1. PUBLIC HEALTH STATEMENT

This public health statement tells you about 1,2-dichloroethane and the effects of exposure.

The 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 the sites targeted for long-term federal cleanup activities. 1,2-Dichloroethane has been found in at least 570 of the 1,585 current or former NPL sites. However, the total number of NPL sites evaluated for 1,2-dichloroethane is not known. As more sites are evaluated, the sites at which 1,2-dichloroethane is found may increase. This information is important because exposure to 1,2-dichloroethane may harm you and because these sites may be sources of exposure.

When a substance is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. This release does not always lead to exposure. You are exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to 1,2-dichloroethane, many factors determine whether you'll be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider the other chemicals you're exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

1.1 WHAT IS 1,2-DICHLOROETHANE?

1,2-Dichloroethane is a clear, manufactured liquid that is not found naturally in the environment. It evaporates quickly at room temperature and has a pleasant smell and a sweet taste. 1,2-Dichloroethane burns with a smoky flame. At this time, the most common use of 1,2-dichloroethane is to make vinyl chloride, which is used to make a variety of plastic and vinyl products including polyvinyl chloride (PVC) pipes and other important construction materials, packaging materials, furniture and automobile upholstery, wall coverings, housewares, and automobile parts. 1,2-Dichloroethane is also used as a solvent and is added to leaded gasoline to

remove lead. In the past, it was also found in small amounts in products that industries used to clean cloth, remove grease from metal, and break down oils, fats, waxes, resins, and rubber. In the household, 1,2-dichloroethane was formerly a component of some cleaning solutions and pesticides; some adhesives, such as those used to glue wallpaper or carpeting; and some paint, varnish, and finish removers. Although large amounts of 1,2-dichloroethane are produced today, most is used to make other chemical products.

Small amounts of 1,2-dichloroethane that were released into water or soil evaporate into the air. 1,2-Dichloroethane that remains in soil from a spill or improper disposal can travel through the ground into water. The chemical may remain in water or soil for more than 40 days.

Chapter 4 contains more chemical and physical information about 1,2-dichloroethane. Chapter 5 has more information on its uses, and Chapter 6 tells about its presence in the environment.

1.2 WHAT HAPPENS TO 1,2-DICHLOROETHANE WHEN IT ENTERS THE ENVIRONMENT?

1,2-Dichloroethane can enter the environment when it is made, packaged, shipped, or used. Most 1,2-dichloroethane is released to the air, although some is released to rivers or lakes. 1,2-Dichloroethane could also enter soil, water, or air in large amounts in an accidental spill.

1,2-Dichloroethane evaporates into the air very fast from soil and water. In the air, it breaks down by reacting with other compounds formed by the sunlight. 1,2-Dichloroethane will stay in the air for more than 5 months before it is broken down. It may also be removed from air in rain or snow. Since it stays in the air for a while, the wind may carry it over large distances.

In water, 1,2-dichloroethane breaks down very slowly and most of it will evaporate to the air. Only very small amounts are taken up by plants and fish. We do not know exactly how long 1,2-dichloroethane remains in water, but we do know that it remains longer in lakes than in rivers.

In soil, 1,2-dichloroethane either evaporates into the air or travels down through soil and enters underground water. Small organisms living in soil and groundwater may transform it into other less harmful compounds, although this happens slowly. If a large amount of 1,2-dichloroethane enters soil from an accident, hazardous waste site, or landfill, it may travel a long way underground and contaminate drinking water wells.

More information on what happens to 1,2-dichloroethane in the environment can be found in Chapters 5 and 6.

1.3 HOW MIGHT I BE EXPOSED TO 1,2-DICHLOROETHANE?

Humans are exposed to 1,2-dichloroethane mainly by breathing air or drinking water that contains 1,2-dichloroethane. Human exposure usually happens where the chemical has been improperly disposed of, or spilled onto the ground. However, low levels of 1,2-dichloroethane have also been found in the air near industries where it is made or used in manufacturing. Humans can be exposed to low levels of 1,2-dichloroethane through the skin or air by contact with old products made with 1,2-dichloroethane, such as cleaning agents, pesticides, and adhesives used to glue wallpaper and carpets. Such exposure is probably not enough to cause harmful health effects.

1,2-Dichloroethane has been found in U.S. drinking water at levels ranging from 0.05 to 64 parts of 1,2-dichloroethane per billion (ppb) parts of water. An average amount of 175 ppb has been found in 12% of the surface water and groundwater samples taken at 2,783 hazardous wastes sites. 1,2-Dichloroethane has also been found in the air near urban areas at levels of 0.10–1.50 ppb and near hazardous waste sites at levels of 0.01–0.003 ppb. Small amounts of 1,2-dichloroethane have also been found in foods.

Humans may also be exposed to 1,2-dichloroethane through its use as a gasoline additive to reduce lead content, but these small levels are not expected to affect human health. This is probably not an important way that people are exposed to 1,2-dichloroethane in the United States, since leaded gasolines are rarely used today.

Additional information on levels in the environment and potential for human exposure are presented in Chapter 6.

1.4 HOW CAN 1,2-DICHLOROETHANE ENTER AND LEAVE MY BODY?

1,2-Dichloroethane can enter the body when people breathe air or drink water that contains 1,2-dichloroethane. Studies in animals also show that 1,2-dichloroethane can enter the body through the skin. Humans are most likely to be exposed at work and outside the workplace by drinking water that contains 1,2-dichloroethane, or by breathing 1,2-dichloroethane that has escaped from contaminated water or soil into the air.

Experiments in animals show that 1,2-dichloroethane that is breathed in or swallowed goes to many organs of the body, but usually leaves in the breath within 1 or 2 days. The breakdown products of 1,2-dichloroethane in the body leave quickly in the urine. Soil near hazardous waste sites probably does not have high amounts of 1,2-dichloroethane because it evaporates quickly into the air. This suggests that exposure near a hazardous waste site would most likely occur by breathing contaminated air rather than by touching contaminated soil.

Further information on how 1,2-dichloroethane can enter and leave the body is presented in Chapter 3.

1.5 HOW CAN 1,2-DICHLOROETHANE AFFECT MY HEALTH?

To protect the public from the harmful effects of toxic chemicals and to find ways to treat people who have been harmed, scientists use many tests.

One way to see if a chemical will hurt people is to learn how the chemical is absorbed, used, and released by the body; for some chemicals, animal testing may be necessary. Animal testing may also be used to identify health effects such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method to get information needed to make wise decisions to protect public health. Scientists have the responsibility to treat research animals with care and

compassion. Laws today protect the welfare of research animals, and scientists must comply with strict animal care guidelines.

People who were accidentally exposed to large amounts of 1,2-dichloroethane in the air or who swallowed 1,2-dichloroethane by accident or on purpose often developed nervous system disorders and liver and kidney disease. Lung effects were also seen after a large amount of 1,2-dichloroethane was inhaled. People often died from heart failure. We do not know what levels of 1,2-dichloroethane caused these effects, but they are probably high. Studies in laboratory animals also found that breathing or swallowing large amounts of 1,2-dichloroethane produced nervous system disorders, kidney disease, or lung effects. Reduced ability to fight infection was also seen in laboratory animals who breathed or swallowed 1,2-dichloroethane, but we do not know if this also occurs in humans. Longer-term exposure to lower doses also caused kidney disease in animals.

So far, exposure to 1,2-dichloroethane has not been associated with cancer in humans. One study showed a relationship between increased cancer and exposure to pollutants in groundwater, including 1,2-dichloroethane, but the people were probably exposed to many other chemicals at the same time. Cancer was found in laboratory animals who were fed large doses of 1,2-dichloroethane. When 1,2-dichloroethane was put on the skin of laboratory animals, they developed lung tumors. We are not sure whether breathing 1,2-dichloroethane causes cancer in animals. Because of the cancer findings in animals, the possibility of cancer in humans cannot be ruled out. The Department of Health and Human Services (DHHS) has determined that 1,2-dichloroethane may reasonably be expected to cause cancer. The International Agency for Research on Cancer (IARC) has determined that 1,2-dichloroethane can possibly cause cancer in humans. EPA has determined that 1,2-dichloroethane is a probable human carcinogen.

Additional information regarding the health effects of 1,2-dichloroethane can be found in Chapter 3.

1.6 HOW CAN 1,2-DICHLOROETHANE AFFECT CHILDREN?

This section discusses potential health effects from exposures during the period from conception to maturity at 18 years of age in humans.

Children can be exposed to 1,2-dichloroethane by breathing contaminated air, and possibly by drinking contaminated water. In the past, 1,2-dichloroethane had been used in certain household items, such as cleaning products and adhesives, but is no longer used in these products. There is a possibility that using of one of these older household products containing 1,2-dichloroethane to clean floors or glue carpets could result in exposure, since children often crawl on floors and play on carpets. Such exposures would probably last a few days or less, since 1,2-dichloroethane evaporates very quickly. Children are not likely to be exposed to 1,2-dichloroethane from parents' clothing or other items removed from the workplace. Because 1,2-dichloroethane has been detected in human milk, it is possible that young children could be exposed to 1,2-dichloroethane from breast-feeding mothers who had been exposed to sources of 1,2-dichloroethane.

There have been no studies of health effects in children exposed to 1,2-dichloroethane, and we have no reliable information on whether 1,2-dichloroethane causes birth defects in children. One study broadly suggests that heart problems could occur in the human fetus from mothers being exposed to 1,2-dichloroethane along with some other chemicals, but the information is not reliable enough for us to be sure whether 1,2-dichloroethane is responsible for the defects. Studies of pregnant laboratory animals indicate that it probably does not produce birth defects or affect reproduction. We do know, however, that when the pregnant animal is exposed to 1,2-dichloroethane, the fetus is probably also exposed.

It is likely that children exposed to 1,2-dichloroethane after birth would show the same health effects that are expected to occur in adults, especially liver and kidney disease. There is no information to determine whether children differ from adults in their sensitivity to the health effects of 1,2-dichloroethane.

More information regarding children's health and 1,2-dichloroethane can be found in Section 3.7.

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO 1,2-DICHLOROETHANE?

If your doctor finds that you have been exposed to significant amounts of 1,2-dichloroethane, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate.

In the past, 1,2-dichloroethane was used in small amounts in household products such as cleaning agents, pesticides, and wallpaper and carpet glue. It is possible that you may have old containers of such products in your home. Risk of exposure from this source could be eliminated if these older products were immediately discarded. Otherwise, household chemicals should be stored out of reach of young children to prevent accidental poisonings. Always store household chemicals in their original labeled containers. Never store household chemicals in containers that children would find attractive to eat or drink from, such as old soda bottles. Keep your Poison Control Center's number next to the phone. Sometimes older children sniff household chemicals in an attempt to get high. Your children may be exposed to 1,2-dichloroethane by inhaling products containing it. Talk with your children about the dangers of sniffing chemicals. The exposure of your family to 1,2-dichloroethane can be reduced by throwing away any household products that contain it. You may wish to contact your county health department for appropriate disposal methods.

1,2-Dichloroethane has been found in drinking water in the United States. Most of the time, 1,2-dichloroethane has been found in small amounts that do not pose a major health risk. You may want to contact your water supplier or local health department to get information about the levels of 1,2-dichloroethane in the drinking water.

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

1,2-Dichloroethane has been found in the breath, blood, breast milk, and urine of exposed people. Because breath samples are easily collected, testing breathed-out or exhaled air is now a possible way to find out whether someone has recently been exposed to 1,2-dichloroethane. However, tests that measure small amounts in human breath, tissues, and fluids may not be available at your doctor's office because they require special equipment. Your physician can refer you to a facility where these tests are done. Although these tests can show that you have been exposed to 1,2-dichloroethane, it is not possible to tell if you will experience any harmful health effects. Because 1,2-dichloroethane leaves the body fairly quickly, these methods are best for finding exposures that occurred within the last several days. Exposure to 1,2-dichloroethane at hazardous waste sites will probably include exposure to other organic compounds at the same time. Therefore, levels of 1,2-dichloroethane measured in the body by these methods may not show exposure to 1,2-dichloroethane only. Medical tests available at a doctor's office include lung-, liver-, and kidney-function tests, but these tests look for damage that has already occurred from general chemical exposure and do not determine the cause of damage. Damage could also be the result of lifestyle (e.g., drinking alcohol, smoking) or general exposure to environmental agents. Other methods to measure the effects of exposure to 1,2-dichloroethane (such as abnormal enzyme levels) do not measure the effects of exposure to 1,2-dichloroethane only, but measure effects of other chemicals as well.

1.9 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 in not-to-exceed levels in air, water, soil, or food that are usually based on levels that affect animals; then they are adjusted to help protect people. Sometimes these not-to-exceed levels differ among federal organizations because of different exposure times (an 8-hour workday or a 24-hour day), the use of different animal studies, or other factors.

Recommendations and regulations are also periodically updated as more information becomes available. For the most current information, check with the federal agency or organization that provides it. Some regulations and recommendations for 1,2-dichloroethane include the following:

The federal government has developed regulatory standards and guidelines to protect people from the possible health effects of 1,2-dichloroethane in air. OSHA has set a limit of 50 parts of 1,2-dichloroethane per million parts of air (ppm, 1 ppm is 1,000 times more than 1 ppb) in the workplace for an 8-hour day, 40-hour week. NIOSH recommends that a person not be exposed daily in the workplace to more than 1 ppm 1,2-dichloroethane for a 10-hour day, 40-hour week. NIOSH calls 1,2-dichloroethane a possible occupational carcinogen. EPA also calls the compound a probable human cancer-causing agent, based on experiments in animals.

The federal government has also set regulatory standards and guidelines to protect people from the possible health effects of 1,2-dichloroethane in drinking water. EPA has set a limit in water of 0.005 milligrams of 1,2-dichloroethane per liter (5 ppb).