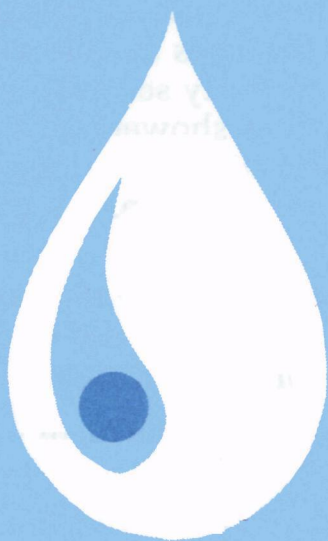
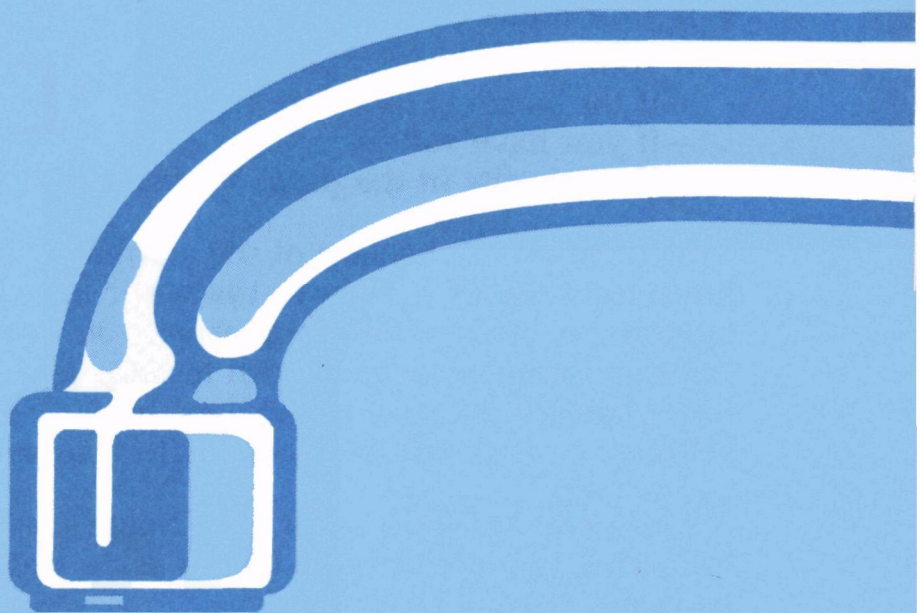


# *Lead And Your Drinking Water*



United States  
Environmental Protection  
Agency

Office of Water  
April 1987  
OPA-87-006

## **The water you drink may have high concentrations of lead.**

### THE FACTS ARE:

**T**oo much lead in the human body can cause serious damage to the brain, kidneys, nervous system, and red blood cells.

You have the greatest risk, even with short-term exposure, if:

- you are a young child, or
- you are pregnant.

**L**ead levels in your drinking water are likely to be highest:

- if your home or water system has lead pipes, or
- if your home has copper pipes with lead solder, and
  - if the home is less than five years old, or
  - if you have soft water, or
  - if water sits in the pipes for several hours.

**T**he only way to be sure of the amount of lead **in your household water** is to have the water tested by a competent laboratory. Your water supplier may be able to offer information or assistance with testing. Testing is especially important for apartment dwellers, because flushing may not be effective in high-rise buildings with lead-soldered central piping.

**W**hile you are waiting for your home's test results, take the following two precautions before using water for drinking or cooking:

- **Anytime the water in a particular faucet has not been used for six hours or longer, "flush" your cold-water pipes by running the water until it becomes as cold as it will get.** (This could take as little as five to thirty seconds if there has been recent heavy water use such as showering or toilet flushing. Otherwise, it could take two minutes or longer.) The more time water has been sitting in your home's pipes, the more lead it may contain.
- **Use *only* water from the cold-water tap for drinking, cooking, and especially for making baby formula.** Hot water is likely to contain higher levels of lead.

The two actions recommended above are very important to the health of your family. They will probably be effective in reducing lead levels because most of the lead in household water usually comes from the plumbing in your house, not from the local water supply.

For more details on the problem of lead in drinking water and what you can do about it, read the questions and answers in the remainder of this booklet. *Your local or state department of health or environment might be able to provide additional information.*

**Q Why is lead a problem?**

**A** Although it has been used in numerous consumer products, lead is a toxic metal now known to be harmful to human health if inhaled or ingested. Important sources of lead exposure include: ambient air, soil and dust (both inside and outside the home), food (which can be contaminated by lead in the air or in food containers), and water (from the corrosion of plumbing). On average, it is estimated that lead in drinking water contributes between 10 and 20 percent of total lead exposure in young children. In the last few years, federal controls on lead in gasoline have significantly reduced people's exposure to lead.

The degree of harm depends upon the level of exposure (from all sources). Known effects of exposure to lead range from subtle biochemical changes at low levels of exposure, to severe neurological and toxic effects or even death at extremely high levels.

**Q Does lead affect everyone equally?**

**A** Young children, infants, and fetuses appear to be particularly

vulnerable to lead poisoning. A dose of lead that would have little effect on an adult can have a big effect on a small body. Also, growing children will more rapidly absorb any lead they consume. A child's mental and physical development can be irreversibly stunted by over-exposure to lead. In infants, whose diet consists of liquids made with water—such as baby formula—lead in drinking water makes up an even greater proportion of total lead exposure (40 to 60 percent).

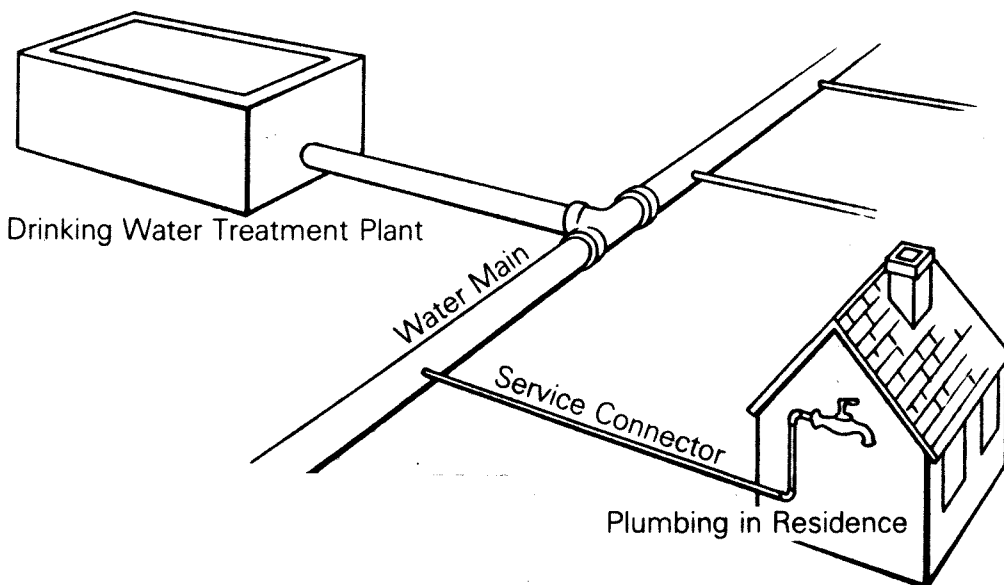


**Q How could lead get into my drinking water?**

**A** Typically, lead gets into your water after the water leaves your local treatment plant or your well. That is, the source of lead in your home's water is most likely pipe or solder in your home's own plumbing.

The most common cause is corrosion, a reaction between the water and the lead pipes or solder. "Soft" water (which lathers soap easily) is a common cause of corrosion. All kinds of water,

## Drinking Water Supply System



however, may have high levels of lead.

One factor that increases corrosion is the practice of grounding electrical equipment (such as telephones) to water pipes. Any electric current traveling through the ground wire will accelerate the corrosion of lead in the pipes. (Nevertheless, wires **should not be removed** from pipes unless a qualified electrician installs an adequate alternative grounding system.)

**Q Does my home's age make a difference?**

**A** Lead-contaminated drinking water is most often a problem in houses that are either very old or very new.

Up through the early 1900's, it was common practice, in some areas of the country, to use lead pipes for interior plumbing. Also, lead piping was often used for the service connections that join residences to public water supplies. (This practice ended only recently in some localities.) Plumbing installed before 1930 is most likely to contain lead. Copper pipes have replaced lead pipes in most residential plumbing. However, the use of lead solder with copper pipes is widespread. Experts regard this lead solder as the major cause of lead contamination of household water in U.S. homes today.

Scientific data indicate that the newer the home, the greater the risk of lead contamination. Lead levels decrease as a building ages. This is because, as time passes, mineral deposits form a coating on the inside of the pipes (if the water is not too corrosive). This coating insulates the water from the solder. But, during the first five years (before the coating forms) water is in direct contact with the lead. More likely than not, **water in buildings less than five years old has high levels of lead contamination.**

**Q How can I tell if my water contains too much lead?**

**A** You should have your water tested for lead. Testing costs between \$20 and \$100. Since you cannot see, taste, or smell lead dissolved in water, testing is the only sure way of telling whether or not there are harmful quantities of lead in your drinking water.

You should be particularly suspicious if your home has lead pipes (lead is a dull-gray metal that is soft enough to be easily scratched with a housekey), if you see signs of corrosion (frequent leaks, rust-colored water, stained dishes or laundry), or if your non-plastic plumbing is less than five years old. Your water supplier may have useful information, including whether or not the service connector used in your home or area is made of lead.

Testing is especially important in high-rise buildings where flushing might not work.

**Q How do I have my water tested?**

**A** Water samples from the tap will have to be collected and sent to a qualified laboratory for analysis.

Contact your local water utility or your local health department for information and assistance. In some instances, these authorities will test your tap water for you, or they can refer you to a qualified laboratory. You may find a qualified testing company under "Laboratories" in the yellow pages of your telephone directory.

You should be sure that the lab you use has been approved by your state or by EPA as being able to analyze drinking water samples for lead contamination. To find out which labs are qualified, contact your state or local department of the environment or health.

**Q** What are the testing procedures?

**A** Arrangements for sample collection will vary. A few laboratories will send a trained technician to take the samples; but in most cases, the lab will provide sample containers along with instructions as to how you should draw your own tap-water samples. If you collect the samples yourself, make sure you follow the lab's instructions exactly. Otherwise, the results might not be reliable.

Make sure that the laboratory is following EPA's water sampling and analysis procedures. Be certain to take a "first draw" and a "fully flushed" sample. (The first-draw sample—taken after at least six hours of no water use from the tap tested—will have the highest level of lead, while the fully flushed sample will indicate the effectiveness of flushing the tap before using the water.)

**Q** How much lead is too much?

**A** Federal standards limit the amount of lead in water to 50 parts per billion (ppb). In light of new health and exposure data, EPA has proposed tightening this standard to 20 ppb. If tests show that the level of lead in your household water is in the area of 20 ppb or higher, it is advisable—especially if there are young children in the home—to reduce the lead level in your tap water as much as possible. (EPA estimates that more than 40 million U.S. residents use water that can contain lead in excess of 20 ppb.)

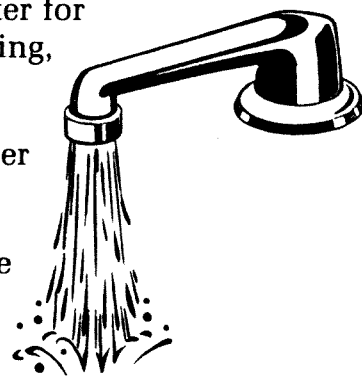
Note: One ppb is equal to 1.0 microgram per liter ( $\mu\text{g/l}$ ) or 0.001 milligram per liter ( $\text{mg/l}$ ).

**Q** How can I reduce my exposure?

**A** If your drinking water is contaminated with lead—or until you find out for sure—there are several things you can do to minimize your exposure. Two of these actions should be taken right away by everyone who has, or suspects, a problem. The advisability of other actions listed here will depend upon your particular circumstances.

## Immediate Steps

- The first step is to refrain from consuming water that has been in contact with your home's plumbing for more than six hours, such as overnight or during your work day. Before using water for drinking or cooking, "flush" the cold water faucet by allowing the water to run until you can feel that the water has become as cold as it will get. You must do this for each drinking water faucet—taking a shower will not flush your kitchen tap. Buildings built prior to about 1930 may have service connectors made of lead. Letting the water run for an extra 15 seconds after it cools should also flush this service connector. Flushing is important because the longer water is exposed to lead pipes or lead solder, the greater the possible lead contamination. (The water that comes out after flushing will not have been in extended contact with lead pipes or solder.)



Once you have flushed a tap, you might fill one or more bottles with

water and put them in the refrigerator for later use that day. (The water that was flushed—usually one to two gallons—can be used for non-consumption purposes such as washing dishes or clothes; it needn't be wasted.)

Note: Flushing may prove ineffective in high-rise buildings that have large-diameter supply pipes joined with lead solder.

- The second step is to never cook with or consume water from the hot-water tap. Hot water dissolves more lead more quickly than cold water. So, do not use water taken from the hot tap for cooking or drinking, and **especially not for making baby formula**. (If you need hot water, draw water from the cold tap and heat it on the stove.) Use only thoroughly flushed water from the cold tap for any consumption.

## Other Actions

- If you are served by a public water system (more than 219 million people are) contact your supplier and ask whether or not the supply system contains lead piping, and whether your water is corrosive. If either answer is yes, ask what steps the supplier is taking to deal with the problem of lead contamination.

Drinking water can be treated at the plant to make it less corrosive. Cities such as Boston and Seattle have successfully done this for an annual cost of less than one dollar per person. (Treatment to reduce corrosion will also save you and the water supplier money by reducing damage to plumbing.)

Water mains containing lead pipes can be replaced, as well as those

portions of lead service connections that are under the jurisdiction of the supplier.

- If you own a well or another water source, you can treat the water to make it less corrosive. Corrosion control devices for individual households include calcite filters and other devices. Calcite filters should be installed in the line between the water source and any lead service connections or lead-soldered pipes. You might ask your health or water department for assistance in finding these commercially available products.

- You can reduce the amount of lead in the tap water in your home. Point-of-use treatment devices such as reverse osmosis devices and distillation units are commercially available. These units may be either purchased or leased. However, they can be expensive, their effectiveness varies, and they must be maintained. Always check the device's capabilities and actual performance in reducing lead. Set up an effective and practical maintenance program to be sure the system is maintained as recommended by the manufacturer. This is the best way to be certain it is doing the job intended. Since these devices also soften water, they should only be installed at the faucet. Of course, attaching a single unit to the kitchen tap will not solve a problem at the tap in the bathroom.

- You can purchase bottled water for home and office consumption. (Bottled water in interstate commerce is regulated by the Food and Drug Administration. Water that is bottled and sold within a state is under state regulation. EPA does not regulate bottled water.)



- Instruct, in writing, any plumber you hire to use only lead-free materials for repairs or in newly installed plumbing.
- Before you move into a newly built home, remove all strainers from faucets and flush the water for at least 15 minutes to remove loose lead solder or flux debris from the plumbing. Occasionally, check the strainers and remove any later accumulation of loose lead.

**Q Aren't there a lot of types of treatment devices that would work?**

**A** No. The following devices are not designed to reduce lead:

- Carbon filters, sand filters, and cartridge filters. These do filter out some water contaminants, but they do not remove lead and they do nothing to prevent corrosion.
- While a water softener can reduce lead in the water entering your home, it can also contribute to the corrosiveness of the water and, thus, to the potential of lead contamination. In homes where lead is a problem, water softeners should not be connected to pipes leading to drinking-water taps.

**Q What is the government doing about the problem of lead in household water?**

**A** There are two major governmental actions to reduce your exposure to lead:

- EPA, under the authority of the Safe Drinking Water Act, limited the amount of lead in drinking water to 50 ppb. In November 1985, the Agency began to revise this standard by proposing a tighter goal of 20 ppb. EPA is scheduled to complete the revision process by June 1988. Utilities must assure that water from

the customer's tap meets the standard, and notify citizens of all violations of the standard.

- In June 1986, President Reagan signed amendments to the Safe Drinking Water Act. These amendments require the use of "lead-free" pipe, solder, and flux in the installation or repair of any public water system, or any plumbing in a residential or non-residential facility connected to a public water system.

Under the provisions of these amendments, solders and flux will be considered "lead-free" when they contain not more than 0.2 percent lead. (In the past, solder normally contained about 50 percent lead.) Pipes and pipe fittings will be considered "lead-free" when they contain not more than 8.0 percent lead.

These requirements went into effect immediately. The law gives state governments until June 1988 to implement and enforce these new limitations. A number of states have already banned all use of lead materials in drinking water systems. These states (as of March 1987) are: Delaware, California, Connecticut, Illinois, Maryland, Massachusetts, Minnesota, New York, Oregon, Rhode Island, Virginia, and Wisconsin. Such bans do not eliminate lead contamination within existing plumbing.

**Q Where can I get more information?**

**A** You should direct any unanswered questions to your drinking water supplier, or your county or state department of health or environment.

# Definitions

**Corrosion:** A dissolving and wearing away of metal caused by a chemical reaction (in this case, between water and the piping that the water contacts or between two different metals).

**First Draw:** The water that immediately comes out when a tap is first opened.

**Flush:** To open a cold-water tap to clear out all the water which may have been sitting for a long time in the pipes.

In new homes, to flush a system means to send large volumes of water gushing through the unused pipes to remove loose particles of solder and flux. (Sometimes this is not done correctly or at all.)

**Flux:** A substance applied during soldering to facilitate the flow of solder. Flux often contains lead and can, itself, be a source of contamination.

**Public Water System:** Any system that supplies water to 25 or more people or has 15 or more service connections (buildings or customers).

**Service Connector:** The pipe that carries tap water from the public water main to a building. In the past, these were often made of lead.

**Soft water:** Any water that is not "hard." Water is considered to be hard when it contains a large amount of dissolved minerals, such as salts containing calcium or magnesium. You may be familiar with hard water that interferes with the lathering action of soap.

**Solder:** A metallic compound used to seal the joints between pipes. Until recently, most solder contained about 50 percent lead.



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