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1.1 WHAT IS 1,1,2-TRICHLOROETHANE

1,1,2-Trichloroethane is a colorless, sweet-smelling liquid that does not burn easily and boils at a higher temperature than water. It is made by two companies in the United States. It is used mostly where 1,1-dichloroethene (vinylidene chloride) is made. 1,1,2-Trichloroethane is used as a solvent. Because information about how much is made and how it is used is not available, we cannot say how much 1,1,2-trichloroethane is used, where it is used, or in what products it is found. 1,1,2-Trichloroethane may also be formed in landfills when 1,1,2,2-tetrachloroethane is broken down. When it is released into the environment, most 1,1,2-trichloroethane finally ends up in the air, but some may enter groundwater. Breakdown in both the air and groundwater is slow. In the air, half the 1,1,2-trichloroethane is expected to breakdown in 49 days and so it is likely to spread far from where it is released before breaking down. A few studies show that 1,1,2-trichloroethane below the soil surface or in groundwater does not breakdown within 16 weeks, and other studies suggest that it will last for years. Some studies show that breakdown of 1,1,2-trichloroethane occurs in landfills, but how fast this happens is not known. For more information, see Chapters 3, 4, and 5.

1.2 HOW MIGHT I BE EXPOSED TO 1,1,2-TRICHLOROETHANE?

Low levels of 1,1,2-trichloroethane may be found in outdoor air. The main source of this 1,1,2-trichloroethane is thought to be industries that use it as a solvent. Because the industries that produce 1,1,2-trichloroethane or use it to make other chemicals often recycle or burn their waste, releases of 1,1,2-trichloroethane by these industries should not be major sources of pollution. From surveys of industrial wastewater, we learn that some of the industries that discharge 1,1,2-trichloroethane are the timber products industry, plastics and synthetics industry, and laundries. Limited data show that 1,1,2-trichloroethane is present in a quarter to a half of city air samples. Where 1,1,2-trichloroethane is found, the samples tested usually contain 10 to 50 parts of 1,1,2-trichloroethane per trillion parts of air (ppt). Though exposure to contaminated drinking water taken from groundwater sources is possible, such exposure appears to be rare. A nationwide survey did not find 1,1,2-trichloroethane in drinking water, but well water in some areas has been found to contain it. Surveys found 1,1,2-trichloroethane in well water in Wisconsin, New Jersey, Rhode Island, and Suffolk County, New York. The largest amount in these supplies was 31 parts of 1,1,2-trichloroethane per one billion parts of water (ppb). 1,1,2-Trichloroethane has not been reported in food or soil. Besides the air and drinking water sources, people may be exposed to 1,1,2-trichloroethane from spills and in the workplace, where it may be used as a solvent. Exposure would most likely be from breathing vapors of the chemical or from skin contact. When a chemical like 1,1,2-trichloroethane is utilized to make other chemicals, it

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is usually used in tightly closed automatic systems, so that workers are not usually exposed to high levels of it. A national survey conducted in 1981-1983 estimated that 1,036 workers were exposed to 1,1,2-trichloroethane. 1,1,2-Trichloroethane has been found thus far at 45 of 1177 hazardous waste sites on the National Priorities List (NPL) in the United States. Landfill gases from these sites may contain 1,1,2-trichloroethane. For more information, please see Chapter 5.

1.3 HOW CAN 1,1,2-TRICHLOROETHANE ENTER AND LEAVE MY BODY?

1,1,2-Trichloroethane can enter the body when a person breathes air containing 1,1,2-trichloroethane, or when a person drinks water containing this compound. It can also enter the body through the skin. After it enters the body, it is carried by the blood to organs and tissues such as the liver, kidney, brain, heart, spleen, and fat. Experiments in which animals were given 1,1,2-trichloroethane by mouth have shown that most 1,1,2-trichloroethane leaves the body unchanged in the breath and as other substances that it was changed into in the urine in about 1 day. Very little stays in the body more than 2 days. More information on how 1,1,2-trichloroethane can enter and leave the body can be found in Chapter 2.

1.4 HOW CAN 1,1,2-TRICHLOROETHANE AFFECT MY HEALTH?

1,1,2-Trichloroethane can cause temporary stinging and burning pain on the skin when humans touch it. There is no other information on the health effects of 1,1,2-trichloroethane in humans. Most of what we know about the health effects of this chemical comes from experiments in animals. As is true with most chemicals, a large amount of 1,1,2-trichloroethane produces more damage than a small amount. Short-term exposure to high levels of 1,1,2-trichloroethane in air or high doses given by mouth or applied to the skin has caused death in animals. Long-term exposure of animals to high doses given by mouth has also shortened the lifespan. These levels and doses are much higher than would be found in the air, water, or food to which humans might be exposed. Breathing high levels in air can affect the nervous system and cause sleepiness. 1,1,2-Trichloroethane may also affect the liver, kidney, and digestive tract, produce skin irritation, and affect the body's ability to fight infections. Mice, but not rats, that were given high doses of 1,1,2-trichloroethane by mouth for most of their life developed liver cancer, but we do not know whether humans exposed to this chemical would develop cancer. From the limited information available in animals, it appears that 1,1,2-trichloroethane does not cause birth defects or otherwise inhibit normal development. More information on the health effects of 1,1,2-trichloroethane can be found in Chapter 2.

1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO 1,1,2-TRICHLOROETHANE?

Although chemists have ways of measuring some chemicals in body fluids,

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there is no commonly used medical test to find out whether a person has been exposed to 1,1,2-trichloroethane.

1.6 WHAT LEVELS OF EXPOSURE HAVE RESULTED IN HARMFUL HEALTH EFFECTS?

Tables 1-1, 1-2, 1-3, and 1-4 show the link between exposure to 1,1,2-trichloroethane and known health effects. Tables 1-1 and 1-3 show that no information is available on human health effects from breathing, eating, or drinking 1,1,2-trichloroethane. Minimal Risk Levels (MRLs) are included in Table 1-3. These MRLs were derived from animal data for both short- and long-term exposure, as described in Chapter 2 and in Table 2-2. The MRLs provide a basis for comparison to levels which people might encounter either in the air or in food or drinking water. If a person is exposed to 1,1,2-trichloroethane at an amount below the MRL, it is not expected that harmful (noncancer) health effects will occur. Since these levels are based on information that is currently available, there is always some uncertainty associated with it. Also since the method for deriving MRLs does not use any information about cancer, an MRL does not imply anything about the presence, absence, or level of risk of cancer. In Table 1-2, death is reported to occur at levels that are less than or equal to the levels that cause central nervous system depression and mild liver effects. However, the period of exposure that produces death is longer. More information on levels of exposure linked with harmful effects can be found in Chapter 2.

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

The Environmental Protection Agency (EPA) has allowed a limit of 0.6 µg/L (ppb) 1,1,2-trichloroethane in waters such as lakes and streams. The EPA also requires industry to report discharges or spills of 100 or more Pounds.

Levels of 1,1,2-trichloroethane allowed in the workplace are regulated by the Occupational Safety and Health Administration (OSHA). The occupational exposure limit is 10 parts of 1,1,2-trichloroethane per one million parts of air (ppm) for an 8-hour workday, 40-hour workweek. More information on government recommendations can be found in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have more questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia 30333

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TABLE 1-1. Human Health Effects from Breathing 1,1,2-Trichloroethane*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term human exposure to air containing specific levels of 1,1,2-trichloroethane are not known.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term human exposure to air containing specific levels of 1,1,2-trichloroethane are not known.

*See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-2. Animal Health Effects from Breathing 1,1,2-Trichloroethane

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
416	6 hr	Death in mice.
418	4 hr	Central nervous system depression in mice.
500	8 hr	Death in rats.
800	3 hr	Liver effects in mice.
Long-term Exposure (greater than 14 days)		
<u>Levels in Air (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term animal exposure to air containing specific levels of 1,1,2-trichloroethane are not known.

*These effects are listed at the lowest level at which they were first observed. They may also be seen at the higher levels.

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TABLE 1-3. Human Health Effects from Eating or Drinking
1,1,2-Trichloroethane*

Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from short-term human exposure to air containing specific levels of 1,1,2-trichloroethane are not known.
<u>Levels in Water (ppm)</u>		
10.5		Minimal risk level (derived from animal data; see Section 1.6 for discussion).
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects</u>
		The health effects resulting from long-term human exposure to food containing specific levels of 1,1,2-trichloroethane are not known.
<u>Levels in Water (ppm)</u>		
1.4		Minimal risk level (derived from animal data; see Section 1.6 for discussion).

*See Section 1.2 for a discussion of exposures encountered in daily life.

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TABLE 1-4. Animal Health Effects from Eating or Drinking
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Short-term Exposure (less than or equal to 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
1200	1 day	Liver effects in rats.
<u>Levels in Water (ppm)</u>		
525	1 day	Taste aversion in mice.
670	1 day	Motor impairment in mice
1990	1 day	Death in mice.
5980	1 day	Death in rats.
Long-term Exposure (greater than 14 days)		
<u>Levels in Food (ppm)</u>	<u>Length of Exposure</u>	<u>Description of Effects*</u>
1500	78 weeks	Shortened lifespan in mice.
<u>Levels in Water (ppm)</u>		
200	90 days	Immune system effects in mice.
200	90 days	Liver effects in mice.

*These effects are listed at the lowest level at which they were first observed. They may also be seen at higher levels.

