

toxics release inventory

Chemical Profile

Environment Division

Barium

What is barium?

Barium (Ba) is a silvery-white metal that is easily molded. In nature, it combines with oxygen and carbon or sulfur to form barium compounds. Small amounts of these barium compounds are naturally present in most soils and water.

Physicians often ask patients to swallow a barium sulfate solution before taking stomach x-rays. Barium compounds are used to manufacture steel, copper, and glass. They are important ingredients in paints and lubricants for oil drilling.

How is barium released by electric utilities?

Trace amounts of barium are present in coal and oil. When electric utilities burn these fuels at their power plants, barium is released in very small amounts. Most of this barium 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. Barium-carrying ash captured by these devices is usually sent to ash ponds or land disposal sites.

The amount of barium that U.S. power plants release into the air each year is presently unknown.

Is barium also released by other sources?

Barium is released into the air by soils as they erode in wind and rain. It is released into the soil and water by eroding rocks.

Barium released into the air by human activities comes mainly from barium mines, metal production facilities, and industrial boilers that burn coal and oil. Barium released into the soil and water comes from copper smelters and oil drilling waste disposal sites. Industries reporting to the U.S. Environmental Protection Agency (EPA) released 159 tons of barium into the environment in 1995. More than half was released to the soil.

What happens to barium after it is released by electric utilities?

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

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

How might people be exposed to barium?

People are commonly exposed to barium by breathing it in the air. They may drink water or eat food that contains very small amounts of barium. However, some people may be exposed to larger amounts of barium in well water, or in fish that have accumulated it in their flesh. Industrial workers may breathe barium dust.

What are the potential effects of barium on human health?

Very small amounts of barium in people's diets appear to promote good health. However, people who have briefly drunk well water that contains large amounts of barium have experienced breathing difficulties, increased blood pressure, kidney damage, stomach irritation, and muscle weakness. Breathing large amounts of barium dust can cause nausea and increased blood pressure. Although research is ongoing, barium has not been found to cause cancer in people.

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

It is unlikely that barium from power plants poses a significant risk to human health. EPA has concluded that the

amount of barium released beyond the site boundaries of various industrial facilities is too small to cause health effects. This conclusion may also apply to barium released by power plants, although they were not directly studied.

EPRI has found that ash from power plants typically has about three times as much barium as the soil. However—since airborne ash particles carrying barium are widely scattered before they settle to the ground—it is unlikely that ash from power plants significantly increases the amount of barium in soils, water, or food.

How is barium regulated?

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

Where can I get more information about barium?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked questions about barium. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://atsdr1.atsdr.cdc.gov:8080/tfacts24.html>