1. PUBLIC HEALTH STATEMENT FOR ANTIMONY AND COMPOUNDS

This Public Health Statement summarizes the Agency for Toxic Substances and Disease Registry’s (ATSDR) findings on antimony, including chemical characteristics, exposure risks, possible health effects from exposure, and ways to limit exposure.

The U.S. 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 sites targeted for long-term federal clean-up activities. The EPA has found antimony and compounds in at least 565 of the 1,832 current or former NPL sites. The total number of NPL sites evaluated for antimony and compounds is not known. But the possibility remains that as more sites are evaluated, the sites where antimony and compounds are found may increase. This information is important because these future sites may be sources of exposure, and exposure to antimony and compounds may be harmful.

If you are exposed to antimony, many factors determine whether you’ll be harmed. These include how much you are exposed to (dose), how long you are exposed (duration), how often you are exposed (frequency), and how you are exposed (route of exposure). You must also consider the other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

WHAT IS ANTIMONY?

Antimony is a silvery white metal of medium hardness that breaks easily. Antimony is usually mixed with other metals such as lead and zinc to form mixtures of metals called alloys. These alloys are used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, type metal, ammunition, and pewter. Antimony trioxide is used in the production of polyethylene terephthalate (PET) water bottles.

WHAT HAPPENS TO ANTIMONY WHEN IT ENTERS THE ENVIRONMENT?

Antimony is found in the earth's crust at about 0.2–0.3 grams per metric ton. Antimony is often found with other metals. Ores containing antimony are mined and then either changed into antimony metal or combined with oxygen to form antimony oxide. Antimony enters the environment during the mining and processing of antimony-containing ores and in the production of antimony metal, alloys, and antimony oxide, and combinations of antimony with other substances. Antimony was mined in the United States; however, the last mine closed in 2001. Impure antimony ore and metal are brought into the United States
from other countries for processing. Small amounts of antimony are released into the environment by
incinerators and coal-burning power plants.

**HOW MIGHT I BE EXPOSED TO ANTIMONY?**

You may be exposed to antimony by breathing air, drinking water, and eating foods that contain it. You
may be exposed by skin contact with soil, water, and other substances that contain antimony. You may
breathe and have skin contact with high levels of antimony in dust if you live or work near antimony
mines or processing companies. Children may also be exposed to antimony by eating dirt.

The amount of antimony in rivers and lakes is very low. The levels are usually less than 1 microgram per
liter (µg/L). Antimony does not appear to accumulate in fish or other aquatic animals. Soil usually
contains very low concentrations of antimony. Soils near mines and other work sites may contain high
levels of antimony.

Food may contain small amounts of antimony. Antimony levels as high as 9.7 µg/L have been reported
in drinking water. Water in PET bottles may contain higher levels of antimony.

You may also be exposed to antimony in the workplace. If you work in industries that process antimony
ore and metal or make chemicals that contain antimony, such as antimony oxide, you may be exposed to
antimony by breathing dust or through skin contact.

For more information on how you may be exposed to antimony, see Chapter 6.

**HOW CAN ANTIMONY ENTER AND LEAVE MY BODY?**

Antimony can enter your body when you drink water or eat food, soil, or other substances that contain
antimony. Antimony can also enter your body if you breathe air or dust containing it. We do not know if
antimony can enter your body through your skin.

When you breathe air containing antimony, antimony particles can be deposited in your lungs. Some of
these particles can be coughed up and swallowed. Small particles deposited deeper in the lungs are likely
to pass through the lining of the lungs and enter the bloodstream. Antimony in your lungs will enter your
blood after several days or weeks, depending on the antimony compound. Less soluble compounds like
antimony trioxide will stay in the lungs longer. A small amount of the antimony that you eat or drink
enters the blood after a few hours. The amount and the form of antimony in the food or water will affect how much antimony enters your blood. The amount of antimony that will enter your blood from your lungs is not known. Antimony in the blood will be distributed throughout the body, with the highest amounts in the blood, spleen, liver, and kidneys. Antimony will leave your body in feces and urine over several weeks.

Further information on how antimony enters and leaves your body is presented in Chapter 3.

**HOW ANTIMONY CAN AFFECT MY HEALTH?**

Antimony in the air can cause lung effects in workers and laboratory animals. Antimony can also cause heart problems. It can damage the heart muscle and cause changes in electrocardiogram (EKG) readings. High levels of antimony in drinking water can cause vomiting and abdominal pain. These effects have also been reported by antimony workers. Stomach ulcers have been seen in animals exposed to antimony in drinking water for several months. Antimony can also cause eye irritation if it gets in the eye.

Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with certain types of parasites. The patients typically receive a number of injections with antimony-containing compounds. Some side effects have been reported, including heart problems, nausea and vomiting, and muscle and joint pain.

Lung cancer has been observed in some studies of workers, and mice breathing high concentrations of antimony. The International Agency for Research on Cancer has determined that antimony trioxide is possibly carcinogenic to humans (group 2B) and antimony trisulfide is not classifiable as to its carcinogenicity (group 3). Antimony has not been classified for cancer effects by the Department of Health and Human Services or the EPA.

More information on how antimony can affect your health is presented in Chapters 2 and 3.

**HOW CAN ANTIMONY AFFECT CHILDREN?**

This section discusses potential health effects of antimony and antimony compounds exposure in humans from when they’re first conceived to 18 years of age.
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We do not know if children would be more susceptible to antimony toxicity than adults. Studies in workers and in rats have shown that antimony can decreases infant growth. There is also limited information suggesting that antimony can damage the developing cardiovascular system in rats.

**HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO ANTIMONY?**

If your doctor finds that you have been exposed to significant amounts of antimony and compounds, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate. You may also contact the state or local health department with health concerns.

Use bottled water if you have concerns about the presence of antimony in your tap water. Prevent children from eating or playing in the dirt if you live near a waste site that has been contaminated with antimony.

**ARE THERE MEDICAL TESTS TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ANTIMONY?**

Antimony levels can be measured in urine, feces, blood, and hair. In the United States, small amounts of antimony are found in the urine of most people. High levels of antimony in the blood or urine can show that you have been recently exposed to higher than normal levels of antimony. Although these tests can show that you have been exposed to higher than normal antimony levels, they cannot be used to predict how much antimony you have been exposed to or whether the exposure will result in an adverse health effect. For more information, see Chapters 3 and 7.

**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 are not enforceable 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 as “not-to-exceed” levels; that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value usually based on levels that affect animals; levels are then adjusted to help protect humans. Sometimes these not-to-exceed levels differ among federal organizations. Different organizations use different exposure times (e.g., an 8-hour workday or a 24-hour day), different animal studies, or emphasize some factors over others, depending on their mission.

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 issued the regulation or recommendation.

EPA has determined that exposure to drinking water containing 0.01 milligrams of antimony per liter (mg/L) is not expected to cause effects that are harmful to children exposed for 1 or 10 days. Lifetime exposure to drinking water containing 0.006 mg/L is not likely to cause adverse health effects.

OSHA has set a limit of 0.5 mg/m³ of antimony in workroom air to protect workers during an 8-hour work shift (40-hour workweek). NIOSH also recommends that the concentration in workroom air be limited to 0.5 mg/m³ for antimony and for stibine (antimony hydride) averaged over an 8-hour work shift. Further information on regulations and guidelines pertaining to antimony is provided in Chapter 8.

WHERE CAN I GET MORE INFORMATION?

If you have any questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below. You may also contact your doctor if experiencing adverse health effects or for medical concerns or questions. ATSDR can also provide publicly available information regarding medical specialists with expertise and experience recognizing, evaluating, treating, and managing patients exposed to hazardous substances.

- Call the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636) or

- Write to:
  Agency for Toxic Substances and Disease Registry
  Division of Toxicology and Human Health Sciences
  1600 Clifton Road NE
  Mailstop F-57
  Atlanta, GA 30329-4027
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Toxicological profiles and other information are available on ATSDR’s web site: http://www.atsdr.cdc.gov.