

toxics release inventory

Chemical Profile

*Environment
Science & Technology Development*

Thallium

What is thallium?

Thallium (Tl) is a bluish-white metal that is very soft. In nature, thallium combines with other elements to form thallium compounds. Small amounts of thallium are naturally present in rocks, soils, and water.

Thallium combines with other metals to form mixtures called alloys. For example, thallium mixed with mercury forms a fluid alloy that is used in low-temperature thermometers and switches. Thallium is also used in electronic components and special grades of glass. Physicians introduce thallium into the body to show blood flow to the heart. Rockets and flares emit a bright green flame when they burn thallium salts. Thallium sulfate is used to control insects and rodents.

How is thallium released by electric utilities?

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

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

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

Is thallium also released by other sources?

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

Thallium released into the environment by human activities comes mainly from metal production facilities, industrial boilers that burn coal, glass factories, and cement plants. Industries reporting to the U.S. Environmental Protection Agency (EPA) released about one-half ton of thallium into the environment in 1997. About 80% was released to the soil.

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

Ash particles carrying thallium settle to the ground after they are released into the air from power plants. Most thallium reaches the ground through gravity and air turbulence. Thallium compounds that dissolve in water are carried to the ground by rain and snow. Thallium builds up in the flesh of fish.

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

How might people be exposed to thallium?

People are commonly exposed to small amounts of thallium naturally present in the air they breathe, the water they drink, and the foods they eat.

However, some people may be exposed to larger amounts of thallium when they smoke tobacco or eat fish that have accumulated it in their flesh. Industrial workers may breathe thallium dust or fumes.

What are the potential effects of thallium on human health?

Thallium affects people's health in the same way, whether they eat, drink, or breathe it. Exposure to large amounts of thallium can cause stomach and intestinal distress, hair loss, changes in blood chemistry, and damage to the nervous system, internal organs, and testicles. Long-term exposure to small amounts of thallium seems to have no harmful effect on human health.

There are no studies of cancer in people exposed to thallium.

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

It is unlikely that thallium from power plants poses a significant risk to human health. EPA has not evaluated the potential health risks of breathing thallium for people who live near power plants that burn coal or oil.

Preliminary estimates from plants preparing to report thallium releases to EPA indicate amounts of thallium that are unlikely to cause significant health effects.

Since airborne ash particles carrying thallium are widely scattered before they settle to the ground, it is unlikely that ash from power plants significantly increases the amount of thallium in soil, water, or food.

How is thallium regulated?

EPA has established limits for thallium in drinking water. EPA also requires that 1000 pounds or more of thallium be reported if it is spilled or released without a permit. Under the National Pollutant Discharge Elimination System, federal and state regulators determine how much thallium 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 thallium in workplace air.

Where can I get more information about thallium?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked health questions about thallium. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://www.atsdr.cdc.gov/tfacts54.html>