

1. PUBLIC HEALTH STATEMENT FOR 1,1-DICHLOROETHANE

This Public Health Statement summarizes the Division of Toxicology and Human Health Science's findings on 1,1-dichloroethane, tells you about it, the effects of exposure, and describes what you can do to limit that exposure.

The U.S. Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites make up the National Priorities List (NPL) and are sites targeted for long-term federal clean-up activities. U.S. EPA has found 1,1-dichloroethane in at least 673 of the 1,699 current or former NPL sites. The total number of NPL sites evaluated for 1,1-dichloroethane is not known. But the possibility remains that as more sites are evaluated, the sites at which 1,1-dichloroethane is found may increase. This information is important because these future sites may be sources of exposure, and exposure to 1,1-dichloroethane may be harmful.

If you are exposed to 1,1-dichloroethane, many factors determine whether you'll be harmed. These include how much you are exposed to (dose), how long you are exposed (duration), and how you are exposed (route of exposure). You must also consider the other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

WHAT IS 1,1-DICHLOROETHANE?

1,1-Dichloroethane is a colorless oily liquid with a chloroform-like odor. 1,1-Dichloroethane is a chemical used mostly as an intermediate in the manufacture of 1,1,1-trichloroethane (1,1,1-TCE). 1,1-Dichloroethane is also used in limited amount as a solvent for cleaning and degreasing, and in the manufacture of plastic wrap, adhesives, and synthetic fiber.

More information on the chemical and physical properties as well as the production and uses of 1,1-dichloroethane is presented in Chapters 4 and 5 of this profile.

WHERE IS 1,1-DICHLOROETHANE FOUND?

1,1-Dichloroethane can be released into the air, water, and soil at places where it is produced or used as a solvent. The majority of the monitoring data for 1,1-dichloroethane focuses on air and water, specifically

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at hazardous waste sites. Minimal data are available for concentrations of 1,1-dichloroethane measured in soil. It is expected that the lack of available soil data is, in part, due to the rapid partitioning of 1,1-dichloroethane to air and water from soil or sediment. 1,1-Dichloroethane has been detected and measured in air samples at concentrations ranging from parts per trillion (ppt) to parts per million (ppm). In the air, 1,1-dichloroethane is slow to break down and has the potential for long-range transport.

1,1-Dichloroethane has been detected in drinking water and groundwater. 1,1-Dichloroethane does not degrade quickly in water, but it can evaporate from the water into the air. Minimal information was found on concentrations of 1,1-dichloroethane in soil, releases of 1,1-dichloroethane to land surfaces, or the disposal of waste products containing 1,1-dichloroethane into landfills. 1,1-Dichloroethane released to soil surfaces would rapidly evaporate to the air. Residual 1,1-dichloroethane remaining on soil surfaces would be available for transport into groundwater, since it is not expected to bind to soil particulates unless the organic content of the soil is high. Minimal information was found on the levels of 1,1-dichloroethane in other media.

In a survey of 234 table ready foods evaluated for the presence of volatile organic compounds (VOCs), 1,1-dichloroethane was not found in any of the samples. It was detected in three peanut butter samples at levels of 1.1, 1.9, and 3.7 micrograms per kilogram ($\mu\text{g}/\text{kg}$); however, the compound was not found in several other foods that were analyzed.

More information on levels of 1,1-dichloroethane found in the environment is presented in Chapter 6 of this profile.

HOW MIGHT I BE EXPOSED TO 1,1-DICHLOROETHANE?

The use of 1,1-dichloroethane as a solvent, cleaning agent, and degreaser, and its use in manufacturing of other compounds, such as 1,1,1-TCE, may result in releases to the environment. 1,1-Dichloroethane has been detected in ambient air and water. Exposure to 1,1-dichloroethane occurs mainly by breathing air near contaminated areas or by drinking water contaminated with 1,1-dichloroethane. However, most people who are exposed to 1,1-dichloroethane through air or water are exposed to very low levels, in the range of ppm to ppt. People may be exposed to higher levels of 1,1-dichloroethane if they smoke cigarettes or are exposed to cigarette smoke. People may also be exposed to 1,1-dichloroethane by using consumer products that contain this compound.

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Job-related exposure of 1,1-dichloroethane results from breathing in workplace air or from touching contaminated chemicals or materials at workplaces where 1,1-dichloroethane is used. According to a survey conducted between 1980 and 1983 by the National Institute for Occupational Safety and Health (NIOSH), an estimated 1,957 people in the United States may have been exposed to 1,1-dichloroethane while working. In general, people who work with 1,1-dichloroethane or live near industrial emission sources and hazardous waste sites containing 1,1-dichloroethane are more likely to be exposed.

Additional information on levels in the environment and potential for human exposure is presented in Chapter 6 of the toxicological profile.

HOW CAN 1,1-DICHLOROETHANE ENTER AND LEAVE MY BODY?

If you breathe air containing 1,1-dichloroethane, it will enter your body through your lungs. 1,1-Dichloroethane in your drinking water will enter your body through the digestive tract. We do not know how much will be absorbed; studies with similar compounds suggested that 1,1-dichloroethane will be rapidly and extensively absorbed.

1,1-Dichloroethane leaves your body in the breath or is broken down into other chemicals, which leave your body in the breath or in the urine.

HOW CAN 1,1-DICHLOROETHANE AFFECT MY HEALTH?

No information is available in humans on the health effects associated with occupational or environmental exposure to 1,1-dichloroethane. 1,1-Dichloroethane was used as an anesthetic; however, it is no longer used for this purpose because of the heart effects that also occurred at these very high concentrations.

Kidney effects have been observed in cats exposed to 1,1-dichloroethane in air for long periods. However, kidney effects have not been observed in other animal species following long-term inhalation or oral exposure.

The results of a study in rats and mice suggest that 1,1-dichloroethane may cause cancer. However, the study had several flaws and the results are not conclusive. Another long-term study of mice that drank water containing 1,1-dichloroethane did not find cancer.

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The U.S. Department of Health and Human Services (DHHS) and The International Agency for Research on Cancer (IARC) have not evaluated the carcinogenic potential of 1,1-dichloroethane. The U.S. EPA has determined that 1,1-dichloroethane is a possible human carcinogen.

See Chapters 2 and 3 for more information on 1,1-dichloroethane health effects.

HOW CAN 1,1-DICHLOROETHANE AFFECT CHILDREN?

This section discusses potential health effects of 1,1-dichloroethane exposure in humans from when they're first conceived to 18 years of age, and how you might protect against such effects.

No available studies have described the effects of exposure to 1,1-dichloroethane on children or young animals. Although we think that children would likely show the same health effects as adults, we don't know whether children are more susceptible than are adults to 1,1-dichloroethane effects.

We don't know whether 1,1-dichloroethane can harm an unborn child. Minor skeletal problems were observed in the fetuses of rats exposed to 1,1-dichloroethane in the air; decreases in body weight were also observed in the mothers.

HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO 1,1-DICHLOROETHANE?

If your doctor finds that you have been exposed to significant amounts of 1,1-dichloroethane, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate.

1,1-Dichloroethane can enter your body from air, water, or consumer products containing this substance. Contact local drinking water authorities and follow their advice if you have any concerns about the presence of 1,1-dichloroethane in your tap water. 1,1-Dichloroethane has the potential to contaminate foods, although the levels found in food are generally low. 1,1-Dichloroethane can also be present in groundwater and soil underneath a building or a home, resulting in above-ground vapors through vapor intrusion (movement of vapors from groundwater or soil into air). To minimize risks associated with breathing in contaminated vapors, ensure that the area is well ventilated. If you think that you may have groundwater contaminated with 1,1-dichloroethane, contact your local state health department. Follow instructions on product labels to minimize exposure to 1,1-dichloroethane. Storing these items in a shed or an outside location may reduce exposure and decrease the impact on indoor air.

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ARE THERE MEDICAL TESTS TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO 1,1-DICHLOROETHANE?

1,1-Dichloroethane and its breakdown products (metabolites) can be measured in blood and urine. However, the detection of 1,1-dichloroethane or its metabolites cannot predict the kind of health effects that might develop from that exposure. Because 1,1-dichloroethane and its metabolites leave the body fairly rapidly, the tests need to be conducted within days after exposure.

For more information on the different substances formed by 1,1-dichloroethane breakdown and on tests to detect these substances in the body, see Chapters 3 and 7.

WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. Federal agencies that develop regulations for toxic substances include the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA). Recommendations provide valuable guidelines to protect public health but cannot be enforced by law. Federal organizations that develop recommendations for toxic substances include the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH).

Regulations and recommendations can be expressed as “not-to-exceed” levels; that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value usually based on levels that affect animals; levels are then adjusted to help protect humans. Sometimes these not-to-exceed levels differ among federal organizations. Different organizations use different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or emphasize some factors over others, depending on their mission.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that issued the regulation or recommendation.

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OSHA set a legal limit of 100 ppm 1,1-dichloroethane in workplace air averaged over an 8-hour work day. NIOSH recommends a limit of 100 ppm 1,1-dichloroethane in workplace air averaged over a 10-hour work day.

WHERE CAN I GET MORE INFORMATION?

If you have any questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below. ATSDR can also provide publically available information regarding medical specialists with expertise and experience recognizing, evaluating, treating, and managing patients exposed to hazardous substances.

- Call the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636) or
- Write to:
Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE
Mailstop F-57
Atlanta, GA 30329-4027

Toxicological profiles and other information are available on ATSDR's web site:
<http://www.atsdr.cdc.gov>.