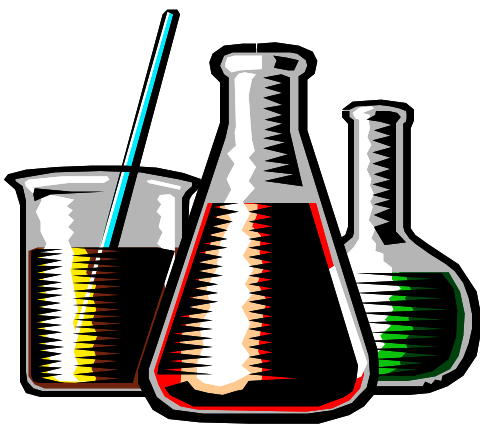


FACT FLASH

9: Common Contaminants

While each Superfund site is unique, with different conditions, history, and contamination, some contaminants are commonly found at many sites. This Fact Flash describes these common contaminants, how people can be exposed to them, and how they can affect human health.



ASBESTOS

What is it?

Asbestos is the name used for any of six minerals (amosite, chrysotile, tremolite, actinolite, anthophyllite, and crocidolite) that occur naturally in the environment. The most common mineral type is white (chrysotile). These minerals are made up of long, thin fibers similar to fiberglass. Asbestos fibers are very strong and heat-resistant, leading to the use of asbestos in a wide range of products, mostly in building materials

and heat-resistant fabrics. Asbestos fibers do not evaporate or dissolve in water, and are not broken down over time. They usually settle out of air and water and are deposited in soil or sediment, but very small fragments can remain in the air or in water.

How can exposure occur?

Inhaling tiny asbestos fibers suspended in air is the most likely **exposure route**, or the way in which people come into contact with a substance. Asbestos can be detected in almost any air sample. In rural areas there is usually an average of 0.03 to 3 fibers in a cubic meter of outdoor air (about the amount of air you breathe in one hour), while levels near an asbestos mine or factory can reach 2,000 fibers per cubic meter or higher. Levels also could be above average near a building that is being demolished or renovated, or near sites where asbestos wastes are not properly protected from being spread by the wind.

Inhaled asbestos fibers may be deposited in the passages and on the cells of the lungs. Most fibers are removed from the lungs by being carried away in a layer of mucus to the throat, where they are swallowed into the stomach. This usually takes place within a few hours, but fibers deposited in the deepest parts of the lung are removed more slowly. Some can remain for many years or may never be removed.

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Asbestos exposure can also result from drinking fibers present in water. Fibers can enter water by being eroded from natural deposits, or from cement pipes used to carry drinking water. Most drinking water supplies in the United States have concentrations of less than one million fibers per liter.

Nearly all swallowed asbestos fibers pass along the intestines within a few days and are excreted. A small number of fibers remain in cells that line the stomach or intestines, and a few enter the blood. Some of these become trapped in other tissues, while others are removed in the urine.

How can it affect human health?

Exposure to high levels of asbestos increases the chances of getting two types of cancer: lung cancer and cancer of the thin membrane that surrounds the lung and other internal organs, called mesothelioma. Both types are usually fatal, and develop over a number of years. Breathing asbestos can also increase the chances of getting cancer elsewhere (for example, in the esophagus, stomach, or intestines).

Breathing asbestos can also cause an accumulation of scar-like tissue in the lungs and in the membrane surrounding the lungs. This tissue does not expand and contract like normal lung tissue, making breathing difficult. Blood flow to the lungs may also decline, causing heart enlargement. When the injury is mostly in the lungs, the disease is called asbestosis.

COPPER

What is it?

Copper is a reddish metal that occurs naturally in rock, soil, water, plants, sediment, and air. It is an essential element for all living organisms. Copper is most commonly found in pennies, electrical wiring, and some water pipes. It is also found in many alloys, such as brass and bronze.

Copper is extensively mined and processed and is primarily used as a metal or alloy in making wire, sheet metal, pipe, and other metal products. Copper compounds are most commonly used in agriculture to treat plant diseases, for water treatment, and as preservatives for wood, leather, and fabrics.

How can exposure occur?

Most copper is released to land by mining operations, agriculture, solid waste, and sludge from sewage treatment plants. Copper is released to water from soil and industrial and sewage treatment discharge. Much of this copper is attached to dust and other air particles.

Most copper compounds found in air, water, sediment, soil, and rock are so strongly attached to dust and dirt or embedded in minerals that they don't usually affect health; this is common of copper found at hazardous waste sites. Some copper in the environment, however, is less tightly bound to particles and may be absorbed by plants and animals. Dissolved copper compounds commonly used in agriculture, for example, are more likely to threaten human health.

Copper can enter the body by ingesting water or food, soil, or other substances that contain copper, or by inhaling copper dust or fumes. Drinking water that contains higher levels of dissolved copper is a common pathway. Water can absorb copper from pipes and brass faucets as it sits overnight. The average concentration of copper in tap water ranges from 20 to 75 parts per billion (ppb). The term “parts per billion” is a way of expressing the concentration of a contaminant in a liquid or air. One part per billion is a very small amount—equal to 1 inch in a distance of about 16,000 miles (or one penny in \$10 million).

How can it affect human health?

The body is very good at blocking high levels of copper from entering the bloodstream. Copper is necessary for good health, but large daily intakes of copper can be harmful. Long-term exposure to copper dust can irritate the nose, mouth, and eyes, and cause headaches, dizziness, nausea, and diarrhea. Vomiting, diarrhea, stomach cramps, and nausea may occur if you drink water that contains high levels of copper. Although large amounts can cause liver and kidney damage, copper is not known to cause cancer.

LEAD

What is it?

Lead is a bluish-gray metal that occurs naturally in the environment. Lead is found in plants and animals that are used for food, and in air, drinking water, surface waters, and soil.

Lead is mined from ore deposits or is salvaged from recycled scrap metal. It is used in a wide range of products, including batteries, paint, ammunition and various metal products.

How can exposure occur?

Lead exposure results from inhaling air, drinking water, or ingesting foods or soil that contain lead. Children may be exposed to lead by swallowing chips of paint that contain lead – a surprisingly common occurrence.

Until recently, the largest single source of lead in the air was vehicle exhaust. Currently, key sources include emissions from iron and steel production, smelting operations, and lead-acid battery manufacturers. Cigarette smoke is also a source of lead. Most of the lead in water is from lead plumbing and solder in houses and other buildings, lead-contaminated dust and soil carried into water by rain and wind, and wastewater from industries that use lead.

Lead in soil often comes from lead-contaminated wastes in landfills and from fertilizers. Because plants can absorb lead from contaminated soil, food may contain lead as a result.

Lead exposure stems primarily from contact with contaminated dust or water. Lead has been found at over 800 Superfund sites. Lead can enter the body if you breathe air contaminated with lead particles. Nearly all lead entering the lungs moves to the blood and then to other parts of the body. In adults, very little of the lead they ingest enters the blood. In children who swallow food or soil containing lead, however, much more of the lead enters their blood and moves to other parts of their bodies. Relatively small amounts of lead enter the body through the skin. Most lead ingested or inhaled is stored in bone. Since more lead is stored with each new exposure, the level in bones and teeth increases with age. Lead that is not stored in the body is removed in bodily wastes.

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How can it affect human health?

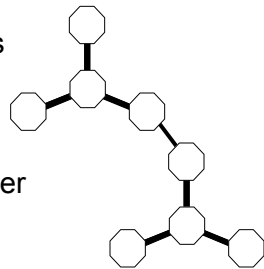
Lead exposure is especially dangerous for fetuses: a woman's exposure during pregnancy can cause premature birth, low birth weight, even miscarriage. Young children are also at greater risk of health damage because their bodies absorb more lead and are more sensitive to its negative effects. Lead exposure in infants and young children can lower IQ scores, stunt physical growth, and cause hearing problems.

Exposure to high levels of lead can cause severe brain and kidney damage, and affect older men's blood pressure and reproductive systems.

POLYCHLORINATED BIPHENYLS (PCBs)

What are they?

PCBs are human-made chemicals of varying toxicity. Because they are good insulators and are nonflammable, PCBs have been widely used as coolants and lubricants in transformers and other electrical equipment. Evidence that PCBs damage the environment and may cause health hazards led to the end of PCB manufacture in the United States in 1977.



How can exposure occur?

Although PCBs are no longer manufactured, human exposure still

occurs. Many older transformers, which have a lifespan of at least 30 years, use fluids that contain PCBs. PCBs are very persistent and are widely distributed in the environment. They have been found in over 300 Superfund sites. Levels of PCBs can be found in outdoor air, on soil surfaces, and in water. PCBs can be released into the environment from:

- Poorly maintained hazardous waste sites that contain PCBs
- Illegal or improper dumping of PCB wastes
- Leaks of gases from electrical transformers that contain PCBs
- Disposal of PCB-containing consumer products into municipal rather than hazardous waste landfills.

Eating PCB-contaminated fish can be a major source of exposure. Exposure from drinking water or from breathing outdoor air containing PCBs is less common. Once in the air, PCBs can be carried long distances — they have even been found in snow and seawater in the Antarctic. Contaminated indoor air may also be a major source of human exposure to PCBs.

How can they affect human health?

PCBs can cause such health problems as liver damage, skin irritation, cancer, and reproductive system damage. While the role of PCBs in causing cancer and other health problems in people cannot be clearly demonstrated, research shows there is cause for people to be concerned about PCB exposure.

TRICHLOROETHYLENE (TCE)

What is it?

TCE is a human-made, clear liquid used mainly as a solvent to remove oils and grease from metal during manufacture or maintenance.

How can exposure occur?

Various studies show that between 9 and 34 percent of the nation's water may be contaminated with TCE. It has been found in over 700 Superfund sites. TCE can evaporate from disposal sites into the air or leak into groundwater. It can also evaporate into the air during its production, or from glues, paints, coatings, and other chemicals.

TCE can enter the body by breathing contaminated air, drinking contaminated water, or absorption through the skin.

How can it affect human health?

Dizziness, headaches, slow reflexes, sleepiness, and numbness have occurred in people breathing TCE or using TCE products in poorly ventilated areas. Irritation of the eyes, nose, and throat can also occur if undiluted TCE is ingested. Unconsciousness, or even death, can occur from drinking or breathing higher amounts of TCE. Generally, minor negative effects that result from one or several exposures to TCE disappear when exposure ends.

Some harmful health effects may persist after long-term TCE exposure. Studies show that repeatedly ingesting or breathing high levels of TCE can cause nervous system changes; liver and kidney damage; tumors of the liver, kidney, and lungs; and leukemia.

ZINC

What is it?

Zinc is one of the most widely used metals in the world. It is used both alone, to coat other metals, and combined with other metals to form alloys such as brass and bronze. It also combines with other chemicals such as chlorine to form zinc compounds (zinc chloride). Zinc compounds occur naturally in the air, soil, and water, and are present in all foods. Our bodies need small amounts of zinc, but in large doses it can be harmful.

How can exposure occur?

Zinc mostly enters the environment from smelting and refining operations, and is usually found in surface water and groundwater. Zinc may also enter the soil in discharges from industrial operations and in the natural breakdown of zinc ore deposits. Food is the main source of ingested zinc; other exposure sources include drinking water, contaminated air, and tobacco products.

Zinc is carried into the air as dust and fumes from zinc production facilities, automobile emissions, fuel combustion, and soil erosion. Garbage incineration, coal combustion, and smelters are also major sources of airborne zinc.

Zinc is present in most rocks and in certain minerals. As these materials break down over time, zinc may be released to surface water or groundwater. This source of zinc is diluted and widely dispersed. Rainwater in urban areas, mine drainage, and municipal and industrial wastes are more concentrated sources of zinc in water. Zinc in soil may come from particles that

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are deposited from the atmosphere, or from sewage treatment sludge. Hazardous waste sites are additional sources of zinc in soil. Zinc has been found in over 700 Superfund sites.

Zinc enters the body through the digestive tract when food or water containing zinc is ingested. It also can enter through the lungs when zinc dust or fumes are inhaled. The most important exposure pathway is likely to be through drinking zinc-contaminated water. Normally, zinc leaves the body in wastes.

How can it affect human health?

Problems with digestion will usually result from eating food or drinking water that contains too much zinc. Stomach cramps, nausea, and vomiting have resulted from ingesting too much zinc. Over an extended period, overexposure to zinc may affect the body's immune system.