

PSD-FL-001  
BORDEN CHEM. PHOSPH  
FT. LONESOME

PRE-CONSTRUCTION REVIEW AND FINAL DETERMINATION  
FOR BORDEN BIG FOUR PHOSPHATE MINE  
TO BE CONSTRUCTED IN FORT LONESOME, FLORIDA

This review was performed by the U.S.  
Environmental Protection Agency in  
accordance with the EPA Regulations  
for Prevention of Significant Air  
Quality Deterioration

December, 1976

## INTRODUCTION AND FINAL DETERMINATION

On December 5, 1974, the Environmental Protection Agency promulgated regulations for Prevention of Significant Air Quality Deterioration (PSD). These regulations were amended on June 12, 1975 and September 10, 1975. Under these regulations, a source that is included in one of 19 source categories must be reviewed with regard to significant deterioration prior to construction. Authority for implementing these regulations in the State of Florida presently rests with the EPA. Therefore, sources wishing to construct in Florida must obtain approval from EPA as well as a permit from the State.

Under the PSD regulations a source must pass two criteria in order to be approved. The first criteria is that Best Available Control Technology (BACT) must be used on all emission points of sulfur oxides and particulate matter within the facility. The second criteria is that increases in ambient concentrations of SO<sub>2</sub> and particulates resulting from emissions from this source must not exceed certain increments. All areas are presently classified as Class II (see attached regulations).

Allowable increments in ambient concentrations are as follows:

<u>Pollutant</u>	<u>ug/m3</u>
Particulate Matter	
Annual Geometric Mean	10
24-Hour Maximum	30
Sulfur Dioxide	
Annual Arithmetic Mean	15
24-Hour Maximum	100
3-Hour Maximum	700

The increments caused by the source are evaluated using air quality models developed by the EPA.

The Borden Chemical Corporation intends to construct a phosphate rock mining facility near Fort Lonesome, Florida, and has made applications to the EPA for approval to construct two emission sources at the facility. The first is a fluidized bed rock dryer and its venturi scrubber; the second source is a storage and shipping system for the dried rock and a wet scrubber control device. EPA has determined that a high efficiency venturi scrubber applied to a rock dryer and a wet scrubber applied to storage and shipping facility represent best available control technology.

On July 20, 1976, EPA made a preliminary determination that the proposed construction would be consistent with the intent of the PSD regulations and therefore could be approved. On July 31, 1976, public notice concerning the preliminary determination was made including a notice in the Tampa Tribune and The Tampa Times newspaper. During the following 30-day comment period, only one response was received. This comment was in the form of a report by the Tampa Bay Regional Planning Council and showed that the Council favored approval of the Borden Chemical Company's application to construct the proposed facility, in accordance with Chapter 380 Florida Statutes.

Originally, Borden proposed a common baghouse applied to the storage and shipping facilities for controlling particulate emissions. However, due to anticipated problems with clogging of the filters, a decision was made to go to a wet scrubber system. This revision was

proposed to EPA shortly after the public comment period ended and as proposed would not affect the approvability of these new sources under the significant deterioration regulations.

EPA has reviewed the material submitted by Borden Chemical Corporation and has made a final determination that in accordance with 40 C.F.R. 52.21(d)(2)(ii), this construction will be approved with conditions. The conditions are necessary for the following reasons:

1. An emission limit is required as a condition of approval for each source under 40 C.F.R. 52.21(d)(2)(ii), unless technological or economic limitations of measurement technology make it unfeasible. A design or equipment standard is then to be applied.
2. From the data submitted in the application, EPA is unable to determine whether best available control technology (BACT) for control of particulates will be applied to the rock dryer. EPA has determined from background data used to develop New Source Performance Standards (NSPS), that BACT for rock dryers is 99.5 percent efficient control device, usually a venturi scrubber. This device would result in a particulate emission of 0.03 grains per dry standard (68°) cubic foot. Although the application states that this emission rate will be achieved, and that a venturi scrubber will be used, the design data for the device is not yet available. Part of the conditions for approval to construct the plant, therefore,

require the applicant to submit certain design and vendor guarantee information to EPA before purchase of any particulate removal devices.

EPA has received sufficient data concerning the scrubber system for the storage and shipping facilities. No further submittals are required.

3. EPA has determined that BACT for SO<sub>2</sub> is the use of low sulfur oil, but is unable to determine the SO<sub>2</sub> emission rate due to an unknown amount of absorption of SO<sub>2</sub> in the dryer. Therefore, BACT has been specified as the use of low sulfur oil.

The following is a listing of the conditions of approval:

1. For particulate emissions from the dryer:

- a. The applicant must submit to EPA, within five working days after it becomes available, copies of all technical data pertaining to the selected control device, including formal bid from the vendor, guaranteed efficiency or emission rate, major design parameters such as pressure drop of the scrubber, air flow rate, water flow rate, and other parameters used to calculate efficiency, and all calculations used to calculate efficiency.

Although the type of control device which is described in general in the application has been determined by EPA to be adequate, EPA must review the final selected device in order to verify the emission limits stated in the application. EPA may, upon review of these data, disapprove the application if EPA determines the selected control

device to be inadequate to meet the emission limits specified in this conditional approval. EPA must review and approve the selected control device before purchase of the device by the applicant.

- b. The source must meet an emission limit, as measured under part (4) as follows:

Particulate matter emitted to the atmosphere from the dryer shall not exceed 0.069 grams per dry standard (68°F, 20°C) cubic meter (0.03 gr/dscf).

2. For sulfur dioxide emissions from the dryer:

Oil combusted in the dryer shall contain no more than 0.8 percent sulfur based on a heat content of 20,000 BTU per pound. The allowable percent sulfur for any oil can be calculated by dividing the heat content, in BTU per pound, by 25,000 ( $20,000 \div 25,000 = 0.8$ ). Compliance with this requirement shall be determined by methods outlined in part (5).

3. For particulate emissions from the materials handling system:

The source must meet an emission limit, as measured under part (4) as follows:

Particulate matter emitted to the atmosphere from the materials handling system control devices shall not exceed 0.069 grams per dry standard (68°F, 20°C) cubic meter (0.03 gr/dscf).

4. Stack testing:

- a. Within 60 days after achieving the maximum production rate at which the facility will be operated, but no later than

180 days after initial start-up, the owner or operator shall conduct performance tests and furnish EPA a written report of the results of such performance tests.

- b. Performance tests shall be conducted and data reduced in accordance with methods and procedures specified by EPA. Reference Methods 1 through 5 as published in Appendix A of 40 C.F.R. 60 will be used for particulate tests.
- c. Performance tests shall be conducted under such conditions as EPA shall specify based on representative performance of the facility. The owner or operator shall make available to EPA such records as may be necessary to determine the conditions of the performance tests.
- d. The owner or operator shall provide EPA 30 days prior notice of the performance test to afford the opportunity to have an observer present.
- e. The owner or operator shall provide or cause to be provided, performance testing facilities as follows:
  - 1. Sampling ports adequate for test methods applicable to facility.
  - 2. Safe sampling platform(s).
  - 3. Safe access to sampling platform(s).
  - 4. Utilities for sampling and testing equipment.
- f. Each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified by EPA. For

the purpose of determining compliance with an emission limitation, the arithmetic mean of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the owner or operator's control, compliance may, upon the approval of EPA, be determined using the arithmetic mean of the other two runs.

5. Monitoring:

Immediately upon start-up of the dryer, the owner or operator shall begin a program of monitoring and reporting of heat content and sulfur content of oil combusted in the dryer. The method and frequency of sampling the oil and the reporting frequency will be determined by EPA after construction of the source. EPA feels that this delay is necessary in order to better determine the minimum frequency and procedures for sampling, considering storage tank throughput rates, oil delivery frequency, and any sampling routinely conducted for other purposes. Analysis of the samples shall be conducted according to standard ASTM methods for determining gross calorific value and sulfur content of fuel oils.

6. Reporting:

Beginning immediately with this final conditional construction approval by EPA and ending when purchase of control equipment



under Part 1(a) is approved by EPA, the applicant shall submit a monthly progress report to EPA. The report may be in the form of a brief letter describing progress made in the selection of control equipment and current projected date for purchase of equipment.

## Air Quality Analysis

The purpose of this section is to present the results of a diffusion analysis, using EPA's air quality models, to predict the maximum concentrations for suspended particulates (TSP) and sulfur dioxide (SO<sub>2</sub>) for various averaging periods. Actual modeling analysis was conducted by Borden Chemical in accordance with Region IV guidance and was submitted to the Agency. The methodology and results of the analysis are presented in the next section of this report. Based on these results, the following conclusions may be drawn from the installation of this phosphate rock mining facility:

The impact of the rock dryer and storage/shipping operations will be in compliance with EPA's regulations for the Prevention of Significant Deterioration promulgated in the Federal Register, December 5, 1974.

The ground-level concentrations of TSP and SO<sub>2</sub> due solely to the operations of the proposed facility will not contravene any applicable State or Federal ambient air quality standard.

### Methodology and Results

The impact of the proposed facility upon local ambient contaminant levels was evaluated by means of mathematical models which simulate the processes of transport and diffusion of stack effluents in the atmosphere. The models employed for this purpose are Gaussian plume models developed by the Meteorological Laboratory of the Environmental Protection Agency.

Inputs include physical dimensions and emission characteristics of the source, as well as hourly values of those meteorological parameters affecting plume behavior. Ground level concentrations of TSP and SO<sub>2</sub> attributable to facility emissions were computed for one-hour, three-hour, 24-hour and annual averaging periods. The output obtained from application of the models consists of hourly, daily, and annual average concentrations at each designated "receptor" location.

The application originally submitted on February 17, 1976, referenced an SO<sub>2</sub> emission rate of 31.76 gm/sec at 2.3% sulfur oil, and emission rates of 5.4 and 1.5 gm/sec from the two particulate emitting points. However, in order to comply with BACT as required by 40 C.F.R. 52.21(d)(ii), Borden modified their application as follows:

1. On March 22, 1976, from 2.3% to 0.8% sulfur oil.
2. On May 10, 1976, the application was revised to comply with an emission rate of 0.03 gr/dscf (BACT) for the venturi scrubber on the rock dryer.
3. On June 9, 1976, the submission of simulation diffusion modeling results referencing the impact of air quality by the operation of the proposed facility.
4. On October 15, 1976, alteration in control equipment from a baghouse to wet scrubbers for loading and transfer points and rock storage facilities.

The above referenced revisions resulted in the revised emission rates of 11.56 gm/sec (SO<sub>2</sub>) and 1.90 gm/sec (particulates) for the rock dryer, and 1.61 gm/sec (particulates) for the storage/shipping facilities.

In an attempt to make an accurate assessment of the impact the operation of the proposed facility will have on the environment in the vicinity of Borden's mine, the modeling results submitted were corrected and/or adjusted according to the allowable emission rates referenced in the forestated conditions. Additional computer printouts were submitted to EPA by Environmental Sciences and Engineering, Inc. on November 18, 1976, in order to clear up certain deficiencies in the original modeling.

Table I presents the input parameters to the models for each of the three major point sources at the proposed facility; (1) the fluidized bed rock dryer, (2) rock storage, and (3) shipping systems. The diffusion study using the EPA's CRS-1 model indicated that the maximum 24-hour concentration occurred approximately 0.2 kilometers from the facility on Borden property for TSP and approximately 1.0 kilometers from the Borden facility for SO<sub>2</sub>.

The basic models applied in this study are the PTMTP, CRS-1 and the AQDM. Borden Chemical ran the PTMTP and AQDM as part of an Air Quality Impact Assessment statement (AIA) prepared for the proposed facility by Environmental Science and Engineering, Inc. The CRS-1 runs for SO<sub>2</sub> and particulates prepared by EPA provided meteorological data for use in the modeling submitted in this application.

The annual SO<sub>2</sub> concentrations were corrected to a recommended calibration factor of 0.5. The particulate emissions for the rock dryer (scrubber) were recalculated using exit gas flow rates converted to standard conditions, and an allowable emission rate of 0.03 gr/dscfm. As referenced in the application, a particulate background level of

TABLE I  
OPERATING & EMISSION PARAMETERS DURING NORMAL OPERATION

	<u>Rock Dryer</u>	<u>Storage</u>	<u>Shipping</u>
Design Process Weight (tons/hour)	299	267	800
Sulfur (%)	0.8	---	---
SO <sub>2</sub> Emission Rate (g/sec)	11.56	---	---
Particulate Emission Rate (g/sec)	1.90	0.26	0.58*
Stack Height (meters)	30.5	15.24	15.24
Stack Diameter (meters)	2.0	0.66	0.97
Exit Temperature (degrees kelvin)	347	Ambient	Ambient
Exit Velocity (meters per second)	13.0	11.0	11.6

\*During 8 hours per day

40 ug/m<sup>3</sup> was utilized in the annual TSP assessment and a fugitive dust emission rate of 8 ug/m<sup>3</sup>. The adjusted modeling results are summarized in Table II. As can be seen from this table, the allowable increments in concentrations of particulates and sulfur dioxide are not violated. Actual air quality in the area of the proposed facility is felt to be generally well below the national ambient air quality standards and, therefore, there is little probability of an air quality violation resulting from the operation of this facility. Since these two conditions are met, the construction can be approved with the conditions stated earlier.

TABLE II

MAXIMUM CALCULATED ESTIMATED GROUND LEVEL SULFUR DIOXIDE & TOTAL SUSPENDED PARTICULATE CONCENTRATIONS (ug/m3) IN THE VICINITY OF BORDEN CHEMICAL'S PROPOSED BIG FOUR PHOSPHATE MINE

Emissions Situation	Sulfur Dioxide (ug/m3)			TSP (ug/m3)	
	Annual Average <sup>a</sup>	24-Hour <sup>b</sup>	3-Hour <sup>b</sup>	Annual Average <sup>c</sup>	24-Hour <sup>b,d</sup>
1974 Baseline	68	26	54	55	19
1977 with Proposed Facility	36	48	75	53	24
Borden's Contribution to Maximum	1	24	24	4	21
Borden's Incremental Maximum	1	24	44	4	21

a. Holland plume rise equation, calibration slope of 0.5.

b. Briggs plume rise equation, calibration slope of 1.0.

c. Holland plume rise equation, calibration slope of 1.0 includes background level of 40 ug/m3.

d. Values include the estimated short-term impact of fugitive dust emissions (8 ug/m3).