

## 1. PUBLIC HEALTH STATEMENT

This Statement was prepared to give you information about antimony and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). Antimony and its compounds have been found at 52 of these sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for antimony. As EPA evaluates more sites, the number of sites at which antimony and its compounds are found may change. The information is important for you because antimony may cause harmful health effects and because these sites are potential or actual sources of human exposure to antimony.

When a chemical 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 as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous substance such as antimony, several 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, sex, nutritional status, family traits, life style, and state of health.

### 1.1 WHAT IS ANTIMONY?

Antimony is a silvery white metal of medium hardness that breaks easily. Small amounts of antimony are found in the earth's crust. Antimony ores are mined and then either changed into antimony metal or combined with oxygen to form antimony oxide.

Antimony oxide is a white powder that does not evaporate. Only a small amount of it will dissolve in water. Most antimony oxide produced is added to textiles and plastics to prevent their catching on fire.

Antimony metal is too easily broken to be used much by itself. To make it stronger, a little 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 enters the environment during the mining and processing of its ores and in the production of antimony metal, alloys, antimony oxide, and

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combinations of antimony with other substances. Little or no antimony is mined in the United States, Antimony ore and impure metals are brought into this country from other countries for processing. Small amounts of antimony are also released into the environment by incinerators and coal-burning power plants. The antimony that comes out of the smoke stacks of these plants is attached to very small particles that settle to the ground or are washed out of the air by rain. It usually takes many days for antimony to be removed from the air. Antimony attached to very small particles may stay in the air for more than a month. Antimony cannot be destroyed in the environment. It can only change its form or become attached to or separated from particles. Most antimony will end up in the soil or sediment, where it attaches strongly to particles that contain iron, manganese, or aluminum. For more information, see Chapters 3, 4, and 5.

### 1.2 HOW HIGH I BE EXPOSED TO ANTIMONY?

Antimony is found at very low levels in the environment, so low that we often cannot measure it. You may be exposed to antimony by breathing air, drinking water, and eating foods that contain it. You also may be exposed by skin contact with soil, water, and other substances that contain antimony. The analytical methods used by scientists testing for the presence of antimony in the environment do not determine the specific form of antimony present. Therefore, we do not always know what form of antimony persons may be exposed to. Similarly, we do not know what forms of antimony are found in hazardous waste sites. Much of the antimony found in sediment, soil, and rock is so strongly attached to dust and dirt or buried in minerals that it cannot easily affect your health. Some antimony in the environment is less tightly attached to particles and may be taken up by plants and animals.

The concentration of antimony in air ranges from a very small part of a nanogram (1 nanogram equals a billionth of a gram) in a cubic meter ( $m^3$ ) of air ( $ng/m^3$ ) to about 170  $ng/m^3$ . However, near companies that change antimony ores into metal or make antimony oxide, concentrations may be more than 1,000  $ng/m^3$ . You may breathe high levels of antimony in dust if you live or work near antimony mines or processing companies.

The concentration of antimony that is dissolved in rivers and lakes is very low, usually less than 5 parts of antimony in 1 billion parts of water (ppb). We cannot measure such small amounts without special equipment. Antimony does not appear to accumulate in fish and other aquatic animals. The concentration of antimony dissolved in one polluted river where wastes from antimony mining and processing had been dumped was as high as 8 ppb. Most of the antimony in the river, however, was not dissolved, but was attached to particles of dirt. Although antimony is used in solder for water pipes, it does not seem to get into the drinking water.

Soil usually contains very low concentrations of antimony, less than 1 part of antimony in a million parts of soil (ppm). However, concentrations

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close to 9 ppm have been found. The highest soil concentrations found at hazardous waste sites on the NPL and at antimony-processing sites range from 109 to 2,550 ppm. High concentrations of antimony may be found in soil because dust sent out during processing settles out from the air. Also, waste from antimony-processing and other antimony-using industries is usually dumped onto the soil. We do not know the form of antimony at these sites. However, we know that much of the antimony in antimony-processing wastes is strongly attached to soil. You may be exposed to this antimony by skin contact. Children may also be exposed to this antimony by eating the dirt.

Food usually contains small amounts of antimony. You eat and drink about 5 micrograms (5 millionths of a gram) of antimony every day. The average concentration of antimony in meats, vegetables, and seafood is 0.2-1.1 ppb. The antimony oxide that is added to many materials for fire protection is very tightly attached to these materials and does not expose people to 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 by skin contact.

For more information on how you may be exposed to antimony, see Chapter 5.

### 1.3 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 antimony. We do not know if antimony can enter your body when it is placed on your skin.

A small amount of the antimony 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. After you eat or drink very large doses of antimony, you may vomit. This will prevent most of the antimony from entering through the stomach and intestines into your blood. Antimony in your lungs will enter your blood after several days or weeks. The amount of antimony that will enter your blood from your lungs is not known.

After antimony enters your blood, it goes to many parts of your body. Most of the antimony goes to the liver, lungs, intestines, and spleen. 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 2.

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### 1.4 HOW CAN ANTIMONY AFFECT MY HEALTH?

Exposure to 9 milligrams per cubic meter of air ( $\text{mg}/\text{m}^3$ ) of antimony for a long time can irritate your eyes, skin, and lungs. Breathing  $2 \text{ mg}/\text{m}^3$  of antimony for a long time can cause problems with the lungs (pneumoconiosis) heart problems (altered electrocardiograms), stomach pain, diarrhea, vomiting and stomach ulcers. People who drank over 19 ppm of antimony once, vomited. We do not know what other health effects would occur to people who swallow antimony. We do not know if antimony can cause cancer or birth defects, or affect reproduction in humans. Antimony can have beneficial effects when used for medical reasons, It has been used as a medicine to treat people infected with parasites. Persons who have had too much of this medicine or are sensitive to it when it was injected into their blood or muscle have experienced adverse health effects. These health effects include diarrhea, joint and/or muscle pain, vomiting, problems with the blood (anemia) and heart problems (altered electrocardiograms).

Rats and guinea pigs that breathed very high levels of antimony for a short time died. Rats breathing high levels of antimony for several days had lung, heart, liver, and kidney damage. Breathing very low levels of antimony for a long time has resulted in eye irritation, hair loss, and lung damage in rats. Dogs and rats that breathed low levels of antimony for a long period had heart problems (changes in EKGs). Problems with fertility have been observed in rats that breathed very high levels of antimony for a couple of months. Lung cancer has been observed in some studies of rats breathing high concentrations of antimony. Antimony has not been classified for cancer effects by the Department of Health and Human Services, the International Agency for Research on Cancer or the Environmental Protection Agency.

Dogs that drank very high levels of antimony for several weeks lost weight and had diarrhea. Rats that drank very low levels of antimony for most of their lives died sooner than rats not drinking antimony. Rats eating high levels of antimony for a long time had liver damage and fewer red blood cells.

Rabbits that had very small amounts of antimony placed on their skin for less than 1 day had skin irritation. Small amounts of antimony placed in rabbit eyes resulted in eye irritation. Large amounts of antimony placed on rabbit's skin resulted in death.

More information on how antimony can affect your health is presented in Chapter 2.

### 1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ANTIMONY?

There are reliable and accurate ways of measuring antimony levels in the body. Antimony can be measured in the urine, feces, and blood for several days after exposure. High levels of antimony in these fluids will show that

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you have been exposed to high levels of antimony. However, these measurements can not tell you how much antimony you have been exposed to or whether you will experience any health effects. For more information, see Chapters 2 and 6.

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

EPA has set a limit of 145 ppb in lakes and streams to protect human health from the harmful effects of antimony taken in through water and contaminated fish and shellfish. EPA has also set limits on the amount of antimony that industry can release.

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.5 mg/m<sup>3</sup> of antimony in workroom air to protect workers during an 8-hour work shift (40-hour workweek). The National Institute of Occupational Safety and Health (NIOSH) also recommends that the concentration in workroom air be limited to 0.5 mg/m<sup>3</sup> for antimony, averaged over an 8-hour work shift. Further information on regulations and guidelines pertaining to antimony is provided in Chapter 7.

### 1.7 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns not covered here, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry  
Division of Toxicology  
1600 Clifton Road, E-29  
Atlanta, Georgia 30333

This agency can also provide you with information on the location of the nearest occupational and environmental health clinic. Such clinics specialize in recognizing, evaluating, and treating illnesses that result from exposure to hazardous substances.

