Lead in School Drinking Water Technical Guidance

Introduction

The Washington State Department of Health (DOH) developed this technical guidance to support the reduction of lead contamination in drinking water at schools. In compliance with RCW 43.70.840, this guidance is at least as protective of student health as any technical guidance on this topic issued by the U.S. Environmental Protection Agency (EPA).

Follow this technical guidance on sampling, testing, and remediation for lead in school drinking water to meet the requirements of RCW 43.70.830 and RCW 28A.210.410. Schools and their contractors are encouraged to use additional resources to better understand:

- Lead in school drinking water;
- The health effects of lead;
- How to communicate with students, their families, school staff, and the community about testing and remediation efforts.

The EPA's 3Ts for Reducing Lead in Drinking Water in Schools provides more information on these topics.

Table of Contents

Section 1: Overview of Laws

Engrossed Second Substitute House Bill 1139, *Taking action to address lead in drinking water,* passed during the 2021 legislative session and resulted in several RCWs:

- RCW 43.70.830 Directing DOH around sampling, testing, and data sharing requirements
- RCW 43.70.835 State-Tribal compact schools
- RCW 43.70.840 Directing DOH to develop technical guidance
- RCW 43.70.845 DOH as lead agency – waiver
- RCW 28A.210.410 Directing schools around sampling and testing, communication, action plans, and remediation

DOH developed this technical guidance for schools and their contractors to provide information on the legal requirements for sampling, testing, and remediation. For more information on the legal requirements, visit the DOH Lead in School Drinking Water webpage.

All public schools with buildings built, or with all plumbing replaced, before 2016 must complete initial testing of drinking water between July 1, 2014, and June 30, 2026.

Note: Schools that own and operate their water system must also meet the Safe Drinking Water Act (SDWA) requirements.

Section 2: Testing for Lead in School Drinking Water

Testing Options

Schools have two options for sampling and testing for the potential of lead in school drinking water. They can either partner with DOH or hire a contractor.

Contractor Testing

Schools and their contractors must follow this technical guidance to ensure all drinking water outlets are sampled and tested according to the legal requirements. **Water sampling conducted by school district staff after July 25, 2021, does not meet the legal requirements.**

> **Note:** Drinking water tested before July 25, 2021, by an organization other than DOH, may fulfill the initial testing requirement. Contractor test results must be submitted to DOH for review upon request. For more information, contact leadfreekids@doh.wa.gov

Find an Accredited Lab

A Washington State Department of Ecology accredited laboratory must perform the testing for lead in drinking water. Department of Ecology's Laboratory Accreditation unit maintains a list of labs accredited to analyze drinking water for lead. The contractor should work with the lab to ensure they know t**he drinking water being tested is for a school, not a water system,** and must:

- meet the legal requirements for school lead testing
- be **first-draw samples**
- be collected in 250 milliliter (mL) bottles. (Note: In contrast to school lead testing samples, water system compliance samples are 1 liter)

Determine Outlets to Sample

All drinking water outlets in school buildings built, or with all plumbing replaced, before 2016 must be tested. Drinking water means "any water that students have access to where it is **reasonably foreseeable** that the water may be used for drinking, cooking, or food preparation." A drinking water outlet or outlet is "any end point for delivery of drinking water, for example a tap, faucet, or fountain."

The law requires sampling and testing of each outlet **intended** for human consumption. This includes:

- Drinking fountains
- Bottle fillers
- Kitchen sinks
- Kitchen kettle/pot fillers
- Ice machines
- Classroom combination sinks and drinking fountains
- Home economics room sinks
- Teacher's lounge sinks
- Nurse's office sinks
- And any other outlets known to be **or appearing to be used** for consumption (e.g., coffeemaker or cups are nearby)

Testing is **not required** in school building areas with outlets that are **not intended** for human consumption, such as, but not limited:

- Janitor closets
- Outdoor hoses
- Eyewash stations
- Emergency showers
- Locker room showers
- Restrooms
- Bathrooms
- Outlets that have signs clearly stating their uses, such as "handwash only" or "handwash only – not for drinking or food preparation"

If outlets not intended for human consumption run the possibility of being used for consumption (e.g., a janitor closet that's close to a kitchen and is used for cleaning appliances, or outdoor hoses being used to fill water jugs for sports activities), clear signage must be posted to indicate that the outlet should not be used for drinking or cooking **or** must be included in your sampling.[1]

Choosing a Sampling Day

- Select a day to sample when school is operating on a **normal use** schedule. Typically, this means Tuesday through Saturday is ideal for sampling.

[1] EPA 3Ts, Module 4, page 31

- Do not:
    - sample the morning after a weekend, during or after vacation or holiday break. This does not represent **normal use** and could create a situation where the water has been stagnant for longer than 18 hours.
    - shut water valves off to prevent use. This is not representative of normal use and may increase lead results by releasing lead particulate.
- Make sure:
    - all staff, students, and parents are aware of the sampling day.
    - everyone using the building knows the water cannot be used after the school is locked up the night prior to sampling, until sample collection is complete. This may require collecting samples early in the morning before staff typically arrive.

Collecting the Water Samples

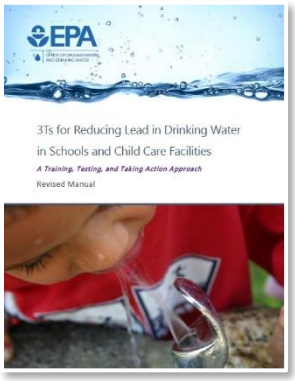
To ensure samples are collected according to the law, **all** of the following criteria must be met:

- **First-draw samples.** First-draw samples are typically collected early in the morning after water has been sitting stagnant in the pipes the night before, at least 8 but no more than 18 hours. Begin collecting the sample immediately after turning on the faucet or valve, not allowing any water to spill.[2]
- **Samples collected in 250 mL bottles.**
- **Samples collected before any water is used in the school building.** Ideally, it is best to collect water samples before the building opens and before any water is used. Best practice is the building restrooms and sinks should not be used during or prior to sampling. The water should sit in the pipes unused for at least 8 but no more than 18 hours before collecting the samples. However, water may be more than 18 hours old at some infrequently used outlets. **If this is typical of normal use patterns**, then these outlets should still be sampled.
- **Sampling occurs during a time of regular building use.** Unless specifically directed, do not collect samples during or the morning after vacations, scheduled or unscheduled school breaks, weekends, or holidays. The water will be stagnant for too long and will not represent water used for drinking during most days of the week.[3]
- **Do not remove aerators.** Do not remove aerators before or during sampling. The purpose of sampling is to get a snapshot of normal use. Do not clean aerators before sampling.
- **Do not conduct pre-stagnation flushing.** Pre-stagnation flushing is flushing water through all outlets the night before sampling. Since some outlets normally sit unused for longer periods of time, pre-stagnation flushing would not be representative of typical use.

[2] EPA 2Ts, Module 5, page 38
[3] EPA 3Ts, Module 4, page 35

RCW 43.70.840 in relation to the technical guidance and sample collection states the following:

Provisions of the technical guidance related to testing for the presence and level of lead in drinking water, as opposed to testing to identify sources of lead for remediation, must be designed to maximize detection of lead in water, and therefore must prohibit sampling analytical methods that tend to mask lead contamination, including pre-stagnation flushing and removal of aerators prior to sampling.



EPA's 3Ts for Reducing Lead in Drinking Water in Schools has a *Sampling Dos and Don'ts* for your reference.

Section 3: Test Results and Next Steps

When test results reveal an "elevated lead level" of greater than 5 parts per billion (ppb) at any drinking water outlet, schools must take action to resolve.

- **For test results that reveal an elevated lead level (greater than 5 ppb) at one or more drinking water outlets, RCW 28A.210.410 (5)(a) requires the school's governing body to adopt an action plan.**
- If test results come back in another unit of measurement that isn't ppb—such as micrograms per liter (µg/L), milligrams per liter (mg/L), or parts per million (ppm)—convert the results to ppb to find out if you need to take remedial action after receiving test results.

Refer to the table below to see the action levels that correspond to the unit of measurement on your test results. You can also use an online unit conversion calculator to convert your results to ppb. Reach out to leadfreekids@doh.wa.gov if you need assistance with conversions.

Parts per billion (ppb)	Micrograms per liter (µg/L)	Milligrams per liter (mg/L)	Parts per million (ppm)
5 ppb	5 µg/L	0.005 mg/L	0.005 ppm
15 ppb	15 µg/L	0.015 mg/L	0.015 ppm

The law does not require outlets with lead levels greater than 5 ppb, through 15 ppb be shut-off or taken out of service. However, schools are encouraged to use their best judgement based on the number of taps with elevated lead levels, student and staff safety, and water accessibility in the school when deciding whether to continue using outlets with elevated lead levels. If possible, do not use all taps with lead levels greater than 5 ppb, or provide an alternative source of water until remediation is completed under the school's action plan.

For outlets with lead levels greater than 15 ppb, schools must immediately shut off the water to the outlet or make the outlet inaccessible for consumption. This can be done by bagging or taping off the area and providing signage.

Note: If you are considering fixture replacement or suspect the plumbing may be the issue, you may **not** want to turn off the water immediately. You will likely want to do flush sampling first to help determine the lead source.

School Action Plan

Per RCW 28A.210.410 (5)(b)(i – iv), a school's action plan must:

- Be developed in consultation with DOH or a local health jurisdiction regarding technical guidance and with the Office of Superintendent of Public Instruction (OSPI) regarding funding for remediation activities.
- Describe mitigation measures implemented since lead test results were received.
- Include a schedule of remediation activities, such as use of filters, that adhere to the technical guidance. The schedule may be based on the availability of state or federal funding for remediation activities.
- Include post-remediation retesting to confirm that remediation activities reduced lead concentrations at drinking water outlets to below the elevated lead level.

For elevated lead test results received between July 1, 2014, and July 25, 2021, for which a school did not take remedial action or for which post-remediation retesting has not confirmed that each outlet with an elevated lead level has been reduced to 5 or fewer ppb, the school's governing body shall adopt an action plan by March 31, 2022.

For elevated lead test results received after July 25, 2021, the school's governing body shall adopt an action plan within six months of receipt.

Section 4: Remediation Options

Determine Remediation Actions

A school has several options for addressing outlets with elevated lead levels in their action plan. The best way for remediating depends on many factors, including:

- Age of the building's plumbing
- Number of outlets with elevated lead levels
- Availability of funds to complete the proposed remediation activities

Remediation options are listed from lowest cost and least invasive, to highest cost and most invasive.

Shut off Outlet or Take Outlet Out of Service

If your school only has a few outlets with elevated lead levels, taking certain outlets out of service or removing them permanently may be easiest. This may be a good option for an outlet that is rarely used or is in an area of low use. This may also be a good option for an outlet that is frequently used but is close to other outlets that provide ample access to water.

There are federal and state regulations that govern water availability to students and staff, as well as food safety requirements in food preparation areas. Examine these regulations before shutting off an outlet or taking an outlet out of service.

Restrict Outlet to Specific Use(s) Only

Outlets may be left in service for specific use when they should not be used for drinking or preparing food. In these cases, signage such as "hand wash only" or "hand wash only – not for drinking or preparing food" should be posted at the outlet to restrict for specific use. Some schools use this option when addressing elevated lead levels yet there is a need to have some use of the outlet. Students and staff need to know not to drink water from these outlets. Examine food safety requirements for food preparation areas before considering this option in school kitchens. Water from outlets with elevated lead levels may not be used for drinking or preparing food. For outlets in kitchens or food service areas, consult with your local health jurisdiction to review safe options or necessary menu changes.

Replace the Fixture

Fixture replacement is more complex, takes more resources, and requires follow-up testing after installation to ensure lead levels have reduced to 5 ppb or less.

When considering fixture replacement, it is recommended to take a flush sample from each outlet to determine if the lead contamination is from the fixture or the interior plumbing

components. As with the first-draw sampling procedure, take follow-up flush samples before a facility opens, before any water in the building is used, and after the water is stagnant for at least 8 hours. To collect a flush sample, open the tap and let the water run for 30 seconds, then take a 250 mL sample. Make sure to label each sample as a flush sample.[4]

Compare the test result of the initial first-draw sample to that of the flush sample. If the first-draw sample result is higher than the flush sample result, the elevated lead level is likely from fixture components. If the flush sample result is close to or above the first-draw result, then the lead is coming from interior plumbing components. In this case a fixture replacement, while it may help, may not reduce lead levels to 5 or fewer ppb. You may need to investigate further to determine the extent of internal plumbing issues.

When making any repairs, use "lead-free" materials. The 1986 Safe Drinking Water Act (SDWA) Amendments and the 2011 Reduction of Lead in Drinking Water Act require only "lead-free" materials be used in new plumbing and plumbing repairs. Ensure all plumbers and other workers adhere to these requirements. These actions will prevent or minimize introducing new lead into the facility's plumbing system. Report any violations of the "lead-free" requirements to the local plumbing inspector, DOH's Office of Drinking Water, or the EPA.[5]

The EPA's revised March 2015 guidance, How to Identify Lead-Free Certification Marks for Drinking Water System and Plumbing Products, can be a useful resource in selecting lead free plumbing.

If you need multiple replacements of one type of component (e.g., fountain valves), you may wish to purchase only one or two initially. Take follow-up water samples after installation to verify the new component(s) reduced lead levels to 5 or less ppb. If follow-up testing reveals reduced lead levels, you can reasonably ascertain that the product would perform well at other locations in your facilities.[6]

There are two important steps to finish the fixture replacement process: fixture conditioning and follow-up testing.

[4] EPA 3Ts, Module 6, page 45
[5] EPA 3Ts, Module 6, page 47
[6] EPA 3Ts, Module 6, page 45

Fixture Conditioning

Fixture conditioning can occur during the normal school year and during school breaks, such as holidays and summer break. Even though laws have changed and require less lead in plumbing components and fixtures, many schools detect elevated lead levels after installing "lead free" fixtures. There are several reasons for this. Debris, metal shavings, and dust from the manufacturing process may be in the fixture and connecting plumbing. Although new fixtures can be certified "lead free," they can still contain a limited percentage of lead and pass the requirements for certification. These components, when new, can leach lead into water. Also, the process of removing the old fixture and installing the new one can loosen pipe scale, which may contain lead.

Much of the information on conditioning fixtures in this technical guidance comes from schools that replaced fixtures to reduce lead levels. Conditioning new fixtures involves running water through the fixture either continuously or systematically for days to weeks. This removes dust and debris from the manufacturing process and allows the metal components in the fixture to develop a protective scale. This protective scale forms on the surface of metal components after interacting with water and helps to form a barrier that lowers the amount of metal that leaches into the water. This process is often referred to as "passivation."

Option 1: Continuous flow conditioning 24–72 hours

Conditioning fixtures by using continuous flow involves installing the fixture and running water through the device continuously for 24–72 hours. The flow rate should be full rate for 10 minutes, then a trickle for the remaining time. This helps reduce turbulence in the internal plumbing and the risk of overflow of the drain. If you install and condition multiple fixtures using continuous flow, consider the drainage of the devices and the plumbing system. Many schools have off-site conditioning rigs. They connect several fixtures to a main pipe with a central drainage system or floor drain. This method may work for school districts with space and resources. But for many schools, this may not be an option.

Checklist for continuous flow conditioning 24–72 hours:

- ❑ Remove aerators and clean any visible debris from them.
- ❑ Ensure drains are free of debris and objects that may hinder water flow.
- ❑ **With aerators removed**, fully open cold-water outlet and flush at full rate for 10 minutes. This helps remove loose particles with lead and brass shavings.
- ❑ After 10 minutes, replace the cleaned aerators and allow the water to trickle for 24–72 hours. The longer the water is allowed to run, the better the passivation process. A protective scale is more likely to be developed this way.

Option 2: Systematic/daily conditioning

For schools replacing many fixtures or conditioning fixtures after installation, systematic (or daily) conditioning may be the best option. This process involves flushing water through the

fixture at specific times and allowing the fresh water to sit in the fixture unused until flushing again at a specific time.

Checklist for systematic/daily conditioning:

- ❑ Remove aerator and clean/remove any visible debris.
- ❑ With aerators removed, fully open cold-water outlet and flush at full rate for 5 minutes. This helps remove loose particles with lead and brass shavings.
- ❑ Replace **cleaned** aerator.
- ❑ Use signage to inform students and staff to **not** use the fixture while conditioning.
- ❑ Run water in the morning for 1–2 minutes, then keep the fixture out of use.
- ❑ If possible, flush midday.
- ❑ Before the end of the school day, flush again and keep the fixture out of use overnight.
- ❑ **Continue this process for one to two weeks during the school week. ***

Since most schools do not have staff on site during the weekends, we do not include it in this recommendation.

Conditioning during summer break is out acceptable. Contact DOH for further guidance on conditioning during breaks.

Post-remediation Sampling and Testing

Sample and test each outlet with a new fixture using the first-draw procedure to confirm lead levels have reduced to 5 ppb or less. **If the outlet is not used daily, collect the first-draw follow-up sample after the conditioning process.**

If test results still show an elevated lead level, follow the conditioning process again and repeat follow-up sampling and testing. If elevated lead levels remain after a second conditioning process, contact DOH to discuss next steps.

Reach out to leadfreekids@doh.wa.gov for support with post-remediation retesting.

Install a Filter

Filters, while effective, can be expensive to purchase and maintain. There are generally two configurations of filters: point-of-entry (POE) and point-of-use (POU).

POE filters are installed where the water enters the building. If you are considering installing a device to treat water entering all school buildings, you should first consult with DOH's Office of Drinking Water. Installing a POE device will make your facility identify as a public water system under the SDWA. Your facility then must meet federal and state regulations for drinking water, including additional water quality monitoring. Any building that installs treatment for water entering the building and serves more than 25 people a day meets the definition of a public water system under the SDWA. In addition, POE devices are not effective in removing lead that comes from plumbing materials within the school. [7] However, POE treatment to adjust the

[7] EPA 3Ts, Module 6, page 44

water's chemistry, such as pH, alkalinity, and free chlorine, may reduce corrosion within the school's plumbing system.

POU filters can be installed at each outlet. POU filter units are commercially available, and there are several types that effectively remove lead. They can be relatively inexpensive ($65 to $250) or more expensive ($250 to $500). Their effectiveness varies, and they may be vulnerable to vandalism. POU filters require routine maintenance (e.g., cartridge filter units need to be replaced periodically) to remain effective. Create a maintenance schedule per the manufacturer's recommendations and identify a point of contact. This will help ensure filters are maintained and operate correctly.

To select a lead-reducing POU filter, check with the manufacturer or a third-party website (such as nsf.org or wqa.org) to verify the product was tested and certified against NSF/ANSI Standard 53 (for lead removal). For additional protection from particulate lead, look for a POU filter that is also certified against NSF/ANSI Standard 42 (for class I particulate reduction, 0.5 µm to <1 µm). [8]

POU filters remove lead coming from the internal plumbing. To meet the requirements of RCW 28A.210.410(5)(b)(iv), post-remediation retesting using the first-draw procedure outlined in this guidance must be done for each outlet remediated with a filter to confirm that lead levels have reduced to 5 or fewer ppb.

Replace the Plumbing

Replacing the plumbing in all or part of a school building can be very expensive, take a long time to complete, and disrupt school operations. However, if you have widespread lead contamination in part or all of your school, it may be an indication that your school's plumbing contains lead piping or other lead components. In this case, plumbing replacement may be the feasible and logical remedy. If you suspect internal plumbing may be the cause of elevated lead levels, a plumbing profile may help determine if lead may be in the plumbing and its location. Appendix G in the EPA's 3Ts has a plumbing profile questionnaire that can help you evaluate the building's plumbing. If you need to replace plumbing, seek the services of a plumbing and/or engineering firm to evaluate, plan, and complete the necessary repairs.

As with fixture replacement and filter installation, conduct follow-up sampling and testing to confirm that lead levels have reduced to 5 ppb or less and to meet the requirements RCW 28A.210.410(5)(b)(iv). After plumbing replacement, collect samples following the first-draw sampling procedure outlined previously in this guidance.

[8] EPA 3Ts, Module 6, pages 43-44

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