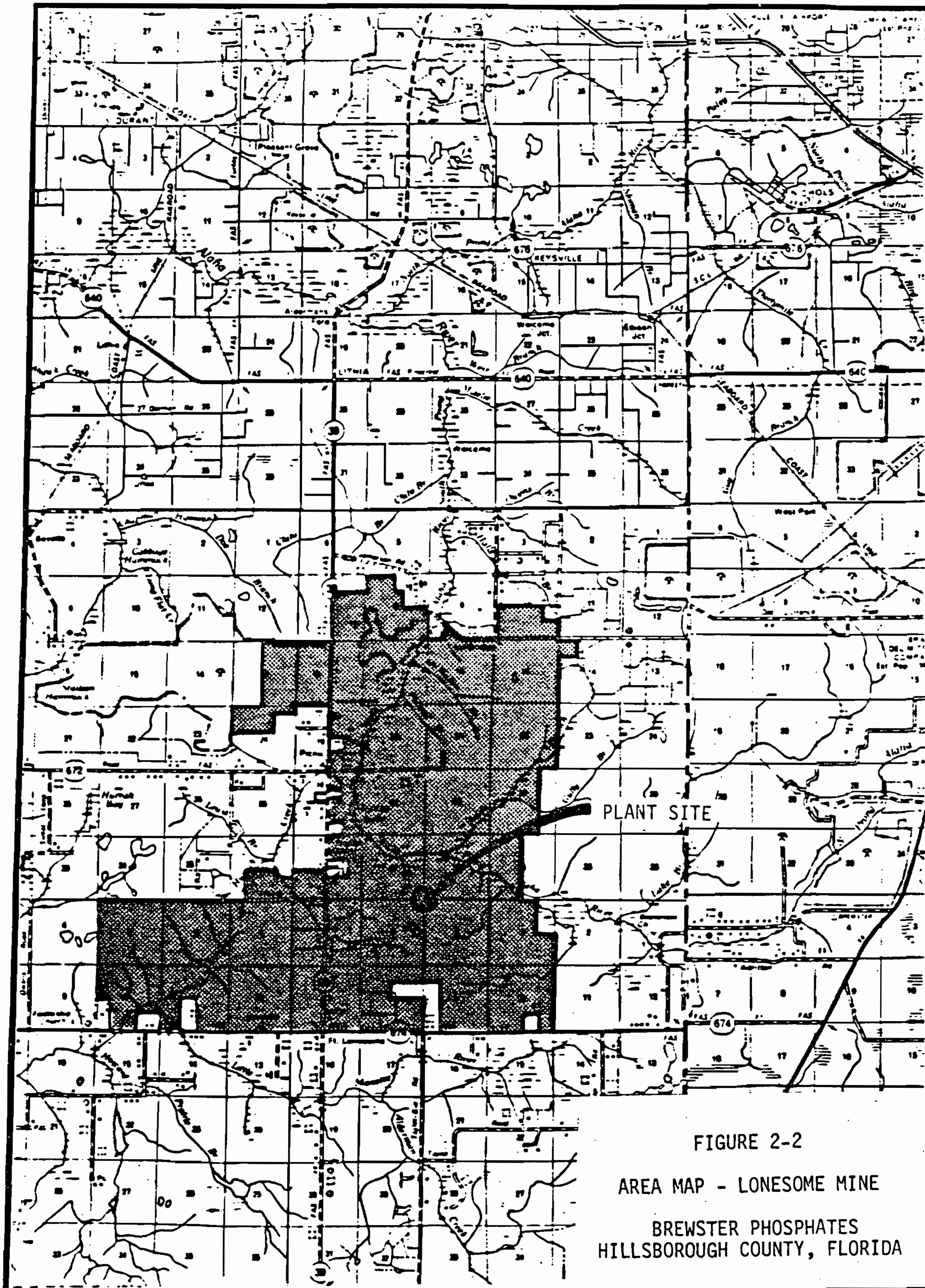
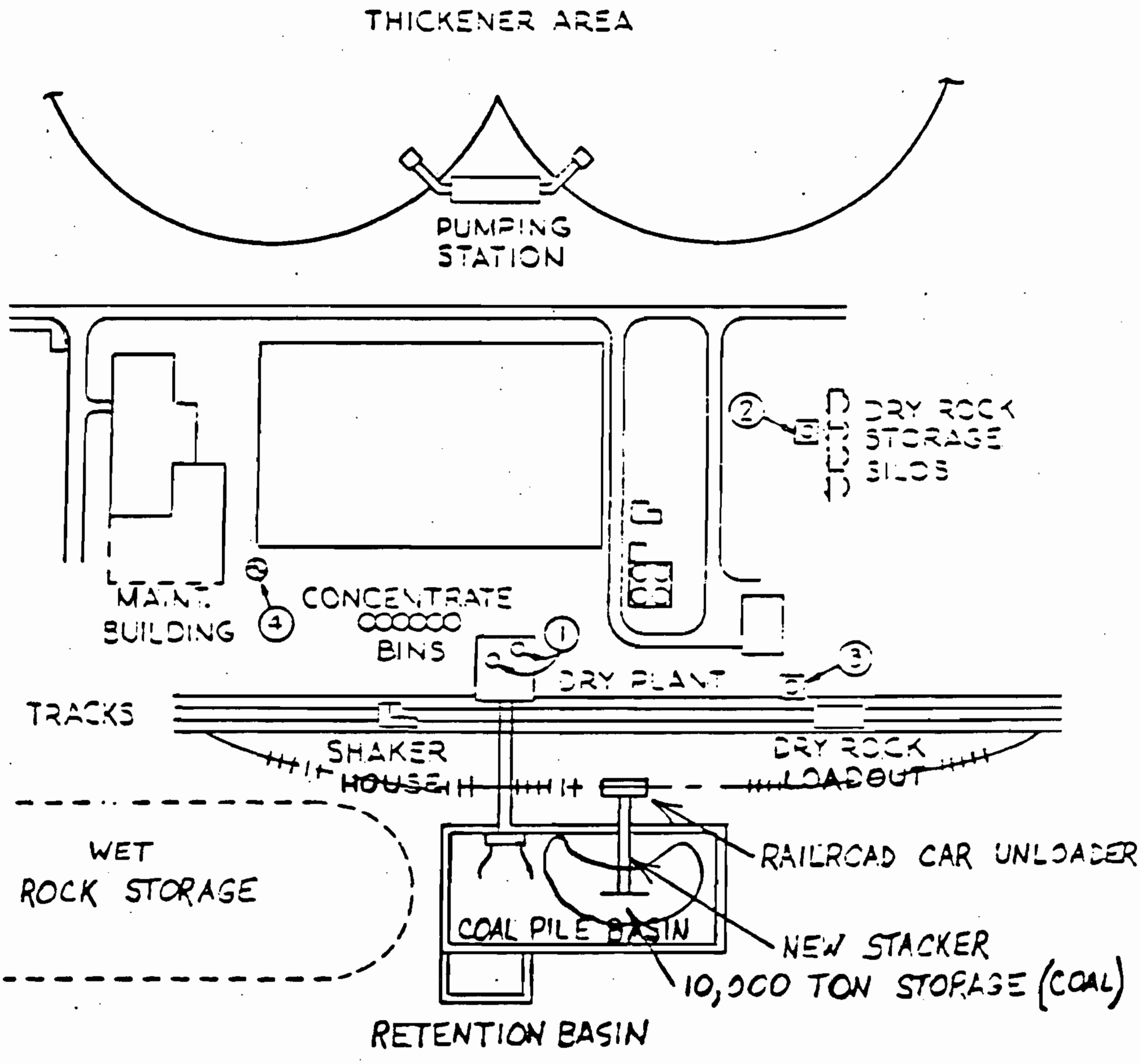


FIGURE 2-2

AREA MAP - LONESOME MINE

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA



1. DRYER SCRUBBERS
2. STORAGE SCRUBBER
3. LOADING SCRUBBER
4. BASE POINT CO-ORDINATES:

FIGURE 2-3

ROCK DRYER AREA PLOT PLAN
BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

APPENDIX 2A-1

POINT SOURCE EMISSION CALCULATIONS

BREWSTER PHOSPHATES

POINT SOURCE EMISSION CALCULATIONS

PRESENT

2 dryers rated at 450 tons rock/hr each

Avg operating factor - 6.3×10^6 tons/year dry rock, total for two dryers (6.7×10^6 tons/yr permitted)

Avg fuel consumption - 2.6 gal/ton of rock of #6 oil with heating value of 151,400 BTU/gal

Permitted emission limits

SO_2 - 0.8 lb $SO_2/10^6$ BTU input

Part. Matter - 45.8 lb/hr, each dryer

No limit for NO_x, CO, HC

Permit date - 12/2/74, both dryers

Present emissions

SO_2 = 6.3×10^6 tons/yr × 2.6 gal/ton × 151,400 BTU/gal × 10^{-6} × 0.8 lb SO_2/10^6 BTU × 1/2000 ton/lb

Annual = 991.8 tons SO_2/yr, total both dryers

= (450×2) tons/hr max × 2.6 gal/ton × 151,400 × 10^{-6} MMBTU/hr × 0.8

Hourly = 283.4 lb SO_2/hr, total both dryers

= 141.7 lb/hr, each dryer

Part. Matter

Hourly = 45.8 lb/hr, permit condition each dryer

Annual = (45.8 × 2) lb/hr × (7000) hr/yr × 1/2000

= 340.8 tons/yr (7000 hr/yr restriction on operation of dryer)

NO_x at 61 ppm (See Attachment 1) in flow of 150,000 Acfm @ 151°F

$= 150{,}000\ ft^3/min \times \frac{528}{460+151} \times 60\ min/hr$

$\times 61/10^6$

$= 474\ ft^3/hr\ NO_x$ at stp

$\times 1/385$ lb-mole/ft^3 × 46 lb NO_2/lb-mole

Hourly = 56.6 lb/hr, each dryer

Annual = $6.3 \times 10^6 \times 1/450 \times 56.6 \times 1/2000$

= 396.2 tons/year

CO at 5 lb/10^3 gal (AP-42)

= 6.3×10^6 tons/yr × 2.6 gal/ton × 0.005 lb CO/gal

× 1/2000

Annual = 41.0 tons/yr

= 450 ton/hr × 2.6 gal/ton × 0.005 lb/gal

Hourly = 5.8 lb/hour, each dryer

Hydrocarbons @ 1 lb/10^3 gal (AP-42)

Annual = 8.2 tons/yr

Hourly = 1.2 lb/hr

PROPOSED

2 dryers at 450 ton rock/hr each

Operating hours - 7000 hours/yr, each dryer

- 6.3×10^6 tons rock/yr

Fuel (1) #6 fuel oil with 2.6% Sulfur at 151,400 BTU/gal

(2) Coal/Oil Mix (COM) with 2.6% Sulfur at 14,750 BTU/lb (52% Coal)

(3) Coal with 2.3% Sulfur at 12,000 BTU/lb

Fuel Use - Assume 177.1×10^6 BTU/hr, each dryer

Proposed emissions

SO_2 - SO_2 is sorbed in the dryers/scrubbers at varying rates depending upon the product being dried and the sulfur content of the dryer fuel. The relationships, developed during the firing of oils with sulfur contents ranging from 0.8% to 2.6%, are presented as Attachment 2. These same relationships were assumed to apply when COM and coal were fired. The annual dryer product mix is:

Concentrate - 60%

Blend (Conc/Pebble) - 35%

Pebble - 5%

— Oil at 2.6% Sulfur

SO_2 = 6.3x10[6] tons/yr x 2.6 gal/ton x 8.45 lb/gal x (0.026x2) lb SO_2/lb [(1-0.62) 0.6 (Conc.) + (1-0.31)(0.35) (Blend) + (1-0.31)(0.05) (Pebble)]* x 1/2000

Annual = 1813.7 tons SO_2/yr, total both dryers

= 450 ton/hr x 2.6 gal/ton x 8.45 lb/gal x (0.026x2) x (1-0.31) (Pebble 'worst case')

Hourly = 354.7 lb/hour, each dryer

— COM at 2.6% Sulfur and 14,750 BTU/lb

SO_2 = 177.1x10[6] BTU/hr x 1/14750 lb/BTU x (0.026x2) x 0.504* x (7000x2) hr/yr x 1/2000

Annual = 2202.7 tons SO_2/yr, total both dryers

= 177.1x10[6] x 1/14,750 x (0.026x2) x 0.69 (Pebble)

Hourly = 430.8 lb/hour, each dryer

* Absorption data from Attachment 2; Annual factor = 0.504 for fuel

— Coal @ 2.3% Sulfur and 12,000 BTU/lb

SO_2 = 177.1 ×10^6 BTU/hr × 1/12,000 lb/BTU × (0.023×2) × 0.471* × (7000×2) hr/yr × 1/2000

Annual = 2238.3 tons/yr, total both dryers

= 177.1×10^6 × 1/12000 × (0.023×2) × (1−0.33) (Pebble)

Hourly = 454.8 lb/hr, each dryer

Part. Matter

= (7000×2) hr/yr × 45.8 lb/hr × 1/2000

Annual = 320.6 tons/yr, total both dryers for all fuels

Hourly = 45.8 lb/hr, permit condition for all fuels

NO_x – For fuel oil combustion an NO_x stack gas concentration of 61 ppm was assumed (see Attachment 1). 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 emission factor was calculated as [(Oil NO_x factor) × 0.48 + (Coal NO_x factor) × 0.52].

* Annual SO_2 sorption rate for fuel with 2.3% Sulfur

— Oil

Hourly = 56.6 lb/hr, each dryer (Same as Present)

= (7000 × 2) hr/yr × 56.6 × 1/2000

Annual = 396.2 tons/yr, both dryers total

— Coal

AP-42 Table 1.1-2 — 18 lb/ton coal

[18 lb/ton / (2000 lb/ton × 12 000 BTU/lb)] × 10^6 = 0.75 lb/10^6 BTU

AP-42 Table 1.3-1 — 60 lb/10^3 gal

0.060 lb/gal / 0.151400 × 10^6 BTU/gal = 0.40 lb/10^6 BTU

= 56.6 × 0.75/0.4

Hourly = 106.1 lb/hr, each dryer

= 396.2 × 0.75/0.4

Annual = 742.9 tons/yr, total both dryers

— COM

= 0.48 (56.6) + 0.52 (106.1)

Hourly = 82.3 lb/hr, each dryer

= 0.48 (396.2) + 0.52 (742.9)

Annual = 576.5 tons/yr, total both dryers

CO

— Oil at 5 lb/10^3 gal (AP-42)

= 6.3×10^6 tons/yr × 2.6 gal/ton × 0.005 lb CO/gal × 1/2000

Annual = 41.0 tons/yr, total both dryers

= 450 × 2.6 × 0.005

Hourly = 5.8 lb/hr, each dryer

— Coal at 1 lb/ton (AP-42)

= (7000 × 2) hr/yr × 177.1×10^6 Btu/hr × 1/12000 lb/Btu × 1/2000 ton/lb × 1.0 lb CO/ton × 1/2000

Annual = 51.6 tons/yr, total both dryers

= 177.1×10^6 × 1/12000 × 1/2000 × 1.0

Hourly = 7.4 lb/hr, each dryer

— COM

= 41.0(0.48) + 51.6(0.52)

Annual = 46.5 tons/yr, total both dryers

= 5.8(0.48) + 7.4(0.52)

Hourly = 6.6 lb/hr, each dryer

Hydrocarbons

— Oil @ 1 lb/10^3 gal (AP-42)

= 6.3×10^6 ton/yr × 2.6 gal/ton × 0.001 × 1/2000

Annual = 8.2 tons/yr, total both dryers

= 450 × 2.6 × 0.001

Hourly = 1.2 lb/hr

— Coal @ 0.3 lb/ton (AP-42)

= (7000 × 2) hr/yr × 177.1×10^6 BTU/hr × 1/12000 lb/BTU

× 1/2000 ton/lb × 0.3 × 1/2000

Annual = 15.5 tons/yr, total both dryers

= 177.1×10^6 × 1/12,000 × 1/2000 × 0.3

Hourly = 2.2 lb/hr, each dryer

— COM

= 8.2 (0.48) + 15.5 (0.52)

Annual = 12.0 tons/yr, total both dryers

= 1.2 (0.48) + 2.2 (0.52)

Hourly = 1.7 lb/hr, each dryer

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

SKEC 224-81-01

January 20, 1981

Mr. Ken Roberts
Conservation Consultants, Inc.
P. O. Box 35
Palmetto, FL 33561

Subject: NO_x Emission Measurements
Dryer No. 2
Brewster Phosphates, Inc.
Lonesome Mine, Polk County, Florida

Dear Ken:

The following is a summary of the NO_x emission measurements conducted in conjunction with your emission testing program at the Brewster Phosphates No. 2 dryer in Polk County, Florida on January 13, 1981 by Mr. George Allen of our staff.

A Thermo Electron Model 12-A chemiluminescent NO_x analyzer was set up, zeroed and calibrated near the scrubber serving the No. 2 dryer at the Brewster Phosphate Lonesome Mine. A sample line was attached to the analyzer which would permit sampling at the scrubber inlet and scrubber outlet without relocating the NO_x analyzer.

Sampling commenced at 0950 at the scrubber outlet and continued until 1149. During this period the average NO_x concentration in the gases exiting the scrubber was 64 parts per million. The NO_x levels ranged from 50 to 77 parts per million.

During this initial sampling period, the water flow rate on the scrubber was increased at 1021 hours. This change in operating conditions did not significantly effect the NO_x concentration in the gas leaving the scrubber.

During the period 1201 to 1320 hours, sampling was conducted at the inlet to the scrubber. During this period the NO_x concentration in the gases entering the scrubber averaged 62 parts per million with a range between 57 and 74 parts per million. During this period the scrubber operated normally and there were no changes in operating conditions.

During the period 1330 to 1430 hours, the NO_x concentration was again measured at the scrubber outlet. During this period of time the NO_x concentration averaged 59 parts per million with a range between 53 and 65 parts per million. During this period the scrubber operated normally with no changes in operating conditions.

During the period 1440 to 1530 hours, sampling was conducted at the inlet to the scrubber. During this period the NO_x levels in the gases entering the scrubber averaged 58 parts per million with a range between 54 and 63 parts per million. During this period the scrubber operated normally with no changes in operating conditions.

During the entire test period the NO_x analyzer operated in a normal manner. The instrument was zeroed and calibrated several times during the test period as evidenced by data on the attached copies of the instrument strip chart.

Our interpretation of these data is that the NO_x level in the gas stream from the dryer was essentially constant at 61 parts per million during the entire test period and that the scrubber had no effect on this NO_x; i.e., the scrubber efficiency for NO_x removal was zero.

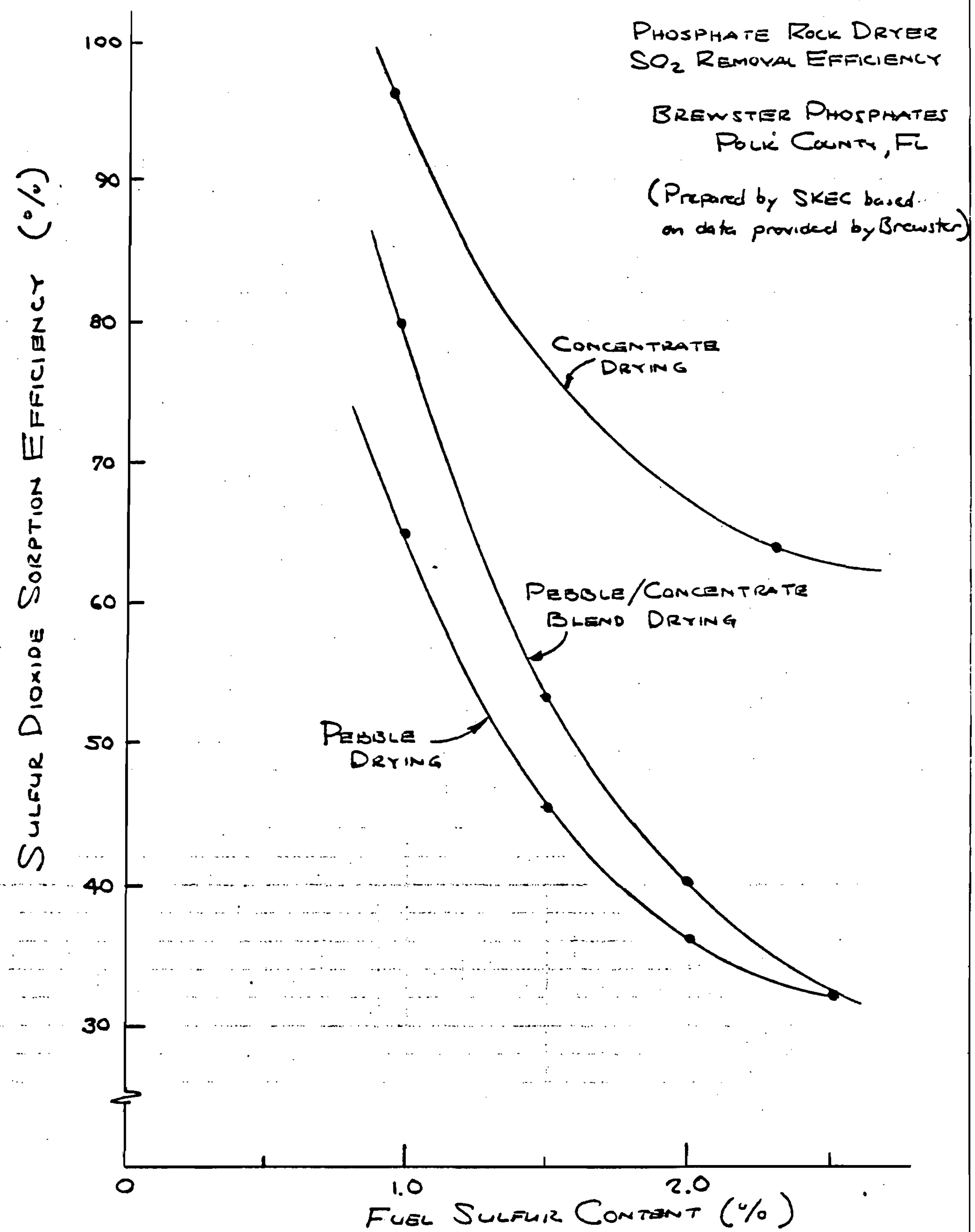
If you have any questions regarding these data, please feel free to call me.

Very truly yours,

SHOLTES & KOOGLER
ENVIRONMENTAL CONSULTANTS

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

JBK:sc
Attachments



PHOSPHATE ROCK DRYER
SO_2 REMOVAL EFFICIENCY
BREWSTER PHOSPHATES
POLK COUNTY, FL
(Prepared by SKEC based on data provided by Brewster)
SULFUR DIOXIDE SORPTION EFFICIENCY (%)
100
90
80
70
60
50
40
30
CONCENTRATE DRYING
PEBBLE/CONCENTRATE BLEND DRYING
PEBBLE DRYING
0
1.0
2.0
FUEL SULFUR CONTENT (%)

APPENDIX 2A-2

FUGITIVE EMISSION CALCULATIONS

FUGITIVE EMISSIONS *

Coal Handling

Assume dryers fired 100% with coal

Coal requirements

(7000×2) hr/yr × 177.1×10⁶ BTU/hr
×1/12000 lb coal/BTU × 1/2000
= 103,308 tons/year, total

Coal Unloading

10 – 100 ton train cars will be received twice per week. Cars will be unloaded thru "bottom dump" car dump at rate of 200 tons/hr. Car dump will have sides and top enclosed to reduce wind blown fugitive emissions. Water sprays will be used for dust suppression.

Emission Factor – 0.4 lb P.M./ton coal (pg 2-17)
Uncontrolled for rotary car dump (pg 2-21)

Control – Use of bottom dump, rather than rotary car dump increases time of unloading a car from 5 min to 30 min. The reduced rate of unloading reduces mechanical agitation (pg 2-14) and hence reduces emissions by an assumed 50%. Water sprays will also be used to suppress fugitive emissions. A control factor of 34% is assumed (Pg 2-10).

Actual Emission Factor

= 0.4 (1−0.5)(1−0.34)

= 0.136 lb/ton unloaded

* Technical Guidance for Control of Industrial Process Fugitive Part. Emissions, EPA-450/3-77-010, March 1977

Storage Pile

Coal will be loaded onto a 10,000 ton storage pile at the rate of 200 tons/hr using a rotary stacker with an adjustable chute to reduce fall distance. Water sprays will be used on the pile and at the load-out to reduce emissions. Load-out will be by front-end loader at rate of 200 tons/hour. The average time for the coal in the storage pile is:

$$(10{,}000 \text{ tons} / 103{,}308 \text{ tons/yr})(365 \text{ days/yr}) = 35 \text{ days}.$$

The pile is assumed to have less than a "Normal Mix" (pg 2-33) of activity since pile loading will occur only 10 hrs/week (2000 tons coal delivered/week ÷ 200 ton/hr unloading and stacking rate) and since load-out will occur only 11.2 hours/week (400 tons/day × 7 day/week ÷ 200 ton/hr load-out rate × 7000/8760 operating factor). The pile, in equivalent terms, only has 2 active days (5-6 hrs/day) per week.

The uncontrolled pile emission factor (pg 2-33) therefore is:

$$\underbrace{(0.33 - \underset{(\text{wind})}{0.11})}_{\text{loading, traffic, load-out}}(2/5) + \underset{(\text{wind})}{0.11} = 0.20 \text{ lb/ton placed in stg.}$$

The silt content of the coal is assumed to be 2% (pg 2-37 for medium vol. coal) and the PE index is 85 (pg 2-34). The distribution of total pile emission among various activities is (pg 2-32 and 33)

Load onto pile – $0.088(12/[12+40+15]) = 0.01$ lb/ton
Traffic – $0.088(40/[12+40+15]) = 0.05$ lb/ton
Wind – 0.11 lb/ton
Load-out – $0.088(15/[12+40+15]) = 0.02$ lb/ton

Control – Use of rotary stacker with adjustable chute is assumed to reduce loading emissions 75% (pg 2-38). Water sprays on the pile are assumed to reduce emissions from wind by 34% (pg 2-10 and 38) and sprays are assumed to reduce load-out emissions by 50% (pg 2-38). Water sprays are also assumed to reduce traffic emissions by 50% (pg 2-38).

Actual Emission Factor (pg 2-35)

$$= 0.01\,(2/1.5)(1-0.75)/(95/100)^2 + 0.05\,(2/1.5)(1-0.5)/(95/100)^2 + 0.02\,(2/1.5)(1-0.5)/(95/100)^2 + 0.11\,(2/1.5)(1-0.34)(35/90)(95/100)^2$$

$$= 0.003 + 0.030 + 0.012 + 0.035$$

$$= 0.08 \text{ lb/ton placed in storage}$$

Transfer and Conveying

Coal will be off-loaded from the pile at the rate of 200 tons/hour by front-end loader and transported approximately 375 ft. on a single open conveyor belt. The coal will be discharged into 2-200 ton day bins. The coal will be wet, from water sprays on the pile and at the load-out, during conveying. An uncontrolled emission factor, which is the geometric mean of the range end values (pg 2-7), was selected since there are no transfer points in the system & since the system is short (375ft vs 1000 ft - typical [pg 2-53]).

Water sprays at the load-out point are assumed to wet the coal sufficiently to reduce emissions during transfer by 34% (pg 2-6)

Actual Emission Factor (pg 2-7)

$$= \left(10^{\left[\frac{\log 0.04 + \log 0.96}{2}\right]}\right)(1-0.34)$$

$$= 0.13 \text{ lb/ton}$$

Total Fugitive Part. Matter Emissions from Coal Handling

$= [0.136 + 0.080 + 0.130]$ lb/ton

$\times$ 103,308 tons/yr $\times$ 1/2000

= 17.9 tons/yr.

Phosphate Rock Loading and Transfer

No change since facility is presently permitted to dry and ship

(450×2) tons/hr x 8760 hr/yr

$= 7.88 \times 10^6$ tons of rock per year

and under proposed conditions Brewster will dry and ship 6.3×10^6 tons of rock per year.

Rail Traffic

Additional rail traffic to transport coal on-site. Assume one locomotive on-site for 6 hr per day, 2 days per week, 52 weeks per year with a fuel consumption of 40 gal/hour.

Fuel use = $6 \times 2 \times 52 \times 40$ = 24960 gal/yr.

Emissions (AP-42) Part. Matter @ 25 lb/1000 gal = 0.3 tons/yr

CO @ 130 lb/1000 gal = 1.6 tons/yr

HC @ 94 lb/1000 gal = 1.2 tons/yr

NO_x @ 370 lb/1000 gal = 4.6 tons/yr

SO_2 @ 57 lb/1000 gal = 0.7 tons/yr

Auto Traffic

No significant increase expected

APPENDIX 2A-3

FDER CONSTRUCTION PERMIT APPLICATIONS

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO ~~OPERATE~~/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Phosphate Rock Dryer [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Brewster Phosphates 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) Lonesome Phosphate Rock Dryer #1

SOURCE LOCATION: Street 2 miles NNE of Ft. Lonesome, Florida City N/A

UTM: East 389.550 kilometers North 3,067.930 kilometers

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

APPLICANT NAME AND TITLE: R. A. Leitzman, Manager

APPLICANT ADDRESS: Brewster Phosphates, Bradley, FL 33835

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Brewster Phosphates

I certify that the statements made in this application for a Modified Operation 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: R A Leitzman

R. A. Leitzman, Manager
Name and Title (Please Type)

Date: 11/13/81 Telephone No. (813) 634-5551

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

J. B. Koogler, Ph.D., P.E.
Name (Please Type)

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS
Company Name (Please Type)

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

(Affix Seal)

Florida Registration No. 12925 Date: 11/13/81 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.

Existing rock dryer is presently permitted to be fired with fuel oil with a sulfur content of ~ 0.8% (0.8 lb $SO_2/10^6$ BTU). Permit modification requests use of three alternative fuels; (1) No. 6 oil with 2.6% sulfur, (2) coal with 2.3% sulfur, or (3) coal/oil mix (COM) with 2.6% sulfur.

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

Start of Construction N/A Completion of Construction N/A

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.)

$450,000 for scrubber, ducts, blower, stack

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

AC29-2392; issued 12/2/74

FDER Operation Permit A023-2392; issued 12/22/76; Expired 11/30/77

FDER Operation Permit A029-6213; issued 03/01/78; Expired 01/01/80

FDER Operation Permit A029-25324; issued 01/28/80; Expires 01/15/85

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 XX No

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

if seasonal, describe: The annual production of dry rock form Dryers No. 1 and No. 2 will not exceed 6.3 million tons. This is equivalent to 14,000 dryer hours per year at a rated production capacity of 450 tons per hour (per dryer).

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? No
   a. If yes, has "offset" been applied? --
   b. If yes, has "Lowest Achievable Emission Rate" been applied? --
   c. If yes, list non-attainment pollutants.
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes
3. Does the State "Prevention of Significant Deteriorіation" (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? No
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 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		
Phosphate Rock	Clay and	0.243	450 TPH	1
	Phosphate			
	Rock Dust			

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

1. Total Process Input Rate (lbs/hr): 513 TPH (14% Moist) Wet Phosphate Rock

2. Product Weight (lbs/hr): 450 TPH (2% Moist) Dry Phosphate Rock

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	
			SEE PAGE 3A				

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]
Entoleter Inc.	clay and	98.98%	Not Known	Test Data
Centri Field Scrubber	phosphate rock			
Model No..1200/1700				
	SO_2	32-96%	N/A	Test Data
	(See Attachment			
	No. 1)			

[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

Contaminant	Emissions Max (lb/hr)	Emissions Annual (ton/yr)	Emission Standard	Allowable Emission Rate (lb/hr)	Potential Emissions Max (lb/hr)	Potential Emissions Annual (tons/yr)	Flow Diagram
Part. Matter* (all fuels)	45.8	160.3	Process Wt.	45.8	4490	15715	4
SO_2 - oil	354.7	1813.7		354.7	514	3599	
coal	454.8	2238.3	BACT	454.8	679	4231	4
COM	430.8	2202.7		430.8	624	4370	
NO_x - oil	56.6	396.2		56.6	56.6	396.2	
coal	106.1	742.9	BACT	106.1	106.1	742.9	4
COM	82.3	576.5		82.3	82.3	576.5	
CO - oil	5.4	37.8		5.4	5.4	37.8	
coal	7.4	51.6	BACT	7.4	7.4	51.6	4
COM	6.4	45.0		6.4	6.4	45.0	
HC - oil	1.1	7.6		1.1	1.1	7.6	
coal	2.2	15.5	BACT	2.2	2.2	15.5	4
COM	1.7	11.7		1.7	1.7	11.7	

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
#6 Fuel Oil	25.93 bbl/hr	27.90	177.10
Coal	13,190 lb/hr	14,168	177.10
Coal/Oil Mix (COM)	26.9 bbl/hr	28.9	177.10

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

Fuel Analysis: Oil/Coal/COM

Percent Sulfur: 2.6/2.3/2.6 Percent Ash: 0.02/14.0/6.0

Density: 8.45/NA/9.9 lbs/gal Typical Percent Nitrogen: 0.24/1.2/0.75

Heat Capacity: 17,920/12,500/14,750 BTU/lb 151,400/NA/146,000 BTU/gal

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.

Underflow from the scrubber containing clay and phosphate rock dust, is pumped to the adjacent benefication plant thickener and ultimately is placed in a mine clay settling pond.

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

Stack Height: 125 ft. Stack Diameter: 8 ft.

Gas Flow Rate: 150,000 ACFM Gas Exit Temperature: 151 °F.

Water Vapor Content: 25 % Velocity: 49.74 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.

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.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

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.).

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).

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.

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).

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.

SECTION V

SUPPLEMENTAL REQUIREMENTS

1. Process Weight derivation

   Dry Rock Production (2% mositure) = 450 tons/hour

   Wet Rock Feed (14% moisture)

   = 450 (1 - 0.02)/(1 - 0.14) = 513 tons/hour

2. Actual Emissions - See Appendix 2A-1 of PSD Application

3. Potential Emissions (Actual Emissions from Appendix 2A-1)

   Particulate Matter - 98.9% Control efficiency based on test data

   Hourly = 45.8/(1 - 0.9898) = 4490 lb/hr

   Annual = 160.3/(1 - 0.9898) = 15715 tons/yr

   Sulfur Dioxide

   Oil: Hourly = 354.7/(1 - 0.31)* = 514.1 lb/hr
   Annual = 1813.7/(1 - 0.496)*= 3598.6 tons/yr

   Coal: Hourly = 454.8/(1 - 0.33)* = 678.8 lb/hr
   Annual = 2238.3/(1 - 0.471)*= 4231.2 tons/yr

   COM: Hourly = 430.8/(1 - 0.31)* = 624.4 lb/hr
   Annual = 2202.7/(1 - 0.496)*= 4370.4 tons/yr

   NO_x, CO, HC

   Same as Actual Emissions

4. N/A

5. Efficiencies:

   Particulate Matter = Test data from 1/1981:
   Inlet - 1676 lb/hr
   Outlet - 17 lb/hr
   Eff = (1676 - 17) x 100/1676
   = 98.98%

   SO_2: See Attachment 1

*SO_2 Sorption rates - See Attachment 1.

6. Flow Diagram - See Attachment 2

7. Location Map - See Attachment 3

8. Plot Plan - See Attachment 4

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

(See Section 3.0 of PSD Application)

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

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

1. Control Device/System:
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:

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:

*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 Section 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.

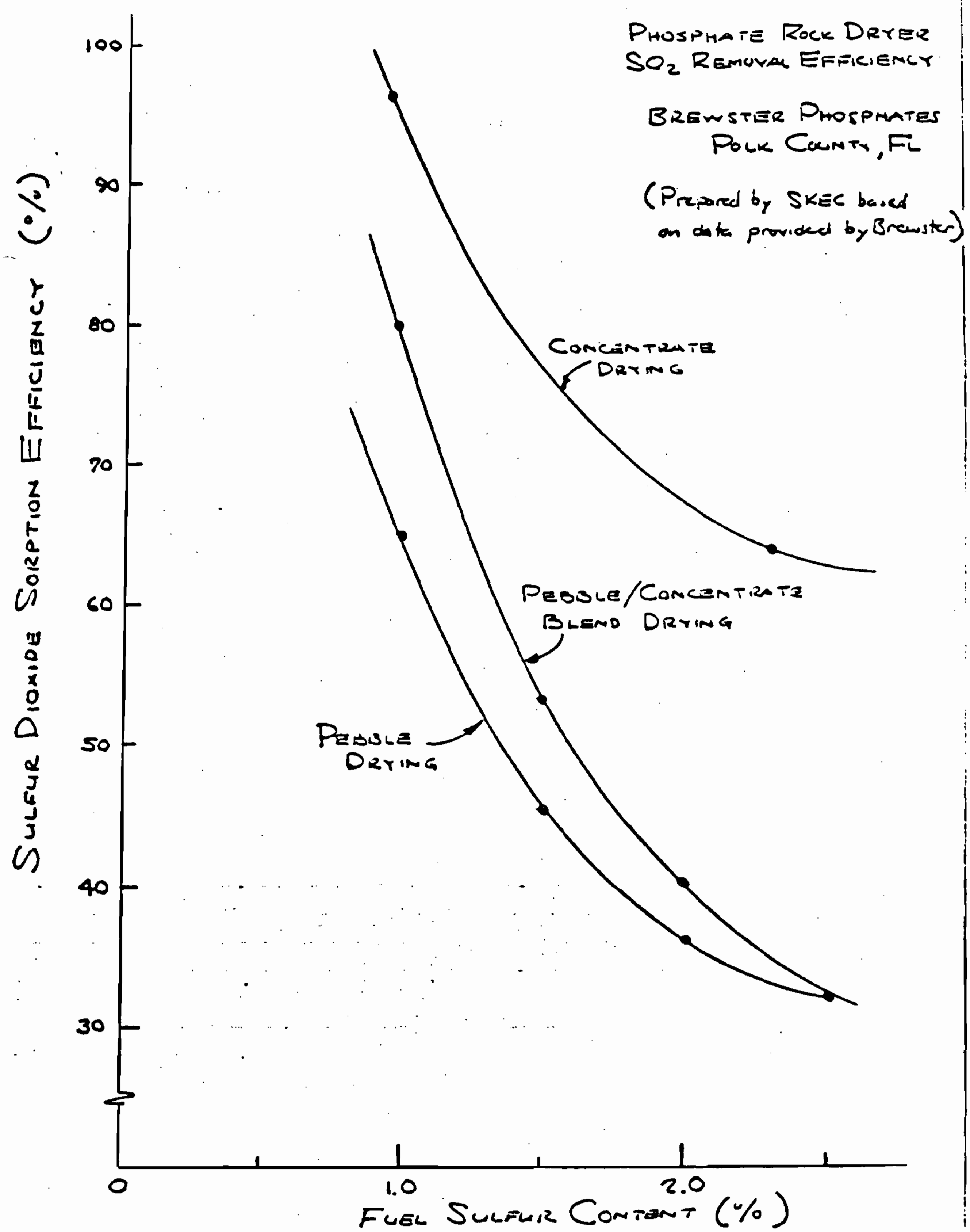
F. Attach all other information supportive to the PSD review.

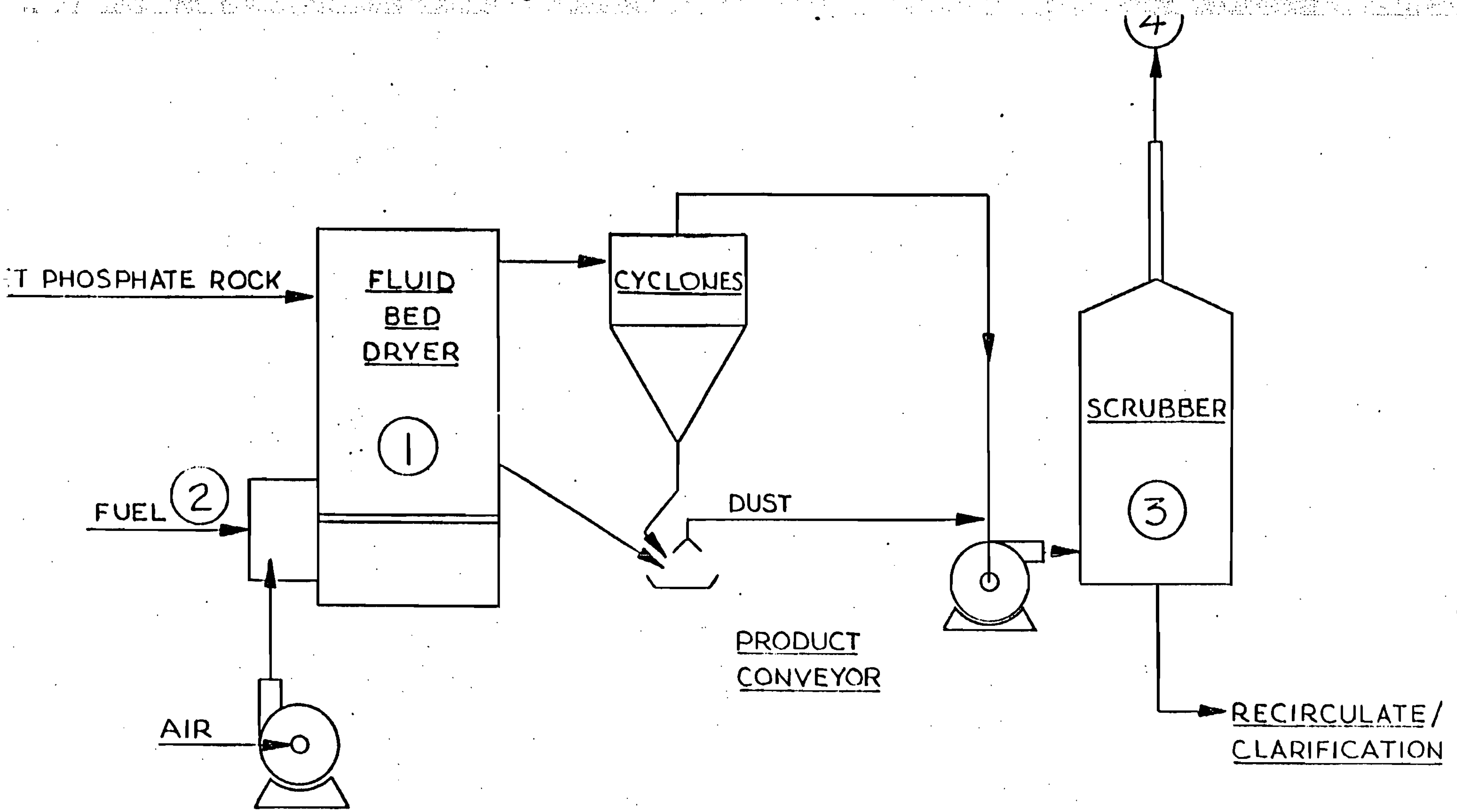
*Specify bubbler (B) or continuous (C).

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.

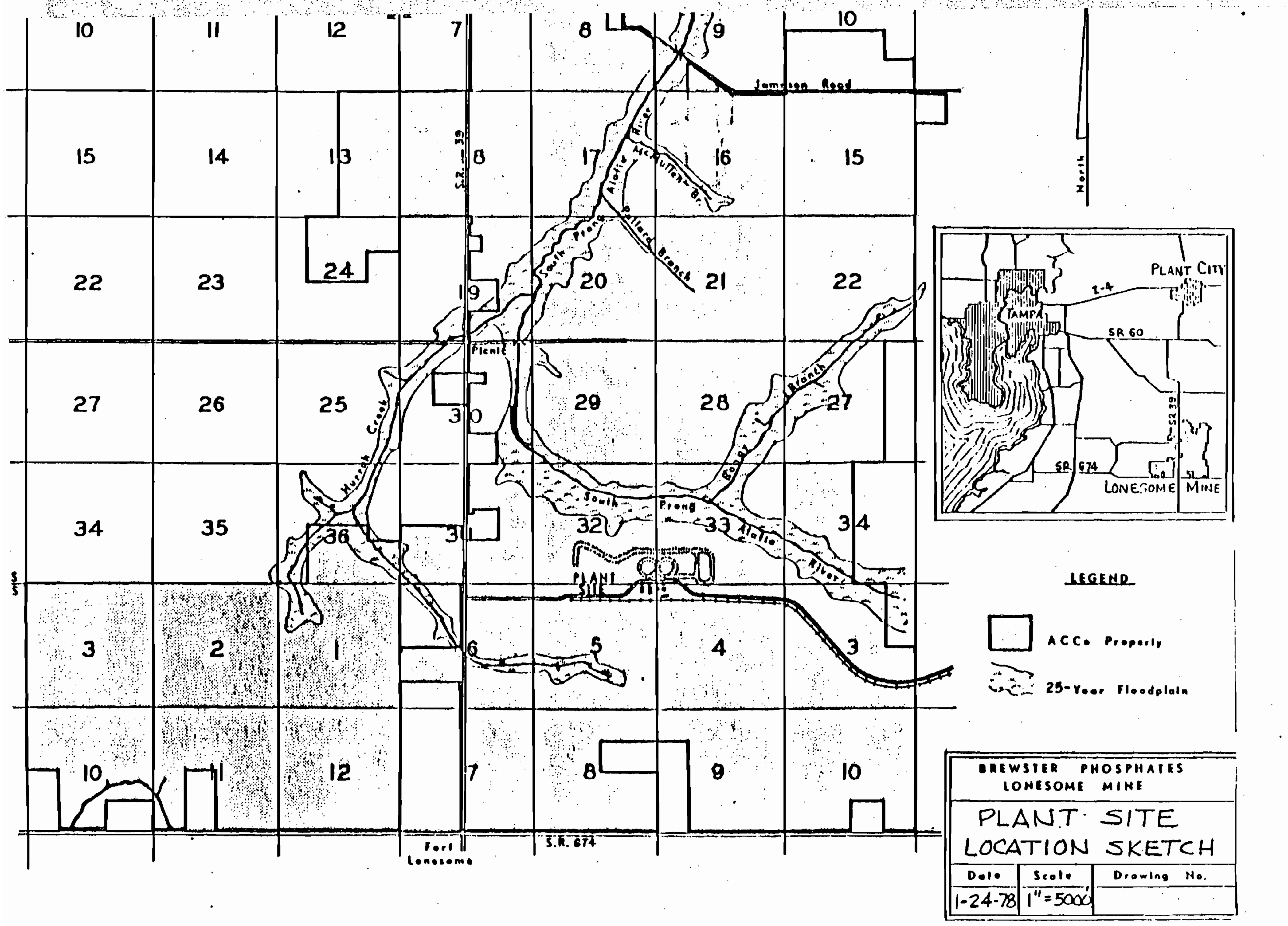
ATTACHMENT 1



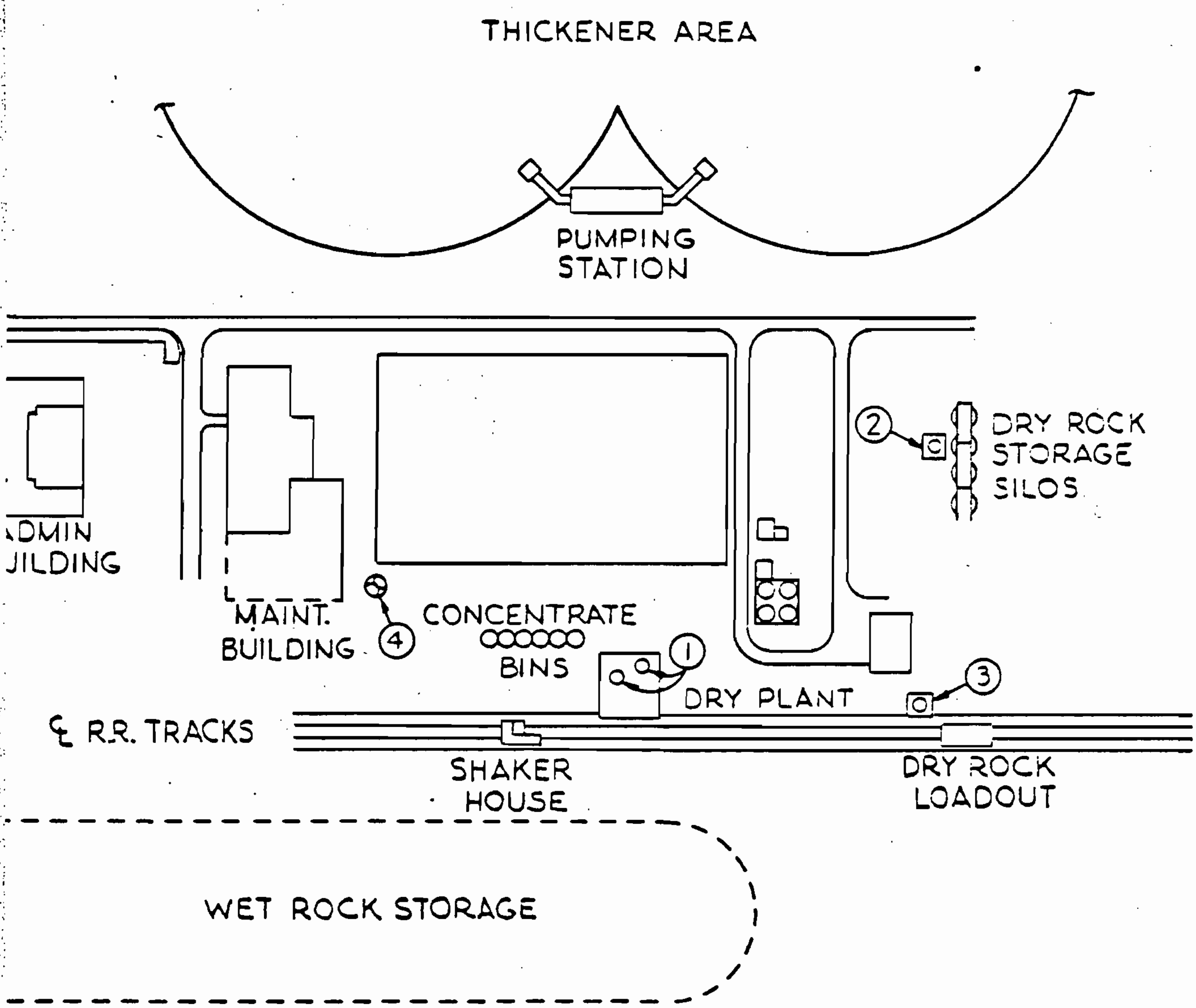


TWO IDENTICAL SYSTEMS AS SHOWN

BREWSTER PHOSPHATES LONESOME MINE
FLOW DIAGRAM PHOSPHATE ROCK DRYERS
DATE 10-15-81


Jameson Road
S.R. 39
North
Alafia River
McMullen Br.
Ballard Branch
South Prong
Picnic
Hurrah Creek
Bossy Branch
South Prong Alafia River
PLANT SITE
Fort Lonesome
S.R. 674
PLANT CITY
I-4
TAMPA
SR 60
SR 39
SR 674
LONESOME MINE
LEGEND
ACCo Property
25-Year Floodplain
BREWSTER PHOSPHATES
LONESOME MINE
PLANT SITE
LOCATION SKETCH
Date
1-24-78
Scale
1" = 5000'
Drawing No.

ATTACHMENT 4



RYER SCRUBBERS
TORAGE SCRUBBER
OADING SCRUBBER
ASE POINT CO-ORDINATES:

BREWSTER PHOSPHATES LONESOME MINE
PLOT PLAN
DATE 8-23-74

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO ~~OPERATE~~/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Phosphate Rock Dryer [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Brewster Phosphates 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) Lonesome Phospahte Rock Dryer #2

SOURCE LOCATION: Street 2 miles NNE of Ft. Lonesome, Florida City N/A

UTM: East 389.550 kilometers North 3,067.930 kilometers

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

APPLICANT NAME AND TITLE: R. A. Leitzman, Manager

APPLICANT ADDRESS: Brewster Phosphates, Bradley, Florida 33835

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Brewster Phosphates

I certify that the statements made in this application for a Modification Operation permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: [signature]

R. A. Leitzman, Manager
Name and Title (Please Type)

Date: 11/13/81 Telephone No. (813) 634-5551

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

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

Signed: [signature]

J. B. Koogler, Ph.D., P.E.
Name (Please Type)

(Affix Seal)

SHOLTES & KOOGLER ENVIRONMENTAL CONSULTANTS
Company Name (Please Type)

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

Florida Registration No. 12925 Date: 11/13/81 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.

Existing rock dryer is presently permitted to be fired with fuel oil with a sulfur content of ∿ 0.8% (0.8 lb $SO_2/10^6$ BTU). Permit modification requests use of three alternative fuels; (1) No. 6 oil with 2.6% sulfur, (2) coal with 2.3% sulfur, or (3) coal/oil mix (COM) with 2.6% sulfur.

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

Start of Construction N/A Completion of Construction N/A

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.)

$450,000 for scrubber, ducts, blower, stack

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

AC29-2392; issued 12/2/74

FDER Operation Permit A023-2392; issued 12/22/76; Expired 11/30/77

FDER Operation Permit A029-6213; issued 03/01/78; Expired 01/01/80

FDER Operation Permit A029-25324; issued 01/28/80; Expires 01/15/85

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 XX No

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

if seasonal, describe: The annual production of dry rock form Dryers No. 1 and No. 2 will not exceed 6.3 million tons. This is equivalent to 14,000 dryer hours per year at a rated production capacity of 450 tons per hour (per dryer).

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? No
   a. If yes, has "offset" been applied? --
   b. If yes, has "Lowest Achievable Emission Rate" been applied? --
   c. If yes, list non-attainment pollutants.
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? No
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 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		
Phosphate Rock	Clay and	0.243	450 TPH	1
	Phosphate			
	Rock Dust			

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

1. Total Process Input Rate (XXXXX): 513 TPH (14% Moist) Wet Phosphate Rock
2. Product Weight XXXXX: 450 TPH (2% Moist) Dry Phosphate Rock

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	
			SEE PAGE 3A				

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]
Entoleter Inc.	clay and	98.98%	Not Known	Test Data
Centri Field Scrubber	phosphate rock			
Model No..1200/1700				
	SO_2	32-96%	N/A	Test Data
	(See Attachment			
	No. 1)			

1See Section V, Item 2.

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

3Calculated from operating rate and applicable standard

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

5If Applicable

Contaminant	Emissions Max (lb/hr)	Emissions Annual (ton/yr)	Emission Standard	Allowable Emission Rate (lb/hr)	Potential Emissions Max (lb/hr)	Potential Emissions Annual (tons/yr)	Flow Diagram
Part. Matter* (all fuels)	45.8	160.3	Process Wt.	45.8	4490	15715	4
SO_2 - oil	354.7	1813.7		354.7	514	3599	
coal	454.8	2238.3	BACT	454.8	679	4231	4
COM	430.8	2202.7		430.8	624	4370	
NO_x - oil	56.6	396.2		56.6	56.6	396.2	
coal	106.1	742.9	BACT	106.1	106.1	742.9	4
COM	82.3	576.5		82.3	82.3	576.5	
CO - oil	5.4	37.8		5.4	5.4	37.8	
coal	7.4	51.6	BACT	7.4	7.4	51.6	4
COM	6.4	45.0		6.4	6.4	45.0	
HC - oil	1.1	7.6		1.1	1.1	7.6	
coal	2.2	15.5	BACT	2.2	2.2	15.5	4
COM	1.7	11.7		1.7	1.7	11.7	

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
#6 Fuel Oil	25.93 bbl/hr	27.90	177.10
Coal	13,190 lb/hr	14,168	177.10
Coal/Oil Mix (COM)	26.9 bbl/hr	28.9	177.10

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

Fuel Analysis: Oil/Coal/COM

Percent Sulfur: 2.6/2.3/2.6 Percent Ash: 0.02/14.0/6.0

Density: 8.45/NA/9.9 lbs/gal Typical Percent Nitrogen: 0.24/1.2/0.75

Heat Capacity: 17,920/12,500/14,750 BTU/lb 151,400/NA/146,000 BTU/gal

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.

Underflow from the scrubber containing clay and phosphate rock dust, is pumped to the adjacent benefication plant thickener and ultimately is placed in a mine clay settling pond.

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

Stack Height: 125 ft. Stack Diameter: 8 ft.

Gas Flow Rate: 150,000 ACFM Gas Exit Temperature: 151 ºF.

Water Vapor Content: 25 % Velocity: 49.74 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.
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.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
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.).
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).
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.
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).
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.

SECTION V

SUPPLEMENTAL REQUIREMENTS

1. Process Weight derivation

Dry Rock Production (2% mositure) = 450 tons/hour

Wet Rock Feed (14% moisture)

= 450 (1 - 0.02)/(1 - 0.14) = 513 tons/hour

2. Actual Emissions - See Appendix 2A-1 of PSD Application

3. Potential Emissions (Actual Emissions from Appendix 2A-1)

Particulate Matter - 98.9% Control efficiency based on test data

Hourly = 45.8/(1 - 0.9898) = 4490 lb/hr

Annual = 160.3/(1 - 0.9898) = 15715 tons/yr

Sulfur Dioxide

Oil: Hourly = 354.7/(1 - 0.31)* = 514.1 lb/hr
Annual = 1813.7/(1 - 0.496)*= 3598.6 tons/yr

Coal: Hourly = 454.8/(1 - 0.33)* = 678.8 lb/hr
Annual = 2238.3/(1 - 0.471)*= 4231.2 tons/yr

COM: Hourly = 430.8/(1 - 0.31)* = 624.4 lb/hr
Annual = 2202.7/(1 - 0.496)*= 4370.4 tons/yr

NO_x, CO, HC

Same as Actual Emissions

4. N/A

5. Efficiencies:

Particulate Matter = Test data from 1/1981:
Inlet - 1676 lb/hr
Outlet - 17 lb/hr
Eff = (1676 - 17) x 100/1676
= 98.98%

SO_2: See Attachment 1

*SO_2 Sorption rates - See Attachment 1.

6. Flow Diagram - See Attachment 2

7. Location Map - See Attachment 3

8. Plot Plan - See Attachment 4

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

(See Section 3.0 of PSD Application)

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

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration

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

1. Control Device/System:
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:

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:

*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 Section 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.

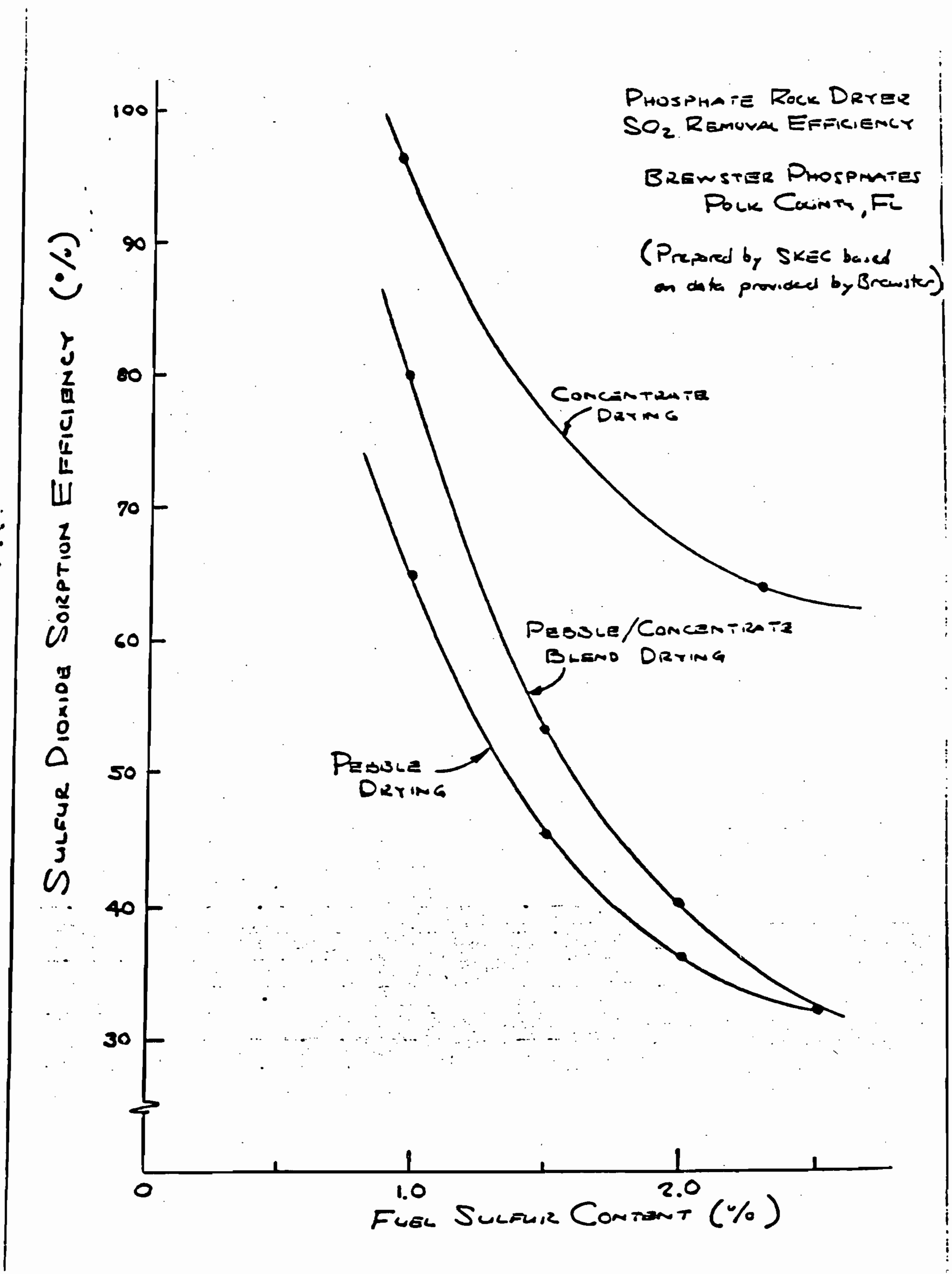
F. Attach all other information supportive to the PSD review.

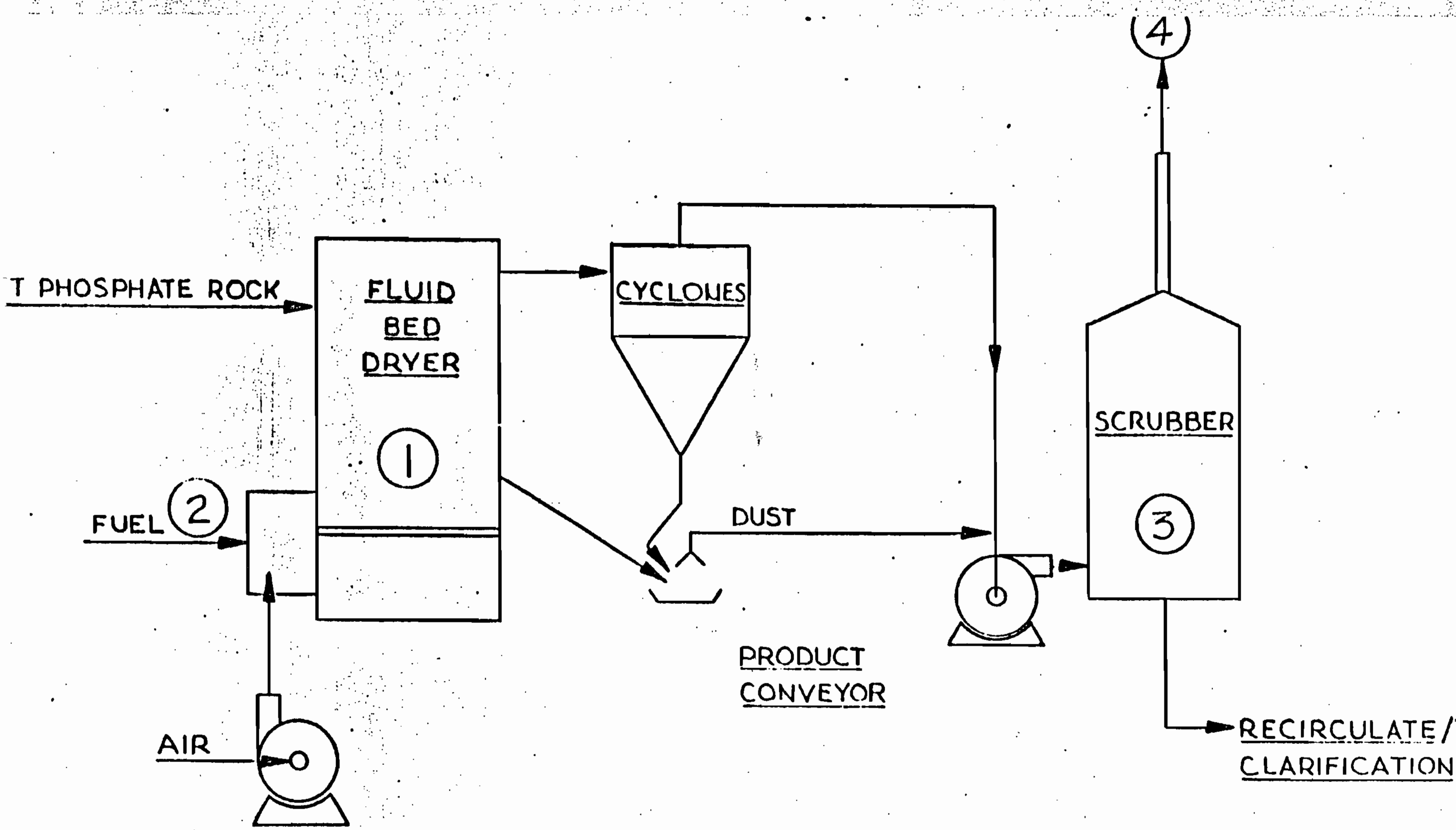
*Specify bubbler (B) or continuous (C):

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.

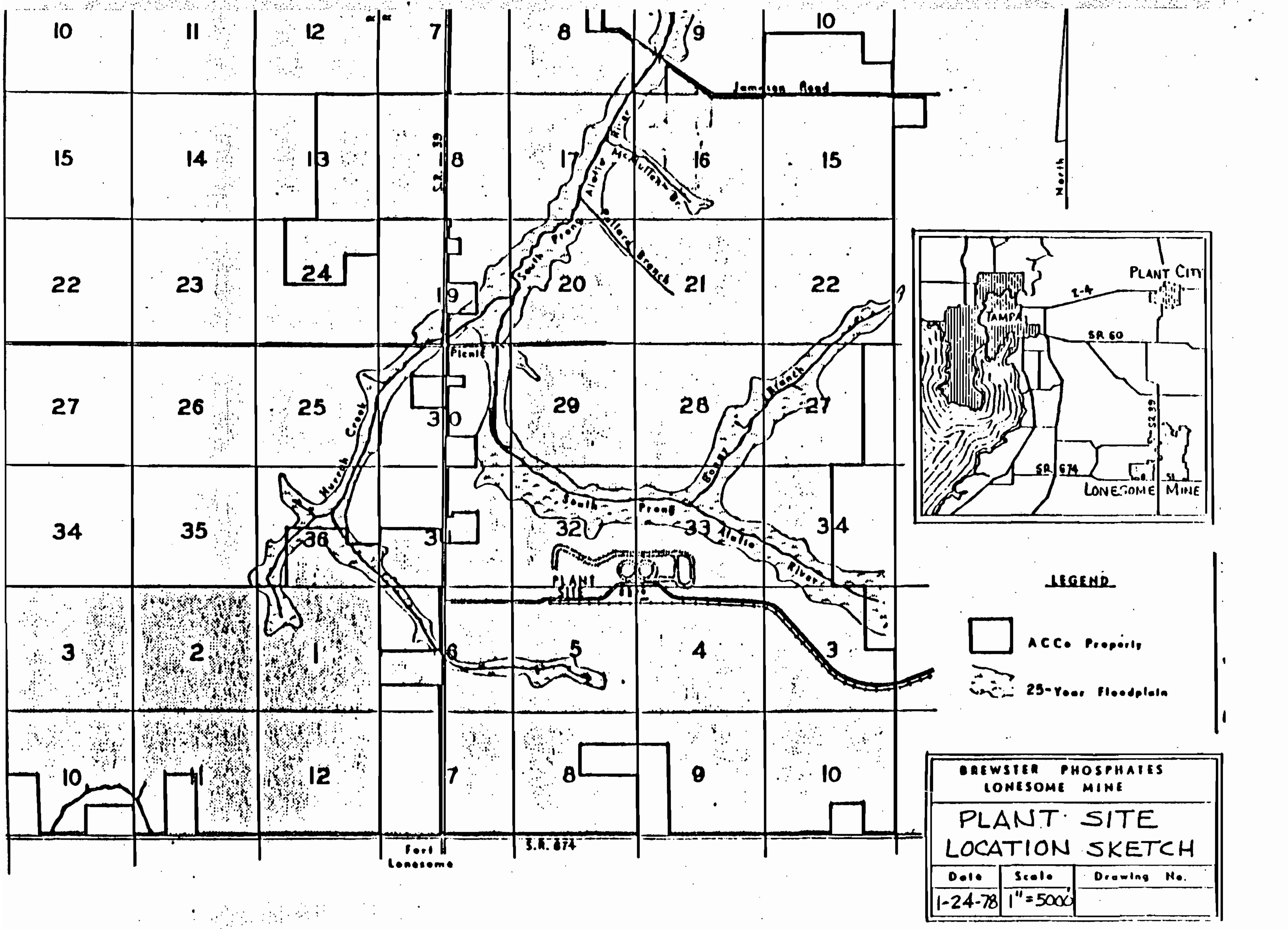
ATTACHMENT 1





TWO IDENTICAL SYSTEMS AS SHOWN

BREWSTER PHOSPHATES LONESOME MINE
FLOW DIAGRAM PHOSPHATE ROCK DRYERS
DATE 10-15-81


Jameson Road
S.R. 39
North
Alafia River
McMullen Br.
Pollard Branch
South Prong
Picnic
Hurrah Creek
Bobby Branch
South Prong Alafia River
PLANT SITE
Fort Lonesome
S.R. 674
PLANT CITY
TAMPA
I-4
SR 60
SR 674
LONESOME MINE
LEGEND
ACCo Property
25-Year Floodplain
BREWSTER PHOSPHATES
LONESOME MINE
PLANT SITE
LOCATION SKETCH
Date
1-24-78
Scale
1" = 5000'
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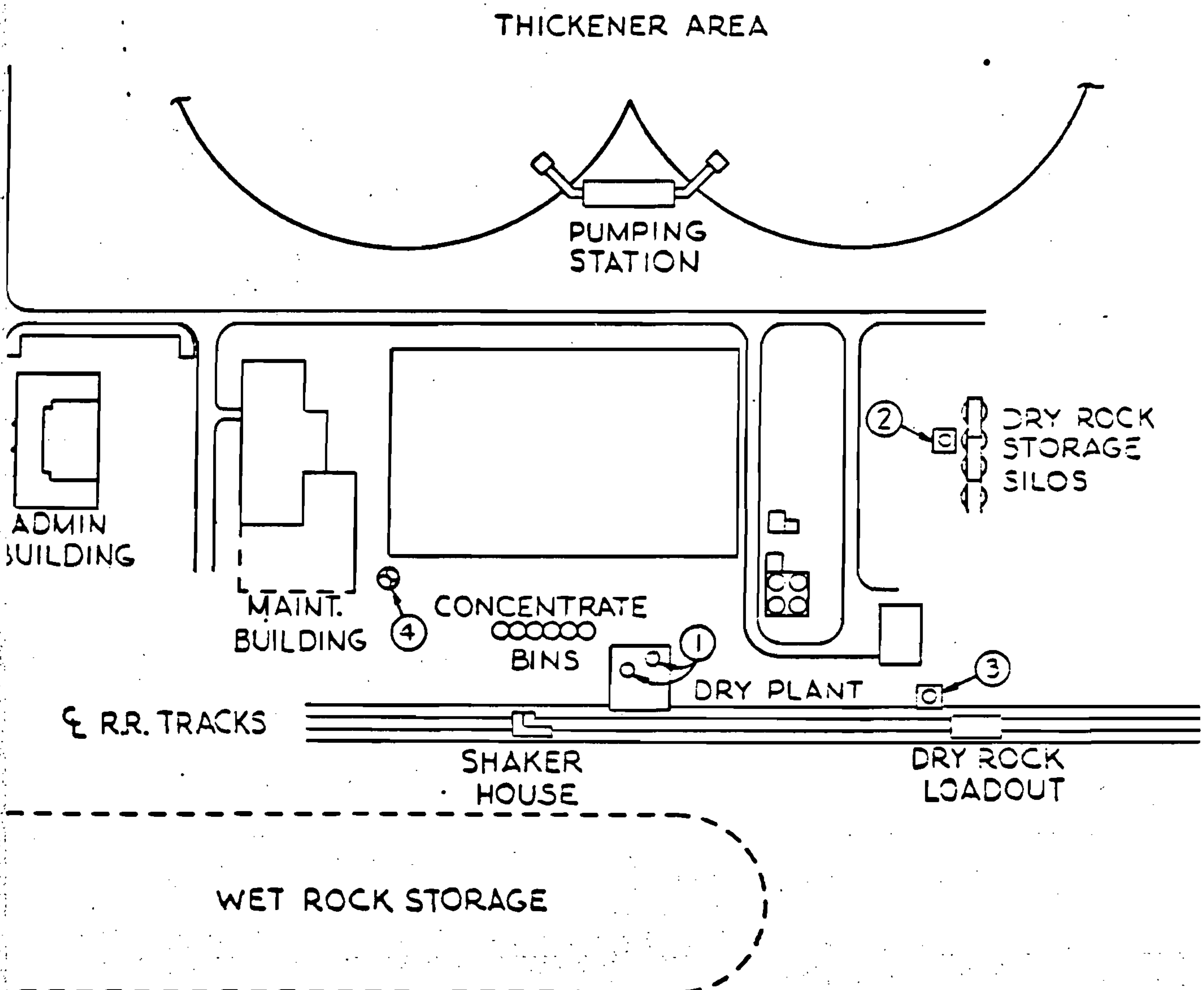
ATTACHMENT 4



DRYER SCRUBBERS
STORAGE SCRUBBER
LOADING SCRUBBER
BASE POINT CO-ORDINATES:

BREWSTER PHOSPHATES LONESOME MINE
PLOT PLAN

3.0 BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology (BACT) is required to control emissions of all regulated pollutants for which emission rate increases exceed the de minimus emission rate increase established by State and Federal PSD Regulations. In the case of Brewster Phosphates, the increase in the emission rates of sulfur dioxide and nitrogen oxides exceed the de minimus emission rate increases (See Table 2-1). The other pollutants that will be emitted from the facility as a result of the use of the alternative fuels are particulate matter, carbon monoxide and hydrocarbons. The increase in emission rates for these three pollutants are less than the de minimus rates defined by State and Federal PSD Regulations for these pollutants. BACT, therefore, must be reviewed for the control of sulfur dioxide and nitrogen oxides emissions.

The only sources that will be effected by the BACT determination are the two fluid-bed rock dryers. In Section 2.0 of this application these sources are described and the proposed action, that is the use of alternative fuels to fired these dryers, is discussed.

Each of the fluid-bed rock dryers operated by Brewster Phosphates use Entoleter, Inc. Model 1200/1700 Centri-Field Scrubbers to control air pollutant emissions. Tests conducted by Brewster in January 1981 show these scrubbers to be 98.98% effective for removing particulate matter emissions. Tests conducted at the same time show that the scrubbers have no effect on nitrogen oxides emissions. In addition to the tests in

January 1981, Brewster has conducted several tests during the period July 1977 through May 1981 to determine the effectiveness of the fluid-bed dryer and scrubber, combined, for removing sulfur dioxide from the stack gas.

Brewster found that the sulfur dioxide removal efficiency of the dryer/scrubber combination varied as a function of the sulfur content of the dryer fuel and as a function of the product being dried. The sulfur dioxide sorption data developed by Brewster from these tests are presented as Attachment 2 to Appendix 2A-1 of this application. These data show that the sulfur dioxide sorption rate varies between 32 and 96 percent.

The data show that the sorption rate of sulfur dioxide is greatest when drying phosphate rock concentrate, lowest when drying pebble phosphate rock and at intermediate levels when drying a blend of concentrate and pebble. For concentrate the sorption rate ranges from 62 to 98 percent, for the blend the sorption rate varies between 32 and 80 percent and for pebble rock the sorption rate varies between 32 and 65 percent. Annually, 60 percent of the rock dried at the Lonesome facility is phosphate rock concentrate, 35 percent is a blend of pebble and concentrate and only 5 percent is pebble rock. With this distribution of products the highest SO_2 sorption rate can be expected 60 percent of the time and the lowest about five percent of the time.

All short-term impact studies were based on the lowest sulfur dioxide sorption rate. The annual impact studies assumed the expected annual product distribution and the associated sulfur dioxide sorption rate.

Brewster plans no additional add-on pollution control equipment in addition to the existing Entoleter scrubbers. Neither does Brewster currently plan to use scrubber water additives to increase sulfur dioxide sorption rates above those inherent in the system.

3.1 Sulfur Dioxide Emissions

Sulfur dioxide emissions from the dryers will be controlled by sorption within the dryer/scrubber system. This sorption rate will depend upon the products being dried and the sulfur content of the fuel used for firing the dryer. Off-setting increases in sulfur dioxide emission rates as the sulfur content of fuels increase will be the cost and availability of fuels.

As BACT Brewster is proposing the use of a No. 6 fuel oil with a sulfur content of 2.6 percent and/or the use of coal with a 2.3 percent sulfur content, monthly average and/or a coal/oil mix fuel with sulfur content of 2.6 percent. In Table 3-1 the annual costs for these fuels and fuels with lower sulfur contents are presented. Also in Table 3-1 the increase in sulfur dioxide emissions over presently permitted emission rates are summarized and the maximum expected annual and 24-hour impacts resulting from increased and total sulfur dioxide emissions are listed.

The fuel oil prices quoted to Brewster on November 12, 1981, and the prices used in this BACT analysis, were $25.05 per barrel for oil with a 2.4 - 2.6 percent sulfur content and $29.10 per barrel for oil with a 0.8 percent sulfur content. Blending to obtain a fuel sulfur content between these two levels can be done at no cost. The price for the coal/oil mix was quoted at 9 to 10 percent per gallon below the price of a fuel oil with a comparable sulfur content. Coal prices are listed in Appendix 3A-1.

From Table 3-1 is can see that there is no increase in sulfur dioxide emissions over presently permitted emission rates for fuel oils with a sulfur content of up to 1.5 percent, for coal with a 0.8% sulfur content and for the coal/oil mix with a sulfur content of 1.0 percent. If follows, therefore, that there will be no significant increase in ambient sulfur dioxide levels when these fuels are burned.

For the other fuels; that is fuel oil with a sulfur content of 2.6 percent or more, for coal with a sulfur content of 2.3 percent, and for the coal/oil mix with a sulfur content of 2.0 percent, or more, there are significant increases in the sulfur dioxide emission rates and significant annual and 24-hour ambient impacts. Additionally, there is a significant sulfur dioxide emission increase and a significant annual sulfur dioxide impact when 2.0 percent sulfur fuel oil is used.

From the last two columns of Table 3-1 it will be noted that the maximum sulfur dioxide levels for the 24-hour and annual periods, resulting from existing and proposed sulfur dioxide emissions within the area, are well below State and Federal Ambient Air Quality Standards. Considering these ambient sulfur dioxide levels and the annual fuel cost saving (Column 6, Table 3-1) Brewster Phosphates is of the opinion that the use of 2.6 percent sulfur fuel or the use of coal with a 2.3 percent sulfur content or the use of a coal/oil mix fuel with a 2.6 percent sulfur content represents Best Available Control Technology for controlling sulfur dioxide emissions and requests approval to use the fuels interchangeably for phosphate rock drying.

3.2 Nitrogen Oxides Emissions

The combustion of fuel, whether it be oil, coal or coal/oil 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 in January 1981, when a fuel with a 2.4 percent sulfur content was being burned, showed nitrogen oxides concentrations in the dryer stack gas of 61 parts per million (See Attachment 1, Appendix 2A-1).

It is expected that the combustion of any fuel oil will result in nitrogen oxides emissions of approximately the same level.

If coal is used as a dryer fuel the nitrogen oxides emissions will be expected to increase because of the increased nitrogen content of the fuel. Similarily, nitrogen oxides emissions will be expected to increase with a coal/oil mix fuel; although not to the same degree as they would increase with coal. Calculations summarized in Table 2-1 indicated that there will be significant increases in nitrogen oxides emissions as a result of using coal or the coal/oil 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 additional air downstream of the burner results in the burner functioning much like a "low NO_x" burner.

Because of the nature of the drying operation, the rock dryer burner functions much like a "low NO_x" burner. 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 could be achieved by flue gas recirculation.

It is the opinion of Brewster Phosphates that the burners used in the rock dryers represent the best practical means of controlling nitrogen oxides emissions from these sources. In the evaluation of BACT for the nitrogen oxides emissions refence should also be made to Section 5.0 which shows the impact of increased nitrogen oxides emissions on ambient air quality to be less than significant.

TABLE 3-1

SUMMARY OF FUEL COSTS AND AMBIENT IMPACTS RESULTING FROM THE USE OF VARIOUS FUELS

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

Fuel	SO_2 Sorption Rate (%)		SO_2 Emission Rate Over Permitted Rate (TPY)	Fuel Cost Per Year		Max Impact of Emissions In Excess of Permitted		Max Impact of All Emissions	
	Range	Annual (1)		Total	Annual Savings (5)	24-hr (3) (ug/m^3)	Annual (4) (ug/m^3)	24-hr (ug/m^3)	Annual (ug/m^3)
Oil								--	--
								--	--
0.8% Sulfur	70-98	92	0(2)	11,718,289	0	0	0	--	--
1.0% Sulfur	64-94	87	0(2)	11,481,556	236,733	0	0	100	13
1.5% Sulfur	45-76	66	0(2)	10,929,567	788,722	4	0	129	15
2.0% Sulfur	36-67	56	194	10,785,612	1,332,677	28	0.5		
2.6% Sulfur	32-62	50	807	9,760,386	1,957,903	27	2.1		
Coal								--	--
								159	16
0.8% Sulfur	70-98	92	0(2)	6,099,324	5,618,965	0	0		
2.3% Sulfur	33-64	52	1289	5,876,178	5,842,111	87	3.4		
COM								--	--
								149	14
1.0% Sulfur	64-94	87	0(2)	10,511,316	1,206,973	0	0	154	16
2.0% Sulfur	36-67	56	513	9,581,410	2,136,879	47	1.4		
2.6% Sulfur	32-64	50	1278	9,173,520	2,544,769	82	3.4		

(1)Based on sulfur content of fuel and dryer product distribution of Concentrate - 60%, Pebble - 5% and Blend - 35%

(2)Present Permit Conditions do not consider, or require, SO_2 sorption.

(3)Impact when Pebble Rock is dried; i.e., when the SO_2 sorption rate is lowest.

(4)From CRSTER air quality model.

(5)Savings in fuel costs when drying 6.3 million tons of rock.

APPENDIX 3A-1

COAL SPECIFICATIONS

	PITTSTON	OLD BEN #1	ARMCO	NEVILLE NORTON	McCALL	CROWN #2	CROWN #3	CROWN #1	A.T. MASSEY
Heating Value KBTU/Lb	13.0	11.35	12.9	13.0	11.3	12.5	12.0	11.5	11.5
Fixed Carbon	53.8	40.5	53.0	58.0					40.5
Volatiles	30.2	38.5	32.0	32.0					37.0
Ash	10.0	9.4	8.0	10.0		14.0	14.0	14.0	17.0
Moisture	6.0	11.6	7.0	6.0		6.0	6.0	8.0	
Carbon	78.11	62.4	72.6	82.12					67.53
Hydrogen	4.80	4.4	4.7	5.07					4.9
Sulfur	0.77	3.6	0.79	0.79	3.0	2.5/3.0	2.0/2.5	0.93	1.77
Nitrogen	1.32	1.3	1.2	1.29					1.21
Oxygen	3.91	7.3	5.7	4.47					6.59
Ash	9.88	9.4	8.0	5.43		14.0			18.0
Moisture	1.07	11.6	7.0	0.73					
	Cl-0.14	Cl-0.03							Cl-0.09
Grindability HI	73	52	52	61					
FSI	7		7.5						
			R	R				R	
Ash Fushion Temp. FI	2710	2350	2465	2350	2450			2495	2500
S	2770	2410	2745+	2515				2550	
H	2800+	2460	2745+	2595				2585	
F	2800+	2520	2745+	2700+				2615	
Ash Analysis SiO_2 %Wgt.		40.85	55.4						
Al_2O		19.21	33.7						
Fe_2O_3		29.66	4.4						
CaO		2.48	1.0						
MgO		0.93	0.5						
K_2O		1.92	1.5						
Na_2O		0.77	0.26						
SO_3		1.42	0.81						
TiO_2		0.87	1.5						
P_2O5		0.12	0.11						
Cost F.O.B. Mine $/Ton	46.00	25.00	39.0	42.0	26.00	41.00	36.00	36.00	29.00
Location	McClure, VA.	Oakland, IN.	Prenter, W.V.	Nora, Va.,	Benedict, VA.	Woodward, AL.	Gray, KY	Bear Creek, AL.	St. Charles, VA.
Originating R. R.	CC&O	AWW	C & O	Clinchfield	Southern	SO/L & N	L & N	Southern	
Trans. Cost $/Ton		23.17	24.51		17.19	19.23	20.84	21.35	
Total Cost $/Ton		48.17	63.51		43.19	60.25	56.84	57.35	
Total Cost $/MBTU		2.12	2.46		1.91	2.41	2.37	2.49	

4.0 EXISTING AIR QUALITY DATA

State and Federal PSD regulations require that an air quality review be conducted for regulated air pollutants emitted from major sources or modified major sources at rates greater than de minimus levels defined by these regulations. 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 and 14 micrograms per cubic meter, 24-hour average, for nitrogen oxides; the two pollutants emitted as a result of using alternative fuels at greater than de minimus emission rates.

Air quality modeling, the results of which are presented in Section 5.0, show that the increased sulfur dioxide emissions do have a significant impact on the ambient air quality but that the increased nitrogen oxides emissions do not have a significant ambient impact. As a result of this, and consistent with the requirements of state and federal PSD regulations, Brewster Phosphates has been required to conduct pre-construction ambient monitoring for sulfur dioxides. The requirement is to install one continuous sulfur dioxide monitor at existing Brewster monitoring site No. 2 (See Figure 4-1) and to monitor for a period of four months. Monitoring at this site commenced on October 1, 1981 and will terminate, for purposes of this PSD application, on January 31, 1982. Ambient monitoring for nitrogen oxides is not required since the impact of increased emissions are less than the established de minimus impact level for this pollutant.

In 1977 Brewster established three ambient air monitoring sites around the Lonesome Mine Beneficiation Plant. These sites are shown in Figure 4-1. Monitoring commenced in December, 1977 at these three stations for particulate matter and sulfur dioxide. Both pollutants are monitored on a one day in six schedule; particulate matter being monitored with the standard high-volume sampler and sulfur dioxide being monitored with temperature controlled bubbler samplers.

Although bubbler sampler data for sulfur dioxide are not acceptable for PSD purposes, a summary of the data collected by Brewster during the period December 1977 through March 1981 is presented to provide an indication of expected sulfur dioxide levels in the vicinity of the Lonesome Mine. These data are summarized in Table 4-1. The data summarized in Table 4-1 represent a 40-month data base from three monitoring sites.

The ambient sulfur dioxide data show that the observed highest 24-hour sulfur dioxide concentration in the area is 55 micrograms per cubic meter. This compares with an ambient air quality standard of 260 micrograms per cubic meter. The long-term (40 month) average sulfur dioxide concentration in the area is 6.8 micrograms per cubic meter compared with an annual average ambient air quality standard for sulfur dioxide of 20 micrograms per cubic meter. These monitoring data indicate that ambient sulfur dioxide levels in the area of the Lonesome Mine are well below applicable ambient air quality standards.

TABLE 4-1

SUMMARY OF BREWSTER PHOSPHATES LONESOME MINE SULFUR DIOXIDE MONITORING

DECEMBER 1977 - MARCH 1981

BREWSTER PHOSPHATES HILLSBOROUGH COUNTY, FLORIDA

Station	Number Samples	Sulfur Dioxide Concentration (ug/m3) 24-hour Max(1)	Average(2)
1	148	55	8.2
2	192	52	6.8
3	199	37	5.4
Air Quality Standard		260	60

(1) Maximum 24-hour concentration recorded in 40 month period.

(2) 40-month average concentration.

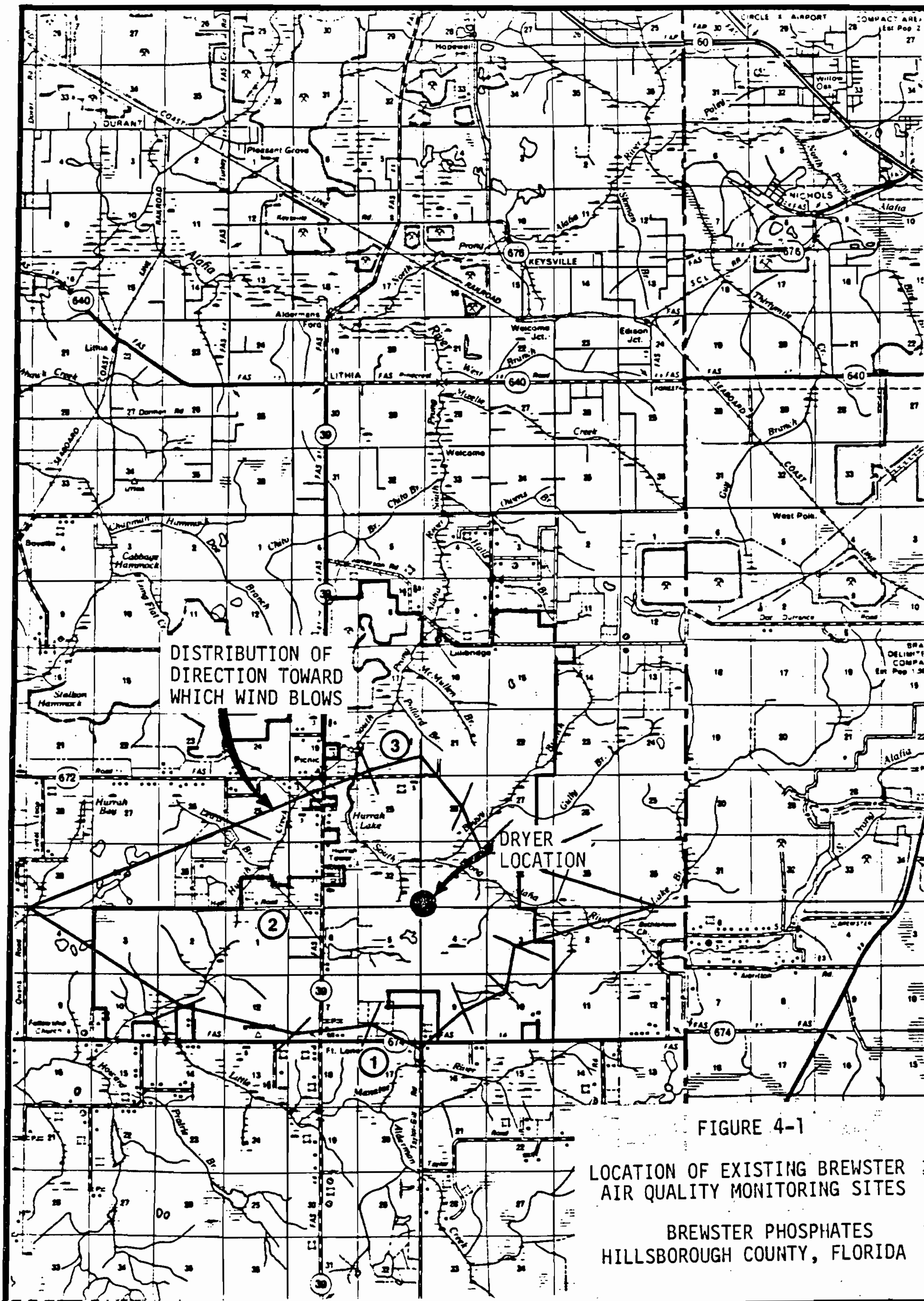


FIGURE 4-1

LOCATION OF EXISTING BREWSTER
AIR QUALITY MONITORING SITES

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

5.0 AIR QUALITY IMPACT ANALYSIS

An air quality review was conducted to evaluate the impact of sulfur dioxide and nitrogen oxides emissions resulting from the use of alternative fuels on ambient air quality. The baseline concentration for the pollutants and the impact of new and modified sources (all major sources constructed or modified since January 6, 1975 and all sources constructed since the baseline date) have been established by air quality modeling. All new or modified sources which have a significant impact on the Lonesome Mine area have been included in the air quality impact analysis.

The air quality modeling performed for long-term and short-term impacts was conducted in accordance with the guidelines established by EPA 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 time correspond to periods for which air quality standards exist for the two pollutants.

The annual impact of pollutants was evaluated using the Air Quality Display Model (AQDM). 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 50 kilometers of the proposed site were used in the air quality review. The source emission data were obtained from FDER source records in Tampa and Tallahassee.

5.1 Meteorological Data

The EPA guidelines for air quality modeling recommend that five years of meteorological data be used for the air quality review. The potential sources of meteorological data included Orlando (115 kilometers northeast of the site) and Tampa (40 kilometers northwest of the site). The Tampa data were selected for the air quality review because of the close proximity to the Brewster site even though the proximity of Tampa to Tampa Bay and the Gulf of Mexico may have introduced some coastal bias into the data.

Hourly surface and upper air data are available from Tampa for the period 1970-1974. These data were combined to obtain mixing heights necessary for the air quality review. The data were also summarized in the STAR format for use with the AQDM.

5.2 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 Brewster Lonesome Mine site. In addition to this review, a request was made to the FDER Tallahassee office for emission data from new and modified sources that would have a significant impact on the Lonesome Mine site. The sources included in the emission inventory are summarized in Table 5-1. The emission and stack parameters associated with the sources are included in the various modeling runs.

The sources included in the emission inventory include all major sources within approximately 50 kilometers of the site and smaller sources which were judged to have a potential impact on air quality at the site.

The emission rates for Brewster sources for hourly and annual periods have been developed and are presented in Appendix 2A-1. For short-term sulfur dioxide modeling, the maximum expected emission rate was used; that is the emission rates resulting from coal combustion. For short-term nitrogen oxides modeling, to determine if the de minimus impact level was exceeded, an hourly emission rate based on coal combustion was used. For annual sulfur dioxide and nitrogen oxides modeling, annual average emission rates were used based on coal combustion.

5.3 Air Quality Review

The air quality review included both the short-term and long-term impact analysis of sulfur dioxide and the long-term impact analysis of nitrogen oxides. The short-term impact is defined as the 3-hour and 24-hour impact 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 first run using as input the emission data from the modified Brewster sources and meteorological data for the period 1970-1974 from Tampa, Florida. The receptor distances in the CRSTER model were set so that the distance to the point of maximum impact could be determined. A second set of CRSTER runs was made for the two pollutants setting the receptor distances so the boundary of the area of significant impact of the proposed sources could be defined. Significant, as used in this context, is defined in Table 5-2.

Meteorological data for evaluating the 3-hour and 24-hour pollutant levels were selected from the first set of CRSTER model runs. Meteorological data resulting in the highest second-high 24-hour and 3-hour sulfur dioxide 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 impacts in the directions that would align various sources or source groups with the Brewster 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 analysis was conducted with the AQDM. The input to the AQDM 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.

5.4 Sulfur Dioxide Impact Analysis

5.4.1 Short-Term Sulfur Dioxide Impact

The short-term impact analysis for sulfur dioxide involved a 3-hour and 24-hour impact analysis. These time periods correspond to applicable short-term air quality standards for sulfur dioxide. The CRSTER model was run twice with sulfur dioxide emission data from the modified Brewster sources. On the first set of runs the receptors were set to determine the maximum air quality impact of the modified sources. From this set of 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 the 24-hour and 3-hour periods and the directions that would allow the investigation of the interaction of pollutants emitted from the various sources in the study area with Brewster sources. The meteorological conditions selected for evaluating impacts in various directions and with various source alignments are summarized in Table 5-3.

The second series of model runs with the CRSTER were made to determine the area of significant impact of sulfur dioxide emissions from the modified sources. In this series of runs it was determined that under the most severe conditions, i.e., coal combustion, the annual impact of increased sulfur dioxide emissions from the Brewster sources would be significant to a distance of 27.9 kilometers from the source, that the 24-hour impact would be significant to a distance of 53.8 kilometers, and that the 3-hour impact would be significant to a distance of 62.3 kilometers. The areas of significant impact are shown in Figure 5-1. These areas of significant impacts do not reach the Chassahowitzka National Wildlife Refuge which is the Class I area nearest the site, nor do they reach the Pinellas County Sulfur Dioxide Non-Attainment Area.

The meteorological conditions established with the CRSTER model, that is those summarized in Table 5-3, and coal fired emission data from Brewster sources and various other sources within the study area were input to the PTMTPW model to determine the maximum impact of sulfur dioxide for each condition investigated. The receptor spacings used for determining the point of maximum impact were 0.1 kilometers. The results of the short-term sulfur dioxide air quality review are summarized in Table 5-4 and Figure 5-2.

5.4.2 Long-Term Sulfur Dioxide Impact

The long-term sulfur dioxide air quality review was conducted with the AQDM. This model was run first to establish baseline sulfur dioxide level; that is the air quality level resulting from 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 or modified sources within the study area other than the Brewster sources and a third time to determine the negative impact of retired baseline sulfur dioxide sources.

The annual sulfur dioxide levels resulting from these various runs are summarized in Table 5-4 and Figures 5-3 through 5-5.

5.4.3 Nitrogen Oxides Impact Analysis

Since only an annual air quality standard exists for nitrogen oxides, only the long-term impact was investigated for this pollutant. This analysis was conducted with the CRSTER in conjunction with the runs made to determine if the 24-hour impact of nitrogen oxides exceeded the de minimus impact level. These runs showed the increased nitrogen oxides emitted as a result of coal combustion to be less than significant; less than 1.0 ug/m^3 for the annual period. Because of this, no additional modeling for nitrogen oxides was conducted.

In addition to the annual impact analysis from the CRSTER runs the outputs were reviewed to determine the area of significant impact of these emissions. The area of significant impact was defined as the area within which the 24-hour nitrogen oxides levels exceeded 14 micrograms per cubic meter. This level was selected from the de minimus impact levels established 40 CFR 52.21.

The impact of nitrogen oxides was determined not be exceed 14 micrograms per cubic meter at any location, hence exempting this pollutant from monitoring requirements.

5.5 Impact On Class I Areas And Non-Attainment Areas

The nearest Class I PSD area to the Brewster site is the Chassahowitzka National Wildlife Refuge is 108.6 kilometers northwest of the site (Figure 2-1). By reviewing the areas of significant impacts for sulfur dioxide shown in Figures 5-1, it is apparent that sulfur dioxide emission increases from the modified Brewster sources do not significantly impact the Class I PSD area. Similarly, it is apparent that the sulfur dioxide emissions from the modified sources do not significantly impact the Pinellas County Sulfur Dioxide Non-Attainment Area; the closest sulfur dioxide non-attainment area to the Brewster site. Since the impact of nitrogen oxides emissions do not exceed the de minimus impact level at any location and is less than 1.0 micrograms per cubic meter, annual average at all locations it is apparent these emissions will not significantly impact the Class I PSD area.

5.6 Air Quality Review Summary

The air quality review for the modified Brewster sources was conducted in accordance with modeling guidelines established by the U.S. Environmental Protection Agency. The long-term impact analyses were conducted with the AQDM and the short-term analyses were conducted with the CRSTER and PTMTPW models. The results of the air quality review are summarized in Table 5-4.

The air quality review indicates that the alternative fuels proposed by Brewster can be used with no threat to ambient air quality standards or PSD increments (See Table 5-4).

5.7 Downwash Analysis

A downwash analysis was conducted to evaluate the impact of increased sulfur dioxide emissions from the rock dryers or air quality under downwash conditions. This analysis was conducted with the ISC short-term model.

The meteorological conditions used for the analysis were those resulting in the maximum impact of emissions for the 3-hour and 24-hour periods as determined during the short-term sulfur dioxide air quality review. The emission data are those resulting from the combustion of coal. The structures evaluated for causing downwash was the dry rock silos, the highest and widest structure at the site, even though this structure is approximately 600 feet from the dryer stacks. It was also assumed that downwash would occur the full 24-hour or 3-hour period.

The results of this analysis showed that for a 3-hour period the maximum sulfur dioxide level would increase from 179 micrograms per cubic meter under normal dispersion conditions to 181 micrograms per cubic meter under downwash conditions. For the 24-hour period, with downwash assumed for the entire period, the maximum impact increased from 87 micrograms per cubic meter (normal) to 94 micrograms per cubic meter under downwash conditions.

The fact that the ISC-ST model assumes that the structure causing downwash is located adjacent to the stack, whereas the rock silos are 600 feet from the stack, and that downwash occurs for the entire 24-hour period makes the 94 micrograms per cubic meter input conservatively high. Even under these severe conditions, the increased impact for a 24-hour period of only seven micrograms per cubic meter indicates that downwash is not a significant problem.

The impact of downwash on the 3-hour sulfur dioxide levels is only two micrograms per cubic meter in a total impact of 179 micrograms per cubic meter. This is not a significant impact.

It can be concluded that downwash will increase ambient sulfur dioxide levels in the order of one to four percent. These increases, considering the magnitude of the total sulfur dioxide impacts, is not considered significant.

TABLE 5-1

AIR POLLUTANT SOURCES INCLUDED
IN EMISSION INVENTORY

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

SOURCE
Brewster
Tampa Electric
Big Bend
Gannon
Hookers Point
Gardinier
AMAX
Piney Point
Plant City
Big Four Mine
Florida Power & Light
Manatee County
New Wales
Conserve
Mobil
W.R. Grace
Royster
C.F. Chemicals - Polk County
Farmland
Agrico-South Pierce
USS Agri-Chemicals
Bartow
Ft. Meade
Estech-Chemical Complex
Lakeland Utilities
Electrophos
PHOSTECH
IMC
Kingsford
Noralyn
Tampa Incinerator

NOTE: All sources emit both sulfur dioxide and nitrogen oxides.

TABLE 5-2

AIR QUALITY STANDARDS AND INCREMENTS

BREWSTER PHOSPHATES
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)	De Minimus Impact Levels (ug/m^3)
Sulfur Dioxide					
Annual	60	20	2	1	NA
24-Hour	260	91	5	5	13
3-Hour	1300	512	25	25	NA
Nitrogen Oxides					
Annual	100	NA	NA	1*	NA
24-Hour	NA	NA	NA	NA	14

*Assumed level based on analogy with significance levels for particulate matter and sulfur dioxide.

SUMMARY OF METEOROLOGICAL CONDITIONS USED TO EVALUATE SHORT-TERM SULFUR DIOXIDE IMPACTS

BREWSTER PHOSPHATES HILLSBOROUGH COUNTY, FLORIDA

	Meteorology				
Pollutant	Day	3-Hr. Period	Year	Direction From Brewster	Sources Other Than Brewster
Sulfur Dioxide					
24-Hour					
1*	178	--	1972	90	TECO Big Bend, AMAX Piney Pt.
2	172	--	1971	100-110	TECO Big Bend
3	068	--	1970	120-130	TECO Gannon & Hookers Pt., Gardinier, Tampa Incinerator
4	140	--	1973	70	AMAX Piney Pt., Florida Power & Light
5	203	--	1972	250-260	AMAX Big Four, Agrico SPCW, IMC Noralyn, USSAC Ft. Meade
6	100	--	1972	240	Farmland, PHOSTECH
7	270	--	1971	230	W.R.Grace, C.F. Chemicals, Royster
8	009	--	1973	210	New Wales, Conserv, Mobil, Lakeland Utilities
Sulfur Dioxide					
3-Hour					
1*	165	8	1971	90	TECO Big Bend, AMAX Piney Pt.
2	172	6	1971	100-110	TECO Big Bend
3	117	7	1973	120-130	TECO Gannon & Hookers Pt., Gardinier, Tampa Incinerator
4	071	6	1973	70	AMAX Piney Pt., Florida Power & Light
5	284	6	1970	250-260	AMAX Big Four, Agrico SPCW, IMC Noralyn, USSAC Ft. Meade
6	264	4	1971	240	Farmland, PHOSTECH
7	293	3	1971	230	W.R.Grace, C.F. Chemicals, Royster
8	018	4	1971	210	New Wales, Conserv, Mobil, Lakeland Utilities

TABLE 5-4

SUMMARY OF AIR QUALITY REVIEW

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

Pollutant	Maximum Impact (ug/m^3) (3)				
	Class II Area			Class I Area	Non-Attain. Area
	Max. Net Impact New Sources(1)	Max Impact All Sources(2)	Max. Impact Brewster Sources	Max. Impact Brewster Sources	Max. Impact Brewster Sources
Sulfur Dioxide					
Annual	4.0	16.0	3.0	< 1	< 1
24-Hour	89.2	159.2	87.0	< 5	< 5
3-Hour	173.0	262.8	173.0	< 25	< 25
Nitrogen Oxide					
Annual	(4)	(4)	0.9(4)	<1	N/A
24-Hour	N/A	N/A	13.3(5)	N/A	N/A

(1) Includes impact of all new sources minus the impact of retired baseline sources.
(2) Includes impact of all baseline and new sources minus the impact of retired baseline sources.
(3) Includes no background since all significant sources in area included in emission inventory. Monitoring presently being conducted by Brewster, to be submitted as part of this PSD Application, will verify that sulfur dioxide background is zero.
(4) Impact of Brewster sources is not significant (<1.0 ug/m^3), therefore no additional modeling was conducted for NO_x.
(5) Impact is less than de minimus (14 ug/m^3), therefore NO_x is exempt from monitoring.

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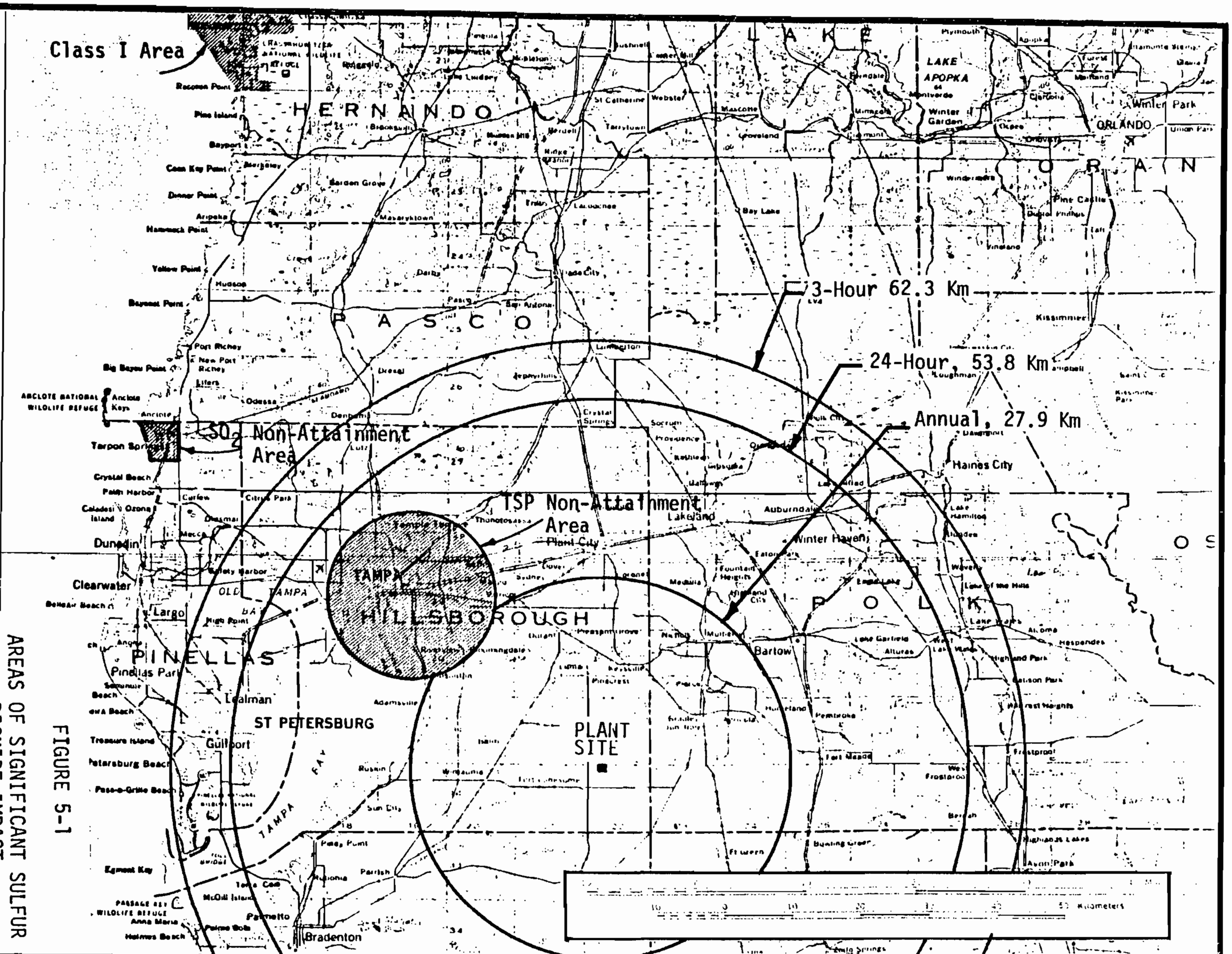

FIGURE 5-1
AREAS OF SIGNIFICANT SULFUR DIOXIDE IMPACT
BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

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Receptor	MAXIMUM SULFUR DIOXIDE CONCENTRATION (ug/m^3) 3-Hour Impact Baseline	Retired	New	Net New(1)	New and Existing(2)	24-Hour Impact Baseline	Retired	New	Net New(1)	New and Existing(2)
1	78.3	0.0	173.0	173.0	251.3	70.0	0.0	89.2	89.2	159.2
2	139.1	0.0	123.7	123.7	262.8	57.3	0.0	40.5	40.5	97.8
3	113.9	13.4	82.7	69.3	183.2	52.3	7.4	28.6	21.2	73.5
4	56.4	0.0	123.8	123.8	180.2	11.5	0.0	24.0	24.0	35.5
5	63.1	0.0	133.2	133.2	196.3	30.7	5.4	53.2	47.8	78.5
6	75.1	3.4	118.6	115.2	190.3	29.8	2.2	44.4	42.2	73.0
7	120.6	40.1	125.4	85.3	205.9	89.9	39.2	56.5	17.3	107.2
8	--	--	--	--	--	28.3	1.4	43.5	42.1	70.4
8A	58.0	1.6	104.8	103.2	161.2	--	--	--	--	--
PSD Increment				512					91	
Air Quality Standard					1300					260

(1)Net new source impact = Impact of all new sources minus impact of retired baseline sources.

(2)New and Existing = Impact of baseline sources minus the impact of retired sources plus the impact of new sources.

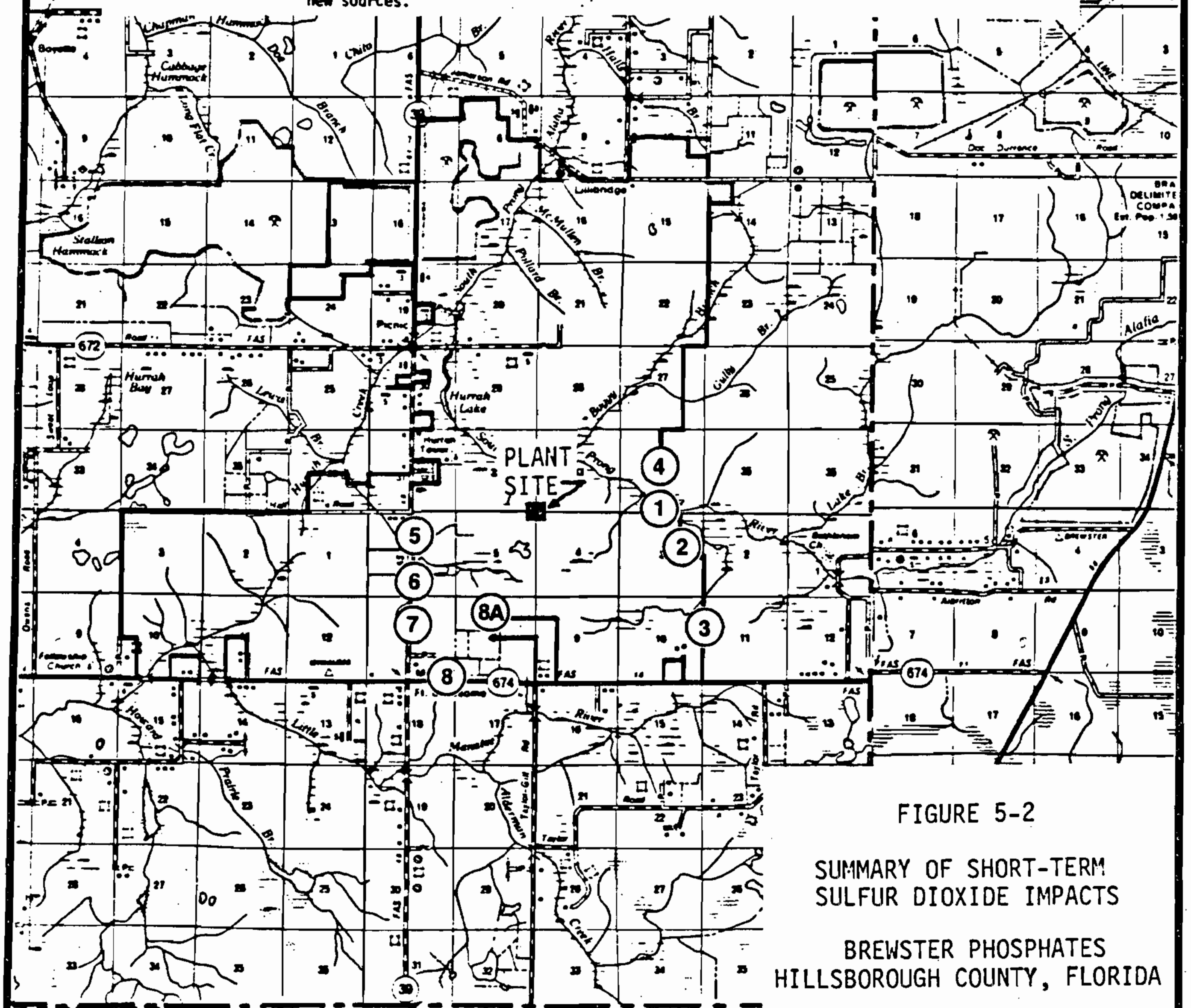

FIGURE 5-2

SUMMARY OF SHORT-TERM SULFUR DIOXIDE IMPACTS

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

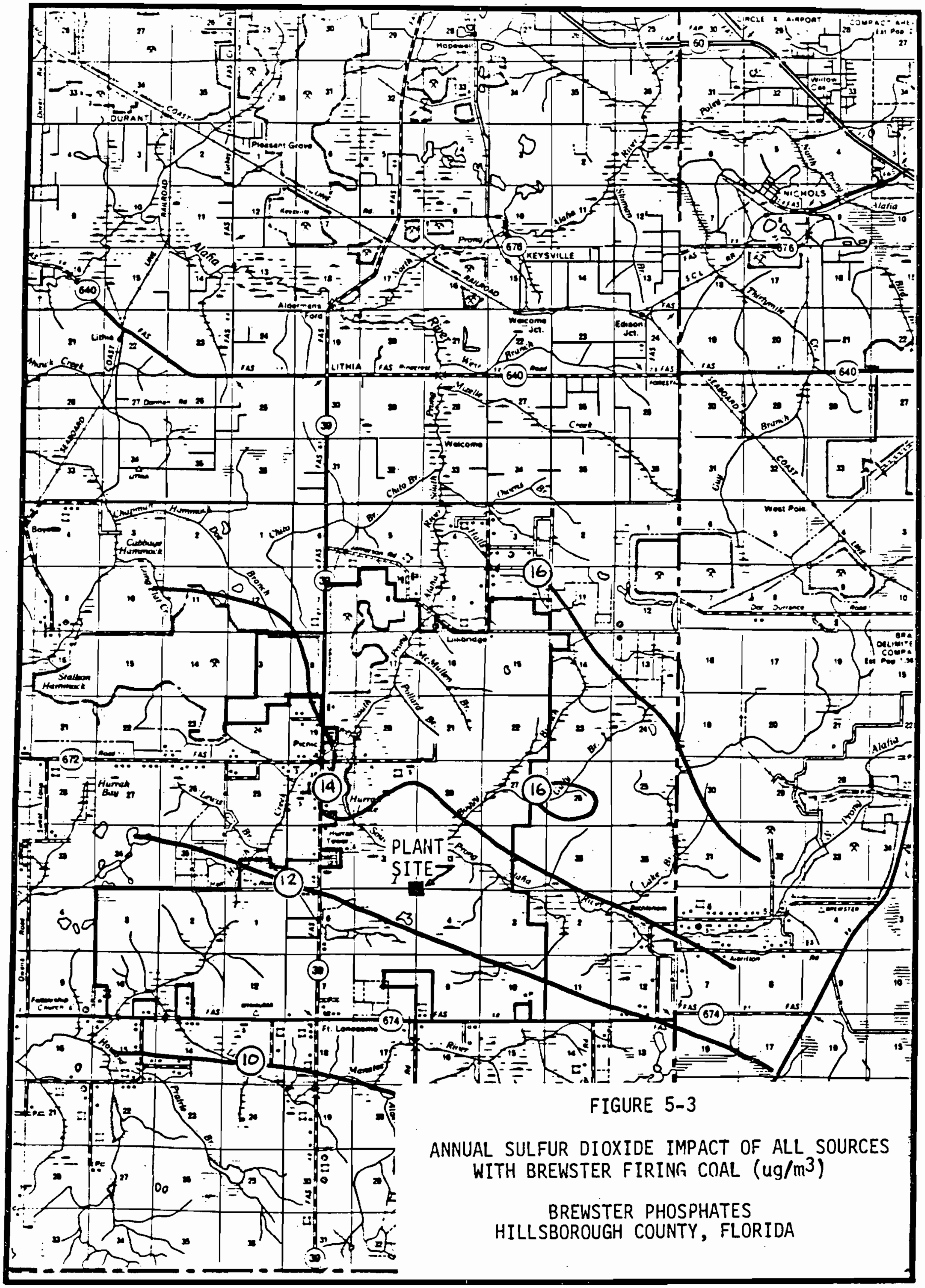

FIGURE 5-3

ANNUAL SULFUR DIOXIDE IMPACT OF ALL SOURCES WITH BREWSTER FIRING COAL (ug/m3)

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

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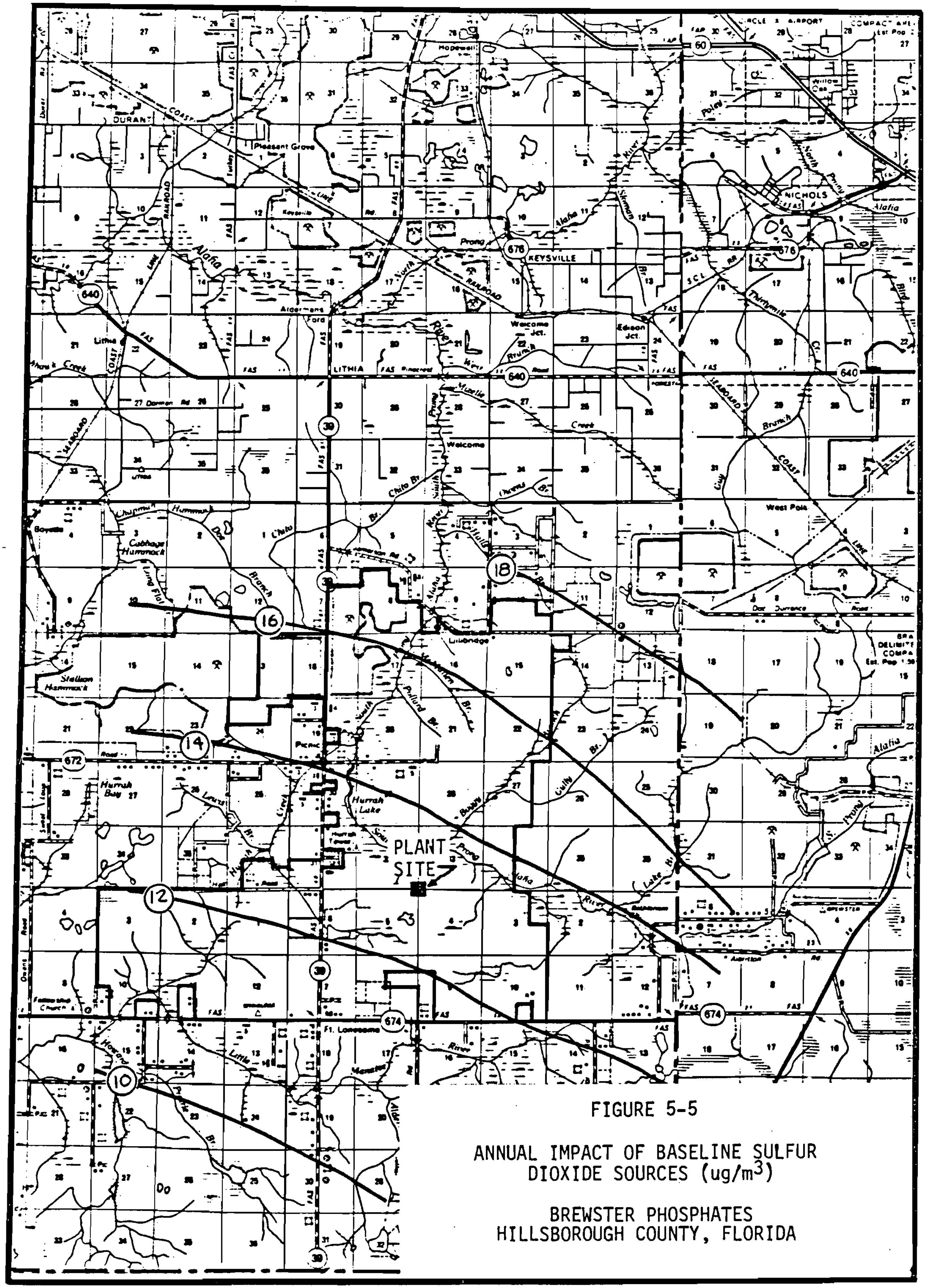

FIGURE 5-5

ANNUAL IMPACT OF BASELINE SULFUR DIOXIDE SOURCES (ug/m^3)

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

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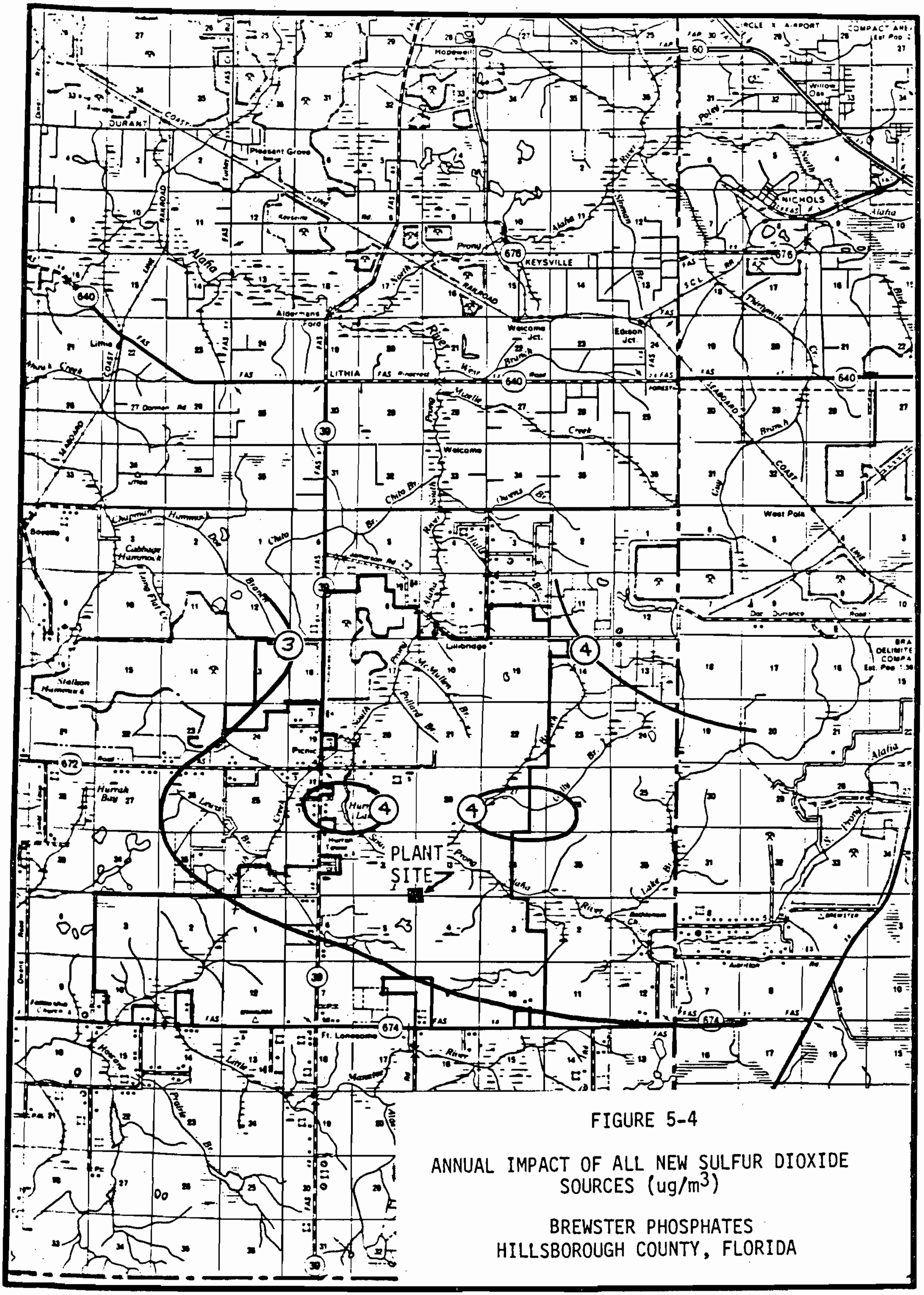

FIGURE 5-4

ANNUAL IMPACT OF ALL NEW SULFUR DIOXIDE SOURCES (ug/m3)

BREWSTER PHOSPHATES
HILLSBOROUGH COUNTY, FLORIDA

6.0 IMPACT ON SOILS AND VEGETATION AND VISIBILITY AND SECONDARY IMPACTS

A qualitative evaluation of the impact of the alternative fuels on soils, vegetation and visibility and commercial growth in the area has been prepared.

The land use in the general are of the Brewster Lonesome Mine is dedicated to agriculture and mining with agriculture activities being devoted primarily to cattle ranching. The use of the alternative fuels proposed by Brewster will result in significant increases in sulfur dioxide and nitrogen oxides emissions. The impact of neither of these emission increases is anticipated to adversely impact any activity presently practiced in the area.

Much of the Lonesome Mine property being mined by Brewster is dedicated to cattle ranching. The present activities practiced by Brewster; that is mining, benefication and rock drying, have had no adverse impact on these cattle. The impact of the increased sulfur dioxide emissions, which will increase ambient sulfur dioxide levels approximately 3 micrograms per cubic meter and the maximum 24-hour sulfur dioxide levels approximately 90 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 nitrogen oxides emissions are expected to increase ambient sulfur dioxide levels for the annual period by less than one microgram per cubic meter; or less than one-one hundredth of the annual nitrogen oxide ambient air quality standard. This slight increase is not anticipated to have any adverse impact on present activities in the area.

Brewster will continue to operate the Lonesome Mine benefication plant and rock dryers in compliance with State emission limiting standards. Brewster 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. If granted the option of using coal as an alternative fuel, Brewster will also take all reasonable precautions to minimize fugitive particulate matter emissions from coal receiving, storage and transfer.

The use of the alternative fuels proposed by Brewster will not result in any significant increase in plant personnel or traffic to or from the plant. Neither will the proposed activities result in a significant 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 proposed by Brewster will not result in significant impacts on the soils, vegetation or visibility within the southeastern

Hillsborough County area nor will the use of the alternative fuels 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.