

Benzene and Vapor Intrusion

Benzene is a component of petroleum, and most benzene used for industrial/manufacturing processes today comes from refined crude oil. Benzene is an intermediate in the production of various plastics, resins and synthetic fibers and is used in the manufacturing of certain types of rubber, lubricants, glues, furniture wax, drugs, and pesticides.

Benzene:

- is a highly flammable liquid at room temperature, easily evaporates into air
- is commonly detected in outdoor and indoor air
- has no odor at low levels; can be smelled (a sweet, gasoline-like odor) at about 190,000 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

People may breathe benzene from:

- Working at an industrial/manufacturing job that uses or produces benzene.
- Outdoor air, which contains low levels of benzene from vehicle exhaust, gasoline stations, industrial emissions, forest fires, and tobacco smoke.
- Indoor air, which often contains higher levels of benzene than outdoor air from products such as glues, paints, furniture wax, detergents, the use of natural gas and propane stoves, and tobacco smoke.
- Vapors from contaminated soil or groundwater that move into indoor air.

Health concerns from breathing benzene

Most exposures to benzene from vapor intrusion are to low amounts that are not likely to result in health effects. The possibility of health effects depends on the amount of benzene in air and how long people breathe it. Once benzene enters the body, about half will leave in exhaled air. The other half of the benzene breathed in gets absorbed and distributed throughout the body via the blood and is quickly eliminated in urine.

Human and animal studies show that breathing benzene can cause reduced blood cell counts (white blood cells, red blood cells, or platelets) and disruptions to bone marrow. Exposure to benzene over long periods can increase the risk of certain types of blood cancers. Long-term human occupational studies have shown sufficient evidence of a link between benzene exposure and leukemia, specifically acute myeloid leukemia/acute non-lymphocytic leukemia.

Benzene Intrusion Screening Values

Intrusion Screening Values (ISVs) are developed to indicate when action may be needed to protect health from vapor intrusion. ISVs are an amount that is safe for people to breathe. This level is protective for sensitive people, including children, pregnant women, and people who already have health issues. The ISVs are set well below levels expected to result in health effects. When ISVs are exceeded, MDH recommends steps be taken to reduce exposures.

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Value	Description
1.3 $\mu\text{g}/\text{m}^3$	Residential ISV - a safe level that protects all people from health effects.
43 $\mu\text{g}/\text{m}^3$	Residential Sub-Slab Value (33X ISV) – a safe level in soil vapor beneath a home
11 $\mu\text{g}/\text{m}^3$	Workplace ISV - a safe level for people who may have exposures in the workplace over many years.
370 $\mu\text{g}/\text{m}^3$	Commercial/Industrial Sub-Slab Value (33X ISV) – a safe level in soil vapor beneath a workplace

(measured in micrograms per cubic meter, or $\mu\text{g}/\text{m}^3$)