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# Radioactive Material From Fertilizer Production

## Radiation Facts

- Phosphogypsum, a waste product from manufacturing fertilizer, emits radon, a radioactive gas. It also contains the radioactive elements uranium, thorium and radium.

Phosphate rock mining is the fifth largest mining industry in the United States in terms of the amount of material mined. The phosphate industry is concentrated in the southeastern United States. About 90% of phosphate is mined in Florida, North Carolina, and Tennessee.

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# About Radioactive Material from Fertilizer Production

<<https://epa.gov/sites/default/files/2021-05/phosphogypsum.png>>



Phosphogypsum waste is stored in stacks.

Source: U.S. Department of Agriculture (USDA)

Phosphate rock contains the mineral phosphorus, an ingredient used in some fertilizers to help plants grow strong roots. Phosphate rock contains small amounts of naturally-occurring radionuclides, mostly uranium and radium. When processing phosphate rock to make fertilizer, the phosphorous is removed by dissolving the rock in an acidic solution. The waste that is left behind is called phosphogypsum. Most of the naturally-occurring uranium, thorium and radium found in phosphate rock ends up in this waste. Uranium and thorium decay to radium and radium decays to radon, a radioactive gas. Because the wastes are concentrated, phosphogypsum is more radioactive than the original phosphate rock.

<[https://epa.gov/sites/default/files/2021-05/phosphogypsum\\_water.png](https://epa.gov/sites/default/files/2021-05/phosphogypsum_water.png)>



Phosphogypsum is watery at first. As it dries, it forms a crust, which blocks most of the radon.

Source: U.S. Department of Agriculture (USDA)

The waste that is created during fertilizer production is stored in large piles called stacks. Some stacks cover hundreds of acres and are hundreds of feet high. In the aerial photo, you can see that the top of a phosphogypsum stack is covered in water.

Phosphogypsum is very watery when it is first put on the stack. As the phosphogypsum dries out, a crust forms on the stack. The crust thickens over time, reducing the amount of radon that can escape and helping keep the waste from blowing in the wind. Some of the water can leak out the bottom and pollute local groundwater.

## What You Can Do

- **Obey safety instructions.** Phosphogypsum stacks are located on private property away from people. Unless you are visiting a facility, you will not encounter a phosphogypsum stack. If you are visiting a facility, always follow posted safety messages.

### Where to Learn More

#### **The U.S. Environmental Protection Agency (EPA)**

The EPA has regulated phosphogypsum since 1989. The EPA requires phosphogypsum to be placed in stacks. All uses of phosphogypsum waste have been banned unless the waste has very little radioactivity.

TENORM: Fertilizer and Fertilizer Production Wastes <<https://epa.gov/radiation/tenorm-fertilizer-and-fertilizer-production-wastes>>

This webpage provides information on fertilizer and fertilizer production wastes.

Subpart R: National Emission Standards for Radon Emissions from Phosphogypsum Stacks <<https://epa.gov/radiation/subpart-r-national-emission-standards-radon-emissions-phosphogypsum-stacks>>

This webpage has information about 40 CFR Part 61, Subpart R, a rule that protects people and the environment from the radon given off by phosphogypsum stacks.

## The States

Some states have worked with the EPA to write rules for managing phosphogypsum. In Florida, companies must follow special rules to shut down a stack that won't be used anymore. Florida is also investigating ways to reduce the amount of waste from the wet acid process that creates phosphogypsum.

Phosphate Primer [🔗 <https://fipr.floridapoly.edu/about-us/phosphate-primer/index.php>](https://fipr.floridapoly.edu/about-us/phosphate-primer/index.php)

### State of Florida

This webpage provides detailed information about phosphate, processing, phosphate in Florida and environmental safety procedures in place.

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