



Common Alaska Contaminants and their Sources

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Glossary

acute toxicity: health problems caused shortly after exposure

chronic toxicity: health problems caused over a long period of time, usually as the result of repeated exposures to a substance

dose: a measure of exposure to a contaminant

exposure route: a way in which a contaminant enters the body; for example, ingestion (eating or drinking a contaminated substance)

What is a contaminant?

The contaminants most commonly found in Alaska are among those commonly found elsewhere in the United States. A contaminant is defined as any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil. These contaminants include petroleum, polychlorinated biphenyls (PCBs), solvents, and metals.

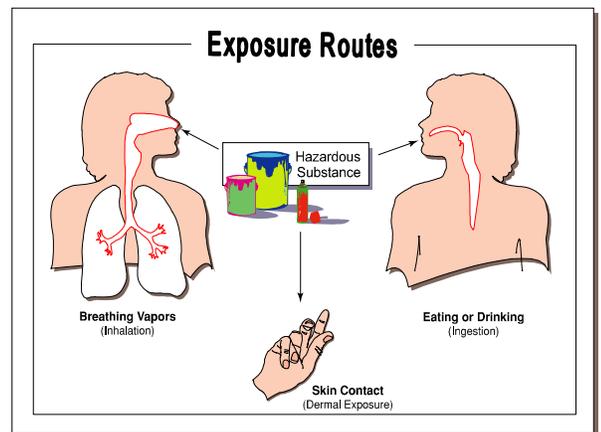
Where do they come from?

Soil, water, and air contamination occur from a variety of sources and activities. Government, public, industrial, or commercial facilities, as well as households, can generate or use chemicals that cause contamination when improperly used. Some chemicals considered contaminants occur naturally in the environment. Many metals, for example, are commonly found in soil. Naturally-occurring contaminants also may be exposed and distributed, such as when excavation or natural processes expose minerals to erosion or get washed into a stream. Contamination discovered today is often from an activity that occurred before there were laws and regulations to protect soil, water, and the air from the impacts of contamination or before the harmful effects were known.

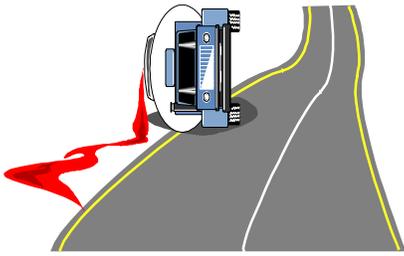
How does a contaminant cause harm?

Exposure to a contaminant may cause harm to plants, aquatic life, animals, and people. The amount of harm depends on several factors, including the **toxicity** of the contaminant, the **exposure route** involved, the amount of the contaminant (**dose**) and the length of exposure.

Depending on the combination of these factors, exposure to a contaminant may result in no effects, a minor effect such as skin irritation, or a serious effect such as liver damage, brain damage, or even death. People and animals are usually exposed to contaminants by breathing (inhalation), eating (ingestion), or absorption through the skin (dermal exposure).



Plants can be exposed by absorbing contaminants from the air, soil, or water or by coming into direct contact with contaminants. Even if the plant lives,



Most contaminated sites in Alaska are contaminated with petroleum because these products are transported and used in huge quantities in Alaska.

Solvents are often used to clean up after painting operations.



Eating paint can lead to PCBs.

the contamination may potentially be passed on to creatures that eat the plant.

Common contaminants in Alaska

Petroleum

Alaskans use a wide variety of petroleum products, including gasoline, diesel fuel, heating oil, jet fuel, lubricating oil, bunker oil, and tar - all of which are refined from crude oil. Each of these products contains many petroleum compounds and, sometimes, other additives that also can be of concern as contaminants. Petroleum is the most common contaminant in Alaska.

Depending on the petroleum product and how it is released into the environment, it may evaporate, attach to soil or sediment particles, be carried into surface waters, or be carried into groundwater. Lighter products such as gasoline are more toxic and mobile in the environment but also degrade faster than heavier ones, such as tar. Petroleum products naturally decompose when exposed to oxygen, sunlight, and soil bacteria. In Alaska, petroleum-contaminated soil decomposes slowly, taking many years or even decades to complete. Cold Alaskan air and soil temperatures and winter snow cover slow natural breakdown. Petroleum-contaminated groundwater can remain contaminated far longer because of cold temperatures and lack of oxygen in the groundwater.

Most Likely Sources: Most petroleum contamination in Alaska comes from leaking storage tanks, containers, pipes, and equipment; transportation accidents; and improper handling and disposal practices that lead to spills. Most of the sites handled by the Contaminated Sites Remediation Program come from past spills.

Even small leaks can add up. A leak of just one drop per second from a tank or pipe can amount to more than 10 gallons per day and nearly 4,400 gallons per year!

Because many storage tanks and piping systems are underground, seeing the leaks is impossible, and a tank can leak for years before it is discovered. In recent years, state and federal regulations have required certain types of tanks to be tested and monitored in an attempt to prevent this sort of contamination.

How this contamination can hurt you and the environment: The primary concern with petroleum contamination is its **chronic toxicity** when ingested through contaminated soil, water, or foods over long periods of time. Different types of petroleum cause different kinds of health effects, including headaches, nausea, skin irritation, and cancer. For instance, gasoline contains benzene, a known carcinogen to people and animals.

Polychlorinated Biphenyls (PCBs)

PCBs are a group of man-made chemicals made up of numerous chemical compounds that contain two or more chlorine atoms. Manufacturing of PCBs in the U.S. has been prohibited since 1977. Prior to that time, PCBs commonly were found in oils used in electrical equipment and hydraulic

Reference List

More information about the harmful effects of many substances can be obtained from the **Agency for Toxic Substances and Disease Registry** (ATSDR). You can call ATSDR at 1-800-447-1544

Over the Internet, the ATSDR homepage can be found at:
www.atsdr.cdc.gov/

From the ATSDR homepage, information on the human health effects of specific hazardous substances can be found under the ToxFAQs, Public Health Statements, and Minimal Risk Levels for Hazardous Substances sections. ATSDR also maintains links to many other related resources on the World Wide Web.

Environmental Protection

Agency: Office of Emergency and Remedial Response, *Common Chemicals Found at Superfund Sites*, August, 1994.

www.epa.gov/superfund/students/class_act/haz-ed/ff09.pdf

EPA web page entitled: *Sources of Common Contaminants and their health effects:*

www.epa.gov/superfund/health/contaminants/index.htm

This fact sheet is one of a series of free publications prepared by DEC to help people understand contaminated site cleanup issues. The others can be found at
www.state.ak.us/dec/spar/faq.htm#csp

fluids. PCBs also were used in heat transfer liquids, hydraulic fluids, plasticizers, and caulking materials.

PCBs strongly attach to plants, soils and sediments. PCBs found in soil can very slowly migrate to groundwater or surface water. Some forms of PCBs are easily evaporated into the air and may return to land or water by settling or washout by rain or snow miles from their origins. PCBs can be spread through windborne dust that contains the contaminant.

Most Likely Sources: The largest use of PCBs was in electrical transformers, switches, and capacitors (including fluorescent light ballasts) from about 1930 until 1977. PCB contamination in Alaska mainly occurred from leaky transformers or the improper disposal of PCB oil on the ground. Most instances of PCB contamination occurred before 1977. Since then, transformers and other equipment containing PCBs must be marked with special labels, checked regularly for leaks, managed according to specific rules, and sent to special incinerators or landfills (all located out-of-state) for disposal.

How this contamination can hurt you and the environment: PCBs are very persistent in the environment because sunlight, oxygen or bacteria do not easily break them down. Small amounts of PCBs can be found in almost all outdoor and indoor air, soil surfaces, and surface water. People and animals become exposed to PCBs mainly when they ingest PCB-contaminated water, sediment, soil, plants, or other animals that already contain PCBs. When exposed to elevated levels of PCBs over a long period of time some animals developed cancer. Based on this research, PCBs are suspected of causing cancer in people.

Solvents

Solvents are commonly used as degreasers, paint strippers, paint and lacquer thinners, and in dry cleaning by a wide variety of commercial and industrial facilities, and in households. Common solvents include acetone, toluene, xylene, kerosene, methylene chloride, tetrachloroethylene, ethanol, and methanol.

Many solvents chemically break down when exposed to oxygen, soil bacteria, or sunlight. Other solvents because of their chemical makeup are more difficult to breakdown and are more persistent in the environment. Also, many solvents dissolve in water and easily move in the water. A small amount of solvent contamination in groundwater can cause a very large problem. When solvents are found in the groundwater, they are difficult to remove. Exposing the contamination to things like, bacteria, oxygen, and sunlight can break down some solvents. Many solvents evaporate readily to become air pollutants. In the air, they can be easily absorbed through skin or are inhaled.

Most Likely Sources: Leaking tanks or containers, and improper disposal of solvents cause environmental contamination. Sources of contamination can include dry cleaners, paint shops, industrial plants, and auto and equipment repair shops. People can become exposed to solvents while working with them and not wearing personal protection, such as respirators and gloves.

How solvents can hurt you and the environment: Solvents can be toxic to plants, animals, and people. Some solvents are known or suspected to cause cancer in animals and people. Other solvents may degrade into more toxic contaminants. In people, overexposure to solvents frequently results in dizziness and lightheadedness in the short-term and may result in memory loss, liver damage, coma, or even death if exposure is severe.

Metals

Metals occur naturally in the environment in many different forms. In very small amounts, certain metals are necessary to sustain life. However, too much of some metals can cause human health and environmental contamination problems.

Metals can be found dissolved in liquid (soluble) or a solid form in the environment. Naturally occurring metals can also be found at levels that are dangerous to human health and the environment. For example, naturally occurring arsenic can be found in drinking water or soils in some parts of Alaska at levels above what is considered safe by state or federal standards.

Most Likely Sources: Metals may be present as environmental contaminants in soil or water, as naturally occurring compounds or because of human activity. Lead from batteries, gasoline and paint; mercury from batteries and historical mining operations; and silver from photographic processing all are common sources of metal contamination from human activities.

How metals can hurt you and the environment: Health effects of overexposure to metals vary depending on the metal itself. Symptoms can include nervous system disorders, brain damage (this was the problem with lead in paint), kidney damage, blindness, and death. Some of the symptoms are reversible if detected soon enough. Any metal can be harmful to plants, animals, and people, if the organism's exposure to the metal is high enough and if the metal is in a form that can be absorbed.

For More Information

Alaska Department of Environmental Conservation
Contaminated Sites Program

Main Offices: Anchorage: 907-269-7558 Juneau: 907-465-5390
Kenai: 907-262-5210 Fairbanks: 907-451-2153

Internet Homepage: www.dec.state.ak.us/spar/csp/

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