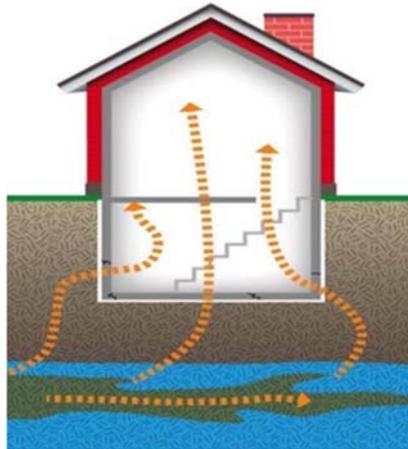


VAPOR INTRUSION

HOW TO DETERMINE IF SOIL VAPOR INTRUSION IS AN ISSUE

Do I need to worry about vapor intrusion?

- *Are there volatile contaminants present?*
- *Are the contaminants near a structure?*
- *Does sampling show contaminant levels that pose a VI risk?*



Courtesy of MN Pollution Control Agency

Contaminants in the subsurface can form vapors and migrate into an overlying structure. This process is known as vapor intrusion.

WHAT IS VAPOR INTRUSION?

Contaminants that are considered “volatile” have chemical properties that result in evaporation from solids or liquids into the surrounding air. When this occurs in the subsurface, chemicals volatilize into the small voids, or pores, in the soil. Vapor intrusion occurs when vapors that volatilize from contaminated soils and groundwater into the soil pores migrate through the subsurface soils and enter into overlying structures through foundation cracks, crawl spaces, utility entry points, etc.

HOW IS IT DETERMINED IF VAPOR INTRUSION SHOULD BE EVALUATED ?

For vapor intrusion to occur, you need to have both volatile contaminants and a structure for them to migrate into. If a structure is, or will be, located within 100 feet of groundwater or soil impacted with volatile contaminants, an evaluation of vapor intrusion potential should be conducted.

It is also important to evaluate preferential pathways, which can act as conduits for vapor migration toward a structure. Depending on local geology, the type(s) of contamination present, and the presence of nearby preferential pathways, it may be necessary to evaluate the potential that vapor intrusion is occurring further than 100 feet from the source of contamination. Knowledge of local geology and utility corridors is an integral component of this evaluation, as is a conceptual site model that accurately represents the site and surrounding area.

WHAT ARE THE CONTAMINANTS OF CONCERN?

The most common volatile contaminants associated with vapor intrusion are petroleum related substances and chlorinated solvents. These contaminants are commonly found on properties such as gas stations, dry cleaners, and metal plating facilities.



ARE ALL VOLATILE COMPOUNDS CREATED EQUAL?

Volatile contaminants in the subsurface behave differently depending on their chemical makeup, and as such they pose varying risks to human health. For instance, when oxygen is present, chemicals associated with petroleum products can be readily broken down by microorganisms. Under these site conditions, you may be able to reduce the vapor intrusion screening radius. Conversely, chlorinated hydrocarbons, typically associated with dry cleaning operations and degreasers, do not biodegrade at a rate that would make a significant difference in subsurface contaminant concentrations. Chlorinated solvents, and in particular Trichloroethylene (TCE) and Tetrachloroethylene (PCE), are among the most common chemicals of concern when evaluating the risk of vapor intrusion.

HOW IS IT DETERMINED IF VAPOR INTRUSION IS AN ISSUE INSIDE A STRUCTURE?

The best way to determine if vapor intrusion is (or may become) an issue is to identify the concentrations of contaminants in the soil gas beneath a structure. For existing structures, this means installing sampling points, known as sub-slab vapor points, through the floor/foundation of the structure. For sites that do not currently have a structure, the risk of vapor intrusion is determined by the use of soil gas samples collected at various locations and depths on the site. Collection of both sub-slab vapor and soil gas samples requires unique equipment and knowledge and should only be performed by experienced practitioners.

If sub-slab or soil gas samples indicate that there is a risk of vapor intrusion, action must be taken to prevent the vapors from migrating into the structure. Indoor air samples can be collected within the structure to determine if vapor intrusion has already occurred and help determine the required action.

WHAT CAN BE DONE IF IT IS DETERMINED THAT A RISK FOR VAPOR INTRUSION EXISTS?

Ideally, the best solution to stop vapor intrusion is to prevent the contamination from migrating under and into structures. Although at times this can be accomplished through groundwater interception and the treatment and removal of source soils, it is not always possible to prevent the migration from taking place.

If impacted soils and/or groundwater are already present beneath an existing structure and soil gas samples show elevated levels of contaminants, some form of treatment system will be needed. Simple systems, known as sub-slab depressurization (SSD) systems, are commonly used to address vapor intrusion. An SSD system works by creating a vacuum under the building foundation, which prevents the vapors from entering the structure. If vapor intrusion is suspected, these systems can be a particularly cost-effective way to pre-emptively mitigate vapor intrusion concerns.

Alternatively, to eliminate the need for the ongoing operation of an SSD system, or based on the need for a more robust remedy, it is common to install a vapor resistant liner system during new construction projects. The size and type of system required will depend on the specific conditions of the site and structure(s) being protected. As a result, conceptual site models should be utilized to design the best system for the site conditions.

OTHER RESOURCES

ITRC: <http://www.itrcweb.org/team/public?teamid=22>

EPA: <https://www.epa.gov/vaporintrusion>