

Lead

Understanding Lead Exposure

School officials and child care providers need to know whether the students, teachers and staff consume elevated levels of lead when drinking water in their facility, because exposure to lead can cause serious health problems, particularly for young children.

Lead in drinking water is primarily from materials and components associated with service lines and facility plumbing. Your municipal water supplier is responsible for providing high quality drinking water, but cannot control the variety of materials contained in the plumbing components used within your facility.

Health Effects of Lead

Lead can cause serious health problems if too much enters your body from drinking water or other sources. Some facts about lead exposure include:

- Infants, young children and pregnant women are at greatest risk to lead exposure;
- Increased lead levels have been shown to cause damage to the brain and kidneys;
- Increased lead levels interfere with the production of red blood cells that carry oxygen to all parts of your body;
- Scientists have linked the effects of lead on the brain with lowered intelligence quotient (IQ) in children;
- Adults with kidney problems and high blood pressure can be affected by lower levels of lead more than healthy adults;
- Lead is stored in the bones and it can be released later in life; and
- During pregnancy, the fetus receives lead from the mother's bones which may affect brain development.

How Lead Gets into Drinking Water

Soft water has a low pH, which is corrosive. Other factors however also contribute to the corrosion potential of the water and include water velocity, temperature, alkalinity, the type of disinfectant, the age and condition of plumbing and the amount of time water is in contact with plumbing. Of note, recent construction work on your facility's plumbing system (e.g., pipe replacement and utility lead service line replacement with copper components) may result in corrosion of remaining lead pipes or disturbance of settled debris within larger pipes in the system which may create new sources of contamination. The occurrence and rate of corrosion depend on the complex interaction between a number of these and other chemical, physical and biological factors.

Municipal water systems take steps to reduce the corrosiveness of the water. However if the plumbing in your facility is made of lead or contains lead parts, corrosion may occur as the water moves through your facility's plumbing.



Example of lead pipes in a plumbing system.

Potential Sources of Lead in Drinking Water

- Lead pipes in plumbing:
 - Dull gray in color and will appear shiny when scratched
 - Banned since 1986 and not widely used since the 1930s
- Copper pipes joined by lead solder:
 - Solder will be dull gray in color and will appear shiny when scratched
 - Banned since 1986 and many communities banned prior to 1986
- Brass pipes faucets fittings and valves:
 - May contain alloys of lead
- Sediments in screens on faucets:
 - Debris from plumbing can collect on screens and may contain lead
- Water service line to facility is made of lead:
 - Pipes that carry water from the municipal water system main to the facility may contain lead
- Water fountains in the facility may contain lead parts:
 - Specific brands of water fountains contain lead parts or have lead lined water tanks
 - Since 1988 it has been mandated that water fountains be lead free but older facilities may have outdated models

Voluntary Testing of Lead in Drinking Water

You cannot see, taste or smell lead in your drinking water. As such, testing the facility's water is the only sure way to know if there are elevated levels of lead in the water.

Test the Facility's Drinking Water for Lead



It is important to test all of the drinking water outlets in your facility, especially those that provide water for drinking, cooking and preparing juice and infant formula. Lead in drinking water can be a very localized problem and can vary from tap to tap. Just because there is lead getting into your water from one outlet does not mean that all your taps are vulnerable or contaminated. At the same time, just because one tap sample is free from lead does not mean that all your taps are clear. It is a good idea to test ALL outlets including drinking fountains and water faucets where water will be used for drinking or cooking. Unusual sources of drinking water, such as locker room shower heads and other non-drinking water taps used to fill water jugs and carboys, should also be included when tested for lead.

If your sink has separate hot and cold water knobs then samples should be collected from cold water as hot tap water is not recommended for food preparation or direct consumption. If you have one lever, be sure to turn it on to the cold water side.

The concentration of lead in your drinking water samples will be reported in metric form, such as milligrams per liter (mg/L) or micrograms per liter (ug/L), or as parts per million (ppm) or parts per billion (ppb).

EPA recommends that schools and child care facilities take action if samples from any drinking water outlets show lead levels greater than 15 parts per billion.

Routine Measures for Reducing Lead Exposure

Whether you have tested your water or not, or even if you have and your water has shown low levels of lead, there are best practices that will further reduce the potential for lead exposure at your facility as well as reduce sediment in your water.

Develop a flushing plan

- Determine how water enters and flows through your facility by developing a plumbing profile. Consult with your maintenance personnel, licensed plumber or local water service provider to develop a plumbing profile;
- Locate all water outlets that are used for consumption;
- Identify the drinking water outlet(s) farthest from the main water service line (Note: If your facility has multiple wings there will be more than one outlet farthest from the main service line);
- Determine the best order to open and flush drinking water outlets, starting with those farthest from the main service line;
- Identify options for collection and non-potable re-use of flushed water (e.g., plant watering); and
- Develop a system for accountability, including identifying one person who is in charge and developing a record keeping system.

Flush all water outlets used for drinking or food preparation

- At the start of each day, before using any water for drinking or cooking, flush the cold water faucet by allowing the water to run for a period of time. Contact your municipal water system to find out what the recommended flushing time is for your facility based on your system size and piping. This should be done for all water outlets used for drinking or food preparation.
- Flushing, or opening up a tap and letting the water run, replaces the stagnant water that may have been in contact with lead-containing plumbing fixtures overnight or over the weekend. The longer water is exposed to lead pipes or solder the greater the likelihood of lead contamination.
- Flushing times vary depending on your buildings pipes and outlets, refrigerated water fountains can take as long as 15 minutes to properly flush out the reservoir.
- If many taps need flushing, the tap farthest from the main pipe should be opened for approximately 10 minutes to flush out the main pipe. Then, individual drinking water taps should be flushed to rid stagnant water from the pipes. Keep in mind that if your facility has more than one wing there may be more than one tap that is furthest from the water line.

Use only cold water to prepare food and drinks

- Hot water dissolves lead more quickly than cold water and is therefore more likely to have greater amounts of lead.
- If hot water is needed, water should be drawn from the cold tap and heated.
- Use only thoroughly flushed water from the cold water tap for drinking and when making mixed baby formula, juices or foods.

Clean debris out of all outlet screens or aerators on a regular basis

- Small screens on the end of a faucet can trap sediments containing lead.
Note: Aerators are often used to regulate flow, reduce splash and conserve water. Check to see if your faucets have aerators, since not all faucets have them.



Faucet Aerators

Many taps that are used to provide water for human consumption have an aerator as part of the faucet assembly. Aerators serve to introduce air into the water flow which makes it feel as if a larger water flow is coming out of the tap. The use of aerators is a common water conservation practice. Screens are not intended to remove contaminants in the water, but may trap sediment or debris as water passes through the faucet. Lead bearing sediment may end up in drinking water from physical corrosion of leaded solder and can build up in the aerator over time.

Faucet Aerators Cleaning Procedures

- Remove the aerator by twisting off with hands or pliers;



- One or more parts are contained within the aerator. Note the order and orientation of the parts as you remove them;



- Rinse the pieces with water and brush off the debris. For deposits that are difficult to remove, soak the parts in water for a few minutes and scrub with a new toothbrush. Backwashing aerator components is also an effective cleaning method for many aerator types. Hold removed aerator upside down under flowing water to backwash screens and mesh filters;



- If any parts are cracked or broken, replace them. If the washer has hardened it should be replaced; and



- Reassemble the aerator by screwing it back onto the faucet and hand-tighten.

It is not recommended that aerators be removed from faucets immediately before sampling for lead as the sample will fail to identify the typical available contribution of particulate lead from that tap and thus additional actions needed to reduce exposure to lead in drinking water will fail to be taken.

However, if the results from the initial sample are above the action level, you can consider taking a second sample to determine whether particulate matter is the source of lead. For this sample, the aerator would be cleaned or removed prior to sampling so that the two samples could be compared.⁷

It is advised that a regular cleaning schedule be established for aerators.

The frequency of cleaning depends on how quickly the debris builds up on the inside walls of the aerator. Generally, the aerator should be cleaned at least quarterly. If blockages from scale or particulate accumulation are noticed, the frequency should be increased to monthly. Flow pattern changes are an indication of buildup.

⁷ EPA, Oct 2006. *Memorandum: Management of Aerators during Collection of Tap Samples to Comply with the Lead and Copper Rule*. Available at: http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2006_10_27_lcrmr_memo_tapsamples-aerators_10202006.pdf.

Follow-up lead monitoring

Water quality changes over time and it is important to make sure that the water in your facility remains free of lead. Periodic retesting of fixtures is recommended.

Respond to Elevated Lead Levels

EPA recommends that schools and child care facilities take action if samples from drinking water outlets show lead levels greater than 15 ppb. Any outlet with test results above this level should not be used until the source of the contamination is found and the lead levels are reduced to 15 ppb or less. If you are going to stop using an outlet due to high lead levels you should place a physical barrier, such as tape or an illustrative sign over the faucet so that everyone knows it should not be used until it is fixed. In addition, you should encourage parents to have their children's blood tested for lead if high lead levels are detected in the water. Facilities should develop Standard Operating Procedures (SOPs) for responding to elevated lead levels and administrators or directors should be encouraged to communicate this information to parents (or the teachers) so they can protect their children. The following remedies can be used to respond to elevated lead levels:

Provide an alternative "lead-free" drinking water

- Bottled water can be used as a temporary measure; and
- Make sure the bottled water distributor meets federal and state bottled water quality standards (which are different than tap water) and their filtration technology is National Sanitation Foundation International (NSF) certified for lead reduction (info.nsf.org).

Remove sources of lead in the plumbing system

These remedies are most appropriate for localized contamination problems and are best handled by a licensed plumber:

- Replace solder joints with lead-free joints;
- Replace the outlet or fixture/faucet with "lead-free" materials (according to NSF/ American National Standards Institute (ANSI) Standards 61 and 372; or
- Replace piping with "lead-free" materials (according to NSF/ANSI Standards 61 and 372).

You can search for NSF Drinking Water System Components here: info.nsf.org/certified/pwscomponents.

Prior to replacing fixtures when elevated lead levels are determined, be sure to test the new fixtures to ensure the fixtures are "lead free." If you are purchasing a large volume of faucets ask the manufacturer or vender to test the faucets with your local tap water to make sure no lead is leached out of the faucets. If you are only purchasing a few faucets make sure the fixtures are certified as lead-free according to NSF/ANSI Standard 61 for lead content.

Install point-of-use treatment devices



- A point-of-use (POU) device is a filtration system that can be installed directly on a drinking water outlet.
- Use a device that is certified by NSF International to remove lead.⁸
- Maintaining POU treatment devices is very important. Refer to the manufacturer's instructions for maintenance procedures. If not maintained properly, some treatment devices may increase lead and other contaminant levels.
- If using a POU device you should do follow up testing to make sure the water is still below the action level.
- With the use of a POU device, flushing is not necessary.
- If using POU devices on some faucets, but not all, make sure that faucets without a POU device are clearly labeled that they are not for drinking or cooking water.

Communicate with Your Community about the Voluntary Lead Testing Program

It is important to communicate early and often about your testing plans, results and next steps. Telling parents and staff about your voluntary lead testing program will demonstrate your proactive commitment to protecting the health of your students and staff and build confidence in your facility's ability to provide a safe and healthy environment, whether or not elevated lead levels are found in your facility.

⁸ *The Lead and Copper Rule: Quick Reference Guide for Schools and Child Care Facilities that are Regulated Under the Safe Drinking Water Act*, available at: http://water.epa.gov/infrastructure/drinkingwater/schools/upload/2006_1_11_schools_lead_sqrg_lcr_schools.pdf.