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AMAX Chemical Corp.
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Best Available Control Technology (BACT) Determination
AMAX Chemical Corporation
Hillsborough County

The applicant plans to construct a phosphoric acid defluorination plant at their facility located near Plant City, Florida. The process involves reacting phosphoric acid with a diatomaceous earth slurry and a caustic solution followed by sparging with compressed air and steam. The mechanics of the reaction produce fluoride compounds as a wasted gaseous overhead effluent and a precipitated by-product. The defluorination plant will have two primary reactors, each with an approximate processing time of four hours. The defluorination plant is scheduled to operate on an eight hour day, five day per week basis.

Fluoride compounds emitted to the atmosphere from the proposed defluorination plant are regulated air pollutants, Table 500-2, Rule 17-2.500. The maximum amount of fluoride compounds allowed to discharge to the atmosphere is to be determined by a BACT review as set forth in the Florida Administrative Code Rule 17-2.600(3)(a)9. - Emission Limiting and Performance Standards.

BACT Requested by the Applicant:

Fluoride emissions will not exceed 0.04 lb/ton of P₂O₅ input.

Date of Receipt of a BACT Application:

December 13, 1984

Date of Publication in the Florida Administrative Weekly:

February 1, 1985

Review Group Members:

The determination was based upon comments received from the Stationary Source Control Section, the Southwest District Office, and the Hillsborough County Environmental Protection Commission.

BACT Determined by DER:

Fluorides (water soluble or gaseous atomic weight 19) shall not exceed 0.02 pounds per ton of P₂O₅ input averaged over the first 3 hours of one normal defluorination plant operation.

Compliance with the fluoride standard will be determined using test Method 13B as specified in 40 CFR Part 60, Appendix A. One normal defluorination plant operation is defined to mean that period beginning when the first reaction vessel sparging cycle is

started followed immediately by the preparation and addition of the diatomaceous earth slurry to the second reaction vessel and subsequent sparging. The maximum time delay between the start of the two sparging cycles shall not exceed 1.5 hours.

BACT Determination Rationale:

The proposed defluorination plant will consist of two primary reaction vessels and one diatomaceous earth slurry tank. The typical reaction vessel charge is 12,000 gallons of phosphoric acid or 43 tons of P₂O₅. A specific quantity of diatomaceous earth slurry is prepared and added to one of the reaction vessels containing the phosphoric acid. The charged vessel is then sparged with air and steam until the defluorination process is complete. A second batch of diatomaceous earth slurry is quickly prepared and added to the second reaction vessel and the sparging process activated. There is approximately a 1-2 hour interval when only one vessel is in the sparging mode. The completion of two charges is defined as a batch.

The rate of fluoride emissions will peak shortly after start of the second reaction vessel sparging cycle. Compliance testing must be done when both reaction vessels are in different processing stages of defluorination. The performance test must be the average of three runs, the first run to start when the first reaction vessel sparge cycle begins. The second run must include the preparation and addition of the diatomaceous earth slurry to the second reaction vessel and the sparge cycle activated. The third run is to start when the sparging cycle of the second reaction vessel is activated. Each test run must be completed during that respective portion of the batch, as described, to be valid. Each sample run may be on a separate batch of acid.

The applicant's data indicates that the maximum hourly fluoride loading in the defluorination plant gaseous effluent will be 0.37 pounds per ton of P₂O₅ charged. The fluoride emission limit judged to be BACT is 0.02 pounds per ton of P₂O₅ charged. An emission control system that will remove 94.6 percent of the fluorides from the gaseous effluent will be required.

$$\frac{0.37 - 0.02}{0.37} = 0.946 \times 100 = 94.6\%$$

The proposed fluoride emission control device, according to the applicant's data, will remove 99 percent of the fluoride vapors produced by the defluorination process. The fluoride emission limit determined as BACT is judged to be reasonable and will allow for variations in the P₂O₅ content of the phosphoric acid feed stock.

Details of the Analysis May be Obtained by Contacting:

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Recommended by:

for *Mr. H. Fancy*
H. Fancy, Deputy Bureau Chief
Date: *8/2/85*

Approved by:

Victoria J. Tschinkel
Victoria J. Tschinkel, Secretary
Date: *8/2/85*