

# toxics release inventory

## Chemical Profile

*Environment  
Science & Technology Development*

## Beryllium

### What is beryllium?

Beryllium (Be) is a hard, gray metal that is very lightweight. In nature, it combines with other elements to form beryllium compounds. Small amounts of these compounds are naturally present in soils, rocks, and water. Emeralds and aquamarines are gem-quality examples of a mineral (beryl) that is a beryllium compound.

Beryllium combines with other metals to form mixtures called alloys. Beryllium and its alloys are used to construct lightweight aircraft, missile, and satellite components. Beryllium is also used in nuclear reactors and weapons, X-ray transmission windows, heat shields for spacecraft, rocket fuel, aircraft brakes, bicycle frames, precision mirrors, ceramics, and electrical switches.

### How is beryllium released by electric utilities?

Trace amounts of beryllium are present in coal and oil. When electric utilities burn these fuels in their power plants, beryllium is released. Most of this beryllium is carried by particles of ash.

Coal-burning power plants are equipped with devices to capture ash particles before they reach the air. Particle control devices typically capture more than 99% of the ash, so very little ash enters the air. Beryllium-carrying ash captured by these devices is usually

sent to ash ponds and land disposal sites.

The U.S. Environmental Protection Agency (EPA) estimates that U.S. power plants released about 8 tons of beryllium into the air in 1994.

### Is beryllium also released by other sources?

Beryllium is released into the air by soils as they erode in wind and rain, and by volcanoes when they erupt. It is released into the soil and water by eroding mineral rocks.

Beryllium released into the air by human activities comes mainly from metal production facilities, industrial boilers that burn coal and oil, and incinerators that burn refuse and sewage sludge. Beryllium released into the soil and water comes from plants that make sheet metal from copper alloys hardened with beryllium. Industries reporting to EPA released 16 tons of beryllium into the environment in 1996. About 97% was released to the soil.

### What happens to beryllium after it is released by electric utilities?

Ash particles carrying beryllium settle to the ground after they are released into the air from power plants. Beryllium compounds that dissolve in water are carried to the ground by rain and snow. Other beryllium compounds that don't dissolve reach the ground through grav-

ity and air turbulence. Beryllium does not seem to build up in the flesh of fish.

Ash pond wastewater discharged into public waterways may contain small amounts of beryllium, but these amounts are regulated by local permits.

### How might people be exposed to beryllium?

People are commonly exposed to beryllium by breathing it in the air. They may drink water or eat food that contains very small amounts of beryllium. However, some people may be exposed to larger amounts of beryllium when they smoke tobacco. Industrial workers may breathe beryllium dust or fumes, or touch substances that contain beryllium.

### What are the potential effects of beryllium on human health?

Breathing large amounts of beryllium for a short time can irritate the lungs and cause symptoms like those of pneumonia. Breathing small amounts of beryllium for a long time can cause noncancerous lesions in the lungs. Some people who are sensitive to beryllium easily develop such lesions. They have trouble breathing, feel tired, and lose weight.

Drinking water or eating food containing beryllium is unlikely to affect people's health since most beryllium passing through the digestive tract leaves

the body. Touching beryllium can cause skin allergies or ulcers.

EPA has classified beryllium as a "probable human carcinogen." Although laboratory animals developed lung cancer when they breathed beryllium mist or drank water with beryllium, evidence is less certain that exposure to beryllium can cause cancer in people.

### **How likely is it that utility releases pose a risk to human health?**

It is unlikely that beryllium from power plants poses a significant risk to human health. EPA has evaluated the potential health risks of breathing beryllium for people who live near power plants that burn coal or oil. EPA estimates that a person living all his life near one of these plants would have one chance in a million (or less) of developing cancer as a result of his exposure to power plant beryllium. According to EPA, no plants out of nearly 600 in the United States posed cancer risks from beryllium exposure greater than these. EPA found no significant risk of health effects due to beryllium other than cancer.

### **How is beryllium regulated?**

EPA has established limits for beryllium in both drinking water and air. Under the National Pollutant Discharge Elimination System, federal and state regulators determine how much beryllium each power plant may release in wastewater discharges. The Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health have set limits on the amount of beryllium in workplace air.

### **Where can I get more information about beryllium?**

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked health questions about beryllium. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://www.atsdr.cdc.gov/tfacts4.html>

EPA also has a fact sheet that is available on the Internet at <http://www.epa.gov/ttnuatw1/hlthef/berylliu.html>