

This fact sheet answers the most frequently asked health questions (FAQs) about boron. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. 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.

**SUMMARY:** Exposure to boron occurs in the workplace or from using certain consumer products. Breathing moderate levels of boron irritates the nose, throat, and eyes. This chemical has been found in at least 142 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

## What is boron?

(Pronounced bôr'ŏn')

Boron is a compound that occurs in nature. It is often found combined with other substances to form compounds called borates. Common borate compounds include boric acid, salts of borates, and boron oxide.

Several companies in the United States produce most of the world's borates by processing boron compounds. Borates are used mostly to produce glass. They are also used in fire retardants, leather tanning industries, cosmetics, photographic materials, soaps and cleaners, and for high-energy fuel. Some pesticides used for cockroach control and some wood preservatives also contain borates.

## What happens to boron when it enters the environment?

- ☐ Boron is released to the environment from natural sources such as oceans, volcanoes, and geothermal steam.
- ☐ Boron is also released from industries that use it.
- ☐ No information is available on how long boron remains in air, water, or soil.
- ☐ Boron does not appear to accumulate in fish or other organisms in water.

- ☐ Boron accumulates in plants and is found in foods, mainly fruits and vegetables.

## How might I be exposed to boron?

- ☐ In air, water, and food at low levels.
- ☐ Drinking water that contains it from areas where boron is found naturally at high levels in the earth.
- ☐ Eating foods containing high levels.
- ☐ Working in borax mining and refining plants and at sites where boric acid is manufactured.
- ☐ Using consumer products that contain it, such as cosmetics and laundry products.

## How can boron affect my health?

There is little information on the health effects of long-term exposure to boron. Most of the studies are on short-term exposures.

Breathing moderate levels of boron can result in irritation of the nose, throat, and eyes. Reproductive effects, such as low sperm count, were seen in men exposed to boron over the long-term. Animal studies have shown effects on the lungs from breathing high levels of boron.

Ingesting large amounts of boron over short periods of time can harm the stomach, intestines, liver, kidney, and

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brain. Animal studies of ingestion of boron found effects on the testes in male animals. Birth defects were also seen in the offspring of female animals exposed during pregnancy.

We don't know what the effects are in people from skin contact with boron. Animal studies have found skin irritation when boron was applied directly to the skin.

### **How likely is boron to cause cancer?**

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified boron as to its human carcinogenicity.

One animal study found no evidence of cancer after lifetime exposure to boric acid in food. No human studies are available.

### **Is there a medical test to show whether I've been exposed to boron?**

Tests are available to measure boron levels in blood and urine. These tests must be done shortly after exposure, because most excess boron leaves the body through the urine within a few days of exposure.

These tests are not usually performed in doctors' offices because special equipment is needed to conduct them. It is not known whether boron levels measured in the body can be used to predict whether health problems will occur.

### **Has the federal government made recommendations to protect human health?**

The EPA allows no more than 30 parts of boron per million parts of cottonseed oil (30 ppm) and 8 ppm of boron in or on citrus fruits.

The EPA requires that discharges or spills into the environment of 100 pounds of more of boron trichloride and boron trifluoride be reported.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 15 milligrams per cubic meter (15 mg/m<sup>3</sup>) for boron oxide dust in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) currently recommends an occupational exposure limit of 10 mg/m<sup>3</sup> for boron oxide dust.

NIOSH also recommends that 25 ppm boron trifluoride be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

The Food and Drug Administration (FDA) allows no more than 310 ppm of boron as a food additive.

### **Glossary**

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

Pesticides: Chemicals used to kill pests.

ppm: Parts per million.

Short-term: Lasting 14 days or less.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for boron. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

