

Air Toxics of Concern in Oregon

What are air toxics?

Air toxics are generally defined as air pollutants known or suspected to cause serious health problems. Serious health effects include cancer, birth defects, lung damage and nerve damage.

How do we know about them?

The U.S. Environmental Protection Agency (EPA) performed several studies to estimate levels of air toxics nationwide. Through computer modeling, the Oregon Department of Environmental Quality (DEQ) has estimated air toxics levels in Portland. In Portland and La Grande DEQ has sampled the air, or monitored air toxics. The Lane Regional Air Protection Agency has also monitored air toxics in Eugene. This fact sheet provides basic information about the 12 chemicals of most concern in Oregon, based on our current knowledge of estimated exposure levels and toxicity.

Acetaldehyde

What is it? Acetaldehyde is a colorless flammable liquid that mixes with water and evaporates when exposed to air. Acetaldehyde has a pungent suffocating odor, but at dilute concentrations it has a fruity odor.

Where does it come from? Acetaldehyde occurs naturally in some foods, such as ripe fruit and coffee. Acetaldehyde is formed as a product of incomplete wood combustion in fireplaces and woodstoves, coffee roasting, burning of tobacco, and vehicle exhaust fumes. Residential fireplaces and woodstoves are the two highest sources of acetaldehyde, followed by various industrial emissions.

What are the health effects? EPA has classified acetaldehyde as a probable human carcinogen of low carcinogenic hazard. Health effects from breathing small amounts of acetaldehyde over long periods of time are unknown.

Acrolein

What is it? Acrolein is a colorless or yellow liquid with a disagreeable odor that burns easily and evaporates quickly in the air.

Where does it come from? Acrolein can be formed from the breakdown of certain pollutants found in outdoor air, from burning tobacco, or

from motor vehicle exhaust. Exposure may occur from breathing contaminated air, from smoking tobacco or proximity to someone who is smoking, or from being near automobiles or oil or coal power plants.

What are the health effects? The major effects from long-term inhalation exposure to acrolein include general respiratory congestion and eye, nose, and throat irritation. EPA considers acrolein to be a high concern pollutant based on toxicity, and a possible human carcinogen.

Arsenic and Compounds

What is it? Inorganic arsenic is a naturally occurring element in the earth's crust. Pure inorganic arsenic is a gray-colored metal. Inorganic arsenic is usually found combined with other elements such as oxygen, chlorine, and sulfur. Arsenic in plants and animals combines with carbon and hydrogen. This is called organic arsenic. Most arsenic compounds have no odor and dissolve in water.

Where does it come from? Inorganic arsenic is found throughout the environment. It is released into the air by volcanoes, the weathering of arsenic-containing minerals and ores and by commercial or industrial processes, such as metal smelting or burning of wood treated with arsenic. Arsenic settles from the air to the ground. The major use for inorganic arsenic is in wood preservation. Arsine, a compound consisting of arsenic and hydrogen, is used in the microelectronics industry and in semiconductor manufacture. For most people, food is the largest source of inorganic arsenic exposure, with lower amounts coming from drinking water and air.

What are the health effects? Inorganic arsenic is a human poison. Organic arsenic is less harmful. High levels of inorganic arsenic in food or water can be fatal. Arsenic damages many tissues including nerves, stomach and intestines, and skin. Breathing inorganic arsenic increases the risk of lung cancer. Ingesting inorganic arsenic increases the risk of skin cancer and tumors of the bladder, kidney, liver and lung. EPA has classified inorganic arsenic as a known human carcinogen.



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Benzene

What is it? Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Where does it come from? Benzene is found in emissions from burning coal, oil and woody material, motor vehicle exhaust and evaporation from gasoline service stations and in industrial solvents. Tobacco smoke contains benzene and accounts for approximately 50 percent of our exposure to benzene. Benzene is widely used in the United States and ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs and pesticides. Natural sources of benzene include volcanoes and forest fires.

What are the health effects? Long-term inhalation of benzene causes blood disorders. Benzene specifically affects bone marrow (the tissues that produce blood cells). Benzene may cause anemia, excessive bleeding, damage to the immune system and genetic damage. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in people occupationally exposed to benzene. EPA has classified benzene as a known human carcinogen.

1,3-Butadiene

What is it? 1,3-Butadiene is a colorless gas with a mild gasoline-like odor. It is formed naturally during combustion but is also manufactured.

Where does it come from? 1, 3-Butadiene is put into the air by motor vehicle exhaust and from the combustion of petroleum fuels and woody materials for space heating and industrial processes. It is also used in the manufacturing of plastics.

What are the health effects? Studies have shown that long-term inhalation of 1,3-butadiene can result in an increase in cardiovascular diseases, such as rheumatic and atherosclerotic heart diseases and effects on the blood. EPA has classified 1, 3-butadiene as a probable human carcinogen.

Chromium and Compounds

What is it? Chromium is a naturally occurring metal found in rocks, animals, plants, soil, and in volcanic dust and gases. Chromium is a steel-gray solid with a high melting point, which comes in several forms.

Where does it come from? Manufacturing, chrome plating, or burning of solid wastes or fossil fuels can release chromium to the air. Chromium metal is used mainly for making steel and other alloys. Chromium compounds are also used to manufacture dyes and pigments, and in leather and wood preservation. Smaller amounts of chromium are used in drilling muds, textiles, and toner for copying machines. Chromium particles settle from the air in less than 10 days and can stick strongly to soil.

What are the health effects? Chromium, when combined with other elements, can occur in several forms. Long term inhalation of chromium (VI) results in damage to the respiratory tract, including nasal damage, bronchitis, decreased lung function, pneumonia, and asthma. Inhaled chromium is a known human carcinogen, resulting in an increased risk of lung cancer. Studies suggest that exposure to chromium (VI) may result in complications during pregnancy and childbirth. EPA has classified chromium (VI) as a human carcinogen of high carcinogenic hazard. Another form of chromium, chromium (III), is not known to cause cancer, and is less toxic. It is estimated that less than 5% of chromium in the air is the more harmful chromium (VI).

Diesel Particulate Matter

What is it? Diesel particulate matter is the microscopic soot present in the complex mixture of air pollutants emitted by diesel engines.

Where does it come from? Diesel particulate matter is emitted from diesel engines found in trucks, cars, ships, locomotives, agricultural and construction equipment and generators.

What are the health effects? Diesel particulate matter creates serious health problems for adults and has extremely harmful effects on children and the elderly. Diesel particulate is associated with an increased risk of premature death, a greater number of hospital admissions for heart and lung disease, and amplified adverse respiratory symptoms such as asthma. Long term exposure to diesel particulate likely increases the chance of lung cancer.

Formaldehyde

What is it? Formaldehyde is a colorless gas with a pungent, suffocating odor at room temperature. It is a naturally occurring substance that is also produced by human activities.

Where does it come from? The highest levels of airborne formaldehyde have been detected in indoor air, where it is released from various consumer products. In outdoor air, the major sources of formaldehyde are power plants,

manufacturing facilities, incinerators and automobile exhaust. It is formed from both natural processes and human activities. Tobacco smoke is another important source of formaldehyde.

What are the health effects? Chronic exposure to inhaled formaldehyde is associated with respiratory symptoms and eye, nose, and throat irritation. An increased incidence of menstrual disorders and pregnancy problems were observed in women workers using urea-formaldehyde resins. Studies of workers have shown significant associations between exposure to formaldehyde and increased incidence of lung and nasal cancer. EPA considers formaldehyde to be a probable human carcinogen.

Naphthalene

What is it? Naphthalene occurs as a white solid or powder that is insoluble in water and evaporates easily. Naphthalene has a strong, mothball odor.

Where does it come from? Naphthalene is produced when coal and oil are burned. It is also called white tar, and tar camphor, and has been used in mothballs and moth flakes. Burning tobacco or wood also produces naphthalene. The major commercial use of naphthalene is in the manufacture of polyvinyl chloride (PVC) plastics. Its major consumer use is in moth repellents and toilet deodorant blocks.

What are the health effects? Chronic exposure of workers and rodents to naphthalene has been reported to cause cataracts and damage to the retina. Hemolytic anemia has been reported in infants born to mothers who inhaled and ingested naphthalene (as mothballs) during pregnancy. EPA has classified naphthalene as a possible human carcinogen.

Polycyclic Organic Matter (POM)

What is it? Most POM compounds are solids with high melting and boiling points, and are extremely insoluble in water. Eight major categories of compounds have been defined by the EPA to constitute the class known as POM. The most common category is the polycyclic aromatic hydrocarbons (PAHs), also known as polynuclear aromatics, which include benzo[a]pyrene.

Where does it come from? POM compounds are formed primarily from combustion and are present in the atmosphere in particulate form. Sources of air emissions are diverse and include cigarette smoke, vehicle exhaust, home heating, laying tar, grilling meat, residential wood burning and agricultural burning.

What are the health effects? Cancer is the major concern from exposure to POM. Epidemiologic studies have reported an increase in lung cancer in humans exposed to coke oven emissions, roofing tar emissions, and cigarette smoke; all of these mixtures contain POM compounds. EPA has classified seven PAHs contained in POM as probable human carcinogens.

1, 1, 2, 2, Tetrachloroethane

What is it? Tetrachloroethane is a colorless, dense liquid that has a sweet, chloroform like odor.

Where does it come from? As it is no longer widely used in the U.S. as an end-product, present sources of tetrachloroethane are fugitive emissions or discharges when it is generated as a by-product and during chemical production activities in which it is an intermediate product. Tetrachloroethane has been found, in trace amounts, in adhesives, oils, greases and lubricants; these household products may contaminate indoor air.

What are the health effects? The main effects of tetrachloroethane are liver and neurological effects. Chronic inhalation exposure to tetrachloroethane in humans results in jaundice and an enlarged liver, headaches, tremors, dizziness, numbness, and drowsiness. EPA has classified tetrachloroethane as a possible human carcinogen.

Tetrachloroethylene (Perc)

What is it? Tetrachloroethylene, also known as perchloroethylene, or perc, is a nonflammable colorless liquid with a sharp sweet odor. It evaporates very easily in the air and has an odor at very low concentrations.

Where does it come from? Tetrachloroethylene is widely used for dry cleaning fabrics and metal degreasing operations. It is also used to make other chemicals and is used in some consumer products such as automotive brake cleaners. After dry cleaning with tetrachloroethylene, clothing will release small amounts of this chemical into the air.

What are the health effects? The main effects of tetrachloroethylene in humans are neurological, liver, and kidney effects. Results from epidemiological studies of dry-cleaners occupationally exposed to tetrachloroethylene suggest increased risks for several types of cancer. In the mid-1980s, EPA considered tetrachloroethylene as a probable or possible human carcinogen. EPA is currently reassessing its potential carcinogenicity.