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United States Environmental Protection Agency

Ground Water and Drinking Water

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Basic Information about Lead in Drinking Water

Have a question that's not answered on this page? Contact the Safe Drinking Water Hotline.

Información relacionada disponible en español

EPA and the Centers for Disease Control and Prevention (CDC) agree that there is no known safe level of lead in a child's blood. Lead is harmful to health, especially for children. On this page, you can find:

General Information about Lead in Drinking Water

- How lead gets into drinking water
- Health effects of being exposed to lead in drinking water
- Can I shower in lead-contaminated water?

Related Information from Other Federal Government Agencies

Centers for Disease Control and Prevention (CDC):

- About Lead in Drinking Water
- Prevention Tips for Lead in Water
- CDC main page on lead

Agency for Toxic Substances & Disease Registry (ATSDR):

- [Public Health Statement for Lead](#)
- [ToxFAQs for Lead](#)
- [ATSDR main page on lead](#)

What You Can Do

Learn how you can...

- [Find out if lead is in your drinking water](#)
- [Take measures to reduce lead in drinking water at home](#)
- [Get your child tested to determine lead levels in his or her blood](#)
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Drinking Water Requirements for Lead

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General Information about Lead in Drinking Water

How Lead Gets into Drinking Water

Lead can enter drinking water when service pipes that contain lead corrode, especially where the water has high acidity or low mineral content that corrodes pipes and fixtures. The most common problem is with brass or chrome-plated brass faucets and fixtures with lead solder, from which significant amounts of lead can enter into the water, especially hot water.

Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The Safe Drinking Water Act (SDWA) has reduced the maximum allowable lead content -- that is, content that is considered "lead-free" -- to be a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures and 0.2 percent for solder and flux.

- [Learn more about the maximum allowable content of lead in pipes, solder, fittings and fixtures](#)
- [Learn more about EPA's regulations to prevent lead in drinking water](#)
- [Learn how to identify lead-free certification marks on drinking water system and plumbing products \(PDF\)](#)

Corrosion is a dissolving or wearing away of metal caused by a chemical reaction between water and your plumbing. A number of factors are involved in the extent to which lead enters the water, including:

- the chemistry of the water (acidity and alkalinity) and the types and amounts of minerals in the water,
- the amount of lead it comes into contact with,
- the temperature of the water,
- the amount of wear in the pipes,
- how long the water stays in pipes, and
- the presence of protective scales or coatings inside the plumbing materials.

To address corrosion of lead and copper into drinking water, EPA issued the Lead and Copper Rule (LCR) under the authority of the SDWA. One requirement of the LCR is corrosion control treatment to prevent lead and copper from contaminating drinking water. Corrosion control treatment means utilities must make drinking water less corrosive to

the materials it comes into contact with on its way to consumers' taps. Learn more about EPA's regulations to prevent lead in drinking water.

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***Health Effects of Exposures to Lead in Drinking Water**

*The health effects information on this page is not intended to catalog all possible health effects for lead. Rather, it is intended to let you know about the most significant and probable health effects associated with lead in drinking water.

Is there a safe level of lead in drinking water?

The Safe Drinking Water Act requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks, are called maximum contaminant level goals (MCLGs). EPA has set the maximum contaminant level goal for lead in drinking water at zero because lead is a toxic metal that can be harmful to human health even at low exposure levels. Lead is persistent, and it can bioaccumulate in the body over time.

Young children, infants, and fetuses are particularly vulnerable to lead because the physical and behavioral effects of lead occur at lower exposure levels in children than in adults. A dose of lead that would have little effect on an adult can have a significant effect on a child. In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.

The Centers for Disease Control and Prevention (CDC) recommends that public health actions be initiated when the level of lead in a child's blood is 5 micrograms per deciliter ($\mu\text{g}/\text{dL}$) or more.

It is important to recognize all the ways a child can be exposed to lead. Children are exposed to lead in paint, dust, soil, air, and food, as well as drinking water. If the level of lead in a child's blood is at or above the CDC action level of 5 micrograms per deciliter, it may be due to lead exposures from a combination of sources. EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead. Infants who consume mostly mixed formula can receive 40 percent to 60 percent of their exposure to lead from drinking water.

Children

Even low levels of lead in the blood of children can result in:

- Behavior and learning problems
- Lower IQ and hyperactivity
- Slowed growth
- Hearing problems
- Anemia

In rare cases, ingestion of lead can cause seizures, coma and even death.

Pregnant Women

Lead can accumulate in our bodies over time, where it is stored in bones along with calcium. During pregnancy, lead is released from bones as maternal calcium and is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. Lead can also cross the placental barrier exposing the fetus to lead.

This can result in serious effects to the mother and her developing fetus, including:

- Reduced growth of the fetus
- Premature birth

Find out more about lead's effects on pregnancy:

- [Lead and Your Baby \(March of Dimes\)](#) EXIT
- [Effects of Workplace Hazards on Female Reproductive Health \(National Institute for Occupational Safety and Health\)](#)

Lead can also be transmitted through breast milk. Read more on lead exposure in pregnancy and lactating women ([PDF](#)) (302 pp, 4.3 MB, [About PDF](#)) .

Adults

Lead is also harmful to adults. Adults exposed to lead can suffer from:

- Cardiovascular effects, increased blood pressure and incidence of hypertension
- Decreased kidney function
- Reproductive problems (in both men and women)

Related Information

- [Learn more about lead and its health effects](#)

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Can I shower in lead-contaminated water?

Yes. Bathing and showering should be safe for you and your children, even if the water contains lead over EPA's action level. Human skin does not absorb lead in water.

This information applies to most situations and to a large majority of the population, but individual circumstances may vary. Some situations, such as cases involving highly corrosive water, may require additional recommendations or more stringent actions. Your local water authority is always your first source for testing and identifying lead contamination in your tap water. Many public water authorities have websites that include data on drinking water quality, including results of lead testing. Links to such data can be found on the [EPA Consumer Confidence Report website](#).

For more information, see CDC's "[Sources of Lead: Water](#)" Web page.

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What You Can Do

Find Out if Lead is in Your Drinking Water

First, learn more about the water coming into your home

EPA requires all community water systems to prepare and deliver an annual water quality report called a *Consumer Confidence Report (CCR)* for their customers by July 1 of each year. Contact your water utility if you'd like to receive a copy of their latest report. If your water comes from a household well or other private water supply, check

with your health department, or with any nearby water utilities that use ground water, for information on contaminants of concern in your area.

- Find your local Consumer Confidence Report
- Information about CCRs for consumers
- EPA's CCR home page
- Learn more about protecting water quality from private drinking water wells
- Printable color fact sheet: Is There Lead in My Drinking Water?

EPA's **Public Notification Rule** requires public water systems to alert you if there is a problem with your drinking water.

- Learn more about the Public Notification Rule

Second, you can have your water tested for lead

Homes may have internal plumbing materials containing lead. Since you cannot see, taste, or smell lead dissolved in water, testing is the only sure way of telling whether there are harmful quantities of lead in your drinking water. A list of certified laboratories are available from your state or local drinking water authority. Testing costs between \$20 and \$100. Contact your water supplier as they may have useful information, including whether the service connector used in your home or area is made of lead.

You can learn on our Protect Your Family from Exposures to Lead web page:

- when you may want to test your drinking water; and
- what to do if your home tests positive for lead.

You can also view and print a fact sheet on testing your home's drinking water.

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Take Measures to Reduce Lead in Drinking Water at Home

Flush your pipes before drinking: The more time water has been sitting in your home's pipes, the more lead it may contain. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking.

Only use cold water for eating and drinking: 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. Run cold water until it becomes as cold as it can get.

Note that boiling water will NOT get rid of lead contamination.

Use water filters or treatment devices:

Many water filters and water treatment devices are certified by independent organizations for effective lead reduction. Devices that are not designed to remove lead will not work. Verify the claims of manufacturers by checking with independent certifying organizations that provide lists of treatment devices they have certified:

- NSF International [EXIT](#)
- Water Quality Association [EXIT](#)

Underwriters Laboratories also provides drinking water product certification services for drinking water products and chemicals. [EXIT](#)

Related Information:

- Fact sheet: Actions You Can Take to Reduce Lead in Drinking Water
- How to make your home lead-safe
- What you can do to protect your drinking water
- Fact sheet: How to Identify Lead-Free Certification Marks for Drinking Water System & Plumbing Products (PDF)

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Get Your Child Tested to Determine Lead Levels in His or Her Blood

A family doctor or pediatrician can perform a blood test for lead and provide information about the health effects of lead. State, city or county departments of health can also provide information about how you can have your child's blood tested for lead. The Centers for Disease Control and Prevention recommends that public health actions be initiated when the level of lead in a child's blood is 5 micrograms per deciliter ($\mu\text{g}/\text{dL}$) or more.

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Find Out if Lead in Drinking Water is an Issue in Your Child's School or Child Care Facility

Children spend a significant part of their days at school or in a child care facility. The faucets that provide water used for consumption, including drinking, cooking lunch, and preparing juice and infant formula, should be tested.

- Protect your children from lead where they learn and play: learn how to test your child, and how to check the condition of schools and child care facilities
- How schools and child care centers can test for lead in drinking water
- EPA main page on drinking water at schools and child care facilities

Drinking Water Requirements for Lead

EPA's Drinking Water Regulations for Lead

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLGs). The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant.

The treatment technique regulation for lead (referred to as the ***Lead and Copper Rule***) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by

the system that are more likely to have plumbing materials containing lead. If more than 10 percent of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

- Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .
- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

EPA issued the Lead and Copper Rule in 1991 and revised the regulation in 2000 and 2007. States may set more stringent drinking water regulations than EPA.

In addition:

- EPA requires all community water systems to prepare and deliver an annual water quality report called a **Consumer Confidence Report (CCR)** for their customers.
 - Find your local Consumer Confidence Report
 - Information about CCRs for consumers
 - EPA's CCR home page
- EPA's **Public Notification Rule** requires public water systems to alert you if there is a problem with your drinking water.
 - Learn more about the Public Notification Rule.
- In 2011, changes to the Safe Drinking Water Act reduced the maximum allowable lead content -- that is, content that is considered "lead-free" -- to be a weighted average of 0.25 percent calculated across the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixture and 0.2 percent for solder and flux. Learn more about the maximum allowable content of lead in pipes, solder, fittings and fixtures.

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How EPA Requires States and Public Water Systems to Protect Drinking Water

The Safe Drinking Water Act (SDWA) requires EPA to establish and enforce standards that public drinking water systems must follow. EPA delegates primary enforcement responsibility (also called **primacy**) for public water systems to states and tribes if they meet certain requirements. Learn more about:

- The SDWA and SDWA standards
- How EPA regulates drinking water contaminants
- Primacy enforcement responsibility for public water systems

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