Phosphates—Help or Hazard?

Very long ago, the Greeks named a common mineral "light-bearer" because sometimes it could be seen to glow in the dark. Today we call the mineral "phosphorus," which is our word for light-bearer.

Phosphorous, however, does more than glow. Humans, animals, and plants need phosphorus for life. For many generations, farmers have realized they must add phosphorous to croplands. At first they ground the bones of animals and spread this bone meal on the soil. This was of some help, but it worked slowly. Then a chemist discovered that putting sulfuric acid on the bones made the phosphorous in them soluble in rainwater and more readily available to plants.

Scientists also knew that some rocks contained phosphorous. They treated the rocks with sulfuric acid, and this phosphorous was also made water-soluble. This might be called the first chemical fertilizer. It was referred to as "phosphate," and that is the term used today.

Apatite is a mineral that contains phosphate. It's composed of calcium, phosphorous, and fluorine. There are two forms of apatite. One type is mined in Russia and Scandinavia. Most apatite, however, is produced in Morocco and the United States. The largest producer of all is Florida.

In the center of Florida, under about 6 meters of sand, is a bed of gravel that is rich in apatite. The bed covers approximately 7770 square kilometers. It was left there by the sea that covered this area about ten million years ago. The apatite in Florida is dug from open pits by enormous excavating machines.

The sand is removed, and the gravel that contains the phosphate is scooped up. It is flushed by high-powered water sources which turn it into a thick liquid called "slurry." The slurry is forced through pipelines to a plant where the phosphate is separated from sand and clay. The pure mineral is then treated with sulfuric acid and converted into fertilizer.

Who pays for our ability to produce such good fertilizer? First, the air pays. When the phosphate is treated at the fertilizer-manufacturing plant, the fluorine in the mineral is released into the air. Fluorine is a poison, and people near the plants soon discovered that crops and cattle were being poisoned.

The water also pays. The water that turns the gravel mixture into slurry may be partially recovered, but much of it evaporates or remains mixed with the slurry. Water, as a result, is in short supply in the area, and farmers in particular feel the shortage.

Perhaps worst of all is the price paid by the land. The mine itself takes up a large chunk of Florida's cattle ranching and orange-growing region. To add to the problem, the slurry that is left when the phosphate is removed does not become solid again. It stands, like thick mud, in enormous dammed-up ponds. Beside these ponds are stacks of rocks left behind when the phosphate is removed.

Is anything being done? The problem can be completely solved only if the manufacture of phosphate fertilizer ceases. At the present time, the industry is strictly regulated by the government and the production of phosphate fertilizer continues.

Applying Problem Solving Skills

1. What is the main issue in the information above?

2. What different points of view might be held by people living in central Florida? Explain your own point of view on the subject of phosphate production. Give reasons for your answer.

3. What might be some of the results of a ban on the production of phosphate fertilizer?

4. Is the phosphate problem the same type of issue as the asbestos problem? Explain.

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