ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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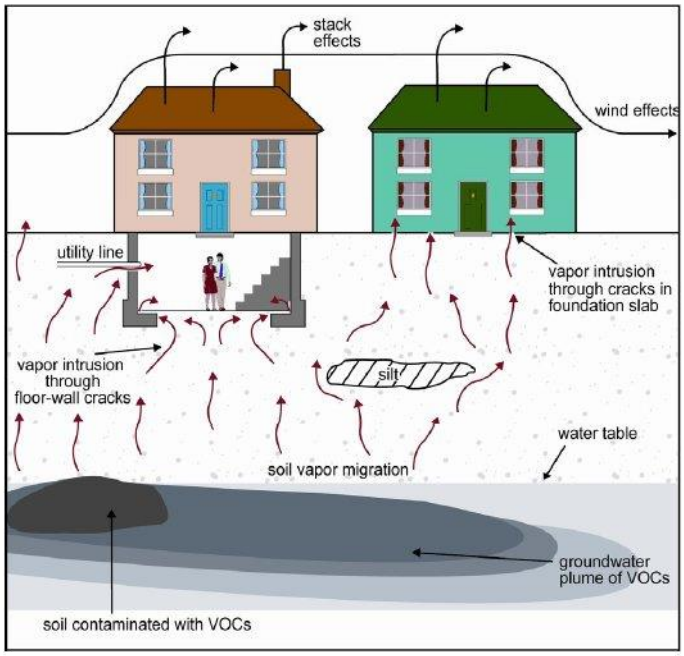
Vapor Intrusion

What is Vapor Intrusion?

When volatile chemicals or petroleum products are spilled on the ground or leak from underground storage tanks, they can give off gases, or vapors, that can migrate from the subsurface into overlying buildings (residences, commercial or industrial buildings, or other enclosed structures). Common products that can cause vapor intrusion include, but are not limited to: industrial de-greasers, dry cleaning solvents, and gasoline or diesel fuel. Vapors move through the soil and seep through cracks in slabs or basement floors and walls, openings for utility lines where pipes and electrical lines go through the foundation, crawl spaces below floors and other openings. Vapor intrusion is a concern because vapors can build up to a point where the health of residents or workers in those buildings could be at risk. The adjacent figure depicts the typical migration pathways of contaminated vapors into buildings.



(EPA 2008)

What contaminants can cause Vapor Intrusion?

Volatile organic compounds (VOCs) are a class of chemicals that readily evaporate at room temperature and form vapors. Subsurface sources of VOCs include contaminated soil and groundwater, or other buried wastes. Some of the typical VOCs found at contaminated sites that may cause vapor intrusion include solvents and degreasers such as: Tetrachloroethylene (PCE), Trichloroethylene (TCE), 1,1-Dichloroethane (1,1-DCA), 1,1-Dichloroethylene (1,1-DCE), 1,2-Dichloroethane (1,2-DCA), Chloroethene (vinyl chloride). Petroleum-related VOCs include: Benzene, Toluene, Ethylbenzene, and Xylene.

Typical Air Sample Canister

How do you test for Vapor Intrusion?

The process of investigating vapor intrusion typically requires several testing methods, either separately or in combination. Soil, soil gas and groundwater samples collected near a contaminated site are used to evaluate whether or not there is the potential for vapor intrusion to exist. Further tests take place where vapor intrusion appears to be a possibility. Canisters (see adjacent photo) are used to collect samples of outdoor air, soil vapors adjacent to or beneath a building, indoor air, and air within crawl-spaces. Soil

vapor samples are collected to generally characterize the nature and extent of vapor contamination in a given area. Sub-slab or crawl-space samples are collected to characterize the nature and extent of vapor contamination immediately beneath a building or in a crawl-space.

Indoor air samples are collected to characterize the nature and extent of air contamination within a structure. Indoor air samples are compared to sub-slab or crawl-space samples and outdoor samples to help determine where detected VOCs may be coming from (indoor sources, outdoor sources, and/or from soil gas contamination below the building). Outdoor air samples are collected to characterize site-specific background conditions for VOCs in ambient air. Outdoor air results are used to evaluate the extent to which outdoor sources such as automobiles, lawn mowers, gas stations, commercial/industrial facilities, etc. may be affecting indoor air quality.

Can vapors found in my home come from household sources?
Yes. VOCs are found in many household products and can be a source of indoor air problems. Some examples include: paints, paint strippers and thinners, mineral spirits, glues, solvents, cigarette smoke, mothballs, new carpet, stored fuel, air fresheners, cleaning products and dry cleaned clothing.

How do you correct the problem?
In general, the goal at contaminated sites is to remove the source of the vapors by cleaning up the contaminated soil or groundwater. However, this can be a lengthy process, and interim response actions are sometimes needed to protect building occupants during the cleanup process. When testing indicates that vapor intrusion is causing harmful levels of VOCs inside of buildings, a sub-surface depressurization system is the most common form of mitigation. These systems are similar to those used to mitigate naturally occurring radon. The system removes soil vapors from below basements, foundations, or within crawl-spaces before they can enter the building.


Typical vent fan (EPA 2012)

These systems must operate continuously to be effective and would need to remain in place until the source of vapors has been addressed thru site cleanup. These systems use little electricity, are relatively quiet, and require little maintenance.

For more information
For vapor intrusion technical questions, contact Robin Mongeon, Waste Management Division, at NHDES at (603) 271-7378 or Robin.Mongeon@des.nh.gov. For health-related questions, contact David B. Larson, Air Resources Division, at (603) 271-4773 or David.Larson@des.nh.gov.

Other Sources of information
NHDES Vapor Intrusion Guidance
EPA's Vapor Intrusion website