

Trichloroethylene (TCE)

For the Bishop Street Community



Region of Waterloo
PUBLIC HEALTH AND
EMERGENCY SERVICES

What is trichloroethylene (TCE)?

TCE is a clear colourless liquid used mainly for degreasing metal parts in the automotive and metal industries. It can also be found in some household products, such as glues, adhesives, paint removers, spot removers, rug cleaning fluids, paints, metal cleaners and typewriter correction fluid.

How does TCE get into the environment?

The largest source of TCE in the environment is through air emissions from factories that use it to remove grease from metals. TCE can also enter air and groundwater if it is improperly disposed of or leaks into the ground. It evaporates easily but can stay in the soil and in groundwater for an extended period of time.

How can I be exposed to TCE?

Aside from workers with occupational exposure, the most common sources of exposure to TCE for the general population are through air and drinking water.

The route of exposure of residents to TCE in the Bishop Street Community is not through the outdoor air (which does not have elevated levels of TCE), but rather through the indoor air. This is due to the presence of TCE in the groundwater underneath the homes. TCE evaporates from the contaminated groundwater, enters the soil vapour (air spaces between soil particles), and migrates through building foundations into the building's indoor air. This process is called "soil vapour intrusion."

The municipal drinking water supplied by the Region of Waterloo to area residents continues to be monitored and is safe and unaffected by the contamination.

What are the health risks associated with TCE exposure?

As with exposure to any chemical, a person's health risk depends on a number of factors, including:

- How much TCE an individual was exposed to (the dose);
- How long the exposure lasted (the duration);
- How the person was exposed (breathing, drinking, eating or skin contact);
- Other factors associated with the individual (such as age, health, lifestyle choices, family traits, and other chemicals the person is exposed to).

Health risks can be categorized into acute effects and chronic/sub-chronic effects. Acute effects are those that occur after short-term exposure (e.g. minutes, a few days) to very high concentrations of TCE (e.g. concentrations in the hundreds of thousands of micrograms per cubic meters ($\mu\text{g}/\text{m}^3$) or greater). Symptoms of acute exposure can include drowsiness, decreased memory and perception, visual effects and anesthesia. Indoor air concentrations of TCE in the Bishop Street Community are much lower than those that give rise to acute effects.

Chronic effects are those that occur after long-term exposure (e.g. years). Sub-chronic effects are those that occur after intermediate-term exposure (e.g. months). These effects include cancer (from chronic exposure) and non-cancer effects (from sub-chronic or chronic exposure). The main concern with TCE exposure is the risk of cancer. Overall, studies in humans and animals are highly suggestive of an increased risk for cancer in people who are exposed to elevated levels of TCE over long periods of time (e.g. workers exposed to levels $20,000 \mu\text{g}/\text{m}^3$).

Cancers that have been associated with TCE include kidney, liver and lymphoid tissue cancers.

The risks of cancer associated with chronic exposures to low levels of TCE are as follows: An air level of TCE at 0.5 µg/m³ corresponds to a one in one million risk of cancer over a lifetime (70-year exposure). An air level of TCE at 5 µg/m³ corresponds to a one in one hundred thousand risk of cancer over a lifetime (70-year exposure). An air level of TCE at 50 µg/m³ corresponds to a one in ten thousand risk of cancer over a lifetime (70-year exposure).

Chronic and sub-chronic effects, other than cancer, are less understood and research is ongoing. Potential effects include those to the central nervous system, kidney, liver, respiratory, developmental and reproductive systems. However, it is generally recognized that cancer is the most sensitive health outcome.

What is the level of risk in the Bishop Street Community?

Although there are many health effects described for TCE, especially for acute exposures to high concentrations, the levels of TCE in the Bishop Street Community are not expected to result in the acute effects described for TCE. While health risks associated with sub-chronic and chronic TCE exposure, in particular cancer, are possible the risk is very low given the low concentrations of indoor TCE in the Bishop Street Community.

What are the recommended action levels?

Recommended action levels are many times lower than the levels that have caused health effects in human and animal studies that have been used to set action levels or standards. The recommended action levels are based on the assumption that people are continuously exposed to TCE in air all day, every day for as long as a lifetime (70 years). This is rarely true for most people who, if exposed, are likely to be exposed for only part of the day and part of their lifetime.

This fact sheet was created using materials and information from the Ontario Ministry of the Environment, Standards Branch (consultation), New York State Department of Health (<http://nyhealth.gov/environmental/indoors/air/contaminants/>), the U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) (<http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=30>), and the U.S. Environmental Protection Agency (EPA) (<http://cfpub.epa.gov/ncea/CFM/recordisplay.cfm?deid=215006>).

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Region of Waterloo Public Health and Emergency Services

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These action levels are for the general population, including infants, children, the elderly and those with preexisting health conditions.

Remediation measures in homes have been very successful at reducing the levels of TCE in indoor air. The concentrations of TCE in the large majority of homes are now below 5 µg/m³.

Public Health recommends that the Ministry of the Environment and Climate Change (the Ministry) continue to direct resources towards effective remedial options, in order to achieve the long-term goal of less than 0.5 µg/m³ TCE in indoor air.

The Ministry is currently determining the most appropriate indoor air remedial options for the future.

Until the Ministry's remedial options are available for residents, Public Health recommends that homes with levels above 0.5 µg/m³ continue to receive annual indoor air monitoring, and that homes above 5 µg/m³ continue to be prioritized for indoor air assessments and remediation.

Public Health's action levels as of May 2017:

Less than 0.5 µg/m³

- No further remedial actions are required.

Between 0.5 µg/m³ and 5 µg/m³

- Annual indoor air monitoring until Ministry remedial options are available.
- Once Ministry remedial options are available, Public Health will work with the Ministry to prioritize homes to receive these options.

Above 5 µg/m³

- These homes should continue to be prioritized for indoor air assessments and remediation, and continue to receive annual indoor air monitoring.