

1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about hexachlorobutadiene and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,350 hazardous waste sites as the most serious in the nation. These sites comprise the "National Priorities List" (NPL): Those sites which are targeted for long-term federal cleanup activities. Hexachlorobutadiene has been found in at least 45 of the sites on the NPL. However, the number of NPL sites evaluated for hexachlorobutadiene is not known. As EPA evaluates more sites, the number of sites at which hexachlorobutadiene is found may increase. This information is important because exposure to hexachlorobutadiene may cause harmful health effects and because these sites are potential or actual sources of human exposure to hexachlorobutadiene.

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 can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking substances containing the substance or by skin contact with it.

If you are exposed to a substance such as hexachlorobutadiene, many 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, gender, nutritional status, family traits, life-style, and state of health.

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1.1 WHAT IS HEXACHLOROBUTADIENE?

Hexachlorobutadiene, also known as HCBd, perchlorobutadiene, or Dolen-Pur-, is a colorless liquid. It does not evaporate or burn easily. Hexachlorobutadiene has a turpentine-like odor. Most people will begin to smell a mild to pungent odor if the compound is present in air at 1 part hexachlorobutadiene per million parts of air (ppm). It is not known how it tastes or at what level people can taste it.

Hexachlorobutadiene does not occur naturally in the environment. It is formed during the processing of other chemicals such as tetrachloroethylene, trichloroethylene, and carbon tetrachloride. Hexachlorobutadiene is an intermediate in the manufacture of rubber compounds and lubricants. It is used as a fluid for gyroscopes, a heat transfer liquid, or a hydraulic fluid. Outside of the United States it is used to kill soil pests.

More information on the properties and uses of hexachlorobutadiene is found in Chapters 3 and 4.

1.2 WHAT HAPPENS TO HEXACHLOROBUTADIENE WHEN IT ENTERS THE ENVIRONMENT?

Hexachlorobutadiene is released to the environment in air, water, and soil, mainly as a result of its disposal following industrial use. Most of the hexachlorobutadiene wastes are destroyed by burning; some are released to the air in this process. It is not known what happens to hexachlorobutadiene after it enters the air. Based on the information we have on similar compounds, it may be broken down by sunlight and react with gases in the atmosphere. It is not known what chemicals are formed by these reactions or if the compounds formed are harmful. Based on the properties of similar compounds, one-half of the hexachlorobutadiene in the air is expected to be broken down to other chemicals within 60 days.

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Hexachlorobutadiene may be released to water during disposal of factory waste. It is not known what happens to it in water or how long it remains there. Hexachlorobutadiene that is present in water may pass into the air or soil in small amounts. Small amounts of hexachlorobutadiene may be released to soil as a result of disposal of industrial wastes containing it. It is not known what happens to hexachlorobutadiene after it contacts soil. Because hexachlorobutadiene binds to most soils, it is expected to remain there for some time. The hexachlorobutadiene present in sandy soils may move through the soil to underground water, However, no information was found on how much reaches the underground water or how long it stays in the water. Hexachlorobutadiene can build up in fish and shellfish, where waters are contaminated. It is not known if hexachlorobutadiene builds up in plants.

More information on what happens to hexachlorobutadiene in the environment may be found in Chapters 4 and 5.

1.3 HOW MIGHT I BE EXPOSED TO HEXACHLOROBUTADIENE?

You may be exposed to hexachlorobutadiene by breathing contaminated air, eating contaminated food, drinking contaminated water, or by direct skin contact with this chemical. People working in the industrial facilities where hexachlorobutadiene is formed or used may be exposed. Concentrations found in outside air were 2-3 parts hexachlorobutadiene per trillion parts of air (ppt). Levels were much higher in or near industrial facilities where hexachlorobutadiene is formed or used. One survey detected air concentrations ranging from 22 to 43,000 ppt in a production facility. No information is available on how many workers are potentially exposed to hexachlorobutadiene.

Although hexachlorobutadiene is not very soluble in water, small amounts may be found in some public drinking water (less than 1 part hexachlorobutadiene per billion parts water [ppb]). It may also be found in underground water near hazardous waste sites. Hexachlorobutadiene has no agricultural or food chemical uses in the United States.

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Levels ranging from 0.1 to 4.7 milligrams per kilogram have been found in fish and shellfish because the compound is present in some surface water.

Exposure at waste sites is most likely to occur from the landfill disposal of waste by-products originating from chlorinated hydrocarbon manufacture.

More information on how you may be exposed to hexachlorobutadiene is found in Chapter 5.

1.4 HOW CAN HEXACHLOROBUTADIENE ENTER AND LEAVE MY BODY?

Hexachlorobutadiene may enter your body through the lungs when you breathe air contaminated with it. It also may enter your body if you drink water or eat food contaminated with hexachlorobutadiene. With the exception of fish and shellfish, however, hexachlorobutadiene has not been found in food. The amount of hexachlorobutadiene that enters your body by these routes depends on how much of the chemical you eat or drink.

What happens to hexachlorobutadiene when you breathe vapors of the compound is not known, but it most likely moves across your lungs into your bloodstream. In animal studies, most of the hexachlorobutadiene is changed by the body into more toxic compounds. It is not known how rapidly hexachlorobutadiene and its breakdown products are removed from your body through your urine and feces. Some is expected to remain in your body fat for long periods.

More information on how hexachlorobutadiene enters and leaves the body is given in Chapter 2.

1.5 HOW CAN HEXACHLOROBUTADIENE AFFECT MY HEALTH?

In one study of workers at a solvent production plant who breathed hexachlorobutadiene for long periods, the compound was shown to affect the function of the liver. Because the workers were also exposed to other solvents (carbon tetrachloride and perchloroethylene), it

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is not certain if this effect was caused by hexachlorobutadiene alone. Studies in mice showed that brief exposure to high concentrations of hexachlorobutadiene irritate the nose. The effects of breathing low levels of hexachlorobutadiene are not known.

Ingestion of hexachlorobutadiene damaged the kidneys of rats and mice and, to a lesser extent, the liver of rats. These effects occurred after both short- and long-term exposures at very low dose levels. Young rats were affected more than adult rats. The kidneys of female rats appeared to be affected more than those of males. On the other hand, the liver of male rats was affected, but the liver of female rats was not. It is not clear if the differences between the sexes might be seen in humans. Kidney, brain, and liver damage were also seen in rabbits after contact of their skin with the compound for a short period.

Hexachlorobutadiene decreased fetal body weight in rats, but did not affect fetal development or impair their ability to produce offspring. The lungs, heart, brain, blood, muscles, and skeleton in rats or mice were not damaged after short- or long-term exposure.

Studies in rats indicate that hexachlorobutadiene may increase the risk of kidney cancer if exposures occur for long periods. The International Agency for Research on Cancer (IARC) has determined that hexachlorobutadiene is not classifiable as to its carcinogenicity in humans, but indicated that there was limited evidence that hexachlorobutadiene was carcinogenic in rats. EPA has determined that hexachlorobutadiene is a possible human carcinogen.

1.6 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO HEXACHLOROBUTADIENE?

Exposure to hexachlorobutadiene can be determined by measuring the chemical or its breakdown products in blood, urine, or fat. These tests are not usually performed in most doctors' offices because special equipment is needed. Samples can be collected and sent to special laboratories to determine if you were exposed to hexachlorobutadiene. These tests

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cannot determine how much of the chemical you were exposed to or if adverse health effects will occur as a result of the exposure.

More information on how hexachlorobutadiene can be detected in your body is found in Chapters 2 and 6.

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

The federal government has developed guidelines and standards to protect the public from excess exposure to hexachlorobutadiene. EPA has recommended guidelines on how much hexachlorobutadiene can be present in drinking water for specific periods of time without causing adverse health effects in humans. EPA recommends that exposures in children should not exceed 0.3 milligrams per liter of water (mg/L) for 10-day periods, or 0.1 mg/L for more than 7 years. If adults are exposed for long periods (more than 7 years), EPA recommends that exposure levels should not exceed 0.4 mg/L.

Hexachlorobutadiene has been named a hazardous substance by EPA. If quantities equal to or greater than 1 pound are released to the environment, the National Response Center of the federal government must be notified immediately.

The Occupational Safety and Health Administration (OSHA) recommends that exposure to hexachlorobutadiene not exceed 0.02 ppm for an 8-hour workday over a 40-hour workweek. This limit is not enforced by the federal government, but it is the law in at least 25 states.

The National Institute for Occupational Safety and Health (NIOSH) classifies hexachlorobutadiene as a potential occupational carcinogen. Because there is potential for effects following contact of the chemical with the skin, measures should be taken to minimize skin exposure.

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More information on federal government guidelines and standards on hexachlorobutadiene is found in Chapter 7.

1.8 WHERE CAN I GET MORE INFORMATION?

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

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, E-29
Atlanta, Georgia 30333
(404) 639-6000

This agency can also provide you with information on the location of occupational and environmental health clinics. These clinics specialize in the recognition, evaluation, and treatment of illness resulting from exposure to hazardous substances.

