EPRI

toxics release inventory

Chemical Profile

Environment Division

Chromium

What is chromium?

Chromium (Cr) is a blue-white metal found naturally only in combination with other substances. It occurs in rocks, soil, plants, and volcanic dust and gases.

Chromium combines easily with other metals to form mixtures called alloys. For example, chromium mixed with steel forms stainless steel, a common alloy that resists rust and corrosion. Chromium is also used as a thin rust-resistant coating on other metals, as a pigment in paint, and as an ingredient in wood preservatives and liquids for tanning hides.

How is chromium released by electric utilities?

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

Chromium from power plants is about 7% of all the chromium from human activities released into the environment each year in the United States. The U.S. Environmental Protection Agency (EPA) estimates that U.S. power plants released about 66 tons of chromium into the air in 1994.

Is chromium also released by other sources?

Chromium is released by volcanoes when they erupt, and by soils as they erode in wind and rain. These natural releases are larger than those from all human activities.

Chromium released by human activities comes mainly from steel mills, metal production facilities, oil refineries, and cement plants.

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

Ash particles carrying chromium settle to the ground after they are released into the air from power plants. Most chromium reaches the ground through gravity and air turbulence. Only small amounts of chromium dissolve in water and it does not seem to build up in the flesh of fish.

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

How might people be exposed to chromium?

People are commonly exposed to chromium by breathing it in the air. They may drink water or eat food that contains small amounts of chromium. Industrial workers may breathe airborne chromium on the job or touch substances that contain chromium.

What are the potential effects of chromium on human health?

Very small amounts of chromium in people's diets are necessary for good health. But the kind of chromium in the diet is important. Trivalent chromium is less toxic than hexavalent chromium. Eating or drinking very small amounts of trivalent chromium promotes good health.

Eating or drinking large amounts of chromium can be toxic. For example, exposure to large amounts of hexavalent chromium can cause stomach ulcers, kidney and liver damage, and even death.

Breathing trivalent chromium can irritate people's lungs. Frequent or constant exposure in this way can eventually lead to bronchitis, pneumonia, asthma, or other respiratory illness. EPA has determined that trivalent chromium does not cause cancer.

Touching liquids or solids that contain hexavalent chromium may cause skin ulcers. EPA has determined that exposure to large amounts of hexavalent chromium can cause lung cancer.

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

It is unlikely that chromium from power plants poses a significant risk to human health. EPA has evaluated the potential health risks of breathing chromium for people who live near power plants that burn coal and 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 chromium. According to EPA, only three plants out of nearly 600 in the United States posed cancer risks from chromium greater than these.

Furthermore, in assessing health risk, EPA estimates that power plants released at least twice as much hexavalent chromium as has been found in actual tests of releases into the air. Tests have shown that only about 5% of the chromium released from power plants into the air is in the hexavalent form—and it quickly changes to trivalent chromium. Therefore, actual risks are likely to be significantly less than EPA estimates. EPA found no significant risk of health effects due to chromium other than cancer.

How is chromium regulated?

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

Where can I get more information about chromium?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked health questions about chromium. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at http://atsdr1.atsdr.cdc.gov:8080/tfacts7.html

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

This Toxics Release Inventory Chemical Profile is available by email at tricoord@epri.com. Funders of the Environment Division may download it from the Internet at http://www.epriweb.com/eg/funders/tri/index.html

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