

Mitigation & Remediation Guide for Lead in School Drinking Water



State of Maine
Department of Health and
Human Services



Maine CDC
Drinking Water Program

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About This Guide

This guide was developed by the Maine CDC Drinking Water Program (DWP) to assist your school in understanding your lead water testing results and guide you through mitigation and remediation processes to help reduce your water's lead levels.

As you work through this guide, remember not all mitigation/remediation actions are appropriate for all schools, locations, or lead levels. While there is no safe level of lead, fixtures with lead levels over 4ppb are recommended to be removed from service until mitigation/remediation takes place. Lead levels above 15 ppb are considered significantly elevated and may require more aggressive treatment actions. If your school has fixtures for which lead sample results exceed 15 ppb, the DWP recommends seeking outside consultation to assist with mitigation/remediation. While the DWP does not endorse individual consultants, a list of [local treatment companies](#) can be found on the DWP website.

Lead mitigation and remediation in schools is voluntary. However, schools are required to report all planned and completed mitigation/remediation actions to the Drinking Water Program.

Understanding Your Results

When you receive your water sample test results from the lab, the results will be reported in parts per billion (ppb).

As you review your sample results, consider not only the lead levels, but also the vulnerability of your students and the likelihood of exposure. Remember, younger children are more vulnerable to lead and are more likely to be exposed by consuming water from bubblers or bottle fill stations. Also keep in mind the longer water sits undisturbed within your plumbing (such as after school vacations), the higher the potential for lead to dissolve into the water.

Lead Level	0 ppb	Fixtures can be used as normal
	4 ppb	Mitigation/remediation recommended
	>15 ppb	Mitigation/remediation highly recommended

How Lead Gets in Water

Lead rarely occurs in water naturally; most often, lead found in drinking water originates from within your building's plumbing – from three locations in particular: the supply line, the internal piping, and individual fixtures like faucets. When plumbing is unused (as it tends to be overnight, on weekends, or extended breaks) lead can slowly dissolve from the plumbing into the water. The longer the water sits undisturbed, the greater the potential for elevated lead levels.

The Fixture (a.k.a. faucet)

Fixtures are water delivery outlets. They can include, but are not limited to, kitchen and bathroom faucets, drinking water fountains and bubblers, bottle fill stations, brass spigots, ice machines, and hot water kettles. Remember even new fixtures, piping, or other components made of non-metal material might not be "lead free." Products manufactured outside the U.S. (as are some online purchases) may still contain un-acceptable amounts of lead.

Internal Piping

The piping inside your building includes many components that could contain lead. In some instances, the pipes themselves are made of lead. Other sources include lead solder (historically used to join copper pipes), joints, fittings, and other pipe material such as galvanized steel.



To determine if any of your fixtures are lead-free, use the [EPA's guide for identifying lead-free fixtures](#)

Supply line

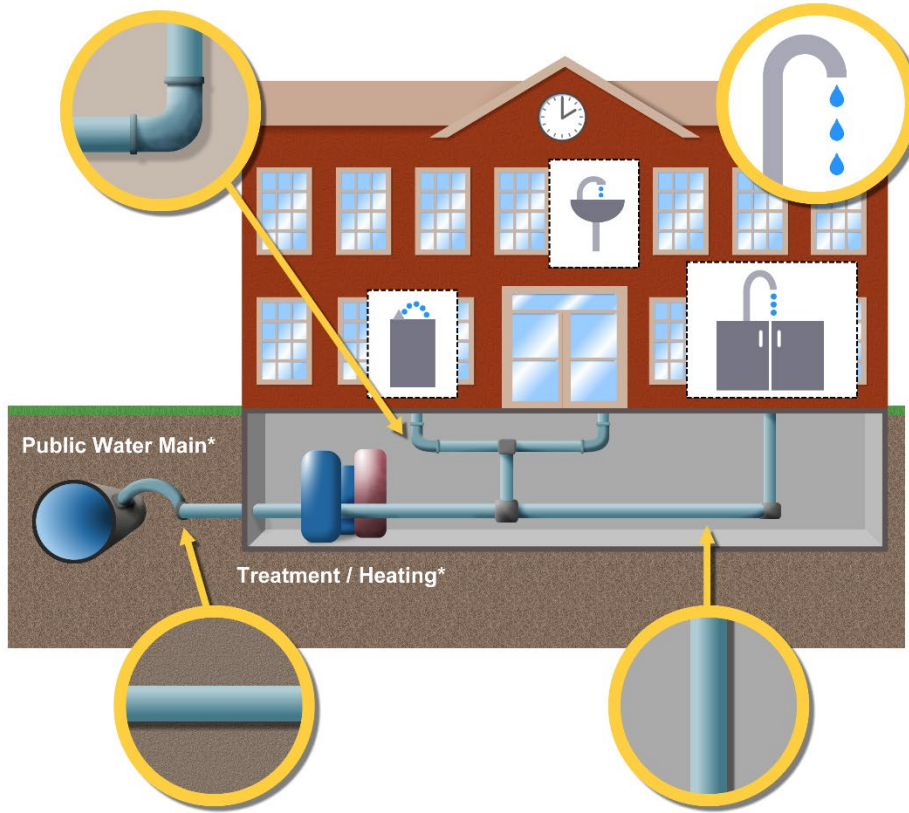
A supply line is the pipe that joins the building's internal plumbing to either a well or to the public water supply. Even non-lead supply lines can contain lead particles or lead components. It is not known how many privately-owned supply lines are made of lead or could contain lead, and so all should initially be considered suspect. Furthermore, private wells might also contain lead in the "packer" element that is used to help seal the well above the well screen; this is more common in wells drilled more than 20 years ago. Some models of older submersible well pumps also contain leaded-brass components.

Pipes with Lead Solder

Solder made or installed before 1986 contained high levels of lead.

Faucets and Drinking Fountains

Fixtures located inside your school might contain lead.



Lead Service Lines and Goosenecks

Lead service lines can contaminate drinking water.

Galvanized Pipes

Lead particles can attach to galvanized metal and eventually enter the water.

***Regardless of whether your school's drinking water is supplied by a municipal water system or its own well, the water will enter the building through a service line(s). Once inside the building, water may undergo treatment for impurities and heating before being distributed to various fixtures in the building via a network of pipes.**

This illustration is a simplified view of an internal water system served by a municipal supplier. Your school's source, system components, and fixtures may be different.

Determining the Source of Lead

If any of your initial samples come back with elevated lead levels, your next step is to identify the exact location(s) where lead is entering the water. To that end, we recommend a course of follow-up samples: a first-draw confirmation sample and a 30-second flush sample for each fixture with elevated lead, and a supply line sample. By collecting these additional samples and comparing their results, it's possible to locate where lead is leaching into your water.

Confirmation Samples

Confirmation samples will confirm your high lead result and can help determine if the fixture itself is contributing lead. *Results from several states show 90% of the time, an elevated sample is a result of lead components in the fixture itself.*

When you order a confirmation sample from the lab, instructions will be included for the collection method. Refer to sampling instructions for guidance on collecting a confirmation sample.

30-Second Flush Samples

The 30-second flush will help determine if the piping *behind* your fixture is contributing to your elevated lead result. For drinking fountains or similar fixtures that share plumbing, a single flush sample may be representative of the shared interior piping. An example would be a drinking water fountain unit with two spouts: a high spout and a low spout.

When you order a 30-second flush sample from the lab, instructions will be included for the collection method. Refer to sampling instructions for guidance on collecting a 30-second flush sample.

Supply line Samples

Use a supply line sample to determine if either the supply line or well pump is contributing lead. Only collect a single sample per supply line.

When you order a supply line sample from the lab, instructions will be included for the collection method. Refer to sampling instructions for guidance on collecting a supply line sample.

Do results from your INITIAL SAMPLE indicate the presence of lead?

Yes	No
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If lead was detected in your **initial sample**, it is likely your fixture(s) or the plumbing directly attached to the fixture(s) contains lead components. To confirm your initial results, collect a confirmation sample at each fixture with detectable lead levels.

Although it is likely the fixture(s) is responsible for the elevated lead levels, it is still possible your internal piping and/or supply line could also be contributing lead.

Collect a 30-second flush sample at each fixture with detectable lead levels. Collect a sample for each supply line. These additional samples will help you determine if the piping and/or supply line is contributing lead.



Does the 30 SECOND FLUSH SAMPLE or the SUPPLY LINE SAMPLE have lead?

Yes	No
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If the **30-second flush sample** contains lead, it is an indication the internal piping contains lead.

If the **supply line sample** contains lead, it is likely the supply line or well pump may contain lead.

Refer to *Choosing an Appropriate Mitigation Method* section on page 8 for the next steps.

Lead is most likely coming only from the fixture and/or the plumbing to which the fixture is attached.

Refer to *Choosing an Appropriate Mitigation Method* section on page 8 for the next steps.

Your fixture does not currently need remediation or mitigation.

The DWP recommends sampling your water every few years because changes in water chemistry can cause lead to dissolve into water.

Choosing an Appropriate Mitigation Method

Once it has been determined mitigation is necessary, you will need to decide on the type of mitigation that is right for your school's system; not all mitigation/remediation actions are appropriate for all schools, locations, or lead levels. Mitigation and remediation methods fall into three different categories: routine, temporary, and permanent control measures, which are discussed in more detail later in this document.

Lead Level at Tap or Fixture	Appropriate Mitigation / Remediation Actions
<p>< 1 ppb or Not Measurable (Non-detected)</p>	<p>Lead was not detected. These tap/fixtures may be used as normal.</p>
<p>1-3 ppb</p>	<p>Routine Control Measures</p> <ul style="list-style-type: none"> • Regularly flush fixtures to bring a fresh supply of water. • Regularly clean aerators to remove lead particles.
<p>4-10 ppb</p> <p>It is recommended fixtures with lead levels over 4 ppb be immediately taken out of service until testing indicates the problem has been addressed.</p>	<p>Temporary and Permanent Control Measures</p> <ul style="list-style-type: none"> • Temporarily remove a fixture from service until new plumbing and/or a new fixture can be installed. • Provide bottled water until lead levels have been addressed and reduced through the mitigation/remediation process. • Install a "Do Not Drink" sign. This would only be appropriate for handwash sinks or other fixtures not intended for drinking or cooking. • Replace existing fixtures and/or plumbing. • Permanently remove the fixture from service. • Install a filter. • Add corrosion control chemicals to reduce the corrosivity of your water, after consulting with the DWP.
<p>15 ppb or Higher</p>	<p>The DWP recommends schools seek outside consultation to address any sample results over 15 ppb.</p>

Routine Control Measures

Routine control measures involve any reoccurring activity whose primary goal is to *temporarily* lower lead water levels. While it is recommended all schools engage in routine control measures following extended periods where the water has not been used (after vacations, for instance), these methods are *only adequate solutions for lead water levels below 4 ppb*. Routine control measures are also typically not effective when a building's internal plumbing or supply line is contributing to elevated lead levels.

• Flushing

Flushing involves opening taps and letting the water run to remove water that has been standing in the interior pipes and/or the fixtures. Before implementing this procedure for remediation, consider how often flushing should occur throughout the week – and possibly throughout the day – and whether it is feasible for your facility. Depending upon the age and condition of the plumbing and the corrosiveness of the water, elevated lead levels can return relatively quickly following flushing.

Flushing can be a quick and easy solution to lead levels under 4 ppb, especially when contamination is localized in a small area or building. It is recommended as a short-term solution only (while more permanent solutions are being implemented) or to improve overall water quality in a building.

If your school uses a well, excessive flushing may stress your source, increasing the risk of losing pressure or running your well dry. At the same time, if your school is connected to a public water utility, this will increase your water usage and water bill.

The image shows a page from an EPA guide. The title is "Ensuring Drinking Water Quality in Schools During and After Extended Closures" with the EPA logo. Below the title, it says "316 TRAINING, TESTING, TAKING ACTION". The page contains several sections of text, including a purpose statement, a section on when to flush, and a section on information about extended closures for school facility managers. A search bar is visible with the text "Know Your Plumbing".

Ensuring Drinking Water Quality in Schools During and After Extended Closures EPA

316 TRAINING, TESTING, TAKING ACTION

The purpose of this fact sheet is to provide guidance to schools on monitoring drinking water quality during extended closures, and to recommend start-up procedures when reopening to ensure that drinking water is safe for consumption.

When a school closes for an extended period (i.e., one week or longer), the water in the building's plumbing will become stagnant. The water may become unsafe for drinking, cooking, bathing, or other purposes.

Stagnant water in plumbing may:

- Support growth of bacteria, such as Legionella, or other microorganisms that can cause disease and
- Have higher levels of metals, such as lead and/or copper from the building plumbing components.

This fact sheet is part of EPA's 316 Drinking Water and Child Care Facilities (DWCF) Toolkit, designed to help schools and child care facilities understand and respond to important resources. The Toolkit includes information on how to monitor water quality and how to use their own water quality data and testing to improve water quality. This fact sheet is included in the Toolkit as a resource for schools and child care facilities.

INFORMATION ABOUT EXTENDED CLOSURES FOR SCHOOL FACILITY MANAGERS

What can schools do while they are closed to maintain water quality?

Completing the following steps during closures may help to avoid more complicated start-up procedures when reopening. Most of these steps are routine procedures that should be part of normal operations. EPA's Toolkit includes additional information about establishing routine practices. See [Important Resources](#).

Know Your Plumbing

To maintain water quality, you need to know how water enters and flows through your facility. EPA's 316 Toolkit includes a guide to help you understand your plumbing configuration. Additionally, the U.S. Centers for Disease Control and Prevention (CDC) Water Management Program Toolkit provides guidance on how to understand and describe your building water system. See [Important Resources](#) for links to both toolkits.

To improve your school's water quality, use the EPA's Guide for Improving Water Quality After Extended Closures

When using the 'flushing' method...

DO:

- Develop a system for accountability, including identifying one person who is in charge and record keeping.
- Flush fixtures individually; flushing a toilet will not flush your water fountains.
- Run water for:
 - 30 seconds to 1 minute for handwash sinks and kitchen faucets.
 - 1 minute for unrefrigerated drinking water fountains.
 - 15 minutes for refrigerated drinking water fountains.
- Utilize flushing as a routine practice to improve overall water quality.
- Flush after remediation. In addition to replacing or removing plumbing or fixtures which contain lead, flushing can help clear out debris or lead particulates that may be released when remediation occurs. Remove and rinse the fixture's aerator after flushing to ensure trapped particles are removed.
- Use as a temporary measure while more permanent control measures are being put into place.
- Start with the fixtures closest to the supply line and progress outward from there.

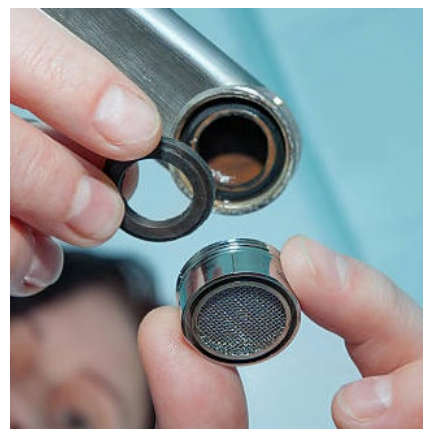
DO NOT:

- Use flushing as a practical remedy for water coolers.
- Flush as a sole effort after finding unacceptable lead levels in your school, without ensuring lead levels will remain low throughout the day.
- Employ flushing as a long-term remediation effort alone. Flushing can be a measure which could be paired with permanent remediation like replacement and/or removal.

- **Cleaning Aerators**

Lead can dissolve in your water via debris trapped in the water faucet screen called an aerator. These particles dissolve into your water and therefore can increase a water's lead levels. Finding trapped lead debris in an aerator indicates additional remediation should take place to remove the source of lead particles in the plumbing.

It's recommended to routinely clean your aerator to remove trapped debris to improve your overall water quality and reduce lead exposure. It is not an effective remediation method for lead levels over 3 ppb, so should be combined with more aggressive mitigation/remediation measures.



Temporary Control Measures

Temporary control measures involve preventing water consumption *until the plumbing/fixture can be replaced*. Temporary control measures should be used for fixtures where lead is 4ppb or above, and anytime internal plumbing or supply lines are contributing to elevated lead levels.

- **Shut Off Fixtures**

If initial sample results from a fixture exceed 4 ppb, the outlet can be shut off or disconnected until the problem is resolved. If the outlet is not used regularly, this may be a viable option; however, if the outlet is frequently used for handwashing, this is probably not a practical solution.

- **Install *Do-Not-Drink* Signs**

If you cannot immediately replace – and cannot shut off – a fixture whose primary function is not for drinking or cooking, such as a handwash station, you may install a sign that the water should not be used to drink. Signage should be prominent and include words/pictures. It should also be multilingual if there are students for whom English is not the first language.

- **Provide Bottled Water**

Bottled water is merely a temporary solution and should only be used until fixtures/plumbing can be replaced. This can be an expensive alternative, but it might be warranted if you are aware of widespread contamination and other remediation is not a near-term option.

Permanent Control Measures

Permanent control measures involve removing lead from water or reducing the amount of lead entering the water. After mitigation/remediation, there are additional follow-up steps. Localized or building-wide flushing should take place after fixtures or internal piping have been replaced, and confirmation samples should be collected to ensure remediation measures were effective. For additional information on follow up sampling, refer to the *Follow-Up Sampling (After Mitigation/Remediation)* section on page 14.

- **Remove or Replace Fixtures**

After identifying the sources of lead contamination, replacing these fixtures and piping components (e.g., valves, leaded solder) will permanently address the problem, compared with other solutions that have long-term costs and risks. If the sources of lead contamination are localized and limited to a few outlets, replacement may also be the most cost-effective option in the short-term. EPA's guidance document, [How to Identify Lead-Free Certification Marks for Drinking Water System and Plumbing Products](#) can be a useful resource when selecting lead-free plumbing.

If multiple components of a single type (for example, fountain valves) are needed, you may wish to initially purchase only one or two. Take follow-up water samples after installing the new component(s) to verify lead levels have been reduced to acceptable levels. If follow-up testing is satisfactory, you can be reasonably certain the product would perform well at other locations in your facilities.

Pipes within your property and supply lines that are under your and/or a public water system's jurisdiction can be replaced. Contact the public water system regarding who owns the supply line. Your school or district may be responsible for replacing the portion of the supply line that is on school property.

Ongoing renovation of school buildings may provide an opportunity to modify the plumbing system, so water supplied for drinking or cooking can be redirected to bypass sources of lead contamination. Before undertaking such an alternative, be certain you have properly identified all the sources of lead contamination in drinking water.

Because electrical current may accelerate the corrosion of lead in piping materials, consider checking grounding wires. In some cases, existing wires already grounded to the water pipes can be removed by a qualified electrician and replaced with an alternative grounding system. Be aware that the removal of grounding from water pipes may create a shock hazard unless an acceptable, alternative ground is provided.

When making any repairs, be sure only "lead-free" materials are used. The 1986 Safe Drinking Water Act Amendments and the 2011 Reduction of Lead in Drinking Water Act requires only "lead-free" materials be used in new plumbing and plumbing repairs. Make sure all plumbers and other workers involved in construction or maintenance at your school adhere to these requirements. These actions will prevent or minimize new lead from being introduced into the facility's plumbing system. Report any violations of the "lead-free" requirements to the local plumbing inspector, the DWP, or EPA.

- **Install a Filter**

Point-of-use (POU) filter units are commercially available and can be effective in removing lead. There are a number of POU cartridge filter units on the market with costs running from the relatively inexpensive (\$65 to \$250) to more expensive units (\$250 to \$500), with varying effectiveness. Remember filters need routine maintenance to remain effective.

To find a lead reducing POU filter that will work best for your facility, first verify the product was tested and certified against **NSF/ANSI Standard 53** (for lead removal). This information should be readily available from the manufacturer or from a reputable third-party source (such as [NSF International](#), the [Water Quality Association](#), or the [EPA's guide](#) to identifying filters certified to remove lead.)

For additional protection for particulate lead, look for a POU filter which is also certified against NSF/ANSI Standard 42 (for class I particulate reduction, 0.5 µm to <1 µm).

- **Add Corrosion Control Chemicals**

The addition of corrosion control chemicals can prevent or mitigate lead from leaching into water when total plumbing replacement is not an option.

If you are considering installing corrosion control chemicals to treat water entering your building, you should first consult with the DWP. Installation of treatment would lead to your facility being identified as a public water system under the Safe Drinking Water Act (SDWA), and your facility would be required to meet the federal and state regulations for drinking water, including additional water quality monitoring, having a designated operator, and more.

Please consult a water treatment expert before installing any corrosion control chemicals. A list of local treatment companies can be found on [the treatment resource page](#) on the DWP website, although other consultants may be available as well.

Follow-Up Sampling (After Mitigation/Remediation)

Work with plumbers and maintenance staff to ensure additional samples are taken from any outlets that were impacted by replacement of fixtures, reconfiguration of plumbing, or other remediation actions.

Additional samples should follow the same testing process as the initial samples. Sample any replaced or reconfigured components using the recommended procedures for first-draw (initial) and/or 30-second flush samples. Follow the sampling instructions included with your sample bottles.

A comparison of original and additional samples will help to assess whether the remediation has been successful in reducing lead in drinking water. Additional samples may be required to further pinpoint sources of lead contamination, if lead levels are still elevated.



Required Reporting

Although all lead mitigation and remediation actions are voluntary, you are required to report those actions. The DWP will reach out to your school via survey to record what actions have been taken or are planned.

It is required that staff, students, and parents be made aware of any discoveries of high lead levels in your school's drinking water. Communication concerning remediation and mitigation efforts should be maintained throughout the process.

Funding for Mitigation and Remediation

Funding and contact information for mitigation and remediation can be found in the EPA's guide for [Potential Funding Sources for Reducing Lead in Drinking Water in Schools and Child Care Facilities](#).

The EPA's document provides information on national foundations, corporations, and state and federal agencies that have a strong commitment to supporting school and child-care improvement initiatives. The national organizations listed here provide funding for environmental health, children's health, and environmental education projects. In addition, these organizations are committed to serving their local communities.

The Maine CDC Drinking Water Program will update schools when new funding sources become available. For more information, visit the [DWP Website](#).

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