



Module 4: Developing a Sampling Plan

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This section includes recommended steps for developing and implementing a plan for testing drinking water in schools and child care facilities¹. Each section includes recommendations and explanations to help you understand your plumbing materials and sampling plan, evaluate your service connection (service lines), take samples, and interpret the results. The [Taking Action Section](#) provides short-term and longer-term control measures, examples of remedies for plumbing fixtures, and appropriate follow-up procedures that you should perform. **Throughout the testing process, remember to document the methodology, any implemented procedures or protocols, and testing results.**

Conduct a Walkthrough

Conduct a walkthrough of the facility and create an inventory. Take note of all sinks and fountains used for human consumption. If a floor plan is available, mark each tap and water filler on the floor plan and assign a unique identification. It may be helpful to take pictures when conducting this walkthrough. A plumbing profile can be created by answering a series of questions about the building's plumbing. The plumbing profile questionnaire in [Appendix G](#) can be used as a worksheet and recordkeeping tool. It may also be helpful to interview custodial staff and the teachers about water use.



Take note of the visible plumbing for these outlets. Staff creating the inventory may need to look under sinks or behind cabinets. Document whether faucets have aerators or filters in place to understand all possible sources of lead and any current remediation efforts at each fixture. Aerators should not be removed while conducting sampling for lead. If your facility has additions, wings or multiple buildings built during different years, a separate plumbing profile is recommended for each. Examples of plumbing configurations for a single-level building and a multilevel building are illustrated in Exhibit 2 and Exhibit 3, respectively.

Make sure to note any lead-lined storage tanks or lead parts such as those noted in [Appendix B](#). Water coolers identified by EPA as having lead-lined storage tanks or lead parts should be removed.

¹ For schools that are public water systems, there are regulatory requirements for sampling that must be followed to comply with the Lead and Copper Rule (LCR). The recommendations in this module could still be useful for those schools in addition to the monitoring required by the LCR.

Conducting this survey of the building's plumbing will enable you to:

- Understand how water enters and flows through building(s).
- Identify and prioritize samples.
- Identify additional sites staff or students may be using for drinking water, such as bathroom faucets, locker room showerheads, and non-traditional drinking water outlets that might be used to fill water jugs.

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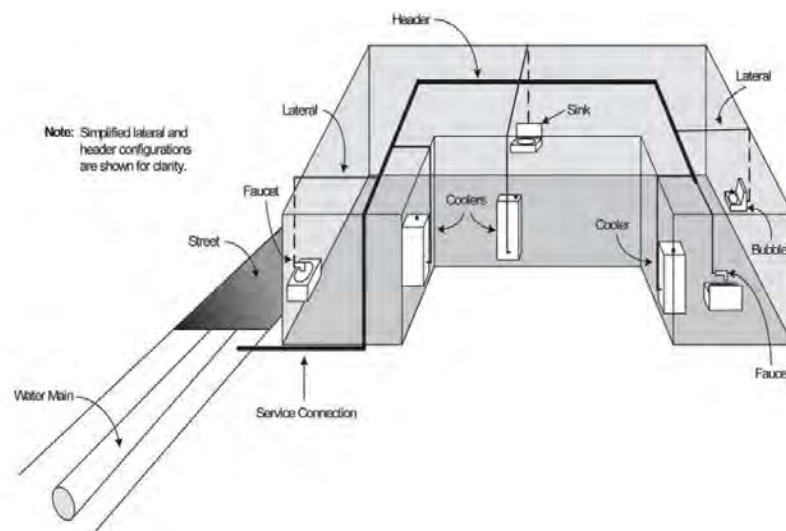
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Exhibit 2. Plumbing Configuration for a Single-Level Building

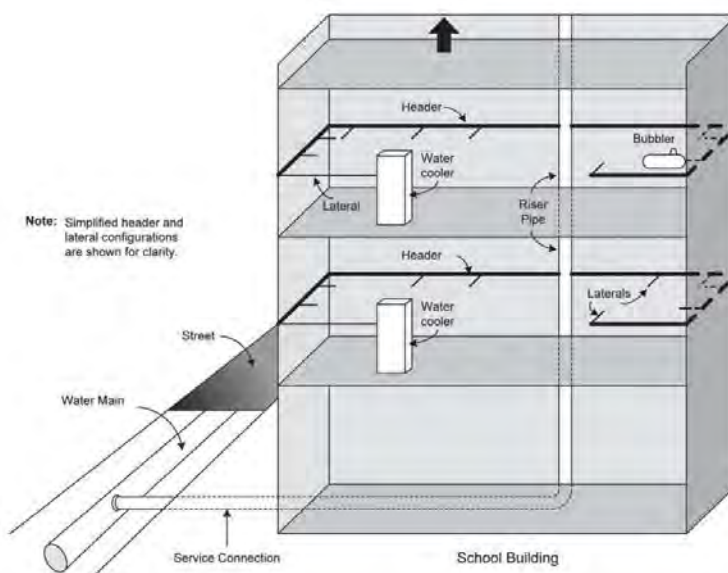


Header: The main pipe in the internal plumbing system of a building. The header supplies water to lateral pipes.

Lateral: A plumbing branch between a header or riser pipe and a fixture or group of fixtures. A lateral may or may not be looped. Where more than one fixture is served by a lateral, connecting pipes are provided between the fixtures and the lateral.

See [Appendix A](#) for additional definitions.

Exhibit 3. Plumbing Configuration for a Multilevel Building



As shown in Exhibit 2, in single-story buildings, the water comes from the service connection via main plumbing branches, often called headers. These, in turn, supply water to laterals. Smaller plumbing connections from the laterals and loops supply water to the faucets, drinking water fountains and other outlets. In multilevel buildings (Exhibit 3), water is carried to the different floors by one or more riser pipes. In addition, in some buildings, water may be stored in a tank prior to being distributed to the drinking water outlets and fixtures. Remember, for sampling purposes, that water within a plumbing system moves from the water main in the street through the service connection and through the building. Sample collection should typically start on the bottom floor then continue up. However, the water main can enter the building from the first floor and splits to the riser running up to the second, third floors, etc., and the riser can lead to the basement. This configuration may also be different if the water tank is on the roof. Try to learn more about how water flows in your facility to better inform your sampling plan.

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Determine Sampling Locations

Decide where to take samples and how to prioritize the sample sites based on responses to the plumbing profile questionnaire and knowledge of the building(s). This should include drinking fountains, kitchen sinks, kitchen kettle filler outlets, classroom combination sinks and drinking fountains, home economics room sinks, teachers' lounge sinks, nurse's office sinks, and any other sink known to be or visibly used for consumption (e.g., coffeemaker or cups are nearby). Faucets that are not used for human consumption, such as sinks in janitor's closets or outdoor hoses, should not be sampled. If there is potential that these may be used (e.g., janitor closet is close to kitchen and is used for cleaning appliances or the outdoor hoses are used to fill water jugs for sports activities), use clear signage to notify people that the faucet should not be used for drinking or cooking, or include the fixture in your sampling plan.

Helpful Tip...

Don't forget to include kitchen kettles in your sampling plan. Kitchen kettles are large containers of water that are then heated to steam or cook things like vegetables, sauces, pastas, rice, etc. They are used in larger kitchens, like some school kitchens, and sample results taken from these have found to contain elevated lead.

Important: schools and child care facilities should not use sample results from one outlet to characterize potential lead exposure from all other outlets in their facility. This approach could miss localized lead problems that would not be identified.

Make sure to prioritize outlets that are used by children under the age of 6 years or pregnant women (e.g., drinking fountains, nurses' office sinks, classrooms used for early childhood education, kitchen sinks, teachers' lounges).

During the process of determining sample locations, it will be helpful to code each outlet using a system that will allow each unique outlet to be identified by location, type and other relevant characteristics. [Appendix C](#) provides examples.

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Do You Have a Lead Service Line?

Lead pipes were used for service connections, or service lines, in some locations. Other materials used for service lines include copper, galvanized steel, plastic, and iron. In larger schools, the service line is probably not lead because lead is impractical for the larger service lines typically used in these facilities; however, many child care facilities reside in small buildings and are at a higher likelihood of being served by lead lines.

Regardless of building size, make sure to check the service line. The water system may be able to provide information about whether there is a lead service line or can help identify the service line for your facility.

Lead service lines may be visible and are generally a dull gray color and very soft. They can be identified easily by carefully scratching with a key. If the pipe is made of lead, the scratched area will turn a bright silver color. Do not use a knife or other sharp instruments and take care not to puncture the pipe.

Picture of a Scratch on a Lead Service Line



Selecting a Laboratory for Sample Analysis

Regardless of who collects the samples, you should employ a certified laboratory approved by the state or EPA for testing lead in drinking water. Contact the state drinking water program or the public water system, or visit EPA's website: [Contact Information for Certification Programs and Certified Laboratories for Drinking Water](#) for a list of certified laboratories in the area. Consider the following issues prior to making a selection:

Considerations When Choosing a Laboratory

- Will the laboratory conduct sampling as well as analyses? Be sure to let the laboratory know that samples will most likely be taken between 5:30 a.m. and 7:30 a.m. Sampling outside of business hours may influence the cost.
- What is the cost of the laboratory's services, and what is included in that cost? Costs will vary, depending upon the extent of the services to be provided (e.g., if only analyses are conducted or if other services such as sample collection are provided), and some laboratories may have bulk analysis rates for a large number of samples.
- You may want to contact several laboratories to compare prices and services, and they may wish to combine sampling with another school or child care facility to reduce the cost per sample.
- What other testing could the laboratory conduct for your facility? See [Appendix D](#) for more information.
- What is the laboratory's time frame for providing sample results?
- Establish a written agreement or contract with the laboratory for all of the services to be provided.

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Determine Your Sampling Frequency

How frequently your facility can and should test for lead in drinking water is dependent on a variety of factors (e.g., plumbing, water quality, lead results, budget, and competing priorities). Regardless of the frequency set by your facility, EPA recommends that the sampling frequency be documented so that it does not go overlooked for extended periods of time.

EPA suggests schools and child care facilities make testing drinking water a part of their regular building operations. Annual monitoring provides information on changes in the lead levels and the effectiveness of remediation or treatment efforts as well timely notice of lead levels that need to be addressed.



Communication Plan: Before you begin sampling, it is important to engage with the community and develop a plan for how to communicate throughout the sampling process.

Understanding the Sampling Procedures

Who should collect 3Ts Samples?

It is important that water samples be collected properly. Certified laboratories chosen to analyze samples may provide specialists to assist with sample collection. If the laboratory is not supplying someone to sample, be sure to identify an individual who is adequately trained to collect lead samples to help avoid sampling errors. It is useful to ask for references to confirm that individuals are qualified to test for lead in schools and child care facilities. Some state drinking water programs or public water systems may provide both services, although there is no federal requirement that they do so.

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What is the recommended sample volume?

EPA recommends the use of small samples (e.g., 250-mL) because a smaller sample represents a smaller section of plumbing, which can help you to identify the sources of lead at an outlet (e.g., fixture, interior plumbing, or water entering the school). A smaller sample is also more representative of the amount of water consumed per serving.



What are the recommended types of samples?

First-draw samples

First-draw samples are typically collected in the morning at outlets that are used for drinking or cooking, after the water has been sitting still the night before. Begin collecting the sample immediately after turning on the faucet or valve, not allowing any water to spill. EPA strongly recommends that schools collect first-draw samples from all fixtures used for consumption and prioritize sampling from high-risk fixtures.

Flush samples

Flush samples are taken after water has been running from the fixture for a pre-determined length of time. These types of samples are used in Step 2 (described in the [2-Step Sampling Section](#) of the 3Ts). Flush samples can be used to determine if lead is coming from the fixture itself or from interior plumbing.

Sequential samples

Sequential samples involve collecting a series of water samples at a single fixture, without flushing beforehand or running the water between samples. This sampling procedure is another method used in a Detailed Fixture Evaluation described in [Appendix D](#), to sample multiple sections of plumbing.

When should samples be collected?

Collect all water samples *before* the facility opens and *before* any water is used. Ideally, the water should sit in the pipes unused for at least 8 hours but not more than 18 hours before a sample is taken. However, water may be more than 18 hours old at some outlets that are infrequently used. If this is typical of normal use patterns, then these outlets should still be sampled. Make sure that no water is withdrawn from the outlets prior to their sampling. Remember not to use the facilities' restrooms or sinks that morning prior to sampling.

Unless specifically directed to do so, do not collect samples in the morning after vacations, weekends or holidays because the water will have remained stagnant for too long and will not represent the water used for drinking during most of the days of the week. See [Establishing Routine Practices](#) to learn ways to improve water quality throughout the year and after long breaks.

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When should I take action?

There is no safe level of lead for children. EPA encourages schools to prioritize remediation efforts based on lead sample results and to use the steps in the toolkit to pinpoint potential lead sources to reduce their lead levels to the lowest possible concentrations.

Before sampling, facilities should establish a plan on how they will respond to their sample results to protect the school and child care facility population from lead in drinking water. This may be dependent on a variety of factors (e.g., age of plumbing, population, water corrosivity, available resources, and other school and child care program priorities). EPA recommends that you prioritize remediation of drinking water outlets with the highest lead levels.

Make sure to also check with your state and local health department. They may have guidance or even requirements that include a lead remediation trigger.

Note: EPA’s Lead and Copper Rule (LCR) establishes a lead action level of 15 parts per billion (ppb) for water systems and facilities that have and/or operate their water source (e.g., own their own well). If the 90th percentile lead level concentration of tap samples exceeds the 15 ppb action level, water systems must take additional actions, such as optimizing corrosion control, public education, and lead service line replacement. The action level for lead is not a health-based standard and is based upon EPA’s evaluation of available data on the ability of corrosion control to reduce lead levels at the tap. The action level is a screening tool for determining when certain treatment technique actions are needed.

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