AP42:3

florida phosphate council
phosphate feeds you

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March 12, 1992

Mr. Ron Myers
Emission Factor and Methodologies Section
Emission Inventory Branch (MD-14)
United States Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Ron:

Submitted on behalf of the Florida Phosphate Council are recommended changes to AP-42, Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources. We have recommended revisions for sections 8.18.1 and 8.18.2 that reflect current practices used by the Florida phosphate industry in mining and beneficiation.

If you have any questions or comments, please call me. Thank you for the opportunity to comment on AP-42.

Sincerely,

Michael S. Batts

Michael S. Batts
Assistant Vice President
Environmental Affairs

MSB:cs
Attachment

cc: Mr. Jim Burleson, Chairman, Managers Committee
Air Quality and Resource Management Committee
FPC staff
Rob Rhodes

8.18 PHOSPHATE ROCK MINING AND BENEFICIATION PROCESSING

8.18.1 General

The separation ~~processing~~ of phosphate rock from impurities and non-phosphate materials, for use in fertilizer manufacture consists of beneficiation, and at some operations drying or calcining, and grinding stages. Since the primary use of phosphate rock is in the manufacture of phosphatic fertilizer, only those phosphate rock mining ~~processing~~ operations associated with fertilizer manufacture are discussed here. A flow diagram of these operations is shown in Figure 8.18-1.

Phosphate rock from the mines is first sent to beneficiation units to separate sand and clay and to remove impurities. Steps used in beneficiation depend on the type of rock. A typical beneficiation unit for separating ~~processing~~ phosphate rock mined in Florida (about 80 percent of United States plant capacity in 1990) begins with wet screening to separate pebble rock (smaller than 1/4 inch and larger than 14 mesh) from the balance of the rock. The pebble rock is shipped as pebble product. The -14 +20 mesh material is separated using hydrosiziers and finer mesh screens, and is added to the pebble product. ~~sent to the rock dryer, and~~ The fraction smaller than 20 ~~14~~ mesh is ~~slurried out and~~ treated by two-stage flotation. The flotation process uses hydrophilic or hydrophobic chemical reagents with aeration to separate suspended particles. Phosphate rock mined in North Carolina (about 8 percent of United States capacity in 1978) does not contain pebble rock. In processing this type of phosphate, the fraction larger than 1/4 inch is sent to a hammer mill and then recycled to the screens, and the fraction less than 14 mesh is treated by two-stage flotation, like Florida rock. The sequence of beneficiation steps at plants processing Western hard phosphate rock (about 10 percent of United States capacity in 1978) typically includes crushing, classification and filtration. The size reduction is carried out in several steps, the last of which is a slurry grinding process using a wet rod mill to reduce the rock to particles about the size of beach sand. The slurry is then classified by size in ~~hydrocleones~~ hydrocyclones to separate tailings (clay and particles smaller than about 100 mesh), and the rock is then filtered from the slurry. Beneficiated rock is commonly stored in open wet piles. It is reclaimed from these piles by one of several methods (including skip loaders, underground conveyor belts, and aboveground reclaim trolleys) and is then conveyed to the next processing step.

The wet beneficiated phosphate rock may be~~is-then~~ dried or calcined, depending on its organic content. Florida rock is relatively free of organics and is for the most part, no longer dried or calcined. Today, the rock is maintained at about 10 per cent moisture, and stored at the mine and/or chemical plant,in piles for future use. The rock is slurried in water and wet ground in ball mills or rod mills at the chemical plant. Consequently, there is no significant emission potential from wet grinding. The small amount of rock that is dried in Florida is dried in direct fired dryers at about 250°F (120°C), where the moisture content of the rock falls from 10-15 percent to 1-3 percent. Both rotary and fluidized bed dryers are used, but rotary dryers are more common. Most dryers are fired with natural gas or fuel oil (No. 2 or No. 6), with many equipped to burn more than one type of fuel.

PHOSROCK.DOC

8.18.2 Emissions and Controls

The major emission sources for phosphate rock mining operations~~processings~~ are dryers, calciners, and/or grinders. These sources emit particulates in the form of fine rock dust. Emission factors for these sources are presented in Table 8.18-1. Beneficiation has no significant emission potential, since the operations involve slurries of rock and water. The majority of mining operations in Florida handle only the beneficiation step at the mine, and all wet grinding is done at the chemical processing facility.

Emissions from dryers depend on several factors, including fuel types, air flow rates, product moisture content, speed of rotation, and type of rock. The pebble portion of Florida rock receives much less washing than the concentrate rock from the flotation processes. It has a higher clay content and generates more emissions when dried. No significant differences have been noted in gas volume or emissions from fluid bed or rotary dryers.