

toxics release inventory

Chemical Profile

Environment

Zinc

What is zinc?

Zinc (Zn) is a soft, bluish-white metal that resists corrosion. Small amounts of zinc are naturally present in air, soil, and water. Zinc may combine with other elements to form zinc compounds.

Zinc combines with other metals to form mixtures called alloys. For example, zinc mixed with copper forms the common alloy, brass. Zinc is also used as a thin rust-resistant coating on iron and steel, and in batteries, electrical fuses, auto parts, paints, pesticides, fungicides, and rubber products.

How is zinc released by electric utilities?

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

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

Is zinc also released by other sources?

Zinc 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. These natural releases are smaller than those from human activities.

Zinc released by human activities comes mainly from mines, steel mills, smelters, industrial boilers that burn coal, incinerators that burn refuse and sewage sludge, and sewage plants that discharge treated waste. Industries reporting to the U.S. Environmental Protection Agency (EPA) released 4224 tons of zinc to the environment in 1996. About 80% was released to the soil.

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

Ash particles carrying zinc settle to the ground after they are released into the air from power plants. Most zinc reaches the ground through gravity and air turbulence. Zinc compounds that dissolve in water are carried to the ground by rain and snow. Zinc builds up in the flesh of fish, but not in plants.

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

How might people be exposed to zinc?

People are commonly exposed to small amounts of zinc naturally present in the foods they eat and the water they drink. Using zinc dietary supplements, drinking water from galvanized containers and pipes or contaminated wells, taking prescription drugs that contain zinc salts (such as injectable insulin), or eating fish that accumulate zinc in their flesh can increase exposure. People may breathe particles in the air that carry trace amounts of zinc, and industrial workers may breathe zinc dust or fumes.

What are the potential effects of zinc on human health?

Very small amounts of zinc in people's diets are necessary for good health. Too little zinc in the diet depresses appetite, dulls taste and smell, slows wound healing, promotes skin lesions, damages the immune system, causes birth defects, and arrests growth and sexual development in children. Too much zinc in the diet causes digestive problems, anemia, pancreas damage, and lowered levels of "good" cholesterol.

Breathing large amounts of zinc dust or fumes irritates the respiratory tract and causes short-term effects that feel like the flu. Zinc 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 zinc from power plants poses a significant risk to human health. EPA has not evaluated the potential health risks of breathing zinc for people who live near power plants that burn coal or oil. Preliminary estimates from plants preparing to report zinc releases to EPA indicate amounts of zinc that are unlikely to cause significant health effects.

EPRI has found that ash from power plants typically has about nine times as much zinc as the soil. It is unlikely that ash from power plants significantly increases the amount of zinc in soils, water, or food, because airborne ash particles carrying zinc are widely scattered before they settle to the ground.

How is zinc regulated?

EPA has recommended limits for zinc in drinking water based on taste, and has published water quality standards to protect freshwater life, such as fish, from exposure to zinc. EPA also requires that 1000 (or in some cases 5000) pounds or more of zinc be reported if it is spilled or released without a permit. The Food and Drug Administration regulates the amount of zinc in bottled water. Under the National Pollutant Discharge Elimination System, federal and state regulators determine how much zinc 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 zinc in workplace air.

Where can I get more information about zinc?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked health questions about zinc. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://atsdr1.atsdr.cdc.gov/tfacts60.html>