

1. PUBLIC HEALTH STATEMENT

This public health statement tells you about lead 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. Lead has been found in at least 1,026 of the 1,467 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 lead 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 result in 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 lead, 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 LEAD?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no characteristic taste or smell. Metallic lead does not dissolve in water and does not burn. Lead can combine with other chemicals to form what are usually known as lead compounds or lead salts. Some lead salts dissolve in water better than others. Some natural and manufactured substances contain lead but do not look like lead in its metallic form. Some of these substances can burn—for example, organic lead compounds in some gasolines.

1. PUBLIC HEALTH STATEMENT

Lead has many different uses. Its most important use is in the production of some types of batteries. It is also used in the production of ammunition, in some kinds of metal products (such as sheet lead, solder, some brass and bronze products, and pipes), and in ceramic glazes. Some chemicals containing lead, such as tetraethyl lead and tetramethyl lead, were once used as gasoline additives to increase octane rating. However, their use was phased out in the 1980s, and lead was banned for use in gasoline for transportation beginning January 1, 1996. Other chemicals containing lead are used in paint. The amount of lead added to paints and ceramic products, caulking, gasoline, and solder has also been reduced in recent years to minimize lead's harmful effects on people and animals. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. Lead is used in a large variety of medical equipment (radiation shields for protection against X-rays, electronic ceramic parts of ultrasound machines, intravenous pumps, fetal monitors, and surgical equipment). Lead is also used in scientific equipment (circuit boards for computers and other electronic circuitry) and military equipment (jet turbine engine blades, military tracking systems).

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Human activities (such as the former use of "leaded" gasoline) have spread lead and substances that contain lead to all parts of the environment. For example, lead is in air, drinking water, rivers, lakes, oceans, dust, and soil. Lead is also in plants and animals that people may eat. See Chapter 3 for more information on the physical and chemical properties of lead. Chapter 4 contains more information on the production and use of lead.

1.2 WHAT HAPPENS TO LEAD WHEN IT ENTERS THE ENVIRONMENT?

Lead occurs naturally in the environment. However, most of the high levels found throughout the environment come from human activities. Before the use of leaded gasoline was banned, most of the lead released into the U.S. environment came from car exhaust. In 1979, cars released 94.6 million kilograms (kg; 1 kg equals 2.2 pounds) of lead into the air in the United States. In 1989, when the use of lead was limited but not banned, cars released only 2.2 million kg to the air. Since EPA banned the use of leaded gasoline for highway transportation in 1996, the amount of

1. PUBLIC HEALTH STATEMENT

lead released into the air has decreased further. Other sources of lead released to the air include burning fuel, such as coal or oil, industrial processes, and burning solid waste. Once lead goes into the atmosphere, it may travel thousands of miles if the lead particles are small or if the lead compounds easily evaporate. Lead is removed from the air by rain and by particles falling to the ground or into surface water.

The release of lead to air is now less than the release of lead to land. Most of the lead in inner city soils comes from old houses painted with paint containing lead and previous automotive exhaust emitted when gasoline contained lead. Landfills may contain waste from lead ore mining, ammunition manufacturing, or other industrial activities such as battery production.

Sources of lead in dust and soil include lead that falls to the ground from the air, and weathering and chipping of lead-based paint from buildings and other structures. Lead in dust may also come from windblown soil. Disposal of lead in municipal and hazardous waste dump sites may also add lead to soil. Mining wastes that have been used for sandlots, driveways, and roadbeds can also be sources of lead.

Higher levels of lead in soil can be measured near roadways. This accumulation came from car exhaust in the past. Once lead falls onto soil, it usually sticks to soil particles. Small amounts of lead may enter rivers, lakes, and streams when soil particles are moved by rainwater. Lead may remain stuck to soil particles in water for many years. Movement of lead from soil particles into underground water or drinking water is unlikely unless the water is acidic or "soft." Movement of lead from soil will also depend on the type of lead salt or compound and on the physical and chemical characteristics of the soil.

Sources of lead in surface water or sediment include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (primarily iron and steel industries and lead producers), urban runoff, and mining piles.

1. PUBLIC HEALTH STATEMENT

Some of the chemicals that contain lead are broken down by sunlight, air, and water to other forms of lead. Lead compounds in water may combine with different chemicals depending on the acidity and temperature of the water. Lead itself cannot be broken down.

The levels of lead may build up in plants and animals from areas where air, water, or soil are contaminated with lead. If animals eat contaminated plants or animals, most of the lead that they eat will pass through their bodies. Chapters 4 and 5 contain more information about what happens to lead in the environment.

1.3 HOW MIGHT I BE EXPOSED TO LEAD?

People living near hazardous waste sites may be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing or touching dust or dirt that contains lead. For people who do not live near hazardous waste sites, exposure to lead may occur in several ways: (1) by eating foods or drinking water that contain lead, (2) by spending time in areas where leaded paints have been used and are deteriorating, (3) by working in jobs where lead is used, (4) by using health-care products or folk remedies that contain lead, and (5) by having hobbies in which lead may be used such as sculpturing (lead solder) and staining glass.

Foods such as fruits, vegetables, meats, grains, seafood, soft drinks, and wine may have lead in them. Cigarette smoke also contains small amounts of lead. Lead gets into food from water during cooking and into foods and beverages from dust that contains lead falling onto crops, from plants absorbing lead that is in the soil, and from dust that contains lead falling onto food during processing. Lead may also enter foods if they are put into improperly glazed pottery or ceramic dishes and from leaded-crystal glassware. Illegal whiskey made using stills that contain lead-soldered parts (such as truck radiators) may also contain lead. The amount of lead found in canned foods decreased 87% from 1980 to 1988, which indicates that the chance of exposure to lead in canned food from lead-soldered containers has been greatly reduced. Lead may also be released from soldered joints in kettles used to boil water for beverages.

1. PUBLIC HEALTH STATEMENT

In general, very little lead is found in lakes, rivers, or groundwater used to supply the public with drinking water. More than 99% of all publicly supplied drinking water contains less than 0.005 parts of lead per million parts of water (ppm). However, the amount of lead taken into your body through drinking water can be higher in communities with acidic water supplies. Acidic water makes it easier for the lead found in pipes, leaded solder, and brass faucets to enter water. Public water treatment systems are now required to use control measures to make water less acidic. Sources of lead in drinking water include lead that can come out of lead pipes, faucets, and leaded solder used in plumbing. Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than twenty years old.

Breathing in or swallowing airborne dust and dirt that have lead in them is another way you can be exposed. In 1984, burning leaded gasoline was the single largest source of lead emissions. Very little lead in the air comes from gasoline now because EPA has banned its use in gasoline. Other sources of lead in the air include releases to the air from industries involved in iron and steel production, lead-acid-battery manufacturing, and non-ferrous (brass and bronze) foundries. Lead released into air may also come from burning of solid lead-containing waste, windblown dust, volcanoes, exhaust from workroom air, burning or weathering of lead-painted surfaces, fumes from leaded gasoline, and cigarette smoke.

Skin contact with dust and dirt containing lead occurs every day. Some cosmetics and hair dyes contain lead compounds. However, not much lead can get into your body through your skin. Leaded gasoline contains a lead compound that may be quickly absorbed.

In the home, you or your children may be exposed to lead if you take some types of home remedy medicines that contain lead compounds. Lead compounds are in some non-Western cosmetics, such as surma and kohl. Some types of hair colorants and dyes contain lead acetate. Read the labels on hair coloring products, use them with caution, and keep them away from children.

1. PUBLIC HEALTH STATEMENT

People who are exposed at work are usually exposed by breathing in air that contains lead particles. Exposure to lead occurs in many jobs. People who work in lead smelting and refining industries, brass/bronze foundries, rubber products and plastics industries, soldering, steel welding and cutting operations, battery manufacturing plants, and lead compound manufacturing industries may be exposed to lead. Construction workers and people who work at municipal waste incinerators, pottery and ceramics industries, radiator repair shops, and other industries that use lead solder may also be exposed. Between 0.5 and 1.5 million workers are exposed to lead in the workplace. In California alone, more than 200,000 workers are exposed to lead. Families of workers may be exposed to higher levels of lead when workers bring home lead dust on their work clothes.

You may also be exposed to lead in the home if you work with stained glass as a hobby, make lead fishing weights or ammunition, or if you are involved in home renovation that involves the removal of old lead-based paint. Chapter 5 contains further information on sources of exposure to lead.

1.4 HOW CAN LEAD ENTER AND LEAVE MY BODY?

Some of the lead that enters your body comes from breathing in dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

You may swallow lead by eating food and drinking liquids that contain it, and also by swallowing large particles (diameter greater than 5 micrometers; 1 micrometer is one millionth of a meter). Most of the lead that enters your body comes through swallowing, even though very little of the amount you swallow actually enters your blood and other parts of your body. In addition to the lead that may be present in food and drink, accidental ingestion of lead may occur due to skin contamination while eating, drinking, smoking, or applying cosmetics (including lip balm). The amount that gets into your body from your stomach partially depends on when you ate your last meal. It also depends on how old you are and how well the lead particles you ate dissolved in your stomach juices. Experiments using adult volunteers showed that, for adults who had just

1. PUBLIC HEALTH STATEMENT

eaten, the amount of lead that got into the blood from the stomach was only about 6% of the total amount taken in. In adults who had not eaten for a day, about 60–80% of the lead from the stomach got into their blood. In general, if adults and children swallow the same amount of lead, a bigger proportion of the amount swallowed will enter the blood in children than in adults.

Dust and soil that contain lead may get on your skin, but only a small portion of the lead will pass through your skin and enter your blood if it is not washed off. More lead can pass through skin that has been damaged (for example by scrapes, scratches, and wounds). The only kinds of lead compounds that easily penetrate the skin are the additives in leaded gasoline, which is no longer sold to the general public. Therefore, the general public is not likely to encounter lead that can enter through the skin.

Shortly after lead gets into your body, it travels in the blood to the "soft tissues" (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks, most of the lead moves into your bones and teeth. In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth. About 73% of the lead in children's bodies is stored in their bones. Some of the lead can stay in your bones for decades; however, some lead can leave your bones and reenter your blood and organs under certain circumstances, for example, during pregnancy and periods of breast feeding, after a bone is broken, and during advancing age.

Your body does not change lead into any other form. Once it is taken in and distributed to your organs, the lead that is not stored in your bones leaves your body in your urine or your feces. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of weeks, but only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, notably bone. For more information on how lead can enter and leave your body, please refer to Chapter 2.

1. PUBLIC HEALTH STATEMENT

1.5 HOW CAN LEAD AFFECT MY HEALTH?

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and in children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Some studies in humans have suggested that lead exposure may increase blood pressure, but the evidence is inconclusive. Lead exposure may also cause anemia, a low number of blood cells. The connection between the occurrence of some of these effects (e.g., increased blood pressure, altered function of the nervous system) and low levels of exposure to lead is not certain. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

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.

We have no proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice given large doses of lead. The animal studies have been criticized because of the very high doses used, among other things. The results of high-dose studies should not be used to predict whether lead may cause cancer in humans. The Department of Health and Human Services (DHHS) has determined that lead acetate and lead phosphate may reasonably be expected to be

1. PUBLIC HEALTH STATEMENT

capable of causing cancer, based on sufficient evidence from animal studies, but there is inadequate evidence from human studies. See Chapter 2 for more information on the health effects of lead.

1.6 HOW CAN LEAD 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.

Studies carried out by the Center for Disease Control and Prevention (CDC) show that the levels of lead in the blood of U.S. children have been getting lower and lower. This is because lead is banned from gasoline, residential paint, and solder that is used for food cans and water pipes. Still, about 900,000 U.S. children between the ages of 1 and 5 years are believed to have blood lead levels equal or greater than 10 $\mu\text{g}/\text{dL}$, the CDC level of concern.

Children are more vulnerable to lead poisoning than adults. Children are exposed to lead all through their lives. They can be exposed to lead in the womb if their mothers have lead in their bodies. Babies can swallow lead when they breast feed, or eat other foods and drink water that contains lead. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. These activities make it easier for children to be exposed to lead than adults. The dirt or dust on their hands, toys, and other items may have lead particles in it. In some cases children swallow nonfood items such as paint chips; these may contain very large amounts of lead, particularly in and around older houses that were painted with lead-based paint. The paint in these houses often chips off and mixes with dust and dirt. Some old paint is 5–40% lead. Also, compared to adults, a bigger proportion of the amount of lead swallowed will enter the blood in children.

Children are more sensitive to the effects of lead than adults. Lead affects children in different ways depending how much lead a child swallows. A child who swallows large amounts of lead

1. PUBLIC HEALTH STATEMENT

may develop blood anemia, kidney damage, colic (severe “stomachache”), muscle weakness, and brain damage which can kill the child. A large amount of lead might get into a child’s body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. In this case, recovery is likely once the child is removed from the source of lead exposure. In some cases, the amount of lead in the child’s body can be lowered by giving the child certain drugs that help eliminate lead from the body. At still lower levels of exposure, lead can affect a child’s mental and physical growth. Fetuses exposed to lead in the womb, because their mothers had a lot of lead in their bodies, may be born prematurely and have lower weights at birth. Exposure in the womb, in infancy, or in early childhood may also slow mental development and lower intelligence later in childhood. There is evidence that some effects may persist beyond childhood.

Health workers can find out whether a child may have been exposed to harmful levels of lead by taking a blood sample. They can also find out how much lead is in a child’s bones by taking a special type of X-ray of the finger, knee, or elbow. This, however, is not a routine type of test.

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO LEAD?

If your doctor finds that you have been exposed to significant amounts of lead, ask your doctor if children may also be exposed. When necessary your doctor may need to ask your state public health department to investigate.

The most important way families can lower exposures to lead is to know about the sources of lead in their homes and avoid exposure to these sources. Some homes or day-care facilities may have more lead in them than others. Families who live in or visit these places may be exposed to higher amounts of lead. These include homes built before 1978 that may have been painted with paint that contains lead (lead-based paint). If you are buying a home that was built before 1978, you may want to know if it contains lead based paint. Federal government regulations require a person selling a home to tell the real estate agent or person buying the home of any known lead-based hazards on the property. Adding lead to paint is no longer allowed. If your house was built

1. PUBLIC HEALTH STATEMENT

before 1978, it may have been painted with lead-based paint. This lead may still be on walls, floors, ceilings, and window sills, or on the outside walls of the house. The paint may have been scraped off by a previous owner, and the paint chips and dust may still be in the yard soil. In some states, homeowners can have the paint in their homes tested for lead by their local health departments. Families can lower the possibility of children swallowing paint chips by not allowing their children to chew or mouth these painted surfaces and be sure they wash their hands often, especially before eating. Families can also have a professional lead paint removal expert remove and dispose of peeling or flaking paint or painted surfaces, and repaint the surface. Using heat guns or dry scrapping of old lead containing paint during home reconstruction and remodeling can be a substantial source of lead exposure to children. Surfaces should be tested before such activities, and professional home repair personnel should be consulted to make sure that safe procedures are used and removed materials and dust are contained in order to keep exposures to children to a minimum. These repairs should not be made by homeowners themselves, unless they consult with a professional to get the information they need to prevent the possibility of lead poisoning during or after the repairs.

Older homes that have plumbing with lead or lead solder may have higher amounts of lead in drinking water. You cannot see, taste, or smell lead in water, and boiling your water will not get rid of lead. Running your water for 15 to 30 seconds before drinking or cooking with it will get rid of lead that may leach out from the pipes, especially if you have not used your water for a while, for example, overnight. You can contact your local health department or water supplier to find out about testing your water for lead.

You can bring lead home in the dust on your hands or clothes if lead is used in the place where you work. Lead dust is likely to be found in places where lead is mined or smelted, where car batteries are made or recycled, where electric cable sheathing is made, where fine crystal glass is made, or where certain types of ceramic pottery are made. Pets can also bring lead into the home in dust or dirt on their fur or feet if they spend time in places that have high levels of lead in the soil.

1. PUBLIC HEALTH STATEMENT

Lead may be taken up in edible plants from the soil by the roots; therefore, home gardening may also contribute to exposure if the produce is grown in soils that have high lead concentrations. Certain hobbies and home or car repair activities like radiator repair can add lead to the home as well. These include soldering glass or metal, making bullets or slugs, or glazing pottery. Some non-Western “folk remedies” contain lead. Examples of these include greta and azarcon used to treat diarrhea.

Some types of paints and pigments that are used as facial make-up or hair coloring contain lead. Cosmetics that contain lead include surma and kohl, which are popular in certain Asian countries. Read the labels on hair coloring products, and keep hair dyes that contain lead acetate away from children. Do not allow children to touch hair that has been colored with lead-containing dyes or any surfaces that have come into contact with these dyes because lead compounds can rub off onto their hands and be transferred to their mouths.

Swallowing of lead in house dust or soil is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dusts and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked in soil. Door mats can help lower the amount of soil that is tracked into the home; removing your shoes before will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home.

Families whose members are exposed to lead dusts at work can keep these dusts out of reach of children by showering and changing clothes before leaving work, and bagging their work clothes before they are brought into the home for cleaning. Proper ventilation and cleaning—during and after hobby activities, home or auto repair activities, and hair coloring with products that contain lead—will decrease the possibility of exposure.

1. PUBLIC HEALTH STATEMENT

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

You can find out whether your child may have been exposed to lead by having your doctor take a blood sample.

1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO LEAD?

The amount of total lead in the blood can be measured to determine if exposure to lead has occurred. This test can tell if you have been recently exposed to lead. Lead can be measured lead in teeth or bones by X-ray techniques, but these methods are not widely available. These tests tell about long-term exposures to lead. Exposure to lead can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\mu\text{g}/\text{dL}$). For this reason, the primary screening method is measurement of blood lead. For more information on tests to measure lead in the body, see Chapters 2 and 6.

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

1. PUBLIC HEALTH STATEMENT

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 lead include the following:

CDC recommends that states develop a plan to find children who may be exposed to lead and have their blood tested for lead. They make basic recommendations for states to follow. These include testing children at ages 1 and 2. Children who are 3 to 6 years old should be tested if they have never been tested for lead before and they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants and Children (WIC); if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; or if they have a brother, sister, or playmate who has had lead poisoning.

CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 $\mu\text{g}/\text{dL}$. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal or greater than 20 $\mu\text{g}/\text{dL}$. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 $\mu\text{g}/\text{dL}$.

EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) averaged over 3 months. EPA regulations no longer

1. PUBLIC HEALTH STATEMENT

allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

EPA regulations also limit lead in drinking water to 0.015 milligrams per liter (mg/L). The 1988 Lead Contamination Control Act requires the Consumer Product Safety Commission (CPSC), EPA, and the states to recall or repair water coolers containing lead. This law also requires new coolers to be lead-free. In addition, drinking water in schools must be tested for lead, and the sources of lead in this water must be removed.

To help protect small children, CPSC requires that the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The Department of Housing and Urban Development (HUD) develops recommendations and regulations to prevent exposure to lead. HUD requires that federally funded housing and renovations, public housing, and Indian housing be tested for lead-based paint hazards and that such hazards be fixed by covering the paint or removing it. When determining whether lead-based paint applied to interior or exterior painted surfaces of dwellings should be removed, the standard used by EPA and HUD is that paint with a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm^2) of surface area should be removed or otherwise treated. HUD is carrying out demonstration projects to determine the best ways of covering or removing lead-based paint in housing.

EPA has developed standards for lead paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including <http://www.epa.gov/opptintr/lead>.

1. PUBLIC HEALTH STATEMENT

OSHA regulations limit the concentration of lead in workroom air to 50 $\mu\text{g}/\text{m}^3$ for an 8-hour workday. If a worker has a blood lead level of 50 $\mu\text{g}/\text{dL}$, then OSHA requires that worker be removed from the workroom where lead exposure is occurring.

FDA includes lead on its list of poisonous and deleterious substances. FDA considers foods packaged in cans containing lead solders to be adulterated. Tin-coated lead foil has been used as a covering applied over the cork and neck areas of wine bottles for decorative purposes and to prevent insect infestations. Because it can be reasonably expected that lead could become a component of the wine, the use of these capsules is also a violation of the Federal Food, Drug, and Cosmetic Act. FDA has reviewed several direct human food ingredients and has determined them to be “generally recognized as safe” when used in accordance with current good manufacturing practices. Some of these ingredients contain allowable lead concentrations that range from 0.1 to 10 parts per million (ppm).

Please see Chapter 7 for more information on federal and state regulations and guidelines for lead.

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) 639-6315 or 6324

1. PUBLIC HEALTH STATEMENT

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

