

# Oregon Department of Human Services

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TECHNICAL BULLETIN

## HEALTH EFFECTS INFORMATION

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**BTEX**

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## **What is BTEX?**

BTEX refers to the group of compounds: benzene, toluene, ethylbenzene, and total xylenes which are naturally occurring components of petroleum that end up largely in gasoline as a result of the refining process. Refineries adjust the amounts of these compounds to meet vapor pressure and octane standards for gasoline.

Benzene is a volatile organic compound. It is used in the production of synthetic materials and consumer products such as synthetic rubber, plastics, nylon, insecticides, paints, dyes, resins, and cosmetics.

Toluene occurs naturally as a component of many petroleum products. Toluene is used as a solvent for paints, coatings, gums, oils, and resins.

Ethylbenzene is used mostly as a gasoline and aviation fuel additive. It may also be present in consumer products such as paints, inks, plastics, and pesticides.

There are three forms of xylene: ortho-, meta-, and para-. Ortho-xylene is the only naturally occurring form, the other two being man-made. Xylenes are used in gasoline and as a solvent in printing, rubber, and leather industries.

## **How does BTEX enter the environment?**

The main concern of the Department of Human Services (OHD) is the improper storage and leakage of gasoline and BTEX chemicals from faulty and ill-maintained underground storage tanks. With improper storage, these chemicals may easily leach into the groundwater and contaminate public and private water systems. Other sources of BTEX contamination to groundwater are large bulk facilities, surface spills, and pipeline leaks. When released into the environment, BTEX components may become attached to soil and rock particles where they eventually find their way into groundwater. Once in the groundwater, these compounds may persist longer than if they were exposed to air, therefore affecting water supplies for months or even years.

## **What health effects are expected from exposure to BTEX?**

Exposure to humans can occur by either ingestion (drinking water from contaminated wells), or by inhalation (exposure to BTEX contaminated water via showering or laundering). Acute exposure to gasoline and its components

benzene, toluene, and xylenes has been associated with skin and sensory irritation, central nervous system depression, and effects on the respiratory system.

Prolonged exposure to these compounds also affects these organs as well as the kidney, liver and blood systems. According to the EPA, there is sufficient evidence from both human epidemiological and animal studies that benzene is a human carcinogen. Workers exposed to high levels of benzene in occupational settings were found to have an increase in leukemia.

### **What regulations are there for BTEX?**

The U.S. Environmental Protection Agency has established Maximum Contaminant Levels (MCLs) which represent permissible levels for chemical contaminants in drinking water supplied by public water systems. To derive these MCLs, the EPA uses a number of conservative assumptions to ensure adequate protection of the public. In the case of known or suspected carcinogens, the MCL is calculated based on consumption of approximately 2 quarts (2 L) of water per day over a lifetime (70 years). The MCL is set so that a lifetime exposure to the contaminant at the MCL concentration would result in no more than 1-100 (depending on the chemical) excess cases of cancer per million people exposed.

<b>Chemical</b>	<b>MCL (mg/liter=ppm)</b>
benzene	0.005
toluene	1
ethylbenzene	0.7
xylenes (total)	10

### **What can be done to prevent exposure to BTEX?**

The Department of Human Services and U.S. EPA recommend that exposure to BTEX be kept as low as possible. To avoid exposure or to reduce exposure to BTEX, people should consider finding an alternate supply of water that is free of these compounds, and/or applying appropriate water treatment/filtration systems. Short-term reductions in exposure may be accomplished by using bottled water for food and beverage preparation and avoiding bathing or laundering with the contaminated water.

With treatment processes such as aeration and activated charcoal filtration, it is usually possible to adequately remove enough BTEX from water to meet the MCL. Because of the serious inhalation hazards of benzene, treatment should be applied to all household water. One should use a water filter that has National Sanitation Foundation certification (313-769-8010).