

## 1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about 1,3-butadiene and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). 1,3-Butadiene has been found at 3 of these sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for 1,3-butadiene. As EPA evaluates more sites, the number of sites at which 1,3-butadiene is found may change. The information is important for you because 1,3-butadiene may cause harmful health effects and because these sites are potential or actual sources of human exposure to 1,3-butadiene.

When a chemical 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 as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous substance such as 1,3-butadiene, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

### 1.1 WHAT IS 1,3-BUTADIENE?

1,3-Butadiene is a colorless gas with a mild gasoline-like odor. 1,3-Butadiene is almost always found at low levels in urban air samples, but it breaks down quickly in the air. In sunny weather, half of 1,3-butadiene goes away from the air in about 2 hours. Sunlight is not necessary for the removal of 1,3-butadiene from air, but it helps. In the winter time when the days are short or if it is not sunny, about half of it would still be gone in a few days.

Because we do not have enough information, we are not sure exactly what happens to 1,3-butadiene in soil or water. We do not know how often 1,3-butadiene is found in soil or water samples because we do not have reliable methods of looking for it there. If 1,3-butadiene were spilled on water or soil, based on its properties, we expect it to evaporate quickly into the air. We do not expect 1,3-butadiene to collect in plants or fish or to be found in the sediment of rivers and lakes. We also don't expect 1,3-butadiene to be found in soil or underground water sources, but we don't know this for sure. We also don't know how long it takes for 1,3-butadiene to break down in soil or in water because these types of studies have not been done.

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Very large amounts of 1,3-butadiene are produced every year from petroleum. 1,3-Butadiene is used to make man-made rubber, which is then used mostly for car and truck tires. It is also used to make other kinds of rubber and plastics. 1,3-Butadiene is also found in small amounts in gasoline. Some plastics or man-made rubbers may have very small amounts of 1,3-butadiene trapped in them. These levels are not expected to be high enough to cause health problems. Small amounts are found in the exhaust of automobiles and trucks at approximately 10 parts in 1 billion parts of air (ppb) and in gasoline vapors at 4 ppb. 1,3-Butadiene is also found in cigarette smoke, and it may also be found in the smoke of wood fires.

You will find more information on the chemical properties of 1,3-butadiene in Chapter 3. The uses of 1,3-butadiene are given in Chapter 4. More information on how 1,3-butadiene will behave in the environment is given in Chapter 5.

### 1.2 HOW MIGHT I BE EXPOSED TO 1,3-BUTADIENE?

You can be exposed to 1,3-butadiene by breathing air, drinking water, or eating food contaminated with it. Also, people most likely to be exposed to 1,3-butadiene are workers in the production of rubber, plastics, and resins.

1,3-Butadiene has been found at three hazardous waste sites. It has been detected in gases coming from soil. We do not have enough information to know exactly how people near hazardous waste sites may be exposed to 1,3-butadiene.

Because 1,3-butadiene is a gas, you are most likely exposed to it by breathing contaminated air. Large amounts of 1,3-butadiene in the air come from leaks or intentional releases at manufacturing plants. Because it is found in the exhaust of cars and trucks, and in the smoke from wood fires and cigarettes, it is always present at very low levels in the air around cities and towns. The average amount of 1,3-butadiene in the air is 0.3 parts of 1,3-butadiene per billion parts of air (ppb) in cities and suburban areas. These levels are not expected to cause any health problems. The amount of 1,3-butadiene in the air may be much higher near polluted cities or near oil refineries, chemical manufacturing plants, and plastic and rubber factories where this chemical is made or used. The amount in the air can also be very high if 1,3-butadiene is accidentally spilled during shipment from one place to another. 1,3-Butadiene has been measured at very low levels (1-10 ppb) in the plastic or rubber of food containers, but it has not often been found in food samples. These amounts are not expected to cause any health problems. The manufacture of food containers is closely regulated by the Food and Drug Administration (FDA) of the United States. 1,3-Butadiene has been found in drinking water, but we do not know what the concentration was or where it came from.

You can find more information on how much 1,3-butadiene is in the environment and how you might be exposed to it in Chapter 5.

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### 1.3 HOW CAN 1,3-BUTADIENE ENTER AND LEAVE MY BODY?

1,3-Butadiene can enter your body through your lungs if you breathe air contaminated with it. 1,3-Butadiene may also enter your body through the skin if you come into contact with it, but we do not know how much enters this way. We do not know if 1,3-butadiene is present in ground or surface waters near hazardous wastes sites or what happens to it after you drink water contaminated with this compound. Although 1,3-butadiene has been found at only three NPL waste sites, people at or near these waste sites may be exposed by breathing 1,3-butadiene that evaporates into the air. The amount of 1,3-butadiene that enters the body depends on the amount in the environment and the length of time a person comes into contact with it. Animal studies have shown that the breakdown products of 1,3-butadiene leave the body in the urine and in the air breathed out. We don't know what happens to 1,3-butadiene in the body if it is found in water that people drink. More information on how 1,3-butadiene enters and leaves the body can be found in Chapter 2.

### 1.4 HOW CAN 1,3-BUTADIENE AFFECT MY HEALTH?

Short-term exposure to high levels of 1,3-butadiene causes eye, nose, and throat irritation. Exposure to very high levels could occur during accidental release and could lead to symptoms like drunkenness and unconsciousness, or even to death. However, no such accidental releases have been reported so far. We do not know the exact levels in air that cause these effects in humans. Studies of rubber industry workers suggested possible harmful effects such as more cases of heart diseases, blood diseases, lung diseases, and even cancer from the long-term exposure to low levels of 1,3-butadiene. These rubber industry workers were also exposed to other chemicals along with 1,3-butadiene, so we do not know for sure which chemical (or a combination of them) caused these effects. In addition, the effect of harmful habits like smoking was not considered in the evaluation of health risks of occupational exposure to 1,3-butadiene. 1,3-Butadiene has a gasoline-like odor, which some people can smell at a concentration as low as 1.6 ppm. Skin contact with liquid 1,3-butadiene can cause irritation and frostbite in humans.

Laboratory animals that breathed in high levels of 1,3-butadiene for a short time died. Mice that survived exposure to 1,3-butadiene longer than 14 days had damage in the organs that make blood cells and damage to nose tissues. Pregnant mice that breathed in low amounts of 1,3-butadiene had miscarriages. Birth defects were found in offspring of rats and mice exposed to 1,3-butadiene during pregnancy. Rats that breathed in lower levels of 1,3-butadiene for more than 1 year had kidney disease and damaged lungs; some of them died. Mice that breathed in lower levels of 1,3-butadiene for more than 1 year had harmful effects in their reproductive organs and damaged livers. Rats and mice that breathed in small amounts of 1,3-butadiene for a long time period developed cancer in many organs.

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There is no information on human or animal health effects from eating food or drinking water containing 1,3-butadiene.

There is no information on animal health effects from skin contact with 1,3-butadiene.

A more complete discussion of the effects of 1,3-butadiene on health can be found in Chapter 2.

### **1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO 1,3-BUTADIENE?**

We have no reliable medical test to determine whether you have been exposed to 1,3-butadiene at this time, but scientists are trying to find a way to test blood to see if 1,3-butadiene attaches to certain compounds such as deoxyribonucleic acid (DNA) or proteins that are found in the blood. For further information, please read Chapters 2 and 6.

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

The Environmental Protection Agency (EPA) requires industries to report spills of 1 pound or more of 1,3-butadiene. EPA also intends to add 1,3-butadiene to the list of hazardous air pollutants (EPA 1985b).

1,3-Butadiene levels in the workplace are controlled by the Occupational Safety and Health Administration (OSHA). The previous limit in workplace air was 1,000 ppm, averaged over an 8-hour workday in a 40-hour workweek. However, the National Institute for Occupational Safety and Health (NIOSH) recommended that OSHA consider lowering this limit because 1,3-butadiene has caused cancer in animals. OSHA is in the process of lowering it.

### **1.7 WHERE CAN I GET MORE INFORMATION?**

If you have any more questions or concerns not covered here, 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

This agency can also provide you with information on the location of the nearest occupational and environmental health clinic. Such clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.