Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans

Trichloroethylene (TCE)

(try- klor'oh eth'uh- leen)

Answers to Frequently Asked Health Questions

What is TCE?

TCE is man-made chemical that is not naturally found in the environment. TCE is a non-flammable (does not burn), colorless liquid with a somewhat sweet odor and has a sweet, "burning" taste. It is mainly used as an industrial cleaner to remove grease from metal parts. TCE can also be found in household items such as glues, paint removers, typewriter correction fluids and spot removers.

The biggest source of TCE in the environment comes from evaporation (changing from a liquid into a vapor/gas) when TCE is used to remove grease from metals or when we use common household products that contain TCE. It can also enter the soil and drinking water as the result of spills or improper disposal.

What happens to TCE in the environment?

- Upon contact with the air, TCE quickly evaporates and breaks down in the presence of sunlight and oxygen.
- TCE quickly evaporates from the surface waters of rivers, lakes, streams, creeks and puddles.
- If large amounts of TCE are spilled on the ground, some of it will evaporate and some of it may leak down into the soils. When it rains, TCE can be carried through the soils and into the groundwater (underground drinking water).
- When TCE is in oxygen-poor groundwater and with time, it will break down into different chemicals such as 1,2 Dichloroethene (1,2 DCE) and Vinyl Chloride (VC).
- TCE does not build up in plants and animals.
- TCE found in foods is believed to come from TCE contaminated water used in food processing or from food processing equipment cleaned with TCE.

How does TCE get into your body?

- Breathing (Inhalation): TCE can get into your body by breathing air contaminated with TCE vapors. The vapors can be released from the industrial use of TCE, from using household products that contain TCE, or by TCE contaminated water evaporating in the shower.
- Drinking (Ingestion): TCE can get into your body by drinking TCE contaminated water.
- Skin (Dermal): Small amounts of TCE can get into your body through skin contact. This can take place when using TCE as a cleaner-degreaser or by contact with TCE contaminated soils.

Can TCE make you sick?

Yes, you can get sick from TCE. But getting sick will depend on the following:

- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General Health, Age, Lifestyle Young children, the elderly and people with chronic (on-going) health problems are more at risk to chemical exposures.

How does TCE affect your health?

Breathing (Inhalation):

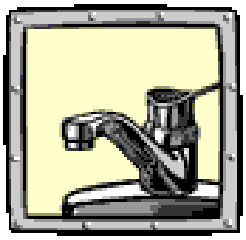
- Breathing high levels of TCE may cause headaches, lung irritation, dizziness, poor coordination (clumsy) and difficulty concentrating.
- Breathing very high levels of TCE for long periods may cause nerve, kidney and liver damage.

Drinking (Ingestion):

- Drinking high concentrations of TCE in the water for long periods may cause liver and kidney damage, harm the immune system and damage fetal heart development in pregnant women.
- It is uncertain whether drinking low levels of TCE will lead to adverse health effects.

Skin (Dermal) Contact:

- Short periods of skin contact with high levels of TCE may cause skin irritation and rash.



Does TCE cause cancer?

In September of 2011 the U.S. EPA revised their Integrated Risk Information System (IRIS) numbers for cancer and non-cancer effects for Trichloroethylene (TCE). The U.S. EPA newly revised IRIS document has classified TCE as "carcinogenic to humans." This classification is used when there is evidence between human exposure and cancer.

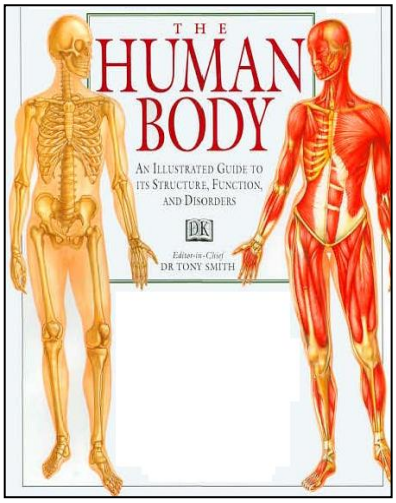
The National Toxicology Program's 12th Report on Carcinogens list TCE as *Reasonably Anticipated to be a Human Carcinogen*. **NOTE:** The 12th Report on Carcinogens was released prior to the release of the new EPA IRIS revision. It is likely the next Report on Carcinogens will reflect the EPA IRIS number changes.

Is there a medical test to show whether you have been exposed to TCE?

Yes, medical testing is available to determine immediate exposure or chronic (long-term) exposures. However there are multiple factors that influence these results, including time when the sample was taken, total body fat, activity level, and enzyme activity of aldehyde and alcohol dehydrogenase (Waksman and Phillips 2004).

- TCE can be measured in your breath, but only if you have been exposed to ***large*** amounts (part per million -- ppm levels).
- Blood or urine samples can also be used, but only if you have been exposed to ***large*** amounts (part per million -- ppm levels).

TCE in the human body:



When chemicals enter the human body, they typically get broken down and eliminated through the various bodily functions. Some of the TCE breakdown products (metabolites) can be measured in your blood or urine. However, exposure to similar chemicals and other sources (diet, medications, environment, etc.) produce some of the same metabolites in your blood and urine, making it difficult to determine which product produced the metabolite.

It is very important to note TCE and TCE metabolites usually leave the body shortly after exposure, so the testing would only be useful for recent exposures. Also, testing may not be useful or reliable in determining whether people have been exposed to low-doses of TCE or whether they will experience any harmful health effects.

Has the federal government made recommendations to protect human health?

The federal government develops regulations and recommendations to protect public health and these regulations can be enforced by law.

Recommendations and regulations are periodically updated as more information becomes available. Some regulations and recommendations for TCE follow:

- ✓ On 09/28/2011 the U.S. EPA revised their Integrated Risk Information System (IRIS) numbers for Trichloroethylene (TCE) (CASRN 79-01-6) -- see below reference section for link --
- The Environmental Protection Agency (EPA) has set a maximum contaminant level (MCL) for TCE in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5.0 parts of TCE per billion parts water (5.0 ppb).
- The Occupational Safety and Health Administration (OSHA) have set an exposure limit of 100 ppm (or 100 parts of TCE per million parts of air) for a healthy adult, 8-hour workday, 40-hour workweek.
- The EPA has developed regulations for the handling and disposal of TCE.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological profile for TCE (electronic at **http://www.atsdr.cdc.gov/toxprofiles/index.asp#T**)

Report on Carcinogens, Twelfth Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, 2011 (electronic at **http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf**)

U.S. EPA Integrated Risk Information System (IRIS) for Trichloroethylene (TCE) (CASRN 79-01-6) **http://www.epa.gov/iris/subst/0199.htm**

The Ohio Department of Health is in cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), Public Health Service, U.S. Department of Health and Human Services.

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