Copper Rule and sampling requirements. The guide is available at:
http://water.epa.gov/infrastructure/drinkingwater/schools/upload/2006_1_11_schools_lead_qrg_icr_schoo.pdf

In addition to complying with the Lead and Copper Rule, it is recommended that schools and child care facilities that are public water systems conduct additional testing for lead as children are particularly susceptible to health effects from lead.

**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.

In addition to protecting human health, facilities that voluntarily test drinking water and make information about their program available to the public may increase the public's confidence in the school or child care facility's water quality.
Table 4. Lead and Copper Tap Monitoring Requirements Under the Lead and Copper Rule

<table>
<thead>
<tr>
<th>School or Child Care Facility Daily Population Served</th>
<th>Number of Lead and Copper Tap Sample Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,001 – 50,000</td>
<td>60</td>
</tr>
<tr>
<td>3,301 – 10,000</td>
<td>40</td>
</tr>
<tr>
<td>501 – 3,300</td>
<td>20</td>
</tr>
<tr>
<td>101 – 500</td>
<td>10</td>
</tr>
<tr>
<td>100 or less</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Lead and Copper Rule: Quick Reference Guide for Schools and Child Care Facilities that are Regulated Under the Safe Drinking Water Act

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, 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.

Example of lead pipes in a plumbing system.

According to the Lead and Copper Rule there are steps that public water systems must take to reduce the corrosiveness of the water if the system has high levels of lead. However, if the plumbing in the facility is made of lead or contains lead parts, corrosion may occur simply by water moving through the plumbing.

Reduction of Lead in Drinking Water Act

A new requirement, signed into law by President Obama in January 2011, will further reduce lead in pipes, pipe fittings, plumbing fittings and fixtures to a weighted average of 0.25 percent. The Reduction of Lead in Drinking Water Act redefines “lead free” under the Safe Drinking Water Act to mean: not containing more than 0.2 percent lead when used with respect to solder and flux, the material used to join pipes and fixtures together (current law) and not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures. The new requirements will become effective in January 2014.
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 may contain lead:**
  - Debris from plumbing can collect on screens
- **Water service line from the well to the facility is made of lead:**
  - Pipes that carry water 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.

Copper

Copper is widely used in household plumbing, sometimes without proper consideration of water quality. Excess copper exposure can cause stomach and intestinal distress, liver or kidney damage and complications of Wilson's disease. Children's bodies absorb more lead and copper than the average adult because of their rapid development. Copper leaches into water through corrosion of the plumbing system—primarily from pipes, but fixtures, faucets and fittings made of brass can also be a source. The amount of copper in your water strongly depends on the acidity and types and amounts of minerals in the water, whether or not it is oxygenated or disinfected, how long the water stays in the pipes, the length of time the pipes have been in use and the water's temperature. When the water pH is below neutral (7) and when the alkalinity of the water (bicarbonate content) is high, very high concentrations of copper can persist for many years in copper pipes and fittings found in new construction and remodeled or renovated buildings. Blue staining of water, sinks and fixtures can be an indicator of extreme copper plumbing corrosion.
Lead

Voluntary Lead Testing

In addition to complying with the Lead and Copper Rule, EPA recommends that schools and child care facilities conduct additional voluntary lead testing at ALL water outlets used for drinking and food preparation. EPA developed the 3Ts (Training, Testing and Telling) for Reducing Lead in Drinking Water in Schools, Revised Technical Guidance to help schools and child care facilities implement simple strategies for managing the health risks of lead in drinking water. Following the 3Ts guidance does not replace requirements for complying with the Lead and Copper Rule (see page 2, Table 2. Regulations that Apply to Non-transient, Non-community Water Systems).

The 3Ts include:

- **Training** school and child care facility officials to raise awareness of the potential occurrences, causes and health effects of lead in drinking water, assist facilities in identifying potential areas where elevated lead may occur, and establish a testing plan to identify and prioritize testing sites;
- **Testing** drinking water in the facility to identify potential problems and take corrective actions as necessary; and
- **Telling** students, parents, staff and the larger community about monitoring programs, potential risks, the results of testing and remediation actions.

The 3Ts for Reducing Lead in Drinking Water in Schools, Revised Technical Guidance is available at: [http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts](http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts)

The 3Ts for Reducing Lead in Drinking Water in Child Care Facilities is available at: [http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts](http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts)

EPA also developed the, “What Your School or Child Care Facility Should Know About Lead in Drinking Water” DVD available for order from the National Service Center for Environmental Publications (NSCEP) at: [http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm](http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm)

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 localized problem and can vary from tap to tap. Just because there

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3 Also available by calling NSCEP at 1-800-490-9198. For International Orders: Call NSCEP at (301) 519-6640 or e-mail NSCEP at nscem@bps-limit.com
is lead getting into your water from one outlet does not mean that all your taps are vulnerable. 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 faucets where water is 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 testing for lead.

There are different sampling techniques used to comply with the Lead and Copper Rule and a voluntary lead testing program. The 3Ts for Reducing Lead in Drinking Water in Schools, Revised Technical Guidance, provides step-by-step instructions on how to properly collect voluntary samples and test your facility's drinking water outlets for lead. A list of certified laboratories for lead testing is available from your state or local water authority. Testing costs between $20.00 and $100.00 and the laboratory will provide instructions on proper sampling procedures.

The concentrations of lead in your drinking water samples will be reported in metric form, such as milligrams per liter (mg/L) or micrograms per liter (µg/L), or as parts per million (ppm) or parts per billion (ppb). One ppm is roughly equivalent to one cup of a substance in a swimming pool. One ppb is about one drop of a substance in a swimming pool.

Under the Lead and Copper Rule, EPA established an action level of 15 ppb for lead in a one-liter sample, based on the 90th percentile level of tap water samples (no more than 10 percent of your samples can be above the action level). If the 15 ppb threshold is exceeded, the Lead and Copper Rule requires corrosion control actions to be taken by the water system operator to reduce lead concentrations.

Under the 3Ts guidance, EPA recommends that schools and child care facilities also take action to correct issues with lead fixtures and piping within the school if samples from any ONE drinking water outlet shows lead levels greater than 20 ppb.

If your sink has separate hot and cold water knobs, 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 before collecting your sample.

**Routine Measures for Reducing Lead Exposure**

Whether you have tested your water or not, or even if your water has shown low levels of lead, there are basic 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, a licensed plumber or a local water service to develop a plumbing profile;
- Locate all water outlets that are used for consumption;
- Identify the drinking water outlet(s) furthest 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);

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*See Section II: Testing of the 3Ts for Reducing Lead in Drinking Water in Schools, Revised Technical Guidance, available at: [http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm](http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm)*

*See Section II: Testing of the 3Ts for Reducing Lead in Drinking Water in Schools, Revised Technical Guidance, available at: [http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm](http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm)*
• 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 state or local drinking water program to find out what the recommended flushing time is for your facility based on system size and pipe diameter. Flushing 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 furthest 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 main 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 water 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.

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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 toothbrush. Backwashing aerator components is also an effective cleaning method for many aerator types. Hold the 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, screw 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.

**Respond to Elevated Lead Levels**

If your system exceeds the lead action level under the Lead and Copper Rule, specific actions need to be taken. These required actions include public education, water quality parameter monitoring, source water monitoring and treatment and corrosion control treatment.\(^8\)

Under the 3Ts' guidance, EPA recommends that schools and child care facilities take action if samples from any ONE drinking water outlet show lead levels greater than 20 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 20 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. It is recommended that facilities 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 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 that their filtration technology is National Sanitation Foundation International (NSF) certified for lead reduction (http://www.nsf.org).

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 vendor 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 according to NSF/ANSI Standards 61 and 372 for lead reduction. You can search for NSF drinking water components at: http://www.nsf.org/certified/pwcomponents/

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 (ANSI)

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Standards 61 and 372); 
- Replace piping with “lead-free” materials; and 
- Be sure to check product packaging to confirm item is NSF certified as lead free.

Install point-of-use/point-of-entry treatment devices
- A point-of-use (POU) device is a filtration system, such as a carbon filter, that can be installed directly on a drinking water outlet. A point-of-entry (POE) device is a filtration system that is installed where the water main enters the facility and treats all the water in your building.
- Use a device that is certified by NSF International⁹ to remove lead.

- Maintaining POU and POE 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 or POE device you should conduct follow up testing to make sure the water is still below the action level.
- With the use of a POU or POE device, flushing is not necessary.
- If using POU or POE devices on some faucets, but not all, make sure that faucets without a POU or POE device are clearly labeled that they are not for drinking or cooking water.

Communicate with your Community about the 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.

![Image of children at a table]

Additional Considerations

Copper

Testing for copper may be appropriate if your water is somewhat acidic (with a pH below 7) and when it is disinfected. Copper corrosion decreases steadily over time under normal water usage conditions, but elevated copper levels can persist for many years in new copper pipes. If you are experiencing blue staining of your water, sinks, bathtubs or showers, or if there is growing blue encrustation on the fixtures, this may be an indicator of high copper levels, and you should have your water tested for both copper and lead. If you are experiencing elevated copper levels in the drinking water system, the easiest method for reducing exposure to copper is to flush the system to avoid drinking or cooking with water that has

4. Conducting Sampling

4.1 General Sampling Procedures
This section outlines the general procedures involved in collecting drinking water samples for lead testing, and the two-step sampling process for sampling at your school. Please note that the general two-step sampling process in this chapter contains recommendations for sampling that were created for typical plumbing configurations. If you believe that the recommendations do not fit your specific site conditions, you may wish to modify them as appropriate. See additional discussion in 4.4.3. EPA strongly recommends that all water outlets in all schools that provide water for drinking or cooking meet a standard of 20 parts per billion (ppb) lead or less.

4.2 Collection Procedures

(1) All water samples collected should be 250 milliliters (mL) in volume. School samples are smaller than the one liter sample collected by public water suppliers for compliance with the Lead and Copper Rule. A smaller sample is more effective at identifying the sources of lead at an outlet because a smaller sample represents a smaller section of plumbing. A smaller sample is also more representative of water per serving consumed by a child. A 250 mL sample from a faucet would not include portions of the plumbing behind the wall that the faucet is mounted on, for example, compared to a 1000 mL (1 liter) sample, which would include a longer line of plumbing with its valves and tees and elbows and soldered joints.

(2) 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.

(3) Make sure that no water is withdrawn from the taps or fountains from which the samples are to be collected prior to their sampling.

(4) 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 would not represent the water used for drinking during most of the days of the week.

(5) Assign a unique sample identification number to each sample collected - use your sampling plan schematic or numbering system. Record the identification number on the sample bottle and on your recordkeeping form (see Appendix F). On your recordkeeping form include information on:

- Type of sample taken, e.g., initial first draw, follow-up flush, etc.
- Date and time of collection.
- Name of the sample collector.
- Location of the sample site.
- Name of the manufacturer that produced the outlet, and the outlet's model number, if known.

*Consult the sample form in Appendix F for additional recordkeeping items.*
4.3 Laboratory Analysis and Handling of Sample Containers

As discussed in the previous chapter, the certified drinking water lab that you select will either collect the samples for you or they will provide you with materials and instructions if you plan to collect your own samples.

If you collect your own samples, follow the instructions provided by the laboratory for handling sample containers to ensure accurate results (also see Appendix G - Preservation of Samples and Sample Containers). Make sure the containers are kept sealed between the time of their preparation by the lab and the collection of the sample. Be sure to carefully follow the laboratory's instructions for preservation of the samples. Icing or refrigeration of the samples will likely be necessary. Most laboratories will provide shipping containers and ice packs if shipping is necessary.

When the laboratory returns your test results, the concentrations of lead in your drinking water samples will be reported in metric form such as milligrams per liter (mg/L) or micrograms per liter (µg/L), or they will be reported as a concentration such as parts per million (ppm) or parts per billion (ppb), respectively.

Milligrams per liter (mg/L) is essentially the same as parts per million (ppm). Micrograms per liter (µg/L) is essentially the same as parts per billion (ppb).

**Examples:**
1 mg/L = 1000 µg/L = 1 ppm = 1000 ppb; 0.020 mg/L = 20 µg/L = 0.02 ppm = 20 ppb

4.4 Overview of the Two-Step Sampling Process

EPA recommends that a two-step sampling process be followed for identifying lead contamination. Lead in a water sample taken from an outlet can originate from the outlet fixture (the faucet, bubbler etc.), plumbing upstream of the outlet fixture (pipe, joints, valves, fittings etc.), or it can already be in the water that is entering the facility. The two-step sampling process helps to identify the actual source(s) of lead.

In Step 1, initial samples are collected to identify the location of outlets providing water with elevated lead levels and to learn the level of the lead in the water entering the facility (i.e., at the service connection). In Step 2, follow-up flush samples are taken only from outlets identified as problem locations to determine the lead level of water that has been stagnant in upstream plumbing, but not in the outlet fixture. Sample results are then compared to determine the sources of lead contamination and to determine appropriate corrective measures.

The protocol, which consists of an established sample size volume and water retention time, is designed to identify lead problems at outlets and upstream plumbing within school facilities, and in the water entering the facility.

This section provides a brief definition and overview of the purpose of each of the two steps in EPA's lead testing process.

4.4.1 Step 1: Initial Sampling

In Step 1, initial samples are taken from prioritized outlets (e.g., bubblers, fountains) in the facility. These samples determine the lead content of water sitting in water outlets that are used for drinking or cooking within your building(s). A sample is also collected from a tap located as near as possible to the service
connection (i.e., the pipe connecting your facility to a larger water main). Initial service connection samples are flush samples, but the initial samples taken from bubblers, fountains, and other outlets used for consumption are all first-draw samples (i.e., the stagnant water is sampled before any flushing or use occurs). The goal of Step 1 is to compare the lead level of water from your facility's service connection to water that has remained stagnant between 8 and 18 hours in an outlet or fixture.

To determine the lead content in water from your facility's service connection, first contact your public water supplier to identify what lead levels you might expect. (If you completed the plumbing profile questionnaire in Appendix 1 that is also discussed in Exhibit 3.1, you will already have this information.) Second, test water that is representative of your service connection and the mains in your public water system. Compare the results to determine what contribution your service connection is making to lead concentrations in your building (see Exhibit 4.3). Then, compare this finding to the results from outlets in the facility. For sampling instructions for initial samples from service connections, mains, and different types of water outlets, see Exhibits 4.3 through 4.9.

Before beginning sampling, you should repair any leaking outlets to ensure that you collect representative samples.

4.4.2 Step 2: Follow-Up Flush Sampling

If initial test results reveal lead concentrations greater than 20 ppb in a 250 mL sample for a given outlet, follow-up flush testing described in Step 2 is recommended to determine if the lead contamination results are from the fixture or from interior plumbing. EPA has established this trigger for follow-up flush testing to ensure that the sources of lead contamination in drinking water outlets are identified. The table below provides details of an additional sub-step that might be taken to eliminate particulate debris that can collect on aerators and screens as a source of lead.

In Step 2, follow-up flush samples are collected and analyzed from outlets whose initial first draw results revealed lead concentrations greater than 20 ppb. The purpose of Step 2 is to pinpoint where (i.e., fixtures or interior plumbing) lead is getting into drinking water so that appropriate corrective measures can be taken.

As with initial first draw samples, follow-up flush samples are to be taken before a facility opens and before any water is used. Follow-up flush samples generally involve the collection of water from an outlet where the water has run for 30 seconds. This sampling approach is designed to analyze the lead content in the water in the plumbing behind the wall. The sampler should induce a small (e.g., pencil-sized) steady flow of water from the outlet or other sample location. The sampler should be careful not to begin with a high rate of flow, and then reduce the flow just prior to sampling. Sudden changes in flow could stir up sediments or cause sloughing of pipe films that would not be characteristic of typical water use patterns.
Eliminating Particulate Lead as a Source of Lead in Drinking Water

Alternative Step 2:

If initial first draw sampling results reveal concentrations higher than 20 ppb in the 250 mL sample for a given outlet, a contributing source of the elevated lead levels could be the debris in the aerator or screen of the outlet. By cleaning the aerator or screen and retesting the water following the initial first draw sampling procedures you can identify whether or not the debris is a contributing source to elevated lead levels in your facility.

Determining aerator/screen debris contribution:

Scenario 1: Your initial first draw sampling result was higher than 20 ppb, you decide to see if the aerator is a contributing source of lead in the water. After cleaning out your aerator you take another first draw sample.* The results come back less than or close to 5 ppb or the detection level. This result tells you that the debris in the aerator was contributing to elevated levels in your school. Continue to clean out the aerator on a regular basis and this outlet is O.K. to use. However, please note that without regular maintenance this tap may serve water with elevated lead levels.

Scenario 2: Your initial first draw sampling result is 25 ppb, you decide to see if the aerator is a contributing source of lead in the water. After cleaning out your aerator you take another first draw sample.* The second sample result is very close or equivalent to the 25 ppb sample. Since your initial first draw sample and alternative second first draw sample results are similar, the problem is upstream from the aerator. Continue to follow the sampling protocol and do your follow-up flush sampling.

Scenario 3: Your initial first draw sampling result is 60 ppb, you decide to see if the aerator is a contributing source of lead in the water. After cleaning out your aerator you take another first draw sample.* The second sample result is 25 ppb. While your results are lower, but still above 20 ppb, this tells you that the aerator or screen is a contributing source and that the plumbing upstream of the aerator is contributing as well. If this situation occurs, you should continue with follow-up flush sampling to target the additional contributing sources.

* When taking your second first draw sample, please remember to follow the same sampling procedure as your initial first draw sample.

A comparison of initial and follow-up samples will help to assess where the lead may be getting into the drinking water. See Exhibits 4.3 through 4.8 for follow-up flush sampling instructions for various types of outlets.

After follow-up flush sampling, additional samples from the interior plumbing within the building are also often necessary to further pinpoint the sources of lead contamination. See Exhibit 4.9 for instructions for additional sampling.

After reviewing the plumbing profile questionnaire and background regarding what your answers to the profile could mean (Exhibit 3.1), you have learned that lead contamination may not occur uniformly throughout a building. You should have an idea of the type of water you are receiving. From this assessment, you will then have a better sense of how to organize your testing activities. When planning your strategy, it is important to note that large variations in lead concentrations may be found among individual outlets in a facility because of differences in flow rates and/or building materials.
In general, you may find widespread presence of lead in your drinking water when:

- Lead pipes are used throughout the facility.
- The building’s plumbing is less than 5 years old and lead solder was illegally used (i.e., after the “lead-free” requirements of the 1986 Safe Drinking Water Act Amendments took effect). This situation is rare.
- The water is corrosive.
- Sediment or scale in the plumbing and faucet screens contain lead.
- Brass fittings, faucets, and valves were installed throughout the building less than five years ago (even though they may contain less than the “lead-free” requirements of the Safe Drinking Water Act).
- The service connection (i.e., the pipe that carries water from the public water system main to the building) is made of lead.

In general, you may find localized presence of lead if:

- Some brass fittings, faucets, and valves have been installed in the last five years (even though they may meet the SDWA “lead-free” requirement).
- Drinking water outlets are in line with brass flush valves, such as drinking water fountains near restroom supply piping.
- Lead pipes are used in some locations.
- The water is non-corrosive.
- Lead solder joints were installed in short sections of pipe before 1986 or were illegally installed after 1988 (i.e., after the lead-free requirements of the Safe Drinking Water Act took effect).
- There are areas in the building’s plumbing with low flow or infrequent use.
- Sediment in the plumbing and screens frequently contains lead.
- Some water coolers or other outlets have components that are not lead-free, especially if the water is corrosive.

After identifying potential problem areas in your facility through completion of a plumbing profile, the next step is to have the water tested. A sampling plan should be developed before testing begins. Key issues to consider in devising a sampling plan include the following:

- Who will be in charge of the sampling effort?
- Who will collect and analyze samples and maintain records?
- Where will the samples be taken?
4.4.3 Initial and Follow-Up Sampling Protocol

The protocol for collecting initial first draw and follow-up flush samples varies by type of drinking water outlet. The initial first draw and follow-up flush testing protocols and the interpretation of test results are described in Exhibits 4.3 through 4.9 for the following locations and type of outlets:

- Service connections and water mains
- Drinking water fountains (four types)
  - Bubblers or drinking water fountains (without central chillers): water is supplied to the bubbler or fountain directly from the building’s plumbing.
  - Bubblers or drinking water fountains (with central chillers): a central chiller unit cools water for a number of drinking water fountains or bubblers in the building.
  - Water coolers: devices are equipped with their own cooling and storage systems; water is supplied to the device from the building’s plumbing.
  - Bottled water dispensers: type of water fountain whose water is supplied from bottled water.

Note: The Food and Drug Administration (FDA) regulates bottled water. EPA recommends testing the dispenser to ensure that the dispenser is not contributing lead to the water.

- Ice making machines
- Water faucets
- Interior plumbing

Please note that sampling ID codes have been indicated in the descriptions of the sampling protocol for each outlet type. These sampling ID codes have been included for illustrative purposes only. When you conduct testing in your facility, you should assign your unique numbers for every sample you collect.

Following the instructions for the above water outlet locations are instructions for conducting sampling of the interior plumbing of buildings (Exhibit 4.9). Instructions are included for sampling laterals, loops and headers, and riser pipes. These types of samples are necessary if outlet follow-up flush samples show lead levels above 20 ppb.

TIP: Schools may wish to collect both initial and follow-up samples at the same time. This is more convenient and may save time and money if a contractor has been hired to collect the samples. However, using this approach creates a trade-off between convenience and confidence. The confidence in the sample results will decrease since flushing water through an outlet after taking the initial sample could compromise the flushed samples taken at subsequent outlets, depending upon the plumbing configuration. As succeeding outlets are flushed, the chances of compromising the remaining flushed samples would increase.

Exhibit 4.2 provides an overview of the sampling process in a flow chart format.
Exhibit 4.4: Drinking Water Fountains: Bubblers

Do not close the shut-off valves to the water fountains to prevent their use prior to sample collection. Minute amounts of scrapings from the valves will produce inaccurate results showing higher than actual lead levels in the water. Take all samples with the taps fully open.

Sample Collection Procedures:

- **Initial First Draw Screening Sample 1A**
  This sample is representative of the water that may be consumed at the beginning of the day or after infrequent use. It consists of water that has been in contact with the bubbler valve and fittings and the section of plumbing closest to the outlet of the unit.

  Take this sample before the facility opens and before any water is used. Collect the water immediately after opening the valve without allowing any water to run into the drain. Take follow-up samples from those bubblers where test results indicate lead levels over 20 ppb.

- **Follow-Up Flush Sample 2A**
  This sample is representative of the water that is in the plumbing upstream from the bubbler (from the bubbler back toward the service connection and the water main). Take this sample before the facility opens and before any water is used. Let the water from the fountain run for 30 seconds before collecting the sample. If several bubblers are served by a central chiller, samples should be taken from different bubblers on different days.

Note: All the samples are collected at the outlet. The sample numbers indicate what water is being targeted for testing.
Interpreting Test Results:

To determine the source of lead in the water, compare the test results of Samples 1A and 2A.

- If the lead level in Sample 1A is higher than that in Sample 2A, a portion of lead in the drinking water is contributed from the bubbler.
- If the lead level in Sample 2A is very low (close to 5 ppb), very little lead is picked up from the plumbing upstream from the outlet. The majority or all of the lead in the water is contributed from the bubbler.
- If the lead level in Sample 2A significantly exceeds 5 ppb (for example, 10 ppb), lead in the drinking water is also contributed from the plumbing upstream from the bubbler.
- If the lead level in Sample 2A exceeds 20 ppb, EPA recommends collecting follow-up flush samples from the header or loop supplying water to the lateral to locate the source of the contamination. *(Sampling instructions for interior plumbing can be found in Exhibit 4.9.)*

For example scenarios of water sample results and possible solutions, see Appendix H.
Exhibit 4.5: Drinking Water Fountains: Water Coolers

Do not close the valves to the water fountains to prevent their use prior to sample collection. Minute amounts of scrapings from the valves will produce inaccurate results showing higher than actual lead levels in the water. Take all samples with the taps fully open.

Sample Collection Procedures:
Two types of water coolers are used: the wall-mounted and the free-standing types. Water in these coolers is stored in a pipe coil or in a reservoir. Refrigerant coils in contact with either of these storage units cools the water. Sources of lead in the water may be the internal components of the cooler, including a lead-lined storage unit; the section of the pipe connecting the cooler to the lateral pipe; and/or the interior plumbing of the building.

Prior to testing, check the make and model numbers of your water coolers and compare them to EPA's listing of coolers that have lead parts or lead-lined tanks (see Appendix E for a summary of the water cooler issues and EPA's list of affected coolers). If you have a Halsey Taylor cooler that is on EPA's list of coolers with lead-lined tanks, consult Halsey Taylor for information on their replacement/refund program and associated testing directions. Contact information is provided in Appendix E.

Regardless of whether your water cooler appears on EPA's listing, initial testing should be conducted.

- **Initial First Draw Screening Sample 1C**
  This sample is representative of the water that may be consumed at the beginning of the day or after infrequent use. (In areas of infrequent use, the water may not have been used in more than 18 hours. This is acceptable if this is representative of the normal water consumption pattern.) The sample consists of water that has been in contact with the interior plumbing, the valve and fittings, the storage unit, and the section of plumbing closest to the outlet of the unit.

  Take this sample before the facility opens and before any water is used. Collect the water immediately after opening the faucet without allowing water to waste. Take follow-up flush samples from water coolers whose test results indicate lead levels greater than 20 ppb.

  When conducting follow-up flush testing with water coolers you should be aware that some...
water coolers manufactured before 1988 may have storage tanks lined with materials containing lead. You should contact the manufacturer of any water cooler units you have purchased or are planning to purchase for written guarantees that the unit is lead-free. *A list of makes and model numbers of coolers that contain lead has been prepared by EPA and is summarized in Appendix E.*

- **Follow-Up Flush Sample 2C**
  This water sample is representative of the water that is in contact with the header or rising piping upstream of the cooler. Take this sample after the facility closes. Let the water from the fountain run for 15 minutes before collecting the sample. You must flush the cooler for 15 minutes to ensure that no stagnant water is left in the storage unit.

- **Follow-Up First Draw Sample 3C**
  Take this sample before the facility opens and before any water is used. This sample must be taken the morning after you collect Follow-Up Flush Sample 2C. Collect the water immediately after opening the faucet without allowing any water to waste.

Because the water in the cooler was flushed the previous afternoon, this sample is representative of the water that was in contact with the cooler overnight, not in extended contact with the plumbing upstream. As such, it may differ from Initial First Draw Screening Sample 1C.
Interpreting Test Results:

- **IF**
  - Follow-up Sample 3C **IS GREATER THAN** Follow-up Sample 2C **THEN**
  - The water cooler may be contributing lead.

- **IF**
  - Follow-up Sample 3C **IS GREATER THAN** Follow-up Sample 2C **AND**
  - Initial Sample 1C **IS GREATER THAN** Follow-up Sample 3C **THEN**
  - The upstream plumbing may also be contributing lead.

- **IF**
  - Follow-up Sample 2C **IS CLOSE OR EQUAL TO** Follow-up Sample 3C **THEN**
  - The water cooler is probably not contributing lead.

- **IF**
  - Follow-up Sample 1C **IS GREATER THAN** Follow-up Sample 3C **AND**
  - Follow-up Sample 2C **IS CLOSE OR EQUAL TO** Follow-up Sample 3C **THEN**
  - The water cooler and/or upstream plumbing are probably contributing lead.

- **IF**
  - Follow-up Sample 2C > 20 pph, AND **IS GREATER THAN OR EQUAL TO** Initial Sample 1C & Follow-up Sample 3C **THEN**
  - The source of the lead may be sediments contained in the cooler storage tank, screen, or the plumbing upstream from the cooler.
• **Follow-Up First Draw Sample 4C**

To confirm whether the cooler is the source of lead, take Follow-Up First Draw Sample 4C.

Turn off the valve leading to the cooler. Disconnect the cooler from the plumbing and look for a screen at the inlet. Remove the screen. If there is debris present, check for the presence of lead solder by sending a sample of the debris to the laboratory for analysis.

Some coolers also have a screen installed at their outlet. Carefully remove the bubbler outlet by unscrewing it. Check for a screen and debris and have a sample of any debris analyzed.

Some coolers are equipped with a drain valve at the bottom of the water reservoir. Water from the bottom of the water reservoir should be sampled and any debris analyzed.

Collect Sample 4C from the disconnected plumbing outlet in the same manner as you collected Sample 1C. Compare the results from Sample 4C to the other sample results.

**Interpreting Additional Water Cooler Test Results:**

- **IF** Follow-up Sample 4C IS LESS THAN 5 ppb, **THEN** The lead is coming from debris in the cooler or in the screen.

- **IF** Follow-up Sample 4C IS MUCH GREATER THAN 5 ppb, **THEN** The lead is coming from debris in the cooler or in the screen.

- **IF** Follow-up Sample 4C IS MUCH GREATER THAN 5 ppb, AND LESS THAN Initial Sample 1C **THEN** The source of lead may be sediments contained in the cooler, screens, and/or the upstream plumbing.

For example scenarios of water sample results and possible solutions, see Appendix H.
Appendix E – Water Cooler Summary

The Lead Contamination Control Act (LCCA), which amended the Safe Drinking Water Act, was signed into law on October 31, 1988 (P.L. 100-572). The potential of water coolers to supply lead to drinking water in schools and child care centers was a principal focus of this legislation. Specifically, the LCCA mandated that the Consumer Product Safety Commission (CPSC) order the repair, replacement, or recall and refund of drinking water coolers with lead-lined water tanks. In addition, the LCCA called for a ban on the manufacture or sale in interstate commerce of drinking water coolers that are not lead-free. Civil and criminal penalties were established under the law for violations of this ban. With respect to a water cooler that may come in contact with drinking water, the LCCA defined the term “lead-free” to mean:

“not more than 8 percent lead, except that no drinking water cooler which contains any solder, flux, or storage tank interior surface which may come in contact with drinking water shall be considered lead-free if the solder, flux, or storage tank interior surface contains more than 0.2 percent lead.”

Another component of the LCCA was the requirement that EPA publish and make available to the states a list of drinking water coolers, by brand and model, that are not lead-free. In addition, EPA was to publish and make available to the states a separate list of the brand and model of water coolers with a lead-lined tank. EPA is required to revise and republish these lists as new information or analyses become available.

Based on responses to a Congressional survey in the winter of 1988, three major manufacturers, the Halsey Taylor Company, EBCO Manufacturing Corporation, and Sunroc Corporation, indicated that lead solder had been used in at least some models of their drinking water coolers. On April 10, 1988, EPA proposed in the Federal Register (at 54 FR 14320) lists of drinking water coolers with lead-lined tanks and coolers that are not lead-free. Public comments were received on the notice, and the list was revised and published on January 18, 1990 (Part III, 55 FR 1772). See Table E-2 for a list of water coolers and lead components.

Prior to publication of the January 1990 list, EPA determined that Halsey Taylor was the only manufacturer of water coolers with lead-lined tanks.1 Table E-1 presents a listing of model numbers of the Halsey Taylor drinking water coolers with lead-lined tanks that had been identified by EPA as of January 18, 1990.

---

1Based upon an analysis of 22 water coolers at a US Navy facility and subsequent data obtained by EPA, EPA believes the most serious cooler contamination problems are associated with water coolers that have lead-lined tanks.
Since the LCCA required the CPSC to order manufacturers of coolers with lead-lined tanks to repair, replace or recall and provide a refund of such coolers, the CPSC negotiated such an agreement with Halsey Taylor through a consent order published on June 1, 1990 (at 55 FR 22387). The consent agreement calls on Halsey Taylor to provide a replacement or refund program that addresses all the water coolers listed in Table E-2 as well as "all tank-type models of drinking water coolers manufactured by Halsey Taylor, whether or not those models are included on the present or on a future EPA list." Under the consent order, Halsey Taylor agreed to notify the public of the replacement and refund program for all tank type models.

SPECIAL NOTE:
Experience indicates that newly installed brass plumbing components containing 8 percent or less lead, as allowed by the SDWA, can contribute high lead levels to drinking water for a considerable period after installation. U.S. water cooler manufacturers have notified EPA that since September 1993, the components of water coolers that come in contact with drinking water have been made with non-lead alloy materials. These materials include stainless steel for fittings and water control devices, brass made of 60 percent copper and 40 percent zinc, terillium copper, and food grade plastic.

Currently, a company formerly associated with Halsey Taylor, Scotsman Ice Systems, has assumed responsibility for replacement of lead-line coolers previously marketed by Halsey Taylor. See below for the address of Scotsman Ice Systems.

Scotsman Ice Systems
775 Corporate Woods Parkway
Vernon Hills, IL 60061
PH: (800) SCOTSMAN or 800-726-8762
PH: (847) 215-4500

Table E-1
Halsey Taylor Water Coolers With Lead-Lined Tanks

The following six model numbers have one or more units in the model series with lead-lined tanks:

| WM8A | WT8A | GC10ACR | GC10A | GC5A | RWM13A |

The following models and serial numbers contain lead-lined tanks:

<table>
<thead>
<tr>
<th>WM14A Serial No. 843034</th>
<th>WM14A Serial No. 843006</th>
<th>WT11A Serial No. 222650</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT21A Serial No. 6430550</td>
<td>WT21A Serial No. 64309542</td>
<td>LL14A Serial No. 64346908</td>
</tr>
</tbody>
</table>

2Based upon an analysis of 22 water coolers at a US Navy facility and subsequent data obtained by EPA, EPA believes the most serious cooler contamination problems are associated with water coolers that have lead-lined tanks.
### Table E-2

**Water Coolers With Other Lead Components**

**ERCO Manufacturing**

All pressure bubbler water coolers with shipping dates from 1962 through 1977 have a bubbler valve containing lead. The units contain a single, 50-50 tin-lead solder joint on the bubbler valve. Model numbers for coolers in this category are not available.

The following models of pressure bubbler coolers produced from 1978 through 1981 contain one 50-50 tin-lead solder joint each.

<table>
<thead>
<tr>
<th>CP3</th>
<th>DP15W</th>
<th>DPM8</th>
<th>ZP</th>
<th>13P</th>
<th>DPM8H</th>
<th>DP15M</th>
<th>DP3R</th>
<th>DP8A</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP16M</td>
<td>DP5S</td>
<td>C10E</td>
<td>PX-10</td>
<td>DP7S</td>
<td>DP13SM</td>
<td>DP7M</td>
<td>DP7MH</td>
<td>DP7WMD</td>
</tr>
<tr>
<td>WTC10</td>
<td>DP13M-60</td>
<td>DP14M</td>
<td>CP10-50</td>
<td>CP5</td>
<td>CP5M</td>
<td>DP15MW</td>
<td>DP3R</td>
<td>DP14S</td>
</tr>
<tr>
<td>DP20-50</td>
<td>DP75M</td>
<td>DP10X</td>
<td>DP13A</td>
<td>DP13A-50</td>
<td>EP10F</td>
<td>DP5M</td>
<td>DP10F</td>
<td>CP3H</td>
</tr>
<tr>
<td>CP3-50</td>
<td>DP13M</td>
<td>DP3RH</td>
<td>DP5F</td>
<td>CP3M</td>
<td>EP5F</td>
<td>13PL</td>
<td>DP8AH</td>
<td>DP13S</td>
</tr>
<tr>
<td>CP10</td>
<td>DP20</td>
<td>DP12N</td>
<td>DP7WM</td>
<td>DP14A-50/60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Halsey Taylor**

1. Lead solder was used in these models of water coolers manufactured between 1978 and the last week of 1987:

<table>
<thead>
<tr>
<th>WMA-1</th>
<th>SCW1/SCWT-A</th>
<th>SWA-1</th>
<th>DC/DHC-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S35/10D</td>
<td>BFC-4F/7F/4FS/7FS</td>
<td>S300/500/100D</td>
<td></td>
</tr>
</tbody>
</table>

2. The following coolers manufactured for Haws Drinking Faucet Company (Haws) by Halsey Taylor from November 1984 through December 18, 1987, are not lead-free because they contain 2 tin-lead solder joints. The model designations for these units are as follows:

<table>
<thead>
<tr>
<th>HC8WT</th>
<th>HC14F</th>
<th>HC6W</th>
<th>HWCG7D</th>
<th>HC8WTH</th>
<th>HC14F</th>
<th>HC8W</th>
<th>HC2F</th>
<th>HC14WT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC14FL</td>
<td>HC14W</td>
<td>HC2FH</td>
<td>HC14WTH</td>
<td>HC8FL</td>
<td>HC4F</td>
<td>HC5F</td>
<td>HC14WL</td>
<td>HCFBD</td>
</tr>
<tr>
<td>HC4FH</td>
<td>HC10F</td>
<td>HC16WT</td>
<td>HCF7HO</td>
<td>HC8F</td>
<td>HC8FH</td>
<td>HC6W</td>
<td>HWC7</td>
<td></td>
</tr>
</tbody>
</table>

If you have one of the Halsey Taylor water coolers noted in Table E-2, contact Scotsman Ice Systems *(address and phone noted above)* to learn more about the requirements surrounding their replacement and rebate program.
### Appendix F – Sample Recordkeeping Form

#### Record of Sampling

| Name of Building          |  
|----------------------------|---|
| Name of Sample Collector  |  
| Contact Person for this Record |  
| Sample ID Number          |  
|                           |  

Circle sample type: Initial / 1st Follow-up / 2nd Follow-up

| Length of Flush (for flushed samples) |  
|--------------------------------------|---|
| Type of Outlet (faucet, cooler etc.) |  
| Mfg/Model                            |  
| Serial #                             |  
| Date of Installation                 |  
| Location                             |  
| Date of Collection                   |  
| Time of Collection                   |  
| Name of Laboratory Used              |  
| Lead Concentration (ppb)             |  

**NOTES:**
Appendix G - Preservation of Samples and Sample Containers

This appendix contains information pertaining to the preservation of samples and sample containers. A certified drinking water laboratory should be aware of these requirements. In addition, they will provide you with actual samplers or sample containers and instructions. The sample containers may have been prepared prior to your receipt. The laboratory will also specify how to handle the sample containers and when to submit them after taking your samples.

In order to avoid analytical errors, pay particular attention to proper collection and handling of the sample before analysis. Sample containers (250 mL) should be obtained from a certified laboratory. You should not use other containers such as used jars or water bottles.

Make sure the containers are kept sealed between the time of their preparation by the lab and the collection of the sample. This will assure that no contaminants from the outside are introduced. Preserve the sample by icing and promptly ship or deliver it to the laboratory. Most laboratories will provide the necessary shipping containers and cold packs. Upon receipt, the laboratory will acidify the sample. The sample can be held up to 14 days prior to acidification without loss of lead through absorption, but EPA recommends that the laboratories receive the samples as soon as possible.

For more detailed information, refer to the following documents:


Appendix H – 
Example Scenarios for Water Sample Results

Service Connection Sampling (See Exhibit 4.3)

Examples:

- Sample 1S (20 ppb) exceeds Sample 1M (5 ppb) = 15 ppb of lead is contributed from the service connection; the lead amount in the main (Sample 1M) does not exceed 5 ppb; therefore, you may want to check for a lead service line or gooseneck depending upon results of lead testing at other outlets in the building; if you reduce lead at the connection, lead levels may be reduced throughout the remainder of the building.

- Sample 1M is 10 ppb and Sample 1S is 10 ppb = very little lead is contributed from the service line; source of lead is most likely the water main.

- Sample 1S (7 ppb) and Sample 1M (6 ppb) are close to 5 ppb = very little lead (1 ppb) is being picked up in the water from the service line or the distribution main; very little lead is contributed from the source water; if other outlets show significantly higher lead levels, the source of the contamination is the interior plumbing and/or the outlets themselves.

Drinking Water Fountain without Central Chiller (See Exhibit 4.4)

Example:

- Sample 1A (31 ppb) exceeds Sample 2A (7 ppb) = 24 ppb of lead is contributed from the bubbler.

- Sample 2A (7 ppb) does not significantly exceed 5 ppb = very little lead (2 ppb) is being picked up from the plumbing upstream from the bubbler; the majority of the lead in the water is contributed from the bubbler.

- Sample 2A (7 ppb) does not exceed 20 ppb = sampling from header or loop supplying water to the lateral is not necessary.

Possible Solution: Replace fixture, valves, or fittings on bubbler with lead-free device (ensure compliance with the NSF standards for any fixtures you intend to purchase); retest water for lead after new materials installed.
Drinking Water Fountain with Central Chiller (See Exhibits 4.4 and 4.9)

Example 1:

- Sample 1A (25 ppb) exceeds Sample 2A (3 ppb) = 22 ppb of lead is contributed from the bubbler.
- Sample 2A (3 ppb) is close to 5 ppb = very little lead is being picked up from the plumbing upstream from the bubbler; the majority or all of the lead is contributed from the bubbler.

Possible Solution: Replace bubbler valve, fittings and/or fixture with lead-free materials (request results of lead leaching studies from manufacturers of brass products before purchasing to ensure that harmful amounts of lead will not be leached); retest water once new materials installed.

Example 2:

- Sample 1A (38 ppb) exceeds Sample 2A (21 ppb) = 17 ppb of lead is contributed from the bubbler.
- Sample 2A (21 ppb) significantly exceeds 5 ppb = about 21 ppb of lead is being contributed from the plumbing upstream from the bubbler.
- Sample 2A (21 ppb) exceeds 20 ppb = sampling from the chiller unit supplying the water to the lateral is necessary to locate the source of the contamination (see instructions and examples below for sampling chiller units).

Example 3:

- Sample 2A (21 ppb) exceeds Sample 2K (10 ppb) = 11 ppb of lead is contributed from the plumbing supplying the water from the chiller to the bubbler.
- Sample 2K (10 ppb) exceeds Sample 1K (4 ppb) = a portion of the lead (6 ppb) may be coming from the chiller; check for and remove any debris and sludge in the chiller unit; flush the unit, and resample the water.
- Sample 1K (4 ppb) does not exceed 20 ppb = additional sampling from the distribution system supplying water to the chiller is not necessary.
- Sample 1K (4 ppb) is very close to 5 ppb = very little lead is picked up from the plumbing upstream from the chiller; the majority or all of the lead in the water can be attributed to the chiller and the plumbing downstream from the chiller.

Possible Solutions: Flush the chiller unit and plumbing; if lead levels are still high, replace plumbing supplying water from the chiller to the bubbler; replace bubbler fixture, fittings, and valves with lead-free materials; and clean sediment and debris from chiller unit. Retest water for lead once changes have been made. If the lead levels after initial flushing are low, clean any sediment and debris from the chiller, and resample the chiller monthly for 3 months. If the lead levels increase, the additional remediation measures listed immediately above are probably necessary to reduce lead risks. If the levels remain low, routine annual cleaning of sediment and debris and routine monitoring at the same frequency as other sites is recommended.

Example 4:

- Sample 2A (45 ppb) exceeds Sample 2K (28 ppb) = 17 ppb of lead is being contributed from the plumbing supplying water from the chiller to the bubbler.
- Sample 2K (28 ppb) exceeds Sample 1K (21 ppb) = 7 ppb of lead is contributed by the chiller.
- Sample 1K (21 ppb) exceeds 20 ppb = additional sampling from the distribution system supplying water to the chiller is necessary to locate the source of the contamination (see Exhibit 4.9 on Sampling Interior Plumbing for instructions).

Possible Solution: Lead levels are clearly elevated at all sample sites. It appears that multiple sources of lead are contributing to the problem. Retesting may help locate sources of lead, but it appears that the solution includes replacement of upstream plumbing; the bubbler fixture, valves, and fittings with lead-free materials; and cleaning the sediment and debris from the chiller. Retest water for lead after changes have been made. If levels are still elevated, replacement of the chiller may be necessary.
Drinking Water Fountain (Water Coolers) (See Exhibit 4.5)

Example 1:
- Sample 1C (54 ppb) = the plumbing upstream from the cooler and/or the water cooler is contributing lead.
- Sample 3C (40 ppb) exceeds Sample 2C (5 ppb) = the water cooler is contributing 35 ppb of lead.
- Sample 3C (40 ppb) exceeds Sample 2C (5 ppb) and Sample 1C (54 ppb) exceeds Sample 3C (40 ppb) = the plumbing directly upstream from the cooler is contributing 14 ppb of lead.
- Sample 2C (5 ppb) is less than 10 ppb and Sample 2C is less than Sample 1C (54 ppb) and Sample 3C (40 ppb) = the source of lead is not sediments contained in the cooler storage tank, screens, or plumbing upstream from the cooler.

Possible Solutions: Replace the cooler with one that contains lead-free components, and retest the water or find an alternative lead-free drinking water source; locate source of lead from plumbing and eliminate it (routine flushing is not applicable as a potential remedy for water coolers – see discussion of this issue in Sections 5.2 and 5.3 of this guidance document for further information).

Example 2:
- Samples 1C (44 ppb), 3C (42 ppb) and 2C (41 ppb) are approximately equal = the cooler is not the likely source of lead.
- Sample 1C (44 ppb) exceeds Sample 3C (42 ppb) and Sample 3C and Sample 2C (41 ppb) are close = the plumbing upstream from the cooler is contributing lead to the water.
- Samples 1C (44 ppb), 3C (42 ppb) and 2C (41 ppb) are approximately equal = the source of lead is not likely sediments contained in the cooler storage tank or screens.
- Sample 4C (43 ppb) significantly exceeds 5 ppb = the source of lead is the plumbing upstream from the cooler.

Possible Solutions: Replace the plumbing upstream between the header and cooler with lead-free materials and retest the water. If the water continues to test high, the header, service connection and/or public water supply may be the problem. An evaluation should be made as soon as possible to determine the source of the lead, and other outlets should be tested immediately if not already done. Remember that flushing is not recommended as a practical remedy for water coolers.

Bottled Water Dispensers (See Exhibit 4.6)

Example 1:
- Sample 1D (23 ppb) exceeds Sample 2D (5 ppb) = 18 ppb of lead is contributed from the dispenser unit.

Possible Solution: Replace dispenser unit with one that is made of lead-free materials and retest.

Example 2:
- Sample 1D (24 ppb) and Sample 2D (23 ppb) are close = the source of lead is the bottled water.

Possible Solutions: Purchase another type of bottled water for which the distributor provides written assurance that lead levels do not exceed federal and state lead standards, or find other alternative lead-free water source. Retest after any remedy has been employed.