Drinking Water
Best Management Practices

For Schools and Child Care Facilities With Their Own Drinking Water Source

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This guide is intended for use by school officials and child care providers responsible for the maintenance and/or safety of school and child care facilities including the drinking water. The purpose of this guide is to describe the importance of implementing best management practices for drinking water in schools and child care facilities and how a school or child care facility would go about implementing these practices. This guide is specifically designed for schools and child care facilities that have their own well and, therefore, are classified as a public water system. This guide is not a regulation itself, nor does it change or substitute for those provisions and regulations. Thus, it does not impose legally binding requirements on EPA, states, public water systems, schools or child care facilities. This guide does not confer legal rights or impose legal obligations upon any member of the public. While EPA has made every effort to ensure the accuracy of the information in this guide the obligations of the regulated community are determined by statutes, regulations or other legally binding requirements. In the event of a conflict between the information in this guide and any statute or regulation, this document would not be controlling.

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This document was prepared by the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, and is based on EPA New England's guide titled, "*Are You Providing Safe Drinking Water at Your School? EPA-901-F-03001, May 2003.*"

What Decision Makers Should Know

On any given day in America nearly 50 million public school students spend a significant portion of their day in school buildings. Exposure to environmental hazards in schools can negatively impact the health of children and school staff. Moreover, studies have shown that poor indoor environments in schools have negative impacts on teacher productivity and student performance.[1,2,3]

Schools and child care facilities receive their drinking water from either nearby municipal water systems or their own on-site drinking water source (i.e., wells). Facilities that receive their drinking water from their own water source are operating a public water system (PWS) and are required to comply with a series of regulations. There are also best management practices that schools and child care facilities should follow if they operate their own public water system. This guide provides an overview of public water systems and regulations that apply to them. Additionally, this guide provides best management practices for the following:

- Complying with regulations that apply to public water systems;
- Protecting sources of drinking water;
- Maintaining and sanitizing water fountains and faucet screens/aerators;
- Voluntarily testing for lead in addition to complying with the Lead and Copper Rule;
- Conducting routine measures for reducing lead exposure in drinking water; and
- Implementing additional measures such as water security, water conservation and educating students about drinking water.

Public Water Systems

A public water supply system is one that provides tap water for human consumption to 15 or more service connections or serves an average of 25 people at least 60 days each year. Water for human consumption includes water for drinking and cooking, food preparation,

Top Five Actions to Protect Drinking Water at Schools and Child Care Facilities

1. Clean drinking water fountains daily using procedures found in this guide.
2. Clean debris out of all outlet screens or aerators on a regular basis using the procedures found in this guide.
3. Test the facility's drinking water for lead. If lead is present, follow the actions for addressing lead contamination outlined in this guide.
4. Ensure the source of your drinking water supply is free from contamination by using the recommendations found in this guide.
5. If elevated lead levels are found, regularly flush all water outlets used for drinking or food preparation and install point-of-use devices, to provide additional treatment of drinking water at the outlet.

[1] Vinciullo F. The relationship between multi-component school health programs and school achievement. Paper presented at: Annual Conference of the National Association of School Nurses, 2008; Albuquerque, NM.

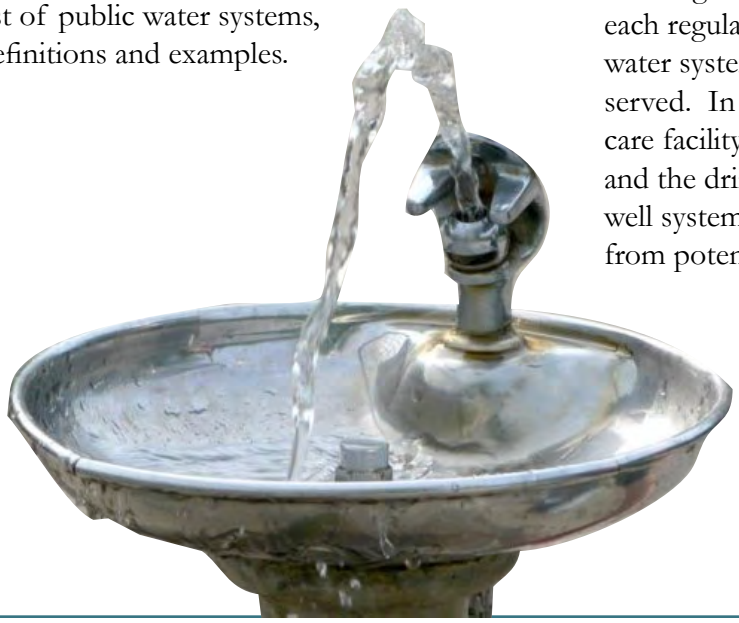
[2] Stolz A, Knickelbein, A., Coburn, S. Linking coordinated school health to student success. Paper presented at: Annual Conference of the National Association of School Nurses, 2008; Albuquerque, NM.

[3] NRC (National Research Council). Green Schools: Attributes for Health and Learning. Washington D.C.: The National Academies; 2006.

Table 1. Types of Public Water Systems

	Definition	Examples
Community water system	Deliver water to 15 or more service connections OR at least 25 residents are served by the system year-round	Subdivisions, mobile home parks, water districts, cities and towns
Non- transient non-community water systems	Serve the same non-resident persons each day for more than 6 months per year	Schools, child care facilities and businesses
Transient non-community water systems	A public water system that provides water in a place where people do not remain for long periods of time	Restaurants, rest stops, summer camps and campgrounds

hand washing and bathing. Most schools and child care facilities that are PWSs are typically non-transient, non-community water systems (NTNCWS), as they serve the same non-resident population each day for more than six months per year. Other types of water systems include community water systems (CWS) and transient, non-community water systems (TNCWS). See Table 1 for a list of public water systems, definitions and examples.



Regulations That Apply to Your Public Water System

As the number of drinking water regulations grows, EPA, states and other organizations continue to provide assistance to public water systems to ensure compliance and help public water systems provide safe, high-quality drinking water (Table 2). Compliance with each regulation depends on what type of public water system you are and the number of people served. In addition, most schools and child care facility PWSs are served by ground water, and the drinking water regulations for these well systems address chronic and acute impacts from potential contaminants.

Table 2. Regulations that Apply to Non-Transient, Non-Community Water Systems*

Regulation	Goal & Importance	Applicability
Total Coliform Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/index.cfm)	Seeks to limit bacteria, parasites and viruses which can cause health problems when humans ingest them in drinking water by using coliform bacteria as an indicator.	All public water systems
Ground Water Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/gwr/index.cfm)	Provides for increased protection (via monitoring) against microbial pathogens in public water systems that use ground water sources. It establishes an approach to focus on ground water systems that are susceptible to contamination and requires ground water systems that are at risk to take corrective action.	All public water systems that use ground water.
Stage 1 Disinfectants and Disinfection Byproducts Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/stage1/factsheet.cfm)	Reduces exposure to disinfection byproducts for customers, strengthening public health by decreasing potential cancer, reproductive and developmental health risks from DBPs.	Community water systems and non-transient non-community systems, including those serving fewer than 10,000 people, that add a disinfectant to the drinking water during any part of the treatment process.
Stage 2 Disinfectants and Disinfection Byproduct Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/stage2/index.cfm)	Strengthen public health protection by tightening compliance monitoring requirements for two groups of disinfection byproducts (DBPs): trihalomethanes (THMs) and haloacetic acids (HAAs). This rule is intended to reduce potential cancer, reproductive and development health risks from DBPs.	Applies to community and non-transient, non-community water systems that add and/or deliver water that is treated with a primary or residual disinfectant other than ultraviolet light.

Regulation	Goal & Importance	Applicability
Lead and Copper (http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/index.cfm)	Requires water systems to control corrosivity and collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. This rule provides monitoring techniques and response actions for lead and copper, which may cause a variety of health problems.	All community and non-transient, non-community water systems.
Phase II/V Rules (http://water.epa.gov/lawsregs/rulesregs/sdwa/chemicalcontaminantrules/basicinformation.cfm)	Establishes monitoring and reporting requirements and allowable limits for inorganic, volatile organic and synthetic organic contaminants. This provides important public health protection through the reduction of chronic risks from cancer, organ damage and circulatory, nervous and reproductive system disorders.	All community and non-community water supplies.
Arsenic Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/regulations.cfm)	Limits arsenic in water to 10 parts per billion (ppb). This rule is intended to reduce risks of cancer and cardiovascular, pulmonary, immunological, neurological and endocrine effects that result from exposure to arsenic.	All community and non-transient, non-community water systems.
Public Notification Rule (http://water.epa.gov/lawsregs/rulesregs/sdwa/publicnotification/index.cfm)	Requires systems to notify the public any time a water system violates national primary drinking water regulations or has other situations posing a risk to public health. This rule ensures that consumers will always know if there is a problem with their drinking water.	All public water systems violating national primary drinking water regulations, operating under a variance or exemption or having other situations posing a risk to public health.

*Almost all school and child care facility water supplies rely on ground water so additional surface water regulations are not highlighted here.

Source Water Protection

One of the best ways to be sure you are providing clean water is to ensure the source of your supply is free from contamination. State drinking water agencies have identified wellhead protection areas, land areas that provide water to public supply wells and surface water supplies. If your facility receives water from an on-site well water system its protection area is likely to include the school or child care facility property and neighboring properties.

State drinking water programs are required to complete a source water assessment for all public drinking water systems, which include information about the location of each drinking water system's protection area and about activities that could potentially contaminate the drinking water source, including ground water wells (see Table 3). You can contact your state or local drinking water program and ask if they have a map showing your protection area.

You should also evaluate potential contamination sources on your facility's property that may impact water quality and make plans to eliminate any risk they pose. If the facility uses an on-site septic system, evaluate the setback between it and your well, and confirm it meets state and local requirements. Some areas to check within the facility are sinks and floor drains in facility maintenance areas, cleaning supply areas, science laboratories, vocational shops and art classrooms. It is a good idea to post signs over sinks indicating chemicals cannot be disposed of down the drain. Protecting the quality of your water before it is contaminated is much more cost-effective than trying to treat or replace a supply that has been contaminated.

Additional information is available from EPA at: http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm

Table 3. Potential Contamination Sources

Potential Contaminant	Source
Bacteria/Pathogens	Septic systems, animal feedlots, manure storage
Nitrogen	Septic systems, lawn fertilizers, agricultural fertilizers, manure storage, animal feedlots
Sodium, Chloride	Road salt storage facilities, major roads when road salt is applied
Oils & Hydrocarbons	Gas stations, fuel oil distributors, underground home heating oil tanks
Chlorinated Solvents	Automotive services and repair facilities, dry cleaners, industrial facilities

Addressing Cross Contamination

It is important to be aware of cross connections within your facility as contamination can occur when there is a connection between your building's drinking water system (pipes) and another liquid or substance. Cross contamination from backflow of harmful substances may occur as a result of reduced pressure in the drinking water system or because of increased pressure in the contaminating source. Be aware, cross contamination may not be immediately apparent because a contaminant may not have a strong taste, odor or color.

Cross contamination can happen at facilities under a number of circumstances, including:

- When a tube or hose from a faucet is submerged in a solution, in a beaker or in a custodian's sink;
- A pipe is connected from a drinking water source to chemical lab equipment, a storage tank or cafeteria equipment; or
- A hose is dropped into a waste/floor drain in an automotive shop, boiler room or cafeteria.

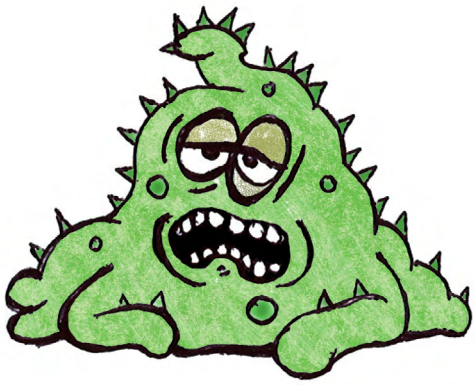
Other sources of potential cross contamination include cross connections between the drinking water system and heating system boilers, water coolers, lawn sprinkler systems, fire sprinkler systems or soft drink machines.

Cross contamination can be prevented by using backflow prevention devices that only allow water to flow in one direction, from the source to the tap, so liquid cannot flow back

A garden hose creates a dangerous cross connection between potable and non-potable water.

down the tap and contaminate the water in the distribution system. Devices should be tested annually by a certified professional. If you have questions about cross connections and contamination, contact the local building/plumbing inspector or for more information on cross contamination please visit: http://water.epa.gov/infrastructure/drinkingwater/pws/crossconnectioncontrol/index.cfm

Bacteria



Bacteria are present throughout our environment. They have adapted to live and reproduce in a variety of environments, including inside animals and humans, and in water, soil and food. If bacteria are present in drinking water sources, most are removed during the disinfection process. However, some may survive and enter the distribution system (the building's pipes and plumbing). Bacteria can also grow within the plumbing system, water fountains and faucets. Therefore, it is important to regularly clean your facility's water fountains, faucets and hot water tanks.

Lead

Understanding Lead Exposure

Lime build-up on mouthpiece and protective guard of drinking fountain.

As a public water system, your school or child care facility is required to comply with the Lead and Copper Rule (see page 2, Table 2. Regulations that Apply to NTNCWSs). The Lead and Copper Rule was developed to protect public health by minimizing lead and copper levels in drinking water. Public water systems are required to collect a number of tap samples based on the daily population served (see Table 4). However, EPA encourages schools and child care facilities to conduct additional voluntary lead testing at ALL water outlets in their facility used for drinking or food preparation. Because you cannot see, taste or smell lead in your drinking water, testing the facility's water is the only sure way to know if there are elevated levels in the water. School officials and child care providers need to know whether the drinking water that students, teachers and staff consume contains elevated levels of lead because exposure to lead can cause serious health problems, particularly for young children.

The "Lead and Copper Rule: Quick Reference Guide for Schools and Child Care Facilities that are Regulated Under the Safe Drinking Water Act" provides an overview of the Lead and Copper Rule and sampling requirements. The guide is available at: http://water.epa.gov/infrastructure/drinkingwater/schools/upload/2006_1_11_schools_lead_qrg_lcr_schools.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

School or Child Care Facility Daily Population Served	Number of Lead and Copper Tap Sample Locations
10,001 – 50,000	60
3,301 – 10,000	40
501 – 3,300	20
101 – 500	10
100 or less	5

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 pipes joined by lead solder.

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.

Drinking Water Best Management Practices

Bacteria

Drinking Water Fountains

Drinking water fountains should be cleaned on a daily basis to reduce possible bacterial contamination. Fountains should also be included in the regular flushing of your facility's plumbing system (as described in the section, Routine Measures for Reducing Lead Exposure).

Drinking Water Fountain Daily Cleaning Procedures[1]

The following procedures should be considered for daily cleaning:

- Gather necessary materials and suggested protective equipment;
- Obtain Material Safety Data Sheets (MSDS) for all chemicals being used and review manufacturer's instructions for use;
- Check the flow of the water to make sure there is a constant stream;
- Spray disinfectant cleaner solution on the inside surfaces of the mouthpiece and protective guard;
- Using a scrub brush, scrub the inside and outside of the mouthpiece and protective guard;
- Rinse the mouthpiece and protective guard with water; and
- Wipe drinking fountain surfaces with a clean cloth dampened with water.

It is also important to clean drinking water fountains to remove lime and calcium build-up. Lime and calcium build-up can begin to block the water from coming through the mouthpiece and going down the drain.

[1] Iowa State University Facilities Planning & Management – Custodial Task Procedures

Removing Lime Build-up on Drinking Fountains or Ice Machines

- Spray descaler onto the bowl and back of the drinking fountain;
- Use a clean, lint-free cloth saturated with the descaler. Apply to the surfaces with the lime build-up. Let stand for the length of time recommended on the label;
- Wring out all excess solution from the cloth;
- Wipe the surface clean with the cloth. If necessary, use a brush or scrub pad to remove hard build-up. Be careful not to damage surfaces while scrubbing; and
- Thoroughly rinse the surfaces with clean water.

For a list of EPA-approved disinfectants to use in your facility, please visit: http://www.epa.gov/oppad001/chemregindex.htm

Hot Water Tanks

Hot water tanks are susceptible to the development of biofilm, which is a surface deposit of bacteria that accumulates creating a slime layer. Similar to the plaque that forms on teeth biofilms accumulate over time. It is recommended that you consult with an experienced professional to have your hot water tank periodically cleaned to remove existing biofilms and sediments.[2]

[2] National Environmental Services Center, Tech Brief. Biofilm Control in Distribution Systems, Summer 2008, Vol. 8, Issue 2.

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

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

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[3]

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

[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 nscep@bps-lmit.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.[4] 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[5]. 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);

[4] 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

[5] 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

- 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.[6] 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.

[6] Lead in School Drinking Water Program (http://www.mass.gov/dep/water/drinking/sclcatlg.pdf).

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 vender to test the faucets with your local tap water to make sure no lead is leached out of the faucets. If you are only purchasing a few faucets make sure the fixtures are certified 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/pwscomponents/

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)

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

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

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 International[9] 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.

[9] NSF/ANSI Standard 61 explanation http://www.nsf.org/business/water_distribution/faq.asp#lead

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.

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

been in contact with the plumbing system for more than four hours. Particularly when first drawing water in the morning, flush the system by running the cold water faucet long enough to get fresh water from the main, which could vary from about two minutes to five or ten minutes, depending on the size and length of the pipes and the flow rate. Each faucet where water is drawn for drinking or cooking purposes should be flushed separately, starting with the faucet or outlet farthest from where the fresh water enters the building.

Water Security[10]

Work with your local emergency planning committee to assess the vulnerability of your facility's drinking water system and be sure everyone working at your facility is involved in this effort and understands their responsibilities.

- Prepare or update an emergency response plan. Make sure all employees help develop the plan and receive training on it.
- Post updated emergency 24-hour numbers at your facilities in highly visible areas (e.g., pumphouse door, vehicles, office) and distribute them to key personnel and local response officials.
- Get to know your local police and fire departments and ask them to add your buildings to their routine rounds. Practice emergency response procedures with local police, emergency responders and public health officials.
- Fence and lock your drinking water facilities and vulnerable areas (e.g., wellhead, hydrants, manholes, pumphouse and storage tanks).
- Lock all entry gates and doors, set alarms and post signs to indicate illegal entry. Do not leave keys in equipment or vehicles at any time.
- Install good lighting around your pumphouse, treatment facility and parking lot.
- Identify existing and alternate water supplies and maximize use of backflow prevention devices and interconnections.
- Use your Source Water Assessment information (as described on page 5) to work with businesses and homeowners that are listed as potential sources of contamination in order to lessen their impact on your water source.
- Lock monitoring wells to prevent vandalism or direct contamination by moving vent pipes inside the pump house or fencing/screening them in.
- In case of an emergency, first call 911 then follow your emergency response plan.

Additional water security resources include:

Top 10 List for Drinking Water Security and Emergency Preparedness (EPA)
Provides tips to enhance security of small ground water systems.
Website: http://water.epa.gov/infrastructure/watersecurity/upload/2004_04_01_watersecurity_fs_security_smallsuppliers_top10.pdf

Security Vulnerability Self Assessment Guide for Small Drinking Water Systems (Association of State Drinking Water Administrators in coordination with National Rural Water Association)
Guidance is available for small systems, such as schools and child care facilities, to complete a security vulnerability assessment of their drinking water system.
Contact: Association of State Drinking Water Administrators at: http://www.asdwa.org

[10] Adapted from EPA New England, Drinking Water Security and Emergency Preparedness (http://water.epa.gov/infrastructure/watersecurity/upload/2004_04_01_watersecurity_fs_security_smallsuppliers_top10.pdf).

Water Conservation

Schools and child care facilities use large amounts of water every day for heating and cooling systems, restrooms, drinking water, cooking, locker rooms, cafeterias, laboratories and outdoor playing fields and lawns. Options to reduce water use for these facilities include:

- Consider replacing old equipment such as dishwashers with energy and water saving devices;
- Repair water leaks and leaky toilets;
- Install aerators and automatic shut-off devices on faucets;
- Use low-flow shower heads and timer shut-off devices to reduce water use during showers;
- Install timers on outdoor sprinklers;
- Install toilet dams on older models;
- Replace plants and grasses that require a lot of water with native sustainable vegetation; and
- Use rain barrels and teach the students about green roofs.

WaterSense

The WaterSense program promotes water efficiency and enhancing the market for water-efficient products, programs and practices. Since the program's inception in 2006, WaterSense has helped consumers save a cumulative 46 billion gallons of water and $343 million in water and sewer bills. For additional information, visit: http://www.epa.gov/watersense/

Teaching Students about Drinking Water

There are a variety of ways to teach students about drinking water:

- Early science classes demonstrating the water cycle;
- Mathematics classes demonstrating supply and demand principles;

- History lessons discussing early settlement patterns near water sources and our nation's system of government, laws and regulations provide important knowledge for water resource decision-making;
- Involve students in the voluntary lead testing program to make it a teaching moment, ensuring that the students wear proper safety equipment and are not exposed to lead; and
- Engage high school science classes or local universities to conduct quick screening tests for devices identified as meeting the application needs and NSF International requirements to verify performance.

EPA has developed numerous resources and activities for students and teachers, including:

Drinking Water in Schools and Child Care Facilities (EPA)

Provides multiple resources regarding lead in drinking water, including health information, an overview of laws and regulations and guidance. Website: http://water.epa.gov/infrastructure/drinkingwater/schools/index.cfm

Kid's Stuff: Drinking Water and Ground Water (EPA)

Provides activities and materials for students and teachers for grades K-3, 4-8 and 9-12. Website: http://water.epa.gov/learn/kids/drinkingwater/index.cfm

Water Science and Technology for Students and Educators (EPA)
Water-related activities and resources for students and teachers.
Website: http://water.epa.gov/learn/resources/index.cfm

That Magnificent Ground Water Connection (New England Interstate Water Pollution Control Commission in coordination with EPA)
Classroom activities for students demonstrating the many characteristics, uses and threats to ground water resources in New England. Available for grades K-6 and 7-12.
Selected activities are available at: http://www.epa.gov/region1/students/teacher/groundw.html

Resources

3Ts for Reducing Lead in Drinking Water in Schools
Provides detailed guidance for schools that receive their drinking water from municipal water supplies regarding training and testing for and communicating about lead in drinking water.
Website: http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts

3Ts for Reducing Lead in Drinking Water in Child Care Facilities
Provides detailed guidance for child care facilities that receive their drinking water from municipal water supplies regarding training and testing for and communicating about lead in drinking water.
Website: http://water.epa.gov/infrastructure/drinkingwater/schools/guidance.cfm#3ts

Lead and Copper Rule: A Quick Reference Guide for Schools and Child Care Facilities that are Regulated Under the Safe Drinking Water Act
Provides an overview of the Lead and Copper Rule requirements, including sampling, compliance and public education requirements.
Website: http://water.epa.gov/infrastructure/drinkingwater/schools/upload/2006_1_11_schools_lead_sqrg_lcr_schools.pdf

EPA's Website on Lead
http://www.epa.gov/lead/

EPA's Website on Lead in Drinking Water
http://water.epa.gov/drink/info/lead/index.cfm

EPA's Website on Reducing Lead in Drinking Water in Schools and Day Care Centers
http://water.epa.gov/drink/info/lead/schools_index.cfm

Centers for Disease Control and Prevention's Website on Lead
http://cdc.gov/lead/

National Lead Information Center Hotline: (800) 424-LEAD

EPA's Safe Drinking Water Hotline: (800) 426-4791

Drinking Water Best Management Practices for Schools and Childcare Facilities Served by Municipal Water Systems (EPA)
Provides basic information for decision-makers as well as best management practices.

State Drinking Water and Lead Prevention Information Sources

State drinking water programs can describe state-specific requirements and provide additional guidance materials for schools. For a complete list of State Drinking Water program contacts and lead prevention information sources, see:

Implementing the Lead Public Education Provision of the Lead and Copper Rule for Non Transient, Non Community Water Systems, Appendix C:

http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/Implementing-the-Lead-Public-Education-Provisions-of-the-Lead-and-Copper-Rule-A-Guide-for-Non-Transient-Non-Community-Water-Systems.pdf

Implementing the Lead Public Education Provision of the Lead and Copper Rule for Community Water Systems, Appendix C:
http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/Implementing-the-Lead-Public-Education-Provisions-of-the-Lead-and-Copper-Rule-A-Guide-for-Community-Water-Systems.pdf

Glossary

Acidic:
The condition of water or soil which contains a sufficient amount of acidic substances to lower the pH below 7.0.

Action Level:
The level of lead or copper which, if exceeded, triggers treatment or other requirements that a water system must follow.

Alkalinity:
The capacity of water to neutralize acids. This capacity is caused by the water's content of carbonate, bicarbonate, hydroxide and occasionally borate, silicate and phosphate. Alkalinity is expressed in milligrams per liter of equivalent calcium carbonate. Alkalinity is not the same as pH because water does not have to be strongly basic (high pH) to have a high alkalinity. Alkalinity is a measure of how much acid can be added to a liquid without causing a significant change in pH.

Alloy:
A solution made of two or more elements, at least one of which is a metal.

Backflow:
A reverse flow condition created by a difference in water pressures which causes water to flow back into the distribution pipes of a potable water supply from any source or sources other than an intended source.

Backwashing:
The process of reversing the flow of water back through the filter media to remove the entrapped solids.

Bacteria:
Microscopic living organisms usually consisting of a single cell. Bacteria can aid in pollution control by consuming or breaking down organic matter in sewage or by similarly acting on oil spills or other water pollutants. Some bacteria in soil, water or air may also cause human, animal and plant health problems.

Compliance:
The act of meeting all state and federal drinking water regulations.

Contaminant:
Anything found in water (e.g., microorganisms, minerals, chemicals, radionuclides, etc.) which may be harmful to human health.

Corrosion:
The gradual decomposition or destruction of a material by chemical action often due to an electrochemical reaction. Corrosion may be caused by: 1) stray current electrolysis, 2) galvanic corrosion caused by dissimilar metals or 3) differential concentration cells. Corrosion starts at the surface of a material and moves inward.

Corrosivity:
A condition of water quality which will dissolve metals at an excessive rate. The factors that make water corrosive include an acidic pH, low alkalinity, high dissolved solids and higher temperature.

Cross Connection:
Any actual or potential connection between a drinking (potable) water system and an unapproved water supply or other source of contamination. For example, if you have a pump moving non-potable water and hook into the ground water system to supply water for the pump seal a cross-connection or mixing between the two water systems can occur. This mixing may lead to contamination of the drinking water.

Descaler:
A solution used to remove and/or prevent limescale and fouling on water taps, kettles, coffeemakers, toilets and water pipes.

Disinfectant:
A chemical (commonly chlorine, chloramine or ozone) or physical process (e.g., ultraviolet light) that kills microorganisms such as bacteria, viruses and protozoa.

Distribution System:
A network of pipes leading from a treatment plant to customers' plumbing systems or the pipes and plumbing within a building that distribute water to all of the water outlets.

Ground Water:
The water that systems pump and treat from aquifers (natural reservoirs below the earth's surface).

Lead Service Line:
A service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such a lead line.

Monitoring Program:
Testing that water systems must perform to detect and measure contaminants. Specifically, measuring concentrations of certain substances within environmental media (e.g., drinking water) at regularly scheduled intervals.

Municipal Water System:
A network of pipes, pumps and storage and treatment facilities designed to deliver potable water to homes, schools, businesses and other users in a city or town.

Non-Potable Water:
Water that may contain objectionable pollution, contamination, minerals or infective agents and is considered unsafe and/or unpalatable for drinking.

Pathogen:
A disease-causing organism.

pH:
A measurement of how acidic or basic a substance is. It ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic.

Point-of-Entry Device:
A treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

Point-of-Use Device:
A treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.

Potable Water:
Water that is safe and satisfactory for drinking and cooking.

Public Water System:
A system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves at least 25 individuals.

Remediation:
Removal of pollution or contaminants from environmental media such as soil, ground water, sediment or surface water for the general protection of human health and the environment.

Samples:
The water that is analyzed for the presence of EPA-regulated drinking water contaminants. Depending on the regulation, EPA requires water systems and states to take samples from source water, from water leaving the treatment facility or from the taps of selected consumers.

Soft Water:
Water having a low concentration of polyvalent cations, such as calcium and magnesium ions. According to U.S. Geological Survey guidelines, soft water is water having a hardness (concentration of polyvalent cations) of 60 milligrams per liter or less.

Solder:
A metallic compound used to seal the joints between pipes. Until recently, most solder contained 50% lead. The use of lead solder containing more than 0.2% lead is now prohibited for pipes carrying potable water.

Source Water:
Water in its natural state prior to any treatment for drinking.

Toilet Dam:
A water-conservation device that is placed inside the tank portion of a toilet to reduce the amount of water the tank will hold by partitioning off part of the tank.