PUBLIC HEALTH STATEMENT
1,3-Butadiene
CAS # 106-99-0

Division of Toxicology and Human Health Sciences **September 2012**

This Public Health Statement is the summary chapter from the Toxicological Profile for 1,3-butadiene. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-800-232-4636.

This public health statement tells you about 1,3-butadiene and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. 1,3-Butadiene has been found in at least 13 of the 1,699 current or former NPL sites. Because not all NPL sites were tested for 1,3-butadiene, the number of sites where this chemical is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may be harmful.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a 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 the substance, or by skin contact.

If you are exposed to 1,3-butadiene, many factors will determine whether you will 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 any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

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What is 1,3-butadiene?

Description	1,3-Butadiene is a colorless gas with a mild gasoline-like odor.
Uses	About 60% of 1,3-butadiene is used to make man-made rubber, which is then used mostly for car and truck tires. 1,3-Butadiene is also used to make certain types of plastics such as acrylics.

What happens to 1,3-butadiene when it enters the environment?

Sources	Large amounts of 1,3-butadiene are released into the air by industrial sources. Industrial releases to water and soil are relatively low. Automobile exhaust is a constant source of 1,3-butadiene release into the air. Other sources of 1,3-butadiene include cigarette smoke and the smoke of wood fires. Forest fires are considered to be a natural source of 1,3-butadiene in the air.
Break-down	
• ***Air***	Half of the 1,3-butadiene in the air will likely be broken down in about 6 hours.
• ***Water and soil***	1,3-Butadiene that is spilled onto water or soil will likely evaporate quickly into the air based on its physical and chemical properties.

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How might I be exposed to 1,3-butadiene?

Air	The primary way you can be exposed to 1,3-butadiene is by breathing air containing it. Releases of 1,3-butadiene into the air occur from: • vehicle exhaust • tobacco smoke • wood burning • burning of rubber and plastic • forest fires • accidental or intentional release at manufacturing plants The average amount of 1,3-butadiene in the air is between 0.04 and 0.9 parts of 1,3-butadiene per billion parts of air (ppb) in cities and suburban areas.
Workplace air	Workers in the production of rubber, plastics, and resins are likely exposed to higher levels of 1,3-butadiene.
Food and drinking water	1,3-Butadiene has been measured at very low levels in plastic or rubber of food containers, but it has not been found often in food samples. Exposure to 1,3-butadiene through ingestion of food and drinking water is expected to be very low compared to exposure through breathing contaminated air.
Gasoline	People may be exposed to small amounts of 1,3-butadiene if gasoline gets on their skin or by breathing air that contains gasoline fumes.

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How can 1,3-butadiene enter and leave my body?

Enter your body	1,3-Butadiene in air can be absorbed from the lungs and enter the blood stream.
Leave your body	1,3-Butadiene is broken down to other chemicals in the liver. About half of inhaled 1,3-butadiene is broken down and exhaled, while most of the remaining chemical is broken down and excreted in the urine. 1,3-Butadiene typically leaves the body by 10 hours.

How can 1,3-butadiene affect my health?

This section looks at studies concerning potential health effects in animal and human studies.

Noncancer	In laboratory animals, 1,3-butadiene causes inflammation of nasal tissues, changes to lung, heart, and reproductive tissues, neurological effects, and blood changes.
Cancer	Studies of workers exposed to 1,3-butadiene suggest that workers may have an increased risk for cancers of the blood and lymphatic system. Laboratory animals have developed cancer in multiple body tissues after exposure to 1,3-butadiene for 13 weeks or longer. Animals appear to be most sensitive to blood and lymphatic system cancers. The International Agency for Research on Cancer (IARC), National Toxicology Program (NTP), and EPA all classify 1,3-butadiene as a human carcinogen.

How can 1,3-butadiene affect children?

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

Effects in children	It is likely that children would show the same health effects as adults. We do not know whether children are more sensitive to the effects of 1,3-butadiene.
Birth defects	We do not know whether 1,3-butadiene causes birth defects in people. Some studies have found decreases in fetal weight and skeletal defects in laboratory animals exposed to 1,3-butadiene.

How can families reduce the risk of exposure to 1,3-butadiene?

Wood burning	Take precautions to minimize the amount of smoke released into the home during wood burning.
Vehicle engines	Make sure vehicle engines are turned off when in an enclosed space such as a garage.
Vehicle traffic	Minimize time spent near areas of heavy vehicle traffic and avoid living very close to busy roads.
Tobacco smoke	Families can reduce exposure to 1,3-butadiene by avoiding tobacco smoke, particularly indoors.

Is there a medical test to determine whether I have been exposed to 1,3-butadiene?

Development of blood tests	We currently have no reliable medical test to determine if someone has been exposed to 1,3-butadiene. However, scientists are working on tests to show if 1,3-butadiene attaches to compounds in the blood, such as proteins or deoxyribonucleic acid (DNA).

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. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but *cannot* be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National

Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels. These are levels of a toxic substance in air, water, soil, or food that do not exceed a critical value. This critical value is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically 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 1,3-butadiene include the following:

Levels in breathing air set by EPA	EPA has set a reference concentration in breathing air of 0.9 ppb for 1,3-butadiene.
Levels in drinking water set by EPA	EPA has not set levels in drinking water for 1,3-butadiene.
Levels in workplace air set by OSHA	OSHA set a legal limit of 1 ppm for 1,3-butadiene in air averaged over an 8-hour work day.

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 contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

Toxicological profiles are also available on-line at www.atsdr.cdc.gov and on CD-ROM. You may request a copy of the ATSDR ToxProfiles™ CD-ROM by calling the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636), by e-mail at cdcinfo@cdc.gov, or by writing to:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE
Mailstop F-57
Atlanta, GA 30333
Fax: 1-770-488-4178

Organizations for-profit may request copies of final Toxicological Profiles from the following:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000
Web site: http://www.ntis.gov/