

Trichloroethylene (TCE) In Indoor Air

What is trichloroethylene or TCE?

TCE is a nonflammable, colorless liquid used as a solvent to remove grease from metal parts. It is also found in adhesives, paint removers, varnishes, lubricants, and spot removers. It is not unusual for low levels of TCE to be present in indoor air. The Massachusetts Department of Environmental Protection (MassDEP) considers up to 0.4 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of TCE in indoor air to be normal.

How can TCE enter the indoor air of buildings?

TCE can enter the air if you use TCE-containing products indoors. In addition, TCE can enter groundwater (e.g., from a spill) and then travel away from the initial source in the direction that groundwater flows. If the groundwater flows under a building, TCE can enter the indoor air of the building through cracks in the foundation or gaps around utility pipes.

What is the exposure guideline for TCE in indoor air?

The U.S. Environmental Protection Agency (EPA) and MassDEP have a long-term exposure guideline of $2 \mu\text{g}/\text{m}^3$ of TCE in indoor air.

If TCE is above the exposure guideline, should I be concerned about immediate health effects?

Effects from exposure to TCE depend on how much you were exposed to, how long the exposure lasted, and how you were exposed. Possible harm from exposure may also depend on personal factors such as age, sex, diet,

lifestyle, and current health status. Breathing TCE above the exposure guideline does not mean health effects will occur; however, the risk for health effects increases as the level and length of exposure increases. The EPA/MassDEP exposure guideline of $2 \mu\text{g}/\text{m}^3$ is set well below levels expected to result in health effects and is designed to protect the most sensitive individuals. Nonetheless, steps to reduce TCE levels should be taken.

Has MassDEP established any additional guidelines to address potential sources of TCE in indoor air?

Yes. Under Massachusetts hazardous waste site cleanup regulations, short-term exposures (i.e. five years or less) that may pose a health risk are called "Imminent Hazards". The MassDEP Imminent Hazard value for TCE in residential indoor air is $6 \mu\text{g}/\text{m}^3$ for women early in pregnancy and $20 \mu\text{g}/\text{m}^3$ for everyone else. For workplace indoor air, the Imminent Hazard values for TCE are $24 \mu\text{g}/\text{m}^3$ for women early in pregnancy and $80 \mu\text{g}/\text{m}^3$ for everyone else.

What happens when TCE levels in indoor air exceed the MassDEP guidelines?

When levels exceed the MassDEP Imminent Hazard values, certain regulatory actions take place. These include notification to individuals potentially exposed and immediate actions to address the source of the chemical and reduce exposures. Further information about MassDEP regulatory actions and recommendations can be found at [https://www.mass.gov/info-details/emerging-contaminants#trichloroethylene-\(tce\)-](https://www.mass.gov/info-details/emerging-contaminants#trichloroethylene-(tce)-)

Are there ways to reduce or eliminate TCE in indoor air?

Yes. If TCE is entering buildings from groundwater flowing under the building, steps can be taken to reduce or prevent the TCE from entering the building. Steps may include sealing foundation cracks, changing the direction of air flow, and/or installing a sub-slab depressurization system. A sub-slab depressurization system is like a radon system, a series of pipes under the basement with a fan that vents vapors to the outdoors. Potential sources of TCE in a building (e.g., degreasers) can also be removed.

What happens to TCE in your body?

TCE present in air can enter your body when you breathe. Following exposure, the human body will break down TCE and eliminate it quickly through the breath and urine.

Can exposure to TCE cause cancer?

The U.S. Department of Health and Human Services, US Environmental Protection Agency, and the International Agency for Research on Cancer have all determined that TCE has the potential to cause cancer. The more TCE a person is exposed to and the longer the length of time a person is exposed, the greater the risk of developing cancer. Studies of workers exposed to TCE in the workplace have shown an increased risk of kidney cancer. There is also some limited evidence for increased risks for non-Hodgkin's lymphoma and liver cancer. Short-term (e.g., several months or several years) exposure to low levels poses lower risks than a lifetime of daily exposure.

What are the non-cancer health effects from exposures to TCE?

Some scientific studies suggest that high exposure to TCE during early pregnancy may increase the risk for certain types of heart defects in the developing fetus. Some studies have shown that exposure to TCE over the long term can lead to an increased risk of developing some autoimmune conditions. Exposure to high levels of TCE in the air can cause irritation of the upper respiratory tract, as well as central nervous system effects, including dizziness, headache, confusion, and nausea.

If I am pregnant, who should I talk to?

If you are pregnant and you have questions about TCE and your health, you may contact the Massachusetts Department of Public Health (see contact information below) or your health care provider. As noted previously, the EPA/MassDEP exposure guideline of $2 \mu\text{g}/\text{m}^3$ corresponds to a level well below what is known to cause health effects. Levels above exposure guidelines do not mean that health effects will necessarily occur.

Who should I contact if I have more questions about TCE in indoor air and health effects?

If you have health questions about exposure to TCE in indoor air you can contact the Environmental Toxicology Program at the MDPH Bureau of Environmental Health at 617-624-5757.

If you are experiencing any symptoms or have medical care questions, you should consult with your health care provider.