

Vapor Intrusion: Indoor Air Pollution at School, Work, and Home

What is Vapor Intrusion?

Vapor intrusion is a form of indoor air pollution caused by the evaporation of toxic chemicals in soil and groundwater. Chemicals such as TCE and PCE (liquid *solvents used to clean metal*) can be found in buried wastes, contaminated soils, and ground water. They emit vapors that can travel through soil layers into buildings. These vapors can move horizontally in the subsurface and enter buildings well away from the contamination source. Studies have proven that these chemicals can be deep in the ground (eighty feet), and still their vapors can reach the surface and enter homes or schools. In extreme cases, the vapors may collect in buildings to levels that can pose near-term safety hazards (e.g., explosion), acute health effects, or unpleasant odors. If vapors do enter a building, the levels of concentration are usually low, but health concerns still exist. The health problems caused by long-term exposure to low levels of these chemicals are proving to be dangerous for people and especially children.

How are TCE or PCE vapors drawn into Buildings?

When there is a pressure difference between the interior of a building and the ground area below it, vapors in the soil and groundwater can enter the building through cracks, seams, and connections in the foundation. This pressure difference is called “Depressurization” and takes place because of air movement (*air flow*) and temperature differences caused by the routine heating and ventilation of buildings. There is a natural tendency for air to move up through buildings; as air would be drawn up through a chimney. A modern sealed building will actually draw air up through any openings and cracks in the floors and foundation. “Depressurization” is often most severe when a sealed building is heated and the ground surface outside is frozen. TCE and PCE vapors cannot penetrate solid surfaces such as paved parking areas, sidewalks, and frozen ground. These vapors try and seek a new path of least resistance. The large footprint of a home or a school foundation becomes that pathway because of the pressure differences between the interior of the buildings and the ground below it.

Are children more at risk than adults?

Children are more sensitive than adults to harmful effects of exposures to contaminants in their environment. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Pound for pound children breathe more air and drink more water than adults. Children being shorter than adult’s means they will breath more dust, soil and vapors, which stay closer to the ground. A child’s lower body weight and higher intake rate results in a greater dose of hazardous substances. If toxic exposure is high enough during critical growth stages, the developing body systems of children can be permanently damaged.

Below is a partial list of the toxic substances that have been found at the Textron/Gorham site.

The fact that these toxins are present does not necessarily mean that community members have been exposed to these pollutants or that they will suffer illness as a result of these contaminants. Nevertheless, it is important to be cautious. All the contaminants listed below have been identified in vapor form as being present on “Parcel B” the High School. Some of the toxins have been recorded in amounts higher than acceptably safe levels for children and adults.

Contaminant of concern and it's <u>acronym</u> (easier label)	Potential sources of these <u>Volatile Organic Compounds (VOCs)</u> found on the Textron Site	Potential health effects from <u>Inhalation</u> (breathing vapors) of these chemicals
PCE Tetrachloroethylene	A solvent used to clean metals in manufacturing process. There is a large PCE source and plume located on the abandoned Stop & Shop parcel. Textron has attempted to remediate this contamination twice in the last four years. Textron has failed both times. The levels of PCE at the source have increased 300% during the same four-year period.	<ul style="list-style-type: none"> ▪ Known to cause cancer ▪ Reproductive problems ▪ Developmental problems ▪ Affects the nervous system
TCE Trichloroethylene	A solvent used to degrease metals throughout Textron's facility. According to RIDEM there is TCE contamination across the entire site. Textron's engineers have stated the TCE is from the PCE degrading (breaking down). Secondary sources are suspected but never identified.	<ul style="list-style-type: none"> ▪ Developmental damage ▪ Lung irritation ▪ Kidney diseases ▪ Cancer
VC Vinyl Chloride	Formed as an inevitable "daughter" product when TCE and PCE are degraded over time. It is extremely toxic and considered more carcinogenic than either TCE or PCE. Vinyl Chloride vapors will begin to appear a few years from now and will not easily breakdown on their own, and could last for fifty years.	<ul style="list-style-type: none"> ▪ Neurological effects ▪ Liver damage ▪ Immune system ▪ Cancer

