

PCE & TCE in the garden

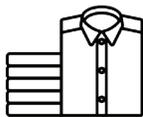
Tetrachloroethylene (PCE) and trichloroethylene (TCE) are chlorinated solvents, compounds used in a wide variety of products including as degreasers, paint thinners, and more. These solvents are part of a broader group of chemicals called volatile organic compounds (VOCs), which can easily evaporate from soils and water into the air. Dry-cleaners are a potential source of PCE in particular.

Summary for Gardeners

- » PCE and TCE are not easily taken up by plants, so without elevated levels in soil, exposure from eating produce is probably not an issue.
- » Breathing in these compounds as they evaporate from soil is only a concern if there are elevated levels in soil.
- » Taking steps to limit exposure is always a good idea. Wash hands or wear gloves, wash and peel produce, and leave dirty tools outside to help prevent exposure.

Sources of PCE & TCE exposure

PCE and TCE exposure can occur in the garden, but non-garden sources including dry-cleaners are likely bigger concerns. Fumes from contaminated soil may enter homes, other indoor spaces, and even enclosed garden spaces like greenhouses and lead to health concerns. Urban soils in particular may contain hotspots of contamination. Groundwater may also be contaminated.



dry-cleaners PCE is used as a dry cleaning agent. Many dry-cleaners have released PCE into surrounding soil where it can either evaporate or leach into groundwater.



vapor intrusion PCE and TCE easily evaporate from soils. These vapors can build up in homes where people inhale these chemicals.



well water PCE and TCE can contaminate groundwater formations that supply drinking water via wells, and could also contaminate garden soil via watering.



nearby industry Some industries use PCE and TCE as degreasers, in glues, paint removers, etc. PCE and TCE can be released in air, water, and soil.

Exposure to PCE & TCE in the garden

How might I be exposed? Exposure can occur through skin contact with contaminated soils, eating soil particles, or breathing in soil dust or evaporated PCE and TCE.

Are my garden plants safe to eat? In general, plants do not take up much PCE or TCE from contaminated soil, so they should be safe. Washing them is still not a bad idea.

Should I be worried? Garden-related PCE and TCE exposure is likely not a concern for most people, but limiting exposure (especially for children) is still a good idea. It is important to remember that there are many health benefits to home and community gardening.

Limit children's exposure

- Small doses matter. Children breathe, eat, and drink more relative to their size than adults
- Their bodies and brains are still developing
- Children spend more time on the ground and often put things (like dirt) into their mouths
- They have more skin surface area than adults, so skin exposure also matters



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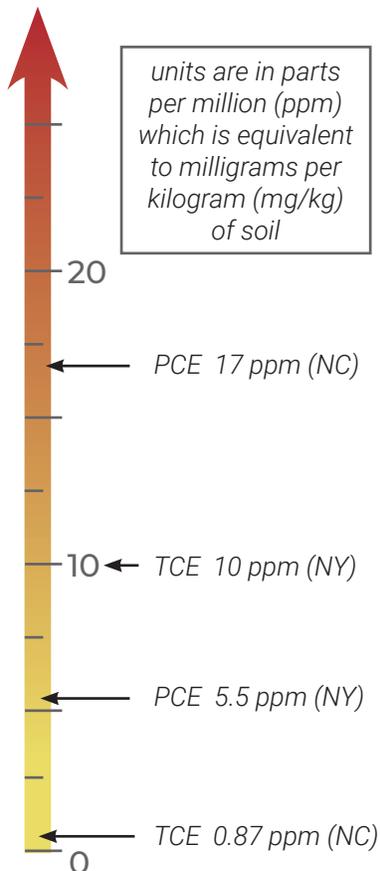
Making sense of regulatory standards

No official standards have been established in North Carolina for levels of PCE or TCE *in garden soils*. Below are North Carolina preliminary soil remediation goals to clean up residential soils **(NC)** and similar goals from New York state **(NY)**. The New York guidelines take into account home gardening as an exposure pathway.

Assessing risk

If there are potential sources nearby and/or a history of contamination or spills, you may want to test your soil for a general group of chlorinated solvents. PCE can break down into other solvents like TCE and vinyl chloride, so the presence of these other chlorinated solvents may indicate past spills.

If levels are elevated, you should attempt to limit exposure as best you can (see right).



Testing resources



How to test your soil and interpret the results: <https://sites.nicholas.duke.edu/superfundcec/gardens/soil-testing/>



Well water testing for PCE, TCE, and other VOCs: <https://epi.dph.ncdhhs.gov/oe/wellwater/howtotest.html>



Still have questions about lead soil testing? Email us at superfund@duke.edu

Health impacts of PCE and TCE

TCE is a known human carcinogen – it has been linked to kidney cancer and potentially blood and liver cancers. PCE has been linked to bladder cancer, cancer of certain cells in bone marrow, and blood cancers, but the evidence is more limited than with TCE.

Short term exposure to PCE or TCE at high enough levels can lead to various health problems including dizziness, headaches, and the malfunction of various organs.

Exposure to PCE during pregnancy may lead to miscarriage, birth defects and slowed growth of the baby. TCE is linked to developmental health effects.

Reduce PCE and TCE exposure in the garden

- If PCE, TCE, or other chlorinated solvents are at high concentrations in your soil or groundwater, there may be a source nearby
- Uptake of PCE and TCE by plants is low, so focus on controlling dust and limiting soil ingestion
- Consider installing raised garden beds and make sure to place landscape fabric between the ground and new soil
- Remove boots or shoes after gardening to reduce the amount of contaminated soil you track into your home
- To reduce PCE and TCE particles in air from dust, cover bare soil with mulch and keep the soil moist
- Conduct a soil safety training for all garden users on exposure reduction strategies
- Visit our website below for our factsheet on [10 Healthy Garden Habits](#)

For more information visit:

<https://sites.nicholas.duke.edu/superfundcec/gardens/>

