VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Virginia Department of Health
DIVISION OF ENVIRONMENTAL EPIDEMIOLOGY
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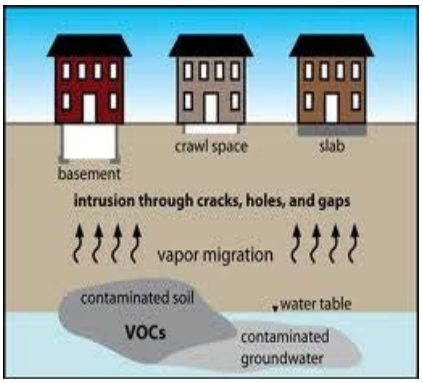
FREQUENTLY ASKED QUESTIONS ABOUT VAPOR INTRUSION

What is vapor intrusion?

Vapor intrusion occurs when chemicals migrate from contaminated groundwater or soil and move into the indoor air. Chemicals may be released to the soil or groundwater if spillage occurs on the ground, or if a petroleum leak occurs from an underground storage tank. These chemicals give off gases that seep into buildings through cracks in basement walls, foundations, sewer lines, or other openings. Vapor intrusion can impact indoor air quality.



(Source: enviroequipment.com)

What chemicals might enter the home or building as a result of vapor intrusion?

Vapor intrusion generally occurs when volatile organic compounds (VOCS) migrate from contaminated groundwater or soil and enter a home or building. Some volatile organic compounds (VOCs) include benzene, toluene, ethylbenzene, trichloroethylene (TCE), and perchloroethylene (PERC). Environmental sources of VOCs include industrial products, dry cleaning solvents, and petroleum products such as gasoline or diesel fuel. Sources of VOC contamination of the groundwater or soil include gas station tank leaks, underground storage tank spills, industrial releases, and spills from dry cleaning facilities. When VOCs contaminate the soil or groundwater, they can migrate into homes or buildings and affect indoor air quality.

Underground tank spill
(Source: enviroequipment.com)

What health effects can occur from vapor intrusion?

Health effects are different for each person. When people are exposed to high levels of chemicals indoors (high enough to produce an odor), they may experience symptoms such as eye and respiratory irritation, headache, and nausea. Symptoms usually lessen when individuals are no longer exposed. Exposure to some chemicals over a long period of time may increase a person's lifetime risk of developing cancer. Individuals who are more prone to health effects include children, the elderly, and those with current respiratory problems such as asthma. The table below lists VOCs that can result from vapor intrusion:

VOCs of Greatest Concern from Vapor Intrusion			
VOCs	**Possible Health Risks (*long-term effects from long-term exposure)**	**Major Sources**	**Type of Releases**
Benzene	Leukemia	Gasoline	Gas station tank leak
Toluene	Affects nervous system	Gasoline	Gas station tank leak
Ethylbenzene	Reproductive risk	Gasoline	Gas station tank leak
MTBE	Kidney damage, possible carcinogen	Gasoline	Gas station tank leak
Naphthalene	Respiratory effects, possible carcinogen	Home heating oil	Oil tank spill
Trichloroethylene (TCE)	Carcinogen, birth defects	Solvent used by industry to clean parts, degreasing agent	Historic industrial releases
Perchloroethylene (PERC)	Carcinogen, kidney toxicity	Dry cleaning solvent	Spill or discharge from dry cleaner
Dichloroethylene	Liver toxicity, nervous system	Industrial solvent and cleaner	Historic industrial releases
Vinyl chloride	Carcinogen	Formed from breakdown of PERC and TCE	Historic industrial releases

Source: Environmental Health Technical Brief: Vapor Intrusion of VOCs

How can I reduce the potential for vapor intrusion?

Vapor Intrusion Mitigation System

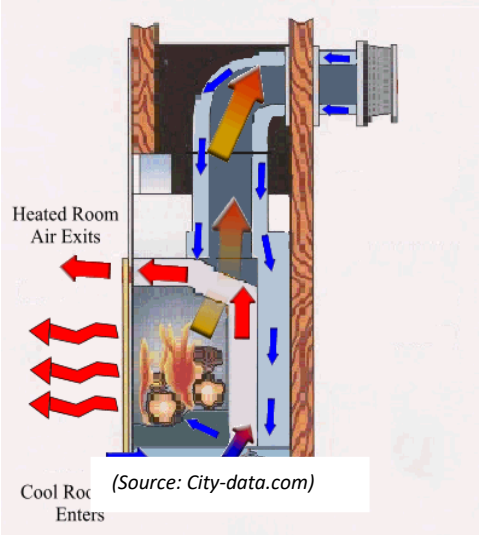
One way to reduce vapor intrusion is to install a vapor intrusion mitigation system. The two most common types of systems are the sub-slab depressurization systems and the sub-membrane depressurization systems, which must operate continuously to be effective. These systems reduce the possibility for soil gases to travel indoors, allow vapors to be vented to the outside, and use minimal electricity. A professional should periodically check the systems to ensure proper functioning. Another solution is to seal cracks in foundations to decrease the possibility for vapors to travel indoors.

How can I improve the air quality inside my home?

One of the primary causes of indoor air quality problems in the home is VOC migration. VOCs found in household products (paint, cleaning supplies, moth balls, air fresheners, hobby supplies)

are more likely to be a source of indoor air quality problems than vapor intrusion from a chemical spill. VOC levels tend to be ten times higher indoors than outdoors. To improve air quality, you can take the following steps:

- Use unscented, non-hazardous household cleaning products such as vinegar and baking soda.
- Maintain proper air circulation and humidity levels in the home, especially when using household products. Use HEPA filters, dehumidifiers, and exhaust fans to improve air quality.

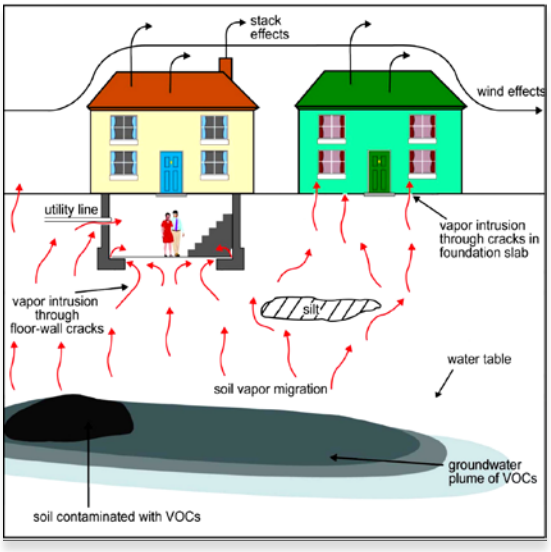


(Source: City-data.com)

- Ensure that heating systems, appliances (wood burning ovens, kerosene heaters), and fireplaces are properly vented and in good condition. Perform annual checks as needed.
- Remove potential health hazards in the home such as lead, mold, radon, pesticides, and other contaminants. Removal may require a skilled professional.
- Install a carbon monoxide monitor or alarm in the home. Carbon monoxide monitors are available at home improvement stores.
- Change or clean filters regularly to remove air pollutants.
- Avoid all tobacco products and smoke-filled rooms.

Should I test the indoor air quality of my home if I suspect vapor intrusion?

If you believe your home has been affected by vapor intrusion, contact an indoor air quality professional. Before hiring a professional, consider their certifications and memberships. VDH does not keep a listing of indoor air professionals, and cannot recommend specific environmental companies.



(Source: www.epa.gov)

Where can I obtain more information?

***For health-related questions regarding vapor intrusion*:**
Contact the Virginia Department of Health (VDH), Division of Environmental Epidemiology, 109 Governor Street, Richmond, VA 23219, call (804) 864-8182, or email toxicology@vdh.virginia.gov.

If you suspect vapor intrusion:
Contact the Virginia Department of Environmental Quality (DEQ), 629 E. Main Street, Richmond, VA 23219, or call (804) 698-4000.