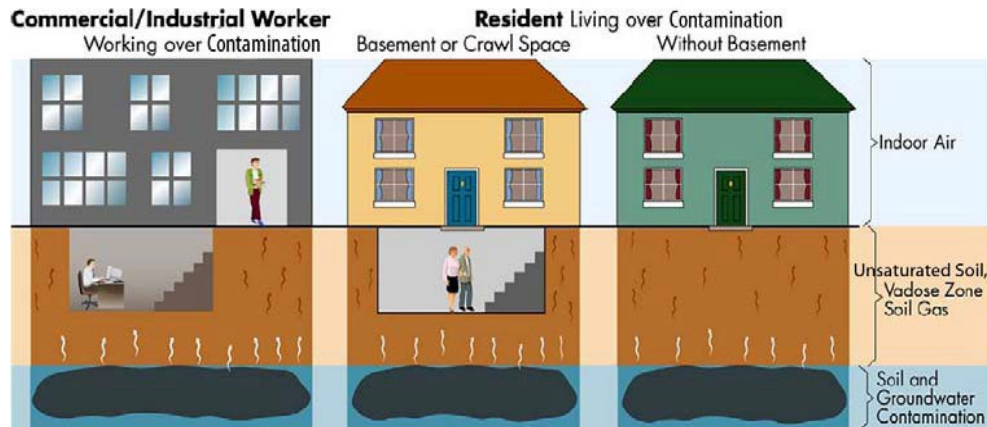




October 2023

VAPOR INTRUSION

Vapor intrusion is an area of increased concern to DEC during the investigation and cleanup of contaminated sites. We at DEC encourage consultants to identify sites in need of vapor intrusion investigation. There are several methods for investigating and addressing the issue. We will work with responsible parties and consultants to identify the best approach for their particular site.



What is vapor intrusion?

Vapor intrusion is a way that chemicals in soil or groundwater can get into indoor air. Sometimes chemicals are spilled on the ground at a factory, storage yard, or dry cleaner, or they leak from an underground storage tank or piping. These chemicals can seep into the soil and groundwater. Many chemicals can also travel through soil as vapors. Vapors move into the outside air if no buildings exist, or they can “intrude” into nearby buildings, contaminating indoor air.

How can chemicals enter buildings?

Chemical vapors can enter the air of buildings through cracks in the foundation or through preferential pathways such as sumps, sewer lines or floor drains. This happens in the same way that radon, a naturally occurring radioactive gas, can enter buildings. The number of leaks in foundations, preferential pathways, foundation type and building ventilation can make a big difference in how vapors get into indoor air. The amount of vapor can vary from building to building, even ones right next to each other.

Vapor intrusion is not common, and it doesn't occur in every instance of contaminated soil or groundwater. Homeowners, businesses and those investigating contamination, however, should consider the possibility whenever there is a known source of soil or groundwater contamination nearby.

What are the health concerns?

In very rare cases we find high concentrations of contaminants that may pose short-term safety hazards (e.g., explosion), acute health effects, or aesthetic problems (e.g., odor). Typically however, health officials

Contamination in the soil and groundwater can take the form of a vapor and travel through soil, entering indoor air through leaks or preferential pathways in parts of buildings which are below-ground, like basements and crawl spaces.

are concerned about **exposure to low-levels of chemicals over many years**, as this may raise a person's lifetime risk for developing cancer. Depending on the chemical, effects can include asthma, neurological effects or kidney damage. In general, the health risks from chemical exposures vary, based on the person exposed and the chemical involved.

Recent information has come to light nationally about the possible health risks of long-term exposure to low levels of vapors over years. Investigators have also developed better sampling techniques in the last several years to prove when these small but unhealthy amounts of toxic vapors are entering indoor air. The concentrations of chemicals from underground contamination have been hard to distinguish from common chemicals stored indoors.

The levels of indoor air contamination are seldom high enough to pose an immediate danger to people who live or work in the affected buildings. If levels are high enough, some people will experience eye and respiratory irritation, headache, and/or nausea. In most cases, these symptoms are temporary and should go away when the person is moved to fresh air. Please report symptoms such as these to DEC and to your health care provider.

Even though the vapor intrusion risk is quite low, we at DEC consider these risks unnecessary and avoidable.

What chemicals are typically involved?

Volatile organic compounds (VOCs) are a group of chemicals that easily become gases, which can migrate through the soil and enter buildings. Examples are petroleum products, like gasoline or diesel fuel, and solvents for dry cleaning and industrial uses.

The most common vapor intrusion cases involve petroleum spilled or leaked from fuel storage tanks. In many cases, chemical and petroleum releases are not immediately discovered. By the time they are, the contamination has had time to migrate through the soil or groundwater.

Vapor intrusion may not be detectable by smell, even if the contaminant is petroleum, since the concentrations are very low. Solvents from commercial and industrial sites such as auto repair shops and dry cleaners also do not usually create an odor at low concentrations that still pose a health risk. If you are concerned about a chemical smell that is not related to activities in your workplace or home, report this to the fire department and to DEC.

Household products are the most likely source of indoor air quality problems at your home rather than vapor intrusion from a contamination site. Some of the same solvents in industrial spills and other sources of VOCs are also commonly stored in homes and businesses. Paints, paint strippers and thinners, along with cigarette smoke, aerosol sprays, moth balls, air fresheners, new carpeting or furniture, gun cleaning solution, hobby supplies (glues and solvents), stored fuels, and dry-cleaned clothing all contain VOCs.

If vapor intrusion is a concern

If you live or work near a site where petroleum or chemicals have contaminated soil or groundwater, you should expect that the potential for vapor intrusion is also being investigated. A DEC project manager, the site owner, their consultant or others working on the cleanup may contact you. They should request your cooperation and consent before doing any testing/sampling on your property. You may ask them any questions about the work being done, or you can contact DEC's cleanup project manager in the Contaminated Sites Program. See contact information below.

How is vapor intrusion investigated?

In most cases, investigators can rule out the potential for vapor intrusion by collecting samples of soil gas or groundwater near the contamination site.

Sometimes sampling closer to or on your property, or at times in your home, may be necessary.

DEC does not always recommend indoor air sampling for vapor intrusion. Indoor air quality changes a lot from day to day, making it difficult to collect samples representative of indoor air. If samples are collected, they are typically evaluated along with other sample types to help distinguish sources which are external versus internal to the building.

Samples may also be taken from beneath the home's foundation. These "sub-slab" samples can help us interpret indoor air samples, and they are not as affected by indoor chemical sources.

What happens if a problem is found?

If vapor intrusion is affecting the air in your home or business, the most common solution is to install a *radon mitigation or depressurization system*. This prevents gases in the soil from entering the home. The system creates a low amount of suction below the foundation, and after removal of the VOCs (if necessary), vents the vapors to the outside. The system uses minimal electricity and should not noticeably affect heating and cooling efficiency. This system also prevents radon from entering the home, an added health benefit. The party responsible for cleaning up the contamination may also be responsible for paying for the installation of this system. When vapor intrusion has been determined to not pose an unacceptable risk, the need for the mitigation system can be reconsidered. In homes with radon problems, these systems should remain in place permanently.

If you have been exposed to vapors from contaminants which have entered the air in your home, office or other location, and have concerns about health risks or health effects, contact the Alaska Department of Health Environmental Public Health Program at (907) 269-8000. DEC works with this program when we are concerned about health risks. The Public Health staff can respond in several ways, including providing informal advice and information, or preparing a written health consultation.

For more information

For health-related questions, contact the Alaska Department of Health's Environmental Public Health Program at (907) 269-8000.