1. PUBLIC HEALTH STATEMENT

1.1 WHAT IS 1,2-DICHLOROPROPANE?

1,2-Dichloropropane is a colorless liquid belonging to a class of chemicals called volatile organic compounds (VOCs). It has a chloroform-like odor and evaporates quickly at room temperature. It is a man-made chemical and people are probably responsible for all releases of 1,2- dichloropropane into the environment. 1,2-Dichloropropane is now used in the United States only in research and industry. Before the early 1980s, 1,2-dichloropropane was used in farming as a soil fumigant and was found in some paint strippers, varnishes, and furniture finish removers. Most of the 1,2-dichloropropane released into the environment finally ends up in the air or groundwater. When applied to soil in one experiment, all but 1% dispersed in 10 days. Breakdown in both the air and groundwater is slow. The rate at which a chemical breaks down is usually explained by how long it takes for half the chemical to disappear (half-life). The half-life of 1,2- dichloropropane in air is not known exactly, but it is longer than 23 days, which means that 1,2-dichloropropane can spread to areas far from where it is released. In groundwater, the half-life of 1,2-dichloropropane is estimated to be between 6 months and 2 years. For more information refer to Chapters 4 and 5 of this document.

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

Air levels of 1,2-dichloropropane are usually quite low. In city areas of the United States, the average amount in air is about 22 parts per trillion (ppt). 1,2-Dichloropropane is found in a few drinking water supplies, and most of those are from groundwater sources. A nationwide survey of groundwater supplies showed that 1.4% of these supplies contained 1,2-dichloropropane levels at around 1 part per billion (ppb). The highest amount of 1,2-dichloropropane in the survey was 21 ppb. Private wells in farming areas where 1,2-dichloropropane was once used as a soil fumigant have the greatest risk for contamination. Occupational exposure to 1,2-dichloropropane may result during its production, its use in chemical reactions and as an industrial solvent, and evaporation from wastewater that contains the chemical. Workers involved in cleaning up hazardous waste or spill sites that contain 1,2-dichloropropane may also be exposed. A national survey conducted by the National Institute for Occupational Safety and Health (NIOSH) in 1981-1983 estimated that 2119 workers outside of the farming sector were exposed to 1,2-dichloropropane. Use of this chemical has recently decreased very much, however, so that the number of exposed workers may now be much lower. According to industry spokesmen, levels of exposure among exposed workers range from less than 1 part per million (ppm) to less than 25 ppm, depending on the industry. 1,2-Dichloropropane was found in 26 of the 1177 hazardous waste sites on the National Priority List (NPL) and gases from these sites may contain low levels of 1,2-dichloropropane. For more information on levels of 1,2-dichloropropane in

the environment and potential exposure to it, please refer to Chapter 5 of this document.

1.3 HOW CAN l,2-DICHLOROPROPANE ENTER AND LEAVE MY BODY?

1,2-Dichloropropane can enter the body if a person breathes air or drinks water contaminated with it, or if a person's skin comes in contact with it. If 1,2-dichloropropane is present at a waste site near homes that use wells as a source of water, the well water could be contaminated. A route of major exposure in the past was by accidentally or intentionally drinking cleaning products that contained 1,2-dichloropropane, but these cleaning materials are no longer produced in the United States. Experiments with animals have shown that when 1,2-dichloropropane enters the body through eating or drinking, it is quickly removed in the urine and feces and by the lungs when the animal breathes out. 1,2-Dichloropropane may enter the lungs of workers exposed where it is used indoors as a solvent. If 1,2-dichloropropane is released at a waste site and evaporates into the air, a person may breathe in 1,2-dichloropropane for a short time before it disperses. When the chemical was a part of some paint strippers, varnishes, and furniture finish removers, exposure of the skin through contact with these products occurred; however, the amount of 1,2-dichloropropane that entered through the skin is unknown. Soil around a waste site may be contaminated with 1,2-dichloropropane, but it is not known how much 1,2-dichloropropane enters the body through the skin upon contact with contaminated soil. For more information on how 1,2-dichloropropane enters and leaves the body, see Chapter 2.

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

Drinking 1,2-dichloropropane by humans (i.e., drinking cleaning solutions) has produced poisoning. At these high levels of exposure, effects include dizziness, headache, nausea, injury to the liver and kidneys, anemia, coma and, ultimately, death. Breathing high levels of 1,2-dichloropropane by humans, as in deliberate breathing of vapors from cleaning solutions, produces similar effects. No reports have been made of any health effects in humans following low-level exposure to 1,2-dichloropropane for either short or long time periods.

In animal experiments, low amounts of 1,2-dichloropropane breathed in over short- and long-term periods result in damage to the liver, kidney, and respiratory systems, while high amounts resulted in death. Short-term exposure to high levels of vapors also causes irritation to the eyes and throat. When 1,2-dichloropropane is given by mouth to animals over short- or long-term periods, damage to the liver and kidneys is seen at low doses, and death occurs at high doses.

1,2-Dichloropropane breathed or eaten for a short time has not been reported to produce cancer in humans, but long-term exposure by mouth in animals has produced evidence of liver cancer in mice and breast cancer in

female rats. The significance of the animal cancer studies to humans is not well understood. Irritation of the skin after contact with 1,2-dichloropropane has been seen in both humans and rabbits. 1,2-Dichloropropane has not been shown to cause birth defects in humans or animals, but a delay in the growth of bones has been seen in fetal rats following exposure of the mother rats. For more information on the health effects of 1,2-dichloropropane in humans and animals, see Chapter 2.

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

Tests are available to detect 1,2-dichloropropane in the urine and the blood. The available methods can predict the concentration of 1,2-dichloropropane in the air from levels in the urine, but not from levels in the blood. The levels of 1,2-dichloropropane in the urine, however, cannot predict specific health effects. The method for testing the urine is simple, but because special equipment is needed, the test is not yet routinely available. Because 1,2-dichloropropane leaves the body quickly, it is best to test for it soon after exposure. For more information on the medical tests available to detect exposure to 1,2-dichloropropane, see Chapter 2.

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

The amounts of 1,2-dichloropropane in air, drinking water and food that cause known health effects in humans and animals are shown in Tables l-l, l-2, l-3 and l-4. The idea of "dose-response" is important when assessing the effect of a chemical on humans or animals. Dose-response refers to the increase in adverse health effects that are observed as the amount of the chemical to which you are exposed increases. The exact amounts that result in the harmful effects in humans (see Section 1.4) are not known because no amounts of 1,2-dichloropropane were determined when the individuals were poisoned.

Minimal Risk Levels (MRLs) are included in Tables 1-l and l-3. These MRLs were derived from animal data for short-term and long-term exposure from breathing 1,2-dichloropropane and for short-term and longer-term exposure from eating or drinking 1,2-dichloropropane, as described in Chapter 2 and in Tables 2-l and 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 1,2-dichloropropane 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 it currently available, there is always some uncertainty associated with them. Also, since the method for deriving MRLs does not use any information about cancer, a MRL does not imply anything about the presence, absence, or level of risk of cancer.

1. PUBLIC HEALTH STATEMENT

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

Short-term Exposure (less than or equal to 14 days)		
Levels in Air (ppb)	Length of Exposure	Description of Effects
		The health effects resulting from short-term exposure to air containing specific levels of 1,2-dichloropropane are not known.
50		Minimal Risk Level (derived from animal data, see Section 1.6 for discussion).
Long-term Exposure (greater than 14 days)		
Levels in Air (ppb)	Length of Exposure	Description of Effects
		The health effects resulting from long-term exposure to air containing specific levels of 1,2-dichloropropane are not known.
7		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.

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

Short-term Exposure (less than or equal to 14 days)		
Levels in Air (ppm)	Length of Exposure	Description of Effects*
100	14 days, 6 hr/day	Nasal damage in rats and mice.
480	10 hr	Death in mice.
1000	14 days, 6 hr/day	Nasal damage in rabbits.
1000	6-10 days, 7 hr day	Death in rats.
1500	9 days, 7 hr/day	Death in guinea pigs.
Long-term Exposure (greater than 14 days)		
Levels in Air (ppm)	Length of Exposure	Description of Effects*
15	13 weeks	Slight respiratory damage in rats.
150	13 weeks	Anemia in rabbit.
400	5 weeks	Death in mice.
1000	2-18 weeks	Death in rats, guinea pigs, and dogs.

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

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

Short-term Exposure (less than or equal to 14 days)		
Levels in Food (ppm)	Length of Exposure	Description of Effects**
3.6		Minimal Risk Level (derived from animal data see Section 1.6 for discussion).
Levels in Water		The health effects resulting from short-term human exposure to drinking water containing specific levels of 1,2-di-chloropropane are not known.
Long-term Exposure (greater than 14 days)		
Levels in Food (ppm)	Length of Exposure	Description of Effects**
2.5		Minimal Risk Level (derived from animal data see Section 1.6 for discussion).
Levels in Water		The health effects resulting from long-term exposure to drinking water containing specific levels of 1,2-dichloropropane are not known.

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

TABLE 1-4. Animal Health Effects from Eating or Drinking 1,2-Dichloropropane

Short-term Exposure (less than or equal to 14 days)		
Levels in Food (ppm)	Length of Exposure	Description of Effects*
2000	10 days	Mild nervous system effects in rats.
3850	14 days	Death in mice.
5000	10 days	Weight loss, anemia, and liver damage in rats.
10,000	10 days	Testicular damage in rats.
40,000	14 days	Death in rats.
Levels in Water		The health effects resulting from short-term animal exposure to drinking water containing specific levels of 1,2-di-chloropropane are not known.
Long-term Exposure (greater than 14 days)		
Levels in Food (ppm)	Length of Exposure	Description of Effects*
960	2 years	Liver damage in mice.
1900	2 years	Death in mice.
2000	13 weeks	Weight loss and anemia in rats.
2500	15 days	Slight effects on the growth of bones in fetal rats.
5000	2 years	Liver damage in rats.
5000	2 years	Death in rats.
Levels in Water		The health effects resulting from long-term animal exposure to drinking water containing specific levels of 1,2-dichloropropane are not known.

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

1. PUBLIC HEALTH STATEMENT

The Occupational Safety and Health Administration (OSHA) believes that 75 ppm 1,2-dichloropropane is acceptable for a normal 8-hour workday and a 40-hour workweek and that 110 ppm 1,2-dichloropropane is acceptable for a 15-minute exposure period. OSHA feels that nearly all workers may be repeatedly exposed to 1,2-dichloropropane at these levels, day after day, without harmful effects (see Section 1.7). The amount at which the smell of 1,2-dichloropropane is first noticed is 0.25 ppm; therefore, most people would probably smell 1,2-dichloropropane before it reached a harmful level. Continued exposure to the odor may reduce the ability to smell 1,2-dichloropropane at 0.25 ppm. For more information on the amounts of 1,2-dichloropropane that cause effects in humans and animals, see Chapter 2.

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

The Occupational Safety and Health Administration (OSHA) regulates levels of 1,2-dichloropropane in the workplace. The limit for an 8-hour workday, 40-hour workweek is an average of 75 ppm and the limit for a 15-minute exposure is an average of 110 ppm. The Environmental Protection Agency (EPA) requires a notice when discharges or spills of 1000 pounds or more of 1,2-dichloropropane are made into the environment. For more information on Federal and State recommendations, see Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

If you have further 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