

Community Guide to Vapor Intrusion Mitigation

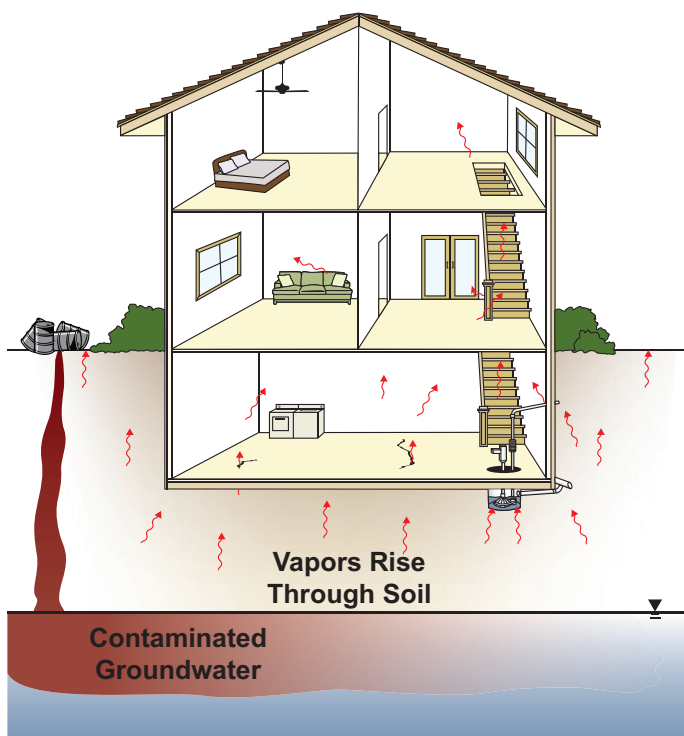


What Is Vapor Intrusion and Why Is It a Concern?

Vapor intrusion is the movement of chemical vapors from contaminated soil, groundwater or sewer lines into nearby buildings. Vapors enter buildings primarily through openings, such as cracks and seams in the foundation or basement walls, gaps around utility lines, and sump pits. They can also enter homes from sewer lines due to chemicals disposed of in drains. Once inside the home or workplace, inhaled chemical vapors may pose health risks for occupants. In some cases, buildup of vapors, such as those from methane or gasoline, may cause explosive conditions.

What Is Vapor Intrusion Mitigation?

Vapor intrusion mitigation removes or decreases the amount of vapor that enters a home. The long-term response to vapor intrusion into buildings is to remove or reduce the underground contamination that is the source of vapors – usually contaminated groundwater, subsurface soil or sewer lines.



Vapors from contaminated groundwater enter a home.

However, if contamination cannot be cleaned up right away, building-specific vapor intrusion mitigation can reduce risks to building occupants faster.

How Does It Work?

Vapor intrusion mitigation methods are available for both existing buildings and those planned for construction near the contaminated area. Chemical vapor entry into buildings can be mitigated by:

- **Sealing openings:** Filling cracks in the floor slab and gaps around pipes and utility lines in basement walls or pouring concrete over unfinished dirt floors.
- **Installing vapor barriers:** Placing sheets of "geomembrane" or strong plastic beneath a building to prevent vapor entry. Vapor barriers are best installed during building construction but can be installed in existing buildings that have crawl spaces.
- **Passive venting:** Installing a venting layer beneath a building, usually with a vapor barrier. Wind or the buildup of vapors moves the vapors through the venting layer toward the sides of the building where they vent to outside air. A venting layer can be installed before building construction or underneath existing buildings.
- **Sub-slab depressurization:** Connecting a blower (an electric fan) to a suction pit underneath the building foundation, which vents vapors from below the foundation to outside air.
- **Building over-pressurization:** Adjusting the building's heating, ventilation, and air-conditioning (HVAC) system to make the pressure indoors greater than the sub-foundation pressure.

Vapor intrusion mitigation also can be accomplished by using air treatment units that remove vapors from indoor air. Units can be portable, wall-mounted or ceiling-mounted or can be installed in HVAC ducts. Air treatment units typically contain a sorbent material, such as carbon (see [Community Guide to Granular](#)

Activated Treatment.) to which vapors “sorb” (stick). Air treatment units can remove chemical vapors from soil, groundwater or sewer lines.

How Long Will It Take?

Vapor intrusion mitigation usually will be needed to prevent vapor intrusion into buildings as long as a significant source of vapors remains in the ground beneath or near the building. It may require several years, or even decades, to complete cleanup of underground vapor sources.

Is Vapor Intrusion Mitigation Safe?

Vapor intrusion mitigation systems are safe to use and will improve the quality of the indoor air by reducing indoor levels of chemical vapors from vapor intrusion. They can also reduce indoor levels of radon gas and soil moisture. Mitigation systems have been installed and operated at hundreds of homes near Superfund sites and at homes near many other types of sites across the country.

How Might It Affect Me?

Installation of vapor intrusion mitigation systems in existing homes typically takes one or two days. Installers may need to access crawl spaces or indoor living areas and may need to pull back carpet or move your furniture to find and seal cracks. They also may need to drill holes in the foundation for sub-foundation pipes. These pipes can often be located near the basement walls, in closets or in low-traffic areas for convenience. The vent pipes and fan may be visible on the outside of the house. However, in some cases, the pipes may be run through a closet to the attic and vented through the roof.

During operation, you might not even notice a mitigation system, although you may hear the hum of the electric fans. These fans typically use less electricity than an LED television, but you might notice a small increase in electric bills.

You will be asked to grant access for indoor air monitoring to verify that the mitigation systems are working properly. Until the threat of vapor intrusion is gone, mitigation systems should be inspected regularly to ensure proper function. For example, floors and walls should be checked to see that no new cracks have developed, a geomembrane in a crawl space checked for rips and holes, and electric fans checked to ensure they are working correctly. You should not turn off the electric fans until EPA or the state agency notifies you that it is appropriate to do so. You will need to report broken fans and vent pipes to the agency point of contact provided.



Typical fan and vent pipe.

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Example

Mitigation is reducing possible risks from vapor intrusion at 43 homes near the Nyanza Superfund site in Massachusetts. Dye manufacturing from the 1910s to 1978 contaminated groundwater with trichloroethylene (TCE) and other chemicals. By the 1980s, a plume of groundwater contamination was found to extend beneath a nearby neighborhood. Sampling of indoor air, sub-slab air and groundwater showed that vapor intrusion was occurring, and TCE concentrations posed a risk to occupants of some homes.

As a result, in 2007 EPA began installing depressurization systems in homes located above the most contaminated groundwater where vapor intrusion was most likely to pose health threats. EPA first sealed cracks in basement walls and floors and covered sump pits. In homes with dirt basements, the Agency poured a concrete floor or installed a geomembrane as a vapor barrier. The systems are inspected annually and maintained to ensure that they continue to work.

For More Information

- About this and other technologies in the Community Guide Series, visit: <https://clu-in.org/cguides> or <https://www.epa.gov/vaporintrusion>
- About use of cleanup technologies at a Superfund site in your community, contact the site's community involvement coordinator or remedial project manager. Select the site name from the list or map at <http://www.epa.gov/superfund/sites> to view their contact information.