

1. PUBLIC HEALTH STATEMENT

This public health statement tells you about di-*n*-butyl phthalate 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. Di-*n*-butyl phthalate has been found in at least 471 of the 1,585 current or former NPL sites. However, the total number of NPL sites evaluated for this substance is not known. As more sites are evaluated, the sites at which di-*n*-butyl phthalate is found may increase. This information is important because exposure to this substance 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 di-*n*-butyl phthalate, 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 DI-*n*-BUTYL PHTHALATE?

Di-*n*-butyl phthalate is an odorless and colorless or faintly yellow oily liquid that does not occur in nature. It is a chemical that is added to hard plastics to make them soft. The plastics that di-*n*-butyl phthalate is used most in are called polyvinyl chloride plastics and nitrocellulose lacquers. These plastics are used to make many products that we use every day such as carpets, paints, glue, insect repellents, hair spray, nail polish, and rocket fuel. In 1994, more than 17 million pounds (i.e., 7.8 million kilograms) of di-*n*-butyl phthalate were made.

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Further information on the properties and uses of di-*n*-butyl phthalate can be found in Chapters 4 and 5.

1.2 WHAT HAPPENS TO DI-*n*-BUTYL PHTHALATE WHEN IT ENTERS THE ENVIRONMENT?

Di-*n*-butyl phthalate enters the environment in many ways. Di-*n*-butyl phthalate is in many items made of plastics such as carpets, paint, and nail polish. When paint dries or new carpets are installed, a small amount of di-*n*-butyl phthalate enters the air. Di-*n*-butyl phthalate also gets into air by sticking to dust particles. In air, di-*n*-butyl phthalate usually breaks down within a few days, but not if it is stuck to dust. When it is on dust, di-*n*-butyl phthalate can move with the wind for many miles before dust drops to the ground. Di-*n*-butyl phthalate can get into soil when people throw out certain plastic items containing di-*n*-butyl phthalate and they get buried. In water and soil, bacteria break down di-*n*-butyl phthalate. This may happen in a day, or may take up to a month. How long it takes to break down di-*n*-butyl phthalate in soil or water depends on many factors. These factors include the outside temperature, because di-*n*-butyl phthalate breaks down more slowly when it is cold than when it is hot. If di-*n*-butyl phthalate does not break down in soil, it can get into groundwater and contaminate wells.

Further information on the uses of di-*n*-butyl phthalate and how it behaves in the environment can be found in Chapters 5 and 6.

1.3 HOW MIGHT I BE EXPOSED TO DI-*n*-BUTYL PHTHALATE?

Because di-*n*-butyl phthalate has so many uses, it is widespread in the environment. Most people are probably exposed to low levels in air. Some people may also be exposed to di-*n*-butyl phthalate in water, food, or both. Most of the time, the largest source of exposure is from air that contains di-*n*-butyl phthalate. Low levels (0.01 parts per billion [ppb]) are present around the globe, and levels of 0.03 to 0.06 ppb are often found in city air. Higher levels can occur temporarily inside homes and offices, especially when products containing di-*n*-butyl phthalate, such as nail polish, are used or when new carpet containing di-*n*-butyl phthalate is installed.

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Di-*n*-butyl phthalate is present in some drinking water supplies, usually at levels of around 0.1 to 0.2 ppb.

Another way you can be exposed is by eating food containing di-*n*-butyl phthalate. Some di-*n*-butyl phthalate in food comes from the materials used to package and store the food. Some comes from di-*n*-butyl phthalate taken up by fish and shellfish. Levels of di-*n*-butyl phthalate in food have been found to range from about 40 to 570 ppb.

The levels of di-*n*-butyl phthalate found in air, water, and food are usually low enough that they are not expected to cause any harmful effects. You can read about this in Section 1.5. If you were exposed to high levels of di-*n*-butyl phthalate, this might be of concern. Exposure to high levels could occur at a number of places. For example, if you live near a factory that makes or uses di-*n*-butyl phthalate, you could be exposed if the factory allowed di-*n*-butyl phthalate to escape into the air that you breathe or into the water that you drink. If the factory spilled or disposed of any di-*n*-butyl phthalate on the ground, you could also be exposed by getting the soil on your skin. You could be exposed to elevated levels of di-*n*-butyl phthalate in these same ways if you live near a chemical waste site that has allowed di-*n*-butyl phthalate to escape into the environment. Di-*n*-butyl phthalate released into the air, water, and soil is also of concern near garbage dumps and landfills. This is because large amounts of products that have di-*n*-butyl phthalate in them are thrown away at these sites, and the di-*n*-butyl phthalate can slowly come out of these products and get into air, water, or soil.

Further information on how you might be exposed to di-*n*-butyl phthalate is given in Chapter 6.

1.4 HOW CAN DI-*n*-BUTYL PHTHALATE ENTER AND LEAVE MY BODY?

If you eat or drink food or water containing di-*n*-butyl phthalate, nearly all of the di-*n*-butyl phthalate rapidly enters your body through the digestive system. If you breathe air containing di-*n*-butyl phthalate, it is likely that most of what you breathe in will enter your body through the lungs, but this has not been studied in detail. Di-*n*-butyl phthalate can also enter the body through the skin, although this occurs rather slowly. Inside the body, di-*n*-butyl phthalate is

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changed into other chemicals. Most of these are quickly removed from the body in the urine. The rest are removed in the feces. Most of the di-*n*-butyl phthalate that enters the body is removed within 24 hours, and virtually all of it is gone by 48 hours after exposure.

More information on how di-*n*-butyl phthalate enters and leaves the body is given in Chapter 3.

1.5 HOW CAN DI-*n*-BUTYL PHTHALATE 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.

Di-*n*-butyl phthalate appears to have relatively low toxicity, and large amounts are needed to cause injury. Adverse effects on humans from exposure to di-*n*-butyl phthalate have not been reported. In animals, eating large amounts of di-*n*-butyl phthalate can affect their ability to reproduce. In male animals, sperm production can decrease after eating large amounts of di-*n*-butyl phthalate. However, when exposure to di-*n*-butyl phthalate stops, sperm production seems to return to near normal levels. The levels of di-*n*-butyl phthalate that cause toxic effects in animals are about 10,000 times higher than the levels of di-*n*-butyl phthalate found in air, food, or water. Exposure to high levels of di-*n*-butyl phthalate might cause similar effects in humans as in animals, but this is not known. In animals, large amounts of di-*n*-butyl phthalate repeatedly applied to the skin for a long time cause mild irritation. Although the available data do not indicate that di-*n*-butyl phthalate causes cancer, this needs to be more thoroughly studied.

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Additional information on the levels of exposure associated with harmful effects of di-*n*-butyl phthalate can be found in Chapters 2 and 3.

1.6 HOW CAN DI-*n*-BUTYL PHTHALATE AFFECT CHILDREN?

This section discusses potential health effects from exposures during the period from conception to maturity at 18 years of age in humans. Potential effects on children resulting from exposures of the parents are also considered.

Very few studies have looked at how di-*n*-butyl phthalate can affect the health of children. It is likely that the health effects seen in children exposed to di-*n*-butyl phthalate will be similar to the effects seen in adults. We do not know whether children differ from adults in their susceptibility to di-*n*-butyl phthalate.

We do not know if exposure to di-*n*-butyl phthalate will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to high levels of di-*n*-butyl phthalate during development. The developing animal is sensitive to di-*n*-butyl phthalate. Death, low body weights, skeletal deformities, cleft palate, and damage to the testes have been observed in the offspring of animals ingesting large amounts of di-*n*-butyl phthalate.

We have no information to suggest that there are any differences between children and adults in terms of how much di-*n*-butyl phthalate will enter the body, where di-*n*-butyl phthalate can be found in the body, and how fast di-*n*-butyl phthalate will leave the body. We do not know if di-*n*-butyl phthalate can be transferred from the mother to an infant in breast milk or whether it can cross the placenta.

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1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO DI-*n*-BUTYL PHTHALATE?

If your doctor finds that you have been exposed to significant amounts of di-*n*-butyl phthalate, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate.

Di-*n*-butyl phthalate is used in many products that are made from plastic. It is also in products like white glues and carpenter's glues made from a plastic known as polyvinyl acetate emulsion. Di-*n*-butyl phthalate is also used in some paints, furniture lacquer, and nail polish. When it is in anything, di-*n*-butyl phthalate is at a higher level when that product is new. There is less in products that are old. Because di-*n*-butyl phthalate may be in some toys, there is a concern that children chewing on such toys might be exposed. No measurements have yet been made to show whether children are exposed in this way.

1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO DI-*n*-BUTYL PHTHALATE?

Tests are available that can detect di-*n*-butyl phthalate in blood and body tissues, and the major breakdown products of di-*n*-butyl phthalate can be measured in urine. However, there is not enough information at this time to use the results of such tests to predict the nature or severity of any health effects that may result from exposure to di-*n*-butyl phthalate. Since special equipment is needed, these tests cannot be performed routinely in your doctor's office.

Further information on how di-*n*-butyl phthalate can be measured in exposed humans is presented in Chapters 3 and 7.

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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 di-*n*-butyl phthalate include the following:

The federal government has developed regulatory standards and advisories to protect individuals from the potential health effects of di-*n*-butyl phthalate in the environment. EPA recommends that levels of di-*n*-butyl phthalate in water not exceed 34 parts per million (34,000 ppb). Any release of di-*n*-butyl phthalate to the environment in excess of 10 pounds must be reported to the federal government. NIOSH has established a limit of 5 milligrams per cubic meter (5 mg/m³) di-*n*-butyl phthalate in workplace air to protect the health of workers.

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Additional information on governmental regulations regarding di-*n*-butyl phthalate can be found in Chapter 8.

1.10 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, Mailstop E-29
Atlanta, GA 30333

* Information line and technical assistance

Phone: 1-888-42-ATSDR (1-888-422-8737)
Fax: (404) 498-0057

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

* To order toxicological profiles, contact

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: (800) 553-6847 or (703) 605-6000