

FACT SHEET

March, 2003

Trichloroethylene (TCE)

Exposure to trichloroethylene (TCE) can affect the central nervous system. The International Agency for Research on Cancer (IARC) classifies TCE as a probable human carcinogen. TCE is a solvent used in a variety of applications, such as in the degreasing of metals, production of solvent mixtures, such as pesticides, and as a solvent in adhesives, printing inks, varnishes, and paints. TCE is one of the most common contaminants of ground water in the United States.

Health Effects

People can be exposed by breathing in TCE vapors, drinking water or eating food contaminated with TCE, or direct skin contact. Studies indicate that TCE crosses the placenta of pregnant women.

Exposure to low levels of TCE can cause skin, eye, and respiratory tract irritation, nausea, vomiting, headache, dizziness, unconsciousness, irregular heart beat, and memory loss. Exposure to high levels can harm the central nervous system, as well as brain, kidney and liver damage, coma, and lead to death. Exposure to TCE has been linked to reproductive problems among women occupationally exposed, and community drinking water exposures have been linked to cardiac birth defects. Some studies also show that men who use solvents, including TCE, are more likely to have decreased sperm counts and their children are more likely to get cancer.



The IARC classifies TCE as a probable human carcinogen based on animal and epidemiological studies, which show increases in liver, lung, kidney, and cervical cancer and various cancers of the blood, such as non-Hodgkin's lymphoma. There is also evidence from Woburn, Massachusetts that children born to mothers who ingested TCE-contaminated well water during pregnancy were at higher risk for developing childhood leukemia.

More than 400,000 U.S. workers are exposed to TCE annually. Occupational exposures are of particular concern due to levels and frequency of exposure, as are exposures to children, due to their increased susceptibility to health effects.

Common Uses

TCE was once used as an anesthetic for surgery. Currently, its primary use is as a metal cleaner and industrial degreaser, which is the largest source of TCE contamination of the environment. TCE is used also as a solvent in adhesive manufacturing, in paints and varnishes, and as a paint stripper and spot remover. In 2000, Massachusetts facilities used 1.7 millions pounds of TCE, primarily in degreasing operations.

Alternatives

There are proven alternatives for metal degreasing, including hydrocarbon solvents (e.g., terpene, alcohols, acetone, MEK, ethyl acetate, and butyl acetate) and aqueous and semi-aqueous processes, including ultrasonic processing. Massachusetts manufacturers have made great progress in reducing the use of TCE during the last 10 years.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1997. Toxicological profile for trichloroethylene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Boyes, W.K, et al. 2000. Neurotoxic and pharmacokinetic responses to trichloroethylene as a function of exposure scenario. *Environmental Health Perspectives* 108(Suppl 2):317-322.

Colt, J.S. and Blair, A. 1998. Parental occupational exposures and risk of childhood cancer. *Environmental Health Perspectives* 106(Suppl 3): 909-925.

Costas, K., Knorr, R.S., Condon, S.K. 2002. A case-control study of childhood leukemia in Woburn, Massachusetts: the relationship between leukemia incidence and exposure to public drinking water. *The Science of The Total Environment* 300(1-3): 23-35.

Culver, A., Feinberg, M., Klebenov, D., Muskinow, J., and Sutherland, L. 2002. *Cleaning for Health: Products and Practices for a Safer Indoor Environment*. <http://www.informinc.org/cleanfor-health.php>.

De Roos, A.J., Olshan, A.F., Teschke, K., Poole, C., Savitz, D.A., Blatt, J., Bondy, M.L., Pollock, B.H. 2001. Parental occupational exposures to chemicals and incidence of neuroblastoma in offspring. *American Journal of Epidemiology* 154(2): 106-114.

International Programme on Chemical Safety (IPCS). 1985. *Environmental health criteria 50: Trichloroethylene*. Geneva: World Health Organization.

National Research Council. 1993. *Pesticides in the diets of infants and children*. Washington, DC: National Academy Press.

Toxics Use Reduction Institute. 2002. *Massachusetts chemical fact sheet: Formaldehyde*. Lowell, MA: University of Massachusetts Lowell.

Wartenberg, D., Reyner, D., and Scott, C.S. 2000. Trichloroethylene and cancer: Epidemiologic evidence. *Environmental Health Perspectives* 108 (Suppl 2): 161-176.

Wu, C. and Schaum, J. 2000. Exposure assessment of trichloroethylene. *Environmental Health Perspectives* 108(Suppl 2): 359-363.

Additional Resources

Agency for Toxic Substances and Disease Registry (ATSDR): <http://www.atsdr.cdc.gov/toxpro2.html>

Inform, Inc.: <http://www.informinc.org>

Massachusetts Toxics Use Reduction Institute (TURI): <http://www.turi.org>

Scorecard: <http://www.scorecard.org>