

toxics release inventory

Chemical Profile

Environment Division

Mercury

What is mercury?

Mercury (Hg) is a silver-colored metal that is liquid at room temperature. It commonly occurs in water and soil.

Mercury is the familiar silver column in thermometers. It is also used in fluorescent lights, some kinds of batteries, and dental fillings.

How is mercury released by electric utilities?

Trace amounts of mercury are present in coal and oil. When electric utilities burn these fuels at their power plants, mercury is released. Most of this is mercury gas.

Power plants pass stack gases through pollution control devices that may remove mercury before it enters the air. Wastes captured by these devices are usually sent to ash ponds or land disposal sites.

Mercury from U.S. power plants is less than 1% of all the mercury released into the air each year around the globe. The U.S. Environmental Protection Agency (EPA) estimates that each year U.S. power plants release about 52 tons of mercury into the air, almost all from burning coal. This is about one-third of all the mercury released into the air by human activities in the United States.

Is mercury also released by other sources?

Natural sources around the globe—such as ocean surfaces, mercury-rich soils, and volcanoes—release about 43% of all the mercury entering the air each year.

In the past, people released large amounts of mercury by manufacturing pesticides and chlorine-based industrial products, and by mining. Today, people release mercury mainly by burning coal and wastes from cities and hospitals. Mercury releases from human activities in the United States peaked about 1960 and are now declining. EPA estimates that current human activities in the United States release 157 tons of mercury into the air each year.

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

Mercury released by power plants becomes part of a global cycle. The behavior of mercury in this global cycle depends on its chemical form. Oxidized mercury easily washes out of the air and returns to earth relatively near its source. In contrast, elemental mercury usually travels further into the atmosphere, where it may remain for months. Eventually, this “background” mercury returns to earth and enters bodies of water and soils. Estimates are that about one-third of the mercury reaching the earth binds to the soil.

As part of a broad investigation of how mercury behaves, researchers are studying how much mercury from power plants enters the atmosphere and how much returns to earth close to the plants that release it. They estimate that about half the mercury from power plants is elemental mercury that enters the atmosphere and eventually settles to earth at points around the globe.

Once mercury reaches the earth, it can enter natural ecosystems. For example, oxidized mercury can enter lakes and streams where bacteria may chemically change it to methylmercury, the organic form of mercury most easily taken up by fish and animals.

How might people be exposed to mercury?

People are most often exposed to methylmercury when they eat fish or shellfish. Because fish may accumulate methylmercury in their bodies, older predatory fish usually have the most methylmercury. People may also breathe elemental mercury from industrial sources or broken thermometers.

What are the potential effects of mercury on human health?

Because the body can naturally eliminate mercury, occasional exposure to relatively small amounts of mercury is believed to have no effect on human health.

Exposure to large amounts of mercury—either from eating methylmercury or breathing elemental mercury—can cause kidney, brain, and nerve damage or even death. It can also affect the unborn babies of pregnant women.

Our knowledge of how large amounts of methylmercury can affect people's health comes from two accidental poisoning incidents—one in Japan in the 1950s and another in Iraq in the 1970s—where people ate massive amounts of methylmercury. In Iraq, researchers observed that it took less methylmercury to affect babies developing in the womb than to affect adults. For this reason, it is a public health goal to limit methylmercury exposure especially for women of childbearing age. Methylmercury apparently does not cause cancer, based on long-term observations of the people exposed in Japan and Iraq.

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

Health risks from power plants depend largely on how much those plants influence the amount of methylmercury in fish that people eat. It is unlikely that U.S. power plants have a measurable effect on the amount of methylmercury in ocean fish living far from our shores. Nor do they impact fish raised on commercial diets at fish farms. These kinds of fish account for about 90% of the U.S. seafood diet.

However, mercury releases from U.S. power plants may influence the amount of methylmercury in freshwater fish living in some U.S. lakes and streams. In several case studies sponsored by EPRI, independent researchers found that the amount of methylmercury in lake fish that might come from nearby power plants was well below the amount that EPA says people may take into their bodies without harming their health.

For an average person who weighs about 150 pounds, the amount that EPA currently considers safe is up to 7 micrograms of methylmercury each day—about one fish meal a week, if the fish contain average amounts of methylmercury. In 1997, an office of the U.S. Public Health Service proposed that people could safely take in 5 times as much methylmercury, up to 35 micrograms each day—almost one fish meal every day. This government agency based its proposal on new studies of the way methylmercury affects children born to mothers who ate seafood containing it when they were pregnant. Although these levels are set by the government to protect the health of its most sensitive residents, average consumers in the United States need not be concerned with exposure to methylmercury.

How is mercury regulated?

At freshwater lakes and rivers known to be contaminated with mercury, many states post “fish advisories” telling fishermen how many and which kinds of fish their families can safely eat. These advisories are aimed especially at protecting pregnant women and small children from harmful exposure to methylmercury, and are based on limits established by FDA or by the states.

EPA regulates public exposure to mercury in drinking water and has published water quality standards to protect freshwater life, including fish, from exposure to mercury. EPA also requires that 1 pound or more of mercury be reported if it is spilled or released without a permit. The Occupational Safety and Health Administration has a limit for mercury in workplace air.

Where can I get more information about mercury?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked

health questions about mercury. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://atsdr1.atsdr.cdc.gov:8080/tfacts46.html>

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

Those interested in detailed information about mercury may read the *Mercury Study Report to Congress*, EPA-452/R-97-003, December 1997. This report, published by the EPA Office of Air Quality Planning and Standards and Office of Research and Development, is available on the Internet at <http://www.epa.gov/ttnuatw1/112nmerc/mercury.html>