

Lead in Drinking Water

Program for Schools and Child Care Facilities



MassDEP Drinking Water Program

Lead in Schools Program

- Since 1988 the Massachusetts Department of Environmental Protection, Drinking Water Program (DWP) has taken a proactive stance in attempting to eliminate lead from drinking water. Specific attention has been given to schools due to the effects on children. Our “Lead in Schools” initiative is continuously being updated and improved in an attempt to integrate the good work of all the stakeholders involved in public health protection with those who provide services to the children of the Commonwealth.

MassDEP Drinking Water Program



As a partner in the Lead Contamination Control Act, the Massachusetts Department of Environmental Protection, Drinking Water Program (DWP) has taken a proactive stance in attempting to eliminate lead from drinking water. Specific attention has been given to schools due to the effects on children. Our “Lead in Schools” initiative is continuously being updated and improved in an attempt to integrate the good work of all the stakeholders involved in public health protection with those who provide services to the children of the Commonwealth.

DWP- Lead in Schools Program

- **Strategic plan, working with all stakeholders**
- **Revise and update sampling recommendations**
- **Distribute outreach material to school administrators, schools and child care facilities**
- **Develop a collaborative curriculum for lead abatement education in schools**
- **Training programs to involve staff members in collecting samples and efforts to reduce lead levels**

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The Drinking Water Program has developed a strategic plan to assist schools. We revise our recommendations every 3-5 years, taking into account new information and research studies. This information is passed on to schools and child care facilities in letters and other outreach material. Currently the Lead in Schools program is working with the EPA New England office to develop a collaborative curriculum to give schools better ownership over their drinking water protection efforts. We are hoping to encourage science teachers to incorporate lessons about lead and water-borne contaminants into units on clean drinking water and health. Furthermore, the DWP provides training programs for custodial and other staff members to best protect water outlets against elevated lead levels.

Stakeholders

- MassDEP
- MA Department of Public Health (DPH)
- MA Department of Elementary and Secondary Education (DESE)
- MA Department of Early Education and Care (EEC)
- Schools and child care facilities of the Commonwealth
- Public Water Systems (PWS)
- EPA New England Office

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A list of the stakeholders includes MassDEP, MA Department of Public Health, MA Department of Elementary and Secondary Education, schools and child care facilities of the Commonwealth, Public Water Systems (PWS), and the EPA New England Office.

Recent Legislation

- California “lead-free” legislation went into effect January 1, 2010. Lead free pipes means less than 0.25% weighted average.
- Similar law passed in Vermont, Maryland
- National level, June 2010- House subcommittee passes bill on lead free plumbing fixtures, adopting the stricter 0.25% California standard.
- National legislation currently under review in House Energy and Commerce Committee



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Recently, state legislative initiatives have prompted a strengthening of lead free standards and regulations beyond those established in the Safe Drinking Water Act of 1974 and its amendments. Most notably, a California law has been passed and went into effect on January 1, 2010 requiring that all plumbing material contain a weighted average of 0.25% lead or less. This is a reduction of the 8% lead standard for pipes established in the Safe Drinking Water Act. The new lead free terminology is moving to the national level, as a bill proposed by Anna Eshoo of California to adopt the 0.25% standard just passed in subcommittee and is currently under review in the House Energy and Commerce Committee. Moving towards completely lead-free materials is advised as we expect to see a more stringent national lead regulation in the near future.

Health Effects of Lead

- Most severe in children
- Impairs mental and physical development
 - IQ deficits
 - Shortened attention span, symptoms of ADHD
 - Hearing damage
 - Poor classroom behavior/performance
 - Antisocial personality
 - Stunted growth
 - Lowered birth weight

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From a health standpoint, the mental and physical impairments linked with lead exposure include IQ deficits (can be severe depending on exposure levels), symptoms of ADHD, hearing damage, behavioral problems, stunted growth, and lowered birth weight. It is especially a concern for children and pregnant women, as fetuses are at greatest risk for lifelong problems.

Health Effects of Lead

- CDC threshold of concern: 10 $\mu\text{g}/\text{dl}$
- In 2005, CDC said there was no safe level of lead exposure in children
- “Regardless of the amount, the presence of lead in [food and water] should be a reason for concern, since they could potentially add to exposure from other sources of the neurotoxin in a child's environment.”

(Article in TIME Health & Science, March 2010)

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The Centers for Disease Control established a threshold of concern at 10 micrograms per deciliter, but in 2005 said that there is no level of exposure in children that can be declared free of health risks. Chronic low-level exposure can accumulate and impair development, as it can interact with exposure to lead and neurotoxins from other sources in the environment.

We should all work to get lead exposure down to zero.

Health Studies

- “Low-level lead exposure, including prenatal exposure, has been linked to decreased performance on standardized IQ tests and end-of-grade testing for school-aged children.”

(The Children's Environmental Health Initiative, CEHI at Duke University)

- Lead linked to ADHD symptoms

(Study by Joel Niggs for Journal of Child Psychology and Psychiatry)

- Lead increases risk factor for criminal activity

(Article in May 2009 issue of PLoS Medicine)

- Detroit Public Schools Case Study



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The Children's Environmental Health Initiative at Duke University has confirmed health risks at low levels of exposure, and other studies in the Journal of Child Psychology and PLoS Medicine have linked lead exposure to ADHD symptoms and increased tendency for criminal activity.

A case study from Detroit Public Schools was recently published in an online newspaper stating that “more than half of the students tested in Detroit Public Schools have a history of lead poisoning, according to data compiled by city health and education officials.” This has led to lower standardized test scores. Children receiving special education were also more likely to have lead poisoning. The legacy of lead in children's health is persistent and troubling across the nation, so we can't let our schools get complacent about lead!

Adverse Impacts of Lead

- “Economists estimate the health impact of human lead exposure costs more than \$43 billion annually in lost time at work, [school], health-care costs and related expenses.”

(Washington Post article, May 19 2010)

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A Washington Post article about the national lead legislation included the statistic that the opportunity cost of health impacts due to lead is \$43 billion annually, covering lost time at work, school, and health care expenses.

Lead and Drinking Water

- **Health risks associated with lead paint and gasoline have been well publicized, but children can also be exposed to unsafe levels of lead in tap water.**
- **On-again, off-again patterns (i.e. weekends and school vacations) of drinking water use in schools increase risk of elevated lead especially at first draw**

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Drinking water at the tap can be a source of lead exposure because of plumbing materials coming in contact with the potable water supply. The on-again, off-again patterns of drinking water use in schools increases the risk for elevated lead levels at first draw.

Lead and Drinking Water

- On average, it is estimated that lead in drinking water contributes between 10 and 20 percent of total lead exposure in young children.
- MassDEP action level for lead in school drinking water: 0.015 mg/L



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The EPA estimates that lead in drinking water contributes between 10 and 20 percent of total lead exposure in young children; this percentage is higher in infants. The MassDEP action level for lead in school drinking water is 15 ppb or 15 milligrams per liter.

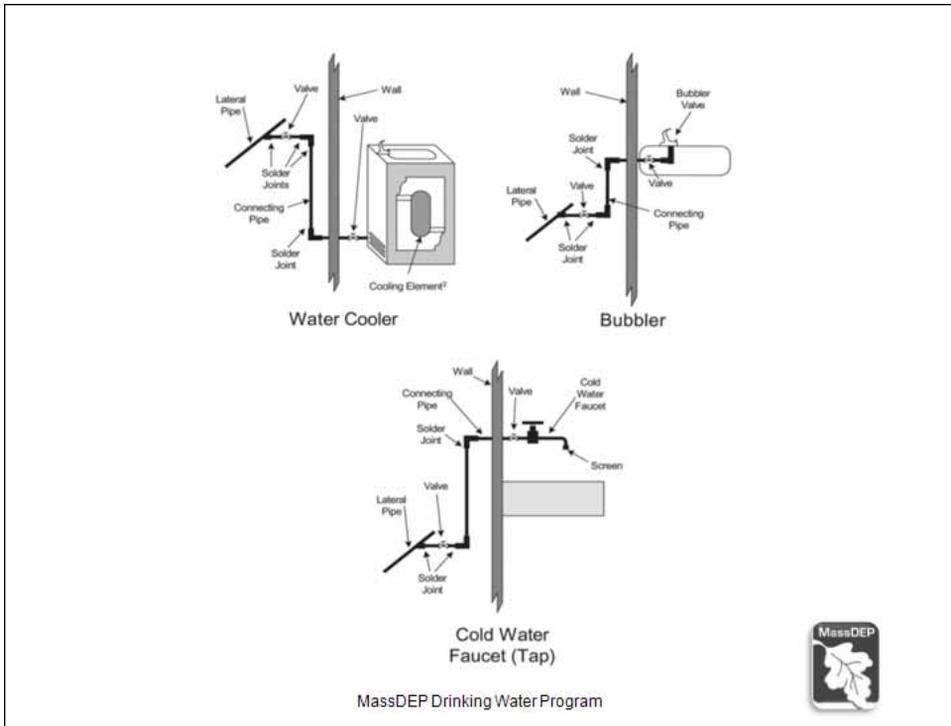
Sources of Lead in Drinking Water

- The amount of lead, if any, in a plumbing system will depend on the age of the system and the materials from which the system was constructed.
- Lead service lines
- Corrosion
- Pipes- historically made of lead
- Drinking water coolers and bubblers
- Individual outlets and fixtures (taps, fountains, ice making machines, kettles)

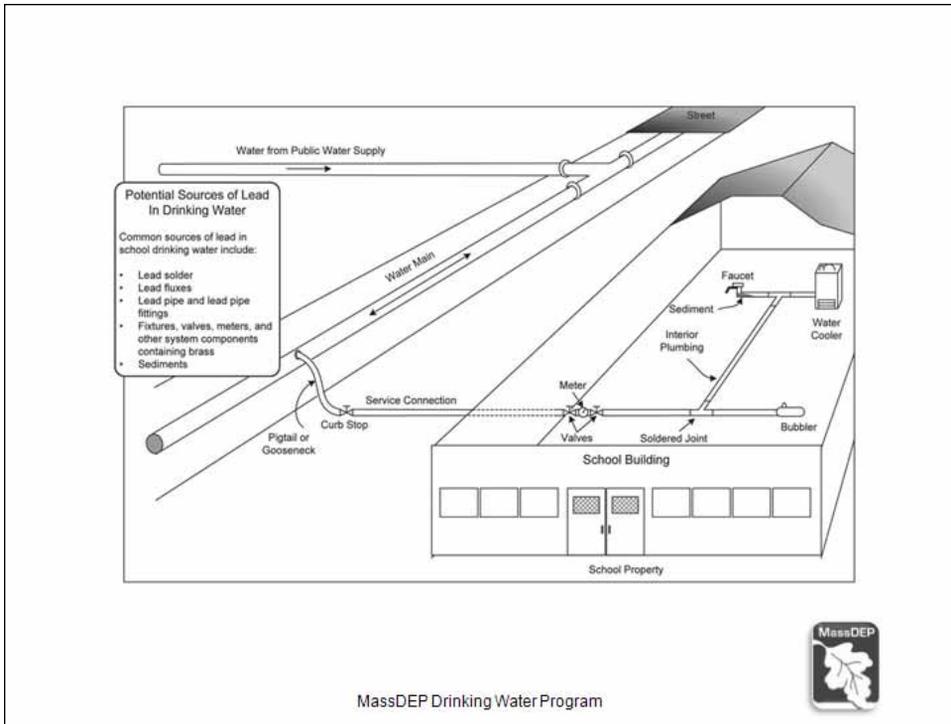


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While the water source supplied to schools is generally well below the action level for lead, the internal plumbing system of the building can raise lead levels at the tap. The amount of lead, if any, in a plumbing system will depend on the age of the system and the materials from which the system was constructed. The longer the water is in contact with the pipes, the greater the risk of elevated lead levels at the tap. Lead may be present in various parts of the plumbing system such as old lead solder, brass, fixtures, and lead pipes. Corrosion causes lead to leach into the drinking water supply.



These images from the EPA guidance material show common drinking water fixtures and their basic plumbing configurations—a water cooler, a bubbler, and a cold water faucet or tap.



This diagram of potential sources of lead in drinking water shows water service lines coming in from the Public Water Supply main to a school building via a service connection. The internal plumbing system is displayed as an example of what this may look like.

Lead Service Lines

- When lead services lines are completely or partially removed and replaced, outlets at individual locations along the main water line are at greater risk for elevated lead levels.

(American Water Works Association)

- The MassDEP recommends having your facility tested for lead if pipes in the main service line have recently been removed or replaced. Contact your PWS for this information.



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Lead service lines from Public Water suppliers are required to be constructed of lead-free materials. However, as old service lines being removed or replaced may still contain higher levels of lead, their replacement can lead to elevated lead levels at taps and drinking water outlets in buildings connected to the main water line. Therefore if the water service lines connected to your facility have recently been replaced, the MassDEP recommends having your fixtures tested for lead.

If a line was only partially replaced, the segment of pipe privately owned may still contains lead. You should coordinate with PWS to do work at the same time in replacing pipes. Have the lines flushed in the event of a disturbance, as material buildup in the pipe may have come loose and been released into water supply.

A press release from the Water Research Foundation in June stated that: “The Centers for Disease Control and Prevention recently completed an epidemiological study of the relationship between children’s levels of lead in their blood and lead water service lines. The study results, currently undergoing peer review in a scientific journal, suggest that when lead service lines are partially replaced children are more likely to have BLLs greater than or equal to 10 µg/dl compared to children in houses with either undisturbed lead service lines or service lines not made of lead.”

Testing for Lead

- According to the LCR, public water suppliers must test for lead twice a year, taking 2 samples each from 2 schools.
- If your school has been sampled by the PWS and has lead levels above the action level, the results come to the MassDEP and we require the school to submit a plan for addressing the elevated levels, including re-sampling.

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The lead and copper rule requires public water suppliers to test schools for lead every 6 months. Two schools are tested each time, and only 2 outlets are sampled at each. Results are sent to the MassDEP, and if they show elevated lead, the DEP requires the school to submit a plan for addressing elevated levels, including re-sampling. The Lead and Copper Rule applies directly to schools and child care centers that meet the definition of a public water system, meaning you have your own water source that supplies water for at least 25 individuals per day, or you treat or sell the water. If your school is PWS, you must submit samples to the MassDEP every 6 months.

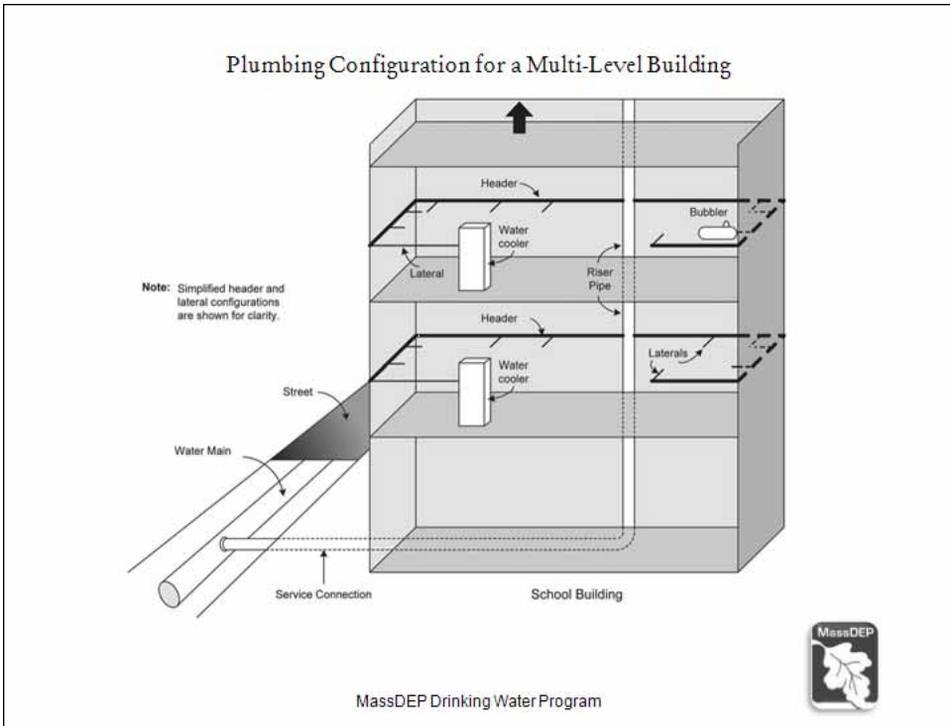
Plumbing Profile

- Keep an up-to-date profile of your facility (separate map for all buildings and renovations) to help identify high-risk areas for lead.
- Note areas of the building that receive water first, and areas that receive water last
- Identify what materials were used in the service connection that carries water to the school from the PWS main line
- Identify materials used for potable water pipes and drinking fixtures.

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Part of the sampling plan involves keeping a school map or plumbing profile up-to-date with any renovations, additions, or new buildings added at your center. A separate profile should be on hand for each building, with diagrams on a floor-by-floor basis.



Here is one possible example of a plumbing profile. Yours should include more notes on material of the plumbing fixture and most recent test date for drinking water outlets.

Sampling Plan for Lead

- **Sample all fixtures every 3-5 years**
- **Collect additional samples immediately following replacements or removal of pipes on the main water line or fixtures in your facility**
- **Inform the school community (staff, parents, local officials, etc) before and after all samples have been gathered and tested**
- **Involve staff and students in sampling efforts! This may include custodial staff, science teachers and students**

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Schools need to develop a sampling plan in addition to the sampling being done by the PWS (they are only hitting a couple of spots as they sample just 2 fixtures, but other fixtures could have elevated lead). It is recommended that your facility test 1/3 of drinking water outlets annually to establish a baseline, and this allows all fixtures to be tested over a period of 3 years. This is a cost-effective and efficient measure. Take control of your efforts to protect the drinking water by involving the custodial staff, students, and teachers in sample collection. The more your school community is aware of lead concerns, the better off it will be.

Collecting Samples

High priority:

- drinking fountains, both bubbler and water cooler style
- kitchen sinks
- classroom combination sinks and drinking fountains
- home economic rooms sinks
- teacher's lounge sink, nurse's office sink
- classroom sinks in special education classrooms
- any sink known to be or visibly used for consumption (e.g. coffee maker or cups are nearby)

Medium priority:

- classroom sinks (potential for cups used for drinking, classroom cooking projects)
- bathroom faucets (yes, many kids drink from these!)

Low priority:

- utility sinks and hose attachments, unless used to fill water jugs (e.g. for sports team practice)
- hot water outlets



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The EPA has identified certain fixtures as high, medium and low priority as shown.

Collecting Samples

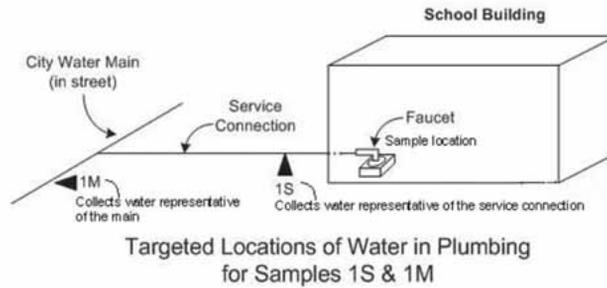
- Water samples from the tap will have to be collected and sent to a certified laboratory for analysis.
- When collecting the samples yourself, make sure you follow the lab's instructions exactly.
- Be certain to take a "first draw" and a "fully flushed" 250 mL sample.
- Re-sample any fixtures with lead above the action level. If the fixture has an aerator, re-sample without aerator.

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Samples collected should be sent to a qualified laboratory for testing and analysis. You may find a qualified testing company under 'Laboratories' in the yellow pages, or consult the EPA or MassDEP websites for a list of approved testing facilities. When collecting samples yourself, take a first draw sample (ideally on a Monday morning) and a sample after several minutes of flushing. Re-sample any fixtures with lead above the action level. If the fixture has an aerator, re-sample without the aerator.

Sample Collection Procedures



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This diagram shows to compare sample results from the main water line to those after the service connection to your building, meaning at the tap.

Communicating Results

- Inform the parents, staff, etc. in your school community as well as the MassDEP of sample results. See our website for a sample letter to parents:

<http://www.mass.gov/dep/water/drinking/smplltr.htm>

- Sharing information– via letters to the school community throughout the testing program AND reporting results to the MassDEP– is “proactive”.
- Avoid problems before they arise rather than managing them once they happen by practicing good record-keeping and reporting habits.
 - Assign sample IDs, date all samples



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It is important to share sample results with all affected parties. Sharing information– via letters to the school community throughout the testing program AND reporting results to the MassDEP– is a proactive measure that allows you to avoid problems before they arise. Practice good record-keeping by assigning consistent sample IDs matched to a map of your facility’s plumbing.

Lead Maintenance Checklist

- The MassDEP has developed a new Lead Maintenance checklist for all schools and child care facilities to identify areas at risk for elevated lead levels.
- You should be receiving the checklist by **email** with updated lead outreach material.
- Please complete and return the checklist by **September 30, 2010** so we can compile an accurate statewide database and better assist schools with their lead programs.



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The best way to improve communication between schools and the MassDEP is to complete the updated Lead Maintenance Checklist included in the recent email to all schools and child care facilities. The checklist is based on both EPA plumbing questionnaires and a checklist developed by the Healthy Schools Council in Massachusetts. Please send back the completed checklist by September 30, 2010. It will only take 5-10 minutes of your time, and goes a long way towards improving the Lead in Schools program!

Lead Abatement Education Curriculum

- **Include clean drinking water topics in science curriculums and incorporate students in conducting samples.**
- **MassDEP and EPA New England are working together to develop a training program for custodial staff.**
- **Goal: staff are informed about the internal plumbing of the facility and associated health risks due to lead and can therefore take appropriate action when necessary.**



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The most recent efforts of the MassDEP and New England EPA office include developing a Lead outreach curriculum for schools to implement into their science programs, and training programs for custodial staff. These two measures encourage a more hands-on approach to learning and safeguarding our drinking water. They will help keep school communities aware of lead concerns and significantly help protect school children from the adverse health risks of lead exposure. Knowledge is power, and being informed about safe drinking water practices will improve the educational climate for all students and faculty.

What To Do If Elevated Lead Levels are Detected

- Discontinue use from those fixtures until they can be removed and replaced
- Visit Technical Assistance website for guidance:
<http://www.mass.gov/dep/water/drinking/leadothe.htm#leadcop>
- Contact Drinking Water Program:
 - Program.Director-DWP@state.ma.us
 - 617- 292-5770

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What should your school do if you get results for lead that exceed the action level? Stop using any fixtures where results were detected immediately, and contact the MassDEP for assistance materials and a remediation plan.

Remediation Actions

- **Interim Measures:**
 - Flushing
 - Provide bottled water
 - Shut off problem outlets
- **Long term measures:**
 - Have all lead fixtures, pipes, etc permanently removed and replaced with lead-free materials
 - <http://media.wattswater.com/S-LeadFree.pdf>
 - Install time-operated solenoid valves to automatically flush problem outlets
 - Install point-of-use (POU) filters
 - Check ground wires and eliminate any that may accelerate corrosion of lead



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Interim measures for dealing with the problem include flushing, shutting off problem fixtures, and providing bottled water for drinking. However, a long term sustainable solution must be implemented to avoid excessive waste created by bottled water use. This could include installing point-of-use filters or, even better, replacing fixtures with the newest lead-free materials (see Watts Water Technologies website for a complete list of lead free plumbing materials).

Remediation Actions

- EPA recommends that if you choose to install a filter, it has been certified to remove lead by either NSF International or the Water Quality Association.
 - <http://www.nsf.org/>; <http://www.wqa.org/>
- By installing a filter you may become a Public Water Supplier

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If you choose to install a filter at drinking water outlets, follow EPA recommendations and ensure the filter is certified by the National Sanitation Foundation International or the Water Quality Association.

Installation of the treatment system would make the school a public water system (PWS) that would have to comply with the MA drinking water regulations. This would entail obtaining a PWS treatment permit application from MassDEP, hiring a certified operator, and sampling and reporting for more than 80 contaminants. MassDEP estimates the cost of operating a public water system to be approximately \$10, 000 per year.

Lead Free Materials

- **Additional resources:**
 - **“We are lead free” website- Home of the Lead Free Plumbing movement, lead free news from around the country and lead free product information:**
 - <http://www.weareleadfree.net/default.asp>
 - **Established by Watts Water Technologies**
 - **Green Plumbers**

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The “We are Lead Free” website created by Watts Water Technologies is an example of embracing the trend towards lowering lead levels to zero in our plumbing materials. The site highlights national and state legislation relating to lead, and provides information on “leadology” and new lead-free materials.

Case Study- Stoughton

- Test results indicated that lead exceeded the action level of 15 ppb and this was picked up by the press.
- Stoughton school district contacted the MassDEP for assistance, put a remediation plan and outreach program in place.
- Stoughton school district now works closely with the MassDEP to create sampling plans and protect their drinking water supply.

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The town of Stoughton is an example of a school system that found elevated lead levels, and once the press got a hold of this information there was great concern among local officials. By contacting the MassDEP for assistance they were able to put a remediation plan in place and communicate with the school community with regards to their efforts. They continue to stay in contact with the MassDEP for sampling plans and guidance.

Good Practices

- **Flushing**
 - Several drinking water outlets daily
 - Pipes only after weekends and vacations
- **Never use hot water for cooking or food preparation**
- **Establish partnerships with other schools, health groups, and your local water supplier for updates and advice on testing and maintenance**

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Good practices for your schools to make a habit of include flushing several drinking water outlets each morning. Pipes need only be flushed after long weekends or vacations. Also, never use hot water for cooking or food preparation. Look to collaborate and form partnerships wherever possible, both within your school and with external groups such as the MassDEP, public health groups, and your Public Water Supplier.

Guidance Material

- EPA's 3Ts (Training, testing, and telling) toolkit for reducing lead in drinking water
http://www.epa.gov/ogwdw000/schools/pdfs/lead/toolkit_leadschools_guide_3ts_leadschools.pdf



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For more extensive guidance material and references, see the EPA 3Ts Toolkit for reducing lead in school drinking water.

Top 3 Things To Do

- **1. Use lead free materials in any plumbing fixture!**
- **2. Do not use fixtures where elevated lead levels exist!**
- **3. Complete and return the Lead Maintenance Checklist by September 30!**

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Remember these three basic objectives to guide your updated lead control efforts: use lead free materials, do not use fixtures with elevated lead levels, and send us your completed checklist this fall!