



PUBLIC HEALTH EVALUATION OF INDOOR AIR CONTAMINANTS AT DELBAR APARTMENT BUILDINGS

The Pennsylvania Department of Health (PA DOH) evaluated indoor air contaminants sampled from March 2023 to July 2024, at Delbar Apartment Buildings and released a health consultation on May 19, 2025, which is available on PA DOH's [website](#).

What is the public health concern at the Delbar Apartment Buildings site?

The Delbar Apartment Buildings (property) located at 601 West Spruce Street, Perkasie, Bucks County, was redeveloped from an old industrial building that manufactured automotive and truck parts until 2008. These past activities likely contaminated the soil and groundwater beneath the buildings with chemicals, such as trichloroethylene ([TCE](#)) and other volatile organic compounds (VOCs), that remain beneath the buildings. Original building materials may have also been contaminated if these chemicals splashed on them. TCE and VOCs in the ground or on building materials can become vapor (liquid turns into a gas) and enter the buildings through a process known as vapor intrusion. For more information on vapor intrusion, please see page 4 of this factsheet. Without an effective system to prevent or remove contaminants from vapor intrusion, known as a vapor mitigation system (VMS), exposure to these contaminants is a major health issue for the tenants.

What's the Delbar property owner doing about these chemicals in the indoor air now?

The property owner made various vapor mitigation efforts to reduce chemicals in the indoor air. While the VMS was installed and assessed, each apartment unit was provided an air purifying unit (APU), and it was recommended that residents continuously run the APUs to avoid breathing in harmful VOCs until an active VMS was installed and operational. For more information on vapor mitigation, please see page 6 of this factsheet.

Are these VOCs detected in my apartment unit?

Eighty-one apartment units were tested, and 278 indoor air samples were taken from these units during several months from March 2023 through July 2024 with various vapor mitigation actions. Along with other VOCs, high TCE levels were found in **some** apartment units in 2023. However, with active VMS, and without using APU, the recent 2024 indoor air TCE levels and other VOCs were lower. Interested tenants can get the test results from the property owner. For more information on TCE, please see page 8 of this factsheet.

How can exposure to TCE and other VOCs affect my health?

In 2023, high TCE and naphthalene levels were detected in a few apartment units. Short-term (two weeks or longer) TCE exposure could have harmed some people's health, particularly the developing fetus (fetal heart malformations) of pregnant women or women who may have become pregnant while living at these apartment units. In addition, TCE exposure in 2023 could have caused noncancer kidney, liver, and immune system effects in the general population. Also, past short-term naphthalene exposure could have caused health effects such as irritation and inflammation in the nose, decreased lung function, headaches, confusion, tiredness, and dizziness in the general population.



Long-term (365 days or longer) exposure to indoor air VOCs, namely benzene, chloroform, 1,4-dioxane, and naphthalene, indicate a potential *slight* increased cancer risk that is **similar to typical levels of these contaminants in indoor air**. The levels of the VOCs detected and the amount of time or years a person lives in the units can increase or decrease the risk of developing cancer from these exposures. Additionally, a person's individual characteristics, like age, lifestyle, and genetics, can play a role in the potential for health effects.

Are my children at risk?

A developing fetus is sensitive to TCE exposure and may experience birth defects, such as fetal heart malformations, if the pregnant woman is exposed to high TCE levels in the first trimester. During the March 2023 to July 2024 sampling period, about 6% of the detected TCE levels exceeded the noncancer health screening value of 2.1 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). TCE exceedances detected in 2023 included some very high levels but ranged from $<0.03 - 349 \mu\text{g}/\text{m}^3$. After active VMS in buildings, TCE levels were below the noncancer health screening value. A "health screening value" is the indoor air level of TCE that should not be harmful to people, even sensitive populations like children or people with certain health issues or are pregnant. If you have any of the health concerns mentioned above, please contact your health care provider.

Do I need to leave my apartment?

It is the tenants' choice to vacate their apartments. In the past, out of approximately 300 indoor air sampling results from 81 apartment units sampled from March 2023 to July 2024, a few apartment units in building A had extremely high levels of TCE ($349 \mu\text{g}/\text{m}^3$ and $66 \mu\text{g}/\text{m}^3$) in May 2023. A few high TCE levels were also found in building A in March 2023 ($6.7, 4.48, 4.24$, and $2.8 \mu\text{g}/\text{m}^3$) and in April 2023 ($4.84 \mu\text{g}/\text{m}^3$). A maximum level of $2.99 \mu\text{g}/\text{m}^3$ was detected in building D in August 2023. The above listed levels exceeded the noncancer health screening value of $2.1 \mu\text{g}/\text{m}^3$. However, the most **recent indoor air sampling results in 2024** from each building unit after 100% active VMS, **TCE levels ($<0.03 - 1.99 \mu\text{g}/\text{m}^3$) were below the health screening value.**

Harmful health effects may not be the same for all tenants. The short-term (two weeks or longer) health effects evaluation is based on the **maximum** concentration detected in a few apartment units in 2023. This may overestimate or underestimate the health risks for individuals in a given apartment, especially for sensitive populations, such as children, pregnant women, and fetuses during the first trimester of development. There are a few limitations with the data collected for this site. On a few occasions, samples were collected while construction activities occurred, which could have increased the levels of chemicals detected. These increased detections may not be related to the vapor intrusion investigation. Also, some of the apartments are in the original building with exposed brick or other interior building materials. It has not been determined if the original building materials present in the apartment units are contributing to indoor air contamination. Given the buildings' industrial history of using volatile chemicals during manufacturing and operations, it is possible the original building materials exposed in some apartment units may be a source of several VOCs, where chemicals may have spilled or splashed a long time ago, soaking building materials and now evaporating over time. The property owner has taken action to reduce contaminant levels caused by vapor intrusion in these apartment units and sampling the indoor levels periodically.

What can I do about VOCs in my apartment?



Increasing air ventilation can also lower VOCs indoor air levels. This includes simple actions like opening a window (when weather permits) or turning on a fan (in the kitchen or bathroom). As of 2024 indoor air sampling results, VMSs are active and effective in removing harmful contaminants. Appropriate maintenance of the system by the property owner is required to ensure that the building conditions do not pose health risks to current and future tenants. If tenants are concerned about the indoor air quality, they can continue using their individual APU to further reduce indoor air contaminants.

Who can I contact for more information?

For questions about your building unit's test results or the building's remediation plans, please contact the property owner via email at leasing@thedelbar.com or call 267-221-1718. For questions about potential VOCs health effects, please contact PA DOH either via email dehe@pa.gov or call 717-787-3350; or electronically fill out a health concern form using <https://forms.health.pa.gov/environmental-health-concern>.

Disclaimer

This fact sheet was made possible by a cooperative agreement [CDC-RFA-TS-23-0001] from the Agency for Toxic Substances and Disease Registry (ATSDR). Its contents are solely the responsibility of the Pennsylvania Department of Health, Environmental Health Assessment program that developed the product and do not necessarily represent the official views of the ATSDR, or the U.S. Department of Health and Human Services.



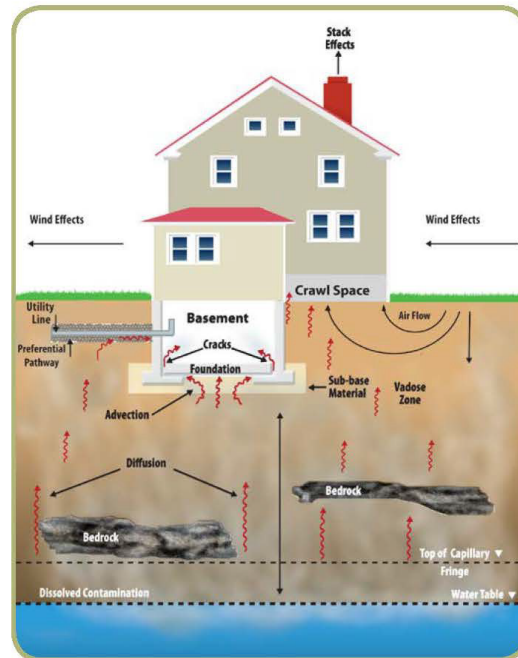
Overview of Vapor Intrusion

What is vapor intrusion?

Vapor intrusion is a way that volatile chemicals in soil and groundwater can enter and build-up inside buildings. Volatile chemicals are a class of chemicals that are volatile (evaporate easily) and form a vapor in the air.

- Common sources of volatile chemicals include gas stations, dry cleaners, and industrial operations.
- When a chemical is spilled or leaks into the ground, it can contaminate the soil and the groundwater.
- The chemical can move with the groundwater and travel under a building (migration route).
- If that chemical is volatile, it can become a gas and seep into nearby buildings and contaminate indoor air.

This fact sheet explains how vapor intrusion occurs and what factors can cause vapors (sometimes called gases) to move into indoor air.



Why is vapor intrusion important to me?

When chemicals move indoors, you can be exposed to them by breathing indoor air. This exposure can cause health effects, depending on the type and amount of chemical and the length of exposure.

You can learn more about the possible health effects of individual volatile chemicals in ATSDR's Toxic Substances Portal: <https://wwwn.cdc.gov/TSP/index.aspx>.

How does vapor intrusion occur?

Vapor intrusion does not occur every time there is contaminated soil or groundwater. It occurs only when volatile chemicals move from a source (like a chemical spill) along an underground migration route and into a building.

The type and amount of chemicals coming from a source will determine whether vapor intrusion occurs at levels of possible health concern.

Agency for Toxic Substances and Disease Registry
Office of Community Health Hazard Assessment



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Source: [ATSDR Fact Sheet - Vapor Intrusion](#)



What factors affect vapor intrusion?

The following factors affect vapor intrusion:

- The type of soil beneath your building
- The type and condition of your building (foundation, leaks, air exchange)
- The weather conditions in your area

The amount of vapors entering a building can be different over time—changing hourly, daily, weekly, and seasonally.

The amount of vapor intrusion can also be different on different floors and in different rooms of the same building or in buildings right next to each other.

If scientists suspect vapor intrusion in buildings in a specific location, they may decide to conduct an investigation. See ATSDR's fact sheet "[Investigating Vapor Intrusion](#)" for information on what to expect if a vapor intrusion investigation is planned for buildings in your area.

Where can I learn more about vapor intrusion?

U.S. Environmental Protection Agency

- Vapor intrusion website, visit: <https://www.epa.gov/vaporintrusion>

Interstate Technology & Regulatory Council

- Vapor intrusion website, visit: <https://itrcweb.org/teams/projects/vapor-intrusion>

Agency for Toxic Substances and Disease Registry

- Investigating vapor intrusion, visit: <https://www.atsdr.cdc.gov/vapor-investigation.html>



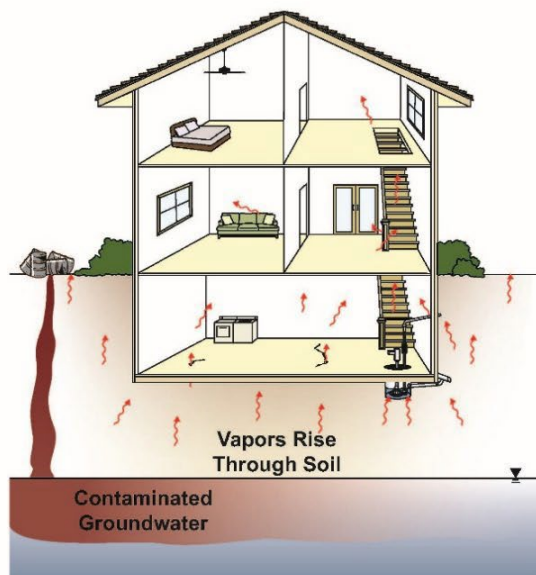
A Citizen's Guide to Vapor Intrusion Mitigation



What Is Vapor Intrusion Mitigation?

Vapor intrusion is the movement of chemical vapors from contaminated soil and groundwater into nearby buildings. Vapors primarily enter through openings in the building foundation or basement walls — such as cracks in the concrete slab, gaps around utility lines, and sumps. It also is possible for vapors to pass through concrete, which is naturally porous. Once inside the home or workplace, vapors may be inhaled posing immediate or long-term health risks for the occupants. In rare cases, the buildup of vapors, such as those from gasoline, may cause explosive conditions. Risks will depend on the types of chemical vapors and their concentrations, how much time people spend in the building, and the building's ventilation. Vapor concentrations will be higher indoors when windows and doors remain closed.

Mitigation methods, which lessen the effects of vapor intrusion, may be needed until contaminated soil or groundwater is cleaned up. Mitigation methods are available for both existing buildings and those planned for construction near the contaminated area.



Vapor intrusion into a home.

How Does It Work?

Vapor intrusion mitigation methods are classified as either “passive” or “active.” Passive methods prevent the entry of chemical vapors into the building, while active methods change the pressure difference between the sub-slab and the inside of the building to keep vapors out. Passive mitigation methods tend to be cheaper, while active methods tend to be more effective. Examples of each include:

Passive Vapor Intrusion Mitigation Methods:

- **Sealing openings** involves filling in cracks in the floor slab and gaps around pipes and utility lines found in basement walls. Concrete can be poured over unfinished dirt floors.
- Installing **vapor barriers** involves placing sheets of “geomembrane” or strong plastic beneath a building to prevent vapor entry. Vapor barriers are best installed during building construction, but can be installed in existing buildings that have crawl spaces.
- **Passive venting** involves installing a venting layer beneath a building. Wind or the build-up of vapors causes vapors to move through the venting layer toward the sides of the building where it is vented outdoors. A venting layer can be installed prior to building construction as well as within existing buildings. It is usually used with a vapor barrier.

Active Vapor Intrusion Mitigation Methods:

- **Sub-slab depressurization** involves connecting a blower (an electric fan) to a small suction pit dug into the slab in order to vent vapors outdoors. (Most common method.)
- **Building over-pressurization** involves adjusting the building's heating, ventilation, and air-conditioning system to increase the pressure indoors relative to the sub-slab area. This method is typically used for office buildings and other large structures.

How Long Will It Take?

Mitigation will be needed to prevent vapor migration into buildings as long as vapor intrusion poses a health risk to occupants. This may be several years, or even decades, until cleanup of soil and groundwater is complete.



Is It Safe?

Vapor intrusion mitigation systems are quite safe to use and will improve the quality of the indoor air by removing chemical vapors due to vapor intrusion as well as radon (another health risk) and moisture, which may lead to mold growth. However, mitigation systems will not reduce vapors from indoor sources of chemicals, such as paints, plastic items, and hobby supplies.

Until the threat of vapor intrusion is gone, mitigation systems should be inspected regularly to make sure they are working correctly. For example, floors and walls are checked to see that no new cracks develop, a geomembrane in a crawlspace is checked for rips and holes, and electric fans are checked to ensure they are working correctly. Homeowners should not turn off the electric fans until EPA or state agency notifies them that it is appropriate to do so. Homeowners should report broken fans and vent pipes to the lead agency.

How Might It Affect Me?

An occupant of a home or office constructed with a vapor mitigation system will not likely notice it. However, the installation of systems in existing homes typically takes one or two days, and workers may need to access crawl spaces or indoor living areas. They may need to pull back carpet or move furniture to find and seal cracks or to drill holes in the foundation for sub-slab pipes. They typically place these pipes near the basement walls, in closets, and in low-traffic areas for the convenience of the homeowner. The vent pipes and fan may be visible on the outside of the house. However, in some cases, the pipes may be run through a closet to the attic and vented through the roof. Later, workers may need to visit homes periodically to inspect mitigation systems to ensure the systems are working properly.

Homeowners may notice the hum of the electric fans, if they have a depressurization system. These fans use less electricity than an LED television; electric bills will rise slightly.

Why Use Vapor Intrusion Mitigation?

Vapor intrusion mitigation systems are installed to reduce health risks in buildings where chemical vapors from contaminated soil and groundwater may be inhaled by indoor occupants. They also may be installed as a precaution where vapor intrusion might occur in the future. Installing a system during building construction typically is cheaper, more effective, and less disruptive than waiting until after construction. Depressurization systems offer the added benefit of reducing radon, moisture, and mold inside the building.

Mitigation systems have been installed and operated at hundreds of homes near Superfund sites and other contaminated sites across the country.



Typical fan and vent pipe.

Example

Mitigation is reducing possible risks from vapor intrusion at 43 homes near the Nyanza Superfund site in Massachusetts. Dye manufacturing from the 1910s to 1978 contaminated groundwater with trichloroethene (TCE) and other chemicals. By the 1980s, a plume of groundwater contamination was found to extend beneath a nearby neighborhood. Sampling of indoor air, sub-slab air, and groundwater showed that vapor intrusion was occurring, and TCE concentrations posed a risk to some homeowners. Vapor intrusion also had the potential to occur at several other homes.

As a result, EPA installed depressurization systems in homes located above the most contaminated groundwater where vapor intrusion is most likely to be a problem. Before installing the systems in 2007, EPA sealed cracks in basement walls and floors, and covered sump pits. In homes with dirt basements, they poured a concrete floor or installed a vapor barrier. Following installation, each depressurization system was tested to ensure that it worked properly. The systems are inspected annually to ensure that they continue to work.

For More Information

For more information about this and other technologies in the Citizen's Guide Series, visit:

www.cluin.org/remediation
www.cluin.org/products/citguide
www.cluin.org/vi
www.epa.gov/oswer/vaporintrusion/

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www.epa.gov/superfund/sites
www.cluin.org



Trichloroethylene - ToxFAQs™

CAS # 79-01-6

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is used as a solvent for cleaning metal parts. Exposure to very high concentrations of trichloroethylene can cause dizziness, headaches, sleepiness, incoordination, confusion, nausea, unconsciousness, and even death. Trichloroethylene has been found in at least 1,051 of the 1,854 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene is a colorless, volatile liquid. Liquid trichloroethylene evaporates quickly into the air. It is nonflammable and has a sweet odor.

The two major uses of trichloroethylene are as a solvent to remove grease from metal parts and as a chemical that is used to make other chemicals, especially the refrigerant, HFC-134a.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene can be released to air, water, and soil at places where it is produced or used.
- Trichloroethylene is broken down quickly in air.
- Trichloroethylene breaks down very slowly in soil and water and is removed mostly through evaporation to air.
- It is expected to remain in groundwater for long time since it is not able to evaporate.
- Trichloroethylene does not build up significantly in plants or animals.

How might I be exposed to trichloroethylene?

- Breathing trichloroethylene in contaminated air.
- Drinking contaminated water.
- Workers at facilities using this substance for metal degreasing are exposed to higher levels of trichloroethylene.
- If you live near such a facility or near a hazardous waste site containing trichloroethylene, you may also have higher exposure to this substance.

How can trichloroethylene affect my health?

Trichloroethylene was once used as an anesthetic for surgery. Exposure to moderate amounts of trichloroethylene may cause headaches, dizziness, and sleepiness; large amounts may cause coma and even death. Eating or breathing high levels of trichloroethylene may damage some of the nerves in the face. Exposure to high levels can also result in changes in the rhythm of the heartbeat, liver damage, and evidence of kidney damage. Skin contact with concentrated solutions of trichloroethylene can cause skin rashes. There is some evidence exposure to trichloroethylene in the work place may cause scleroderma (a systemic autoimmune disease) in some people. Some men occupationally-exposed to trichloroethylene and other chemicals showed decreases in sex drive, sperm quality, and reproductive hormone levels.

How likely is trichloroethylene to cause cancer?

There is strong evidence that trichloroethylene can cause kidney cancer in people and some evidence for trichloroethylene-induced liver cancer and malignant lymphoma. Lifetime exposure to trichloroethylene resulted in increased liver cancer in mice and increased kidney cancer and testicular cancer in rats.

The Department of Health and Human Services (DHHS) considers trichloroethylene to be a known human carcinogen. The International Agency for Research on Cancer (IARC) classified trichloroethylene as carcinogenic to humans. The EPA has characterized trichloroethylene as carcinogenic to humans by all routes of exposure.

Agency for Toxic Substances and Disease Registry

Division of Toxicology and Human Health Sciences



Source: [Trichloroethylene ToxFAQs](#)



Trichloroethylene

CAS # 79-01-6

How can trichloroethylene affect children?

It is not known whether children are more susceptible than adults to the effects of trichloroethylene.

Some human studies indicate that trichloroethylene may cause developmental effects such as spontaneous abortion, congenital heart defects, central nervous system defects, and small birth weight. However, these people were exposed to other chemicals as well.

In some animal studies, exposure to trichloroethylene during development caused decreases in body weight, increases in heart defects, changes to the developing nervous system, and effects on the immune system.

How can families reduce the risk of exposure to trichloroethylene?

- Avoid drinking water from sources that are known to be contaminated with trichloroethylene. Use bottled water if you have concerns about the presence of chemicals in your tap water. You may also contact local drinking water authorities and follow their advice.
- Prevent children from playing in dirt or eating dirt if you live near a waste site that has trichloroethylene.
- Trichloroethylene is used in many industrial products. Follow instructions on product labels to minimize exposure to trichloroethylene.

Is there a medical test to determine whether I've been exposed to trichloroethylene?

Trichloroethylene and its breakdown products (metabolites) can be measured in blood and urine. However, the detection of trichloroethylene or its metabolites cannot predict the kind of health effects that might develop from that exposure. Because trichloroethylene and its metabolites leave the body fairly rapidly, the tests need to be conducted within days after exposure.

Has the federal government made recommendations to protect human health?

The EPA set a maximum contaminant goal (MCL) of 0.005 milligrams per liter (mg/L; 5 ppb) as a national primary drinking standard for trichloroethylene.

The Occupational Safety and Health Administration (OSHA) set a permissible exposure limit (PEL) of 100 ppm for trichloroethylene in air averaged over an 8-hour work day, an acceptable ceiling concentration of 200 ppm provided the 8 hour PEL is not exceeded, and an acceptable maximum peak of 300 ppm for a maximum duration of 5 minutes in any 2 hours.

The National Institute for Occupational Safety and Health (NIOSH) considers trichloroethylene to be a potential occupational carcinogen and established a recommended exposure limit (REL) of 2 ppm (as a 60-minute ceiling) during its use as an anesthetic agent and 25 ppm (as a 10-hour TWA) during all other exposures.

Reference

This ToxFAQs™ information is taken from the 2019 Toxicological Profile for Trichloroethylene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

ToxFAQs™ on the web: www.atsdr.cdc.gov/ToxFAQs

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.