

FACT SHEET

March, 2003

Perchloroethylene (PCE)

Tetrachloroethylene (Perc)

Perchloroethylene (also called PCE, perc, or tetrachloroethylene) is a probable human carcinogen and several studies conducted recently link PCE exposure to leukemia and esophageal, bladder, colorectal and breast cancers. PCE exposure also can harm the digestive and nervous systems, blood, liver and urinary tract. Animal data also indicate that PCE can cause cancer and developmental damage. PCE is used to degrease metals, in some cleaners, and is the most widely used solvent in the dry cleaning industry.

Health Effects

People can be exposed to PCE by breathing fumes from dry-cleaned clothes, in manufacturing operations and ingesting PCE in food and water. Direct skin contact may occur in occupational settings and by using PCE-containing products. Infants can be exposed through ingestion of PCE-contaminated breast milk.

In addition to eye, nose, mouth, and throat irritation, exposure to low levels of PCE can affect the human nervous system, causing changes in behavior and mood. Exposure to high levels of PCE can cause headache, dizziness, confusion, sleepiness, difficulty talking and walking, nausea, vomiting, unconsciousness, kidney and liver damage, and death. Some studies have reported reproductive problems, including menstrual disorders and miscarriage in humans exposed to PCE, while others



report birth defects and altered growth in the offspring of rats exposed to high levels of PCE while pregnant. Experimental evidence indicates that PCE exposure also can cause developmental toxicity, cancer, and kidney and liver damage.

The International Agency for Research on Cancer classifies perc as a probable human carcinogen. Recent studies have found an increased risk of leukemia and breast, colorectal and breast cancer among Cape Cod residents exposed to PCE when it leached into water distribution pipes through a vinyl pipe lining. Other studies have demonstrated an increased risk of esophageal cancer among workers exposed to PCE for many years. It is estimated that more than 630,000 U.S. workers are exposed to PCE annually. A 1998 Environmental Protection Agency (EPA) report indicates that the risk of cancer among workers exposed to PCE over a lifetime's work in a dry cleaning facility could be as high as 1 in 100. Occupational exposures, exposures of residents living close to facilities that use PCE, and exposures of children and pregnant women from dry-cleaned clothes are of particular concern. Some studies have shown that dry-cleaned clothes emit varying amounts of PCE into the air consumers breathe. Thus, consumers can be exposed to potentially harmful levels when wearing dry-cleaned clothing or storing them in home closets.

Common Uses

Historically PCE has been the dry-cleaning fluid of choice, but its use for this purpose has declined since the early 1990s due to the increasing use of alternatives. PCE is used in relatively small amounts in paint removers, printing inks, adhesives, paper coating, and as a carrier solvent for silicones. It is used also in water repellents for garments, spot removers, and silicone lubricants. Massachusetts manufacturing facilities used more than 800,000 pounds of PCE in the year 2000.

Alternatives

Machine wet-cleaning processes are effective, safer alternatives to dry-cleaning processes that use PCE. These processes are currently in use at some cleaners with good results for most types of stains, though attention must be paid to using the safest detergents possible. Liquid carbon dioxide and supercritical fluids are other alternatives for use in dry-cleaning processes. Aqueous and semi-aqueous cleaning processes, as well as non-chlorinated solvent and mechanical cleaning processes, are currently available alternatives for metal cleaning. Other processes, such as laser cleaning, are being explored also.

The South Coast Air Quality Management District in southern California has approved the phase out of PCE by the year 2020 and has called for substitution of PCE by safer alternatives, including wet-cleaning, petroleum-based or silicone-based solvent cleaning. Many dry cleaners in southern California have already made the switch and have reported savings in electricity and hazardous waste disposal costs.

References

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Additional Resources

- Agency for Toxic Substances and Disease Registry (ATSDR): <http://www.atsdr.cdc.gov/toxpro2.html>
- Massachusetts Toxics Use Reduction Institute (TURI): <http://www.turi.org>
- Scorecard: <http://www.scorecard.org>