Lead Plumbing Surveys

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Lead Plumbing Surveys

What are we really trying to do?

• Determine the kind or type of pipe supplying drinking water to the building (outside and underground)

• Determine the kind or type of plumbing in the building (inside and mostly visible/accessible)
Outside/Underground Pipe

[Diagram showing a house with an underground pipe leading to a water main with labels for private and municipal water service lines, property boundary, and water shut-off valve.]

Outside/Underground Pipe

[Images of a person working on an underground water pipe and a close-up of a water shut-off valve on an underground pipe in the ground.]
Outside and Inside Pipe/Plumbing

Potential Sources of Lead In Drinking Water
Common sources of lead in school drinking water include:
- Lead solder
- Lead fluxes
- Lead pipe and lead pipe fittings
- Fixtures, valves, meters, and other system components containing brass,
  lead, or other metals containing lead

Inside/Mostly Visible Plumbing

Water Cooler

Bubbler
Inside/Mostly Visible Plumbing

Lead Plumbing Surveys

How do we do this?

- We can improvise and freelance; not recommended!
- Follow the USEPA “Plumbing Profile” methodology filling in the blanks without much effort; a little better
- Complete the “Plumbing Profile” and apply some good, old-fashion, common sense (a.k.a. institutional knowledge); the practical recommendation!
Lead Plumbing Surveys

The Plumbing Profile:

• Tells us how water enters and flows through the building

• Helps us identify and prioritize sample sites

• Assists us in determining if the lead concern is widespread or localized, and where this is occurring

Lead Plumbing Surveys

The Plumbing Profile:

• Helps us plan and prioritize corrective actions

• Creates a “Record” documenting what we did, how we did it and when we did it
**Plumbing Profile**

“The Plumbing Profile helps us understand where lead can be coming from” (USEPA 3Ts for Reducing Lead)

- Buildings are like people, they’re all a little different and unique
- Just like people who replace worn out/damaged parts and sometimes add new parts ..... parts in buildings are being replaced and new additions are constructed

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**Plumbing Profile**

Do some investigating before starting the Plumbing Profile.

- When was the original building constructed?
- Were any buildings or additions constructed?
- Was the buried service pipe or internal plumbing ever replaced?
Plumbing Profile

Investigating:

- Local building department records
- Water department/utility records, as-builts
- Other utility accounts (electric/gas)
- County tax records

Preparing – Make a List:

- Of separate buildings (if any)
- Sections in the same building with different ages (original and additions)
- Any areas where the internal plumbing was replaced/updated
Plumbing Profile

**Complete one profile:**

- For each separate building, different sections and additions within the same building and areas with replaced plumbing on the list

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**Example:**

- **P.S. 5**
  - 1938
  - Teacher's Lounge Upgrade 2010
  - P.S. 5 Addition 1975

- **P.S. 5 Gym**
  - 1997

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AWWA New Jersey
American Water Works Association
Prepare a Plumbing Profile for each location on the list:

Plumbing Profile

Example List:

- P.S. 5 Original building
- P.S. 5 Addition
- P.S. 5 Gym

Example:

- P.S. 5 Teacher’s Lounge Update 2010

Include in the Original Building
Plumbing Profile

**USEPA 3Ts for Reducing Lead in Drinking Water in Schools:**

- Appendix I – Questions with blanks for our answers, becomes our “Record”
- Exhibit 3.1 – Use as a guide to help answer questions

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**Plumbing Profile**

**Classroom Exercise:**

- Referring to the previous example of P.S. 5 original building
- Fill in the blanks of Appendix I, first 2 pages
# EPA 3Ts for Reducing Lead in Drinking Water in Schools

Frank J. Marascia  
Production Manager  
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Northern Operations

## Appendix I – Plumbing Profile Questionnaire

This questionnaire is designed to assist with the determination of whether or not lead is likely to be a problem in your facility, and will enable you to prioritize your sampling effort. A separate plumbing profile may be needed for each building, addition, or wing of your facility, especially if the construction took place at different times. Some of the questions in this questionnaire may not apply to your facility for various reasons. Skip those questions that do not apply. For a discussion of this questionnaire and interpretation of possible answers, please see Chapter 3 of the document.

<table>
<thead>
<tr>
<th>Plumbing Profile Question</th>
<th>Answers for P.E. Original Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When was the original building constructed?</td>
<td></td>
</tr>
<tr>
<td>Were any buildings or additions added to the original facility? If so, complete a separate plumbing profile for each building, addition, or wing.</td>
<td></td>
</tr>
<tr>
<td>2. If built or repaired since 1986, were lead-free plumbing and solder used in accordance with the lead-free requirements of the 1986 Safe Drinking Water Act Amendments? What type of solder has been used?</td>
<td></td>
</tr>
<tr>
<td>3. When were the most recent plumbing repairs made (more locations)?</td>
<td></td>
</tr>
<tr>
<td>4. With what materials in the service connection (the pipe that carries water to the school from the public water system’s main in the street) made? Note the location where the service connection enters the building and connects to the interior plumbing.</td>
<td></td>
</tr>
</tbody>
</table>
Introduction

• EPA concerned about lead in schools

• Adverse health effects, reduced IQ, learning disabilities, impaired growth, hearing loss

• Children most susceptible, still in development

• EPA suggests schools implement programs for reducing lead

Regulations

• No federal law requiring testing of drinking water in schools

• SDWA LCR requires public water suppliers to test single family dwellings, NOT schools

• States and local jurisdictions may establish programs for testing for lead in schools
Where does lead in drinking water come from?

- Virtually no lead in source water

- Leached from pipe materials and fixtures as water moves through schools plumbing, influenced by water use patterns

- Public water supplier can be in compliance and schools can still have lead in drinking water

EPA 3Ts

- **Training** school officials to raise awareness

- **Testing** drinking water in schools to identify problems and develop corrective actions

- **Telling** students, parents, staff, and community
Testing

Testing school facilities is an evaluation of the plumbing and helps target remediation. It is a key step in understanding the problem, if there is one, and developing an appropriate response. Plumbing survey guides sampling efforts.

EPA Recommended Lead Level

EPA strongly recommends that all water outlets in all schools that provide water for drinking and cooking meet a standard of 20 parts per billion (ppb) or less.
General Sampling Procedures

1. All water samples should be 250 milliliters (ml) in volume
   - Smaller sample size than 1 liter LCR sample, shorter pipe section
2. Collect all water samples before facility opens and before water is used
   - At least 8 hours, but not more than 18 hours
3. Make sure no water is withdrawn from taps or fountains prior to sampling
4. Do not collect samples after vacations, weekends, and holidays
5. Assign a unique sample identification

Sample Handling & Laboratory Analysis

• Use a certified laboratory

• Either they will collect or you will collect

• If you, follow all instructions i.e. sample preservation, Chain of Custody, and shipping

• Understand units; 1 ppm = 1000 ppb
Two-Step Sampling Process

• Step 1
  – Identify “hot spots” and determine level of lead, if any, from the service connection
    • Service connection - flush sample
    • Outlets (fountains, faucets) – first draw sample

  – Goal of Step 1 is to compare lead levels from service connection water to water that has been stagnant in outlets

Service Connection Sampling
Two-Step Sampling Process

• Step 2
  – Follow up flush samples taken from “hot spots” to identify upstream sources of lead in plumbing
  – If Step 1 first-draw samples are greater than 20 ppb in a 250 ml sample, then perform Step 2 sampling
  – Flush sample, run for 30 seconds before collecting
  – Determines upstream plumbing sources of lead

Widespread presence of lead in drinking water

• Lead pipes in building
• Plumbing less than five years old, illegal solder
• Water is corrosive
• Sediment/scale in screens contains lead
• Brass fittings and faucets
• Lead service line
Localized presence of lead in drinking water

- Some brass fittings and faucets,
- Outlets in line with brass valves
- Lead pipes
- Water is non-corrosive
- Lead solder, either before 1986 or illegal
- Low flow/use
- Sediment in screens contains lead
- Fountain components contain lead

Sampling Plan

- Who will be in charge of sampling effort?
- Who will collect and analyze samples and maintain records?
- Where will the samples be taken?
- QA/QC procedures
  - Sample collection & handling
- Chain of custody
**Sampling Strategy**

- Collect and analyze water for contaminants. Use water samples collected daily at the point of use. Ensure consistent sampling, and analyze for lead and copper content.
- In the treatment plant, select the sample point:
  - Yes: Select the sample point after the treatment process.
  - No: Select the sample point before the treatment process.
- In the distribution system, select the sample point:
  - No: Select the sample point at the point of use.
  - Yes: Select the sample point at the treatment plant.
- Choose the activity that will affect the sample:
  - Chart C.R.: No contact
  - Chart C.R.: No contact
- Is the sample to be collected in the treatment plant or distribution system? (Chart C.R.: Yes)

**Additional Parameters**

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Limit</th>
<th>Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>5 ppb</td>
<td>A regulated toxic metal found in low levels in galvanized pipe. The maximum allowable level is 5 ppb. However, the presence of cadmium at any level indicates that corrosive conditions may exist in the plumbing.</td>
</tr>
<tr>
<td>Color</td>
<td>15 color units</td>
<td>An aesthetic parameter that may indicate the presence of iron oxides. Iron oxides are often present in iron or steel pipes as a result of corrosive conditions.</td>
</tr>
<tr>
<td>Copper</td>
<td>1300 ppb</td>
<td>A regulated toxic metal used to make copper piping. The presence of copper in water samples taken from copper piping is not unusual, but higher levels indicate that corrosive conditions may be a concern.</td>
</tr>
<tr>
<td>Iron</td>
<td>300 ppb</td>
<td>An aesthetic parameter that is indicative of corrosive conditions at higher levels. See also color and turbidity. (Galvanized pipe is typically made of iron.)</td>
</tr>
<tr>
<td>Turbidity</td>
<td>1 turbidity unit</td>
<td>A measurement of the clarity of water. Higher turbidity values may indicate the presence of iron oxides. Iron oxides are often present in iron or steel pipe as a result of corrosive conditions.</td>
</tr>
<tr>
<td>Zinc</td>
<td>5000 ppb</td>
<td>An aesthetic parameter that is indicator of corrosive conditions at higher levels. Zinc is used in making galvanized piping products. The presence of zinc in water samples taken from galvanized piping is not unusual, but higher levels indicate that corrosive conditions may be a concern.</td>
</tr>
</tbody>
</table>
Water Fountains: Bubblers

Water Fountains: Coolers
Water Fountains: Dispensers

Ice Makers
Water Faucets

Targeted Locations of Water in Plumbing for Samples 1F & 2F.

Central Chiller

Targeted Locations of Water in Plumbing for Samples 1K & 2K
Sample Sites for Single Level Building

1. Morning first-draw samples from coolers, faucets, bubblers, etc. (Initial Screening Samples 1A, 1C, 1D, 1E, 1F.)
2. Samples from service line after 30-second flush from designated outlet. (Follow-up Samples 2A, 2E, 3F, 3G.)
3. Samples from coolers after 15-minute flush. (Follow-up Sample 2C)
4. Samples from coolers morning first-draw. (Follow-up Sample 3C.)

Note: Simplified header and lateral configurations are shown for clarity.

Sample Sites for Multi-Level Building

1. Morning first-draw samples from coolers, faucets, bubblers, etc. (Initial Screening Samples 1A, 1C, 1D, 1E, 1F.)
2. Sample from service line after 30-second flush from designated outlet. (Initial Screening Samples 2A, 2D, 3F, 3G.)
3. Sample from header taken from faucet head from rear pipe. (Sample 1H.)
4. Sample from rear pipe taken from faucet closed to rear pipe. (Sample 1J.)
5. Sample from service line and distribution main taken from tee closed to service connection. (Sample 1K.)
6. Sample from outlet of chlorinator unit. (Follow-up sample 1L.)
7. Sample from outlet of chlorinator unit. (Follow-up sample 2L.)

Note: Simplified header and lateral configurations are shown for clarity.
Routine Control Measure

• Aerator cleaning maintenance schedule
• Use only cold water for cooking
• Run water before drinking
• Placard bathroom sinks as “do not drink”. Use pictures for small children

Interim Short Term Control Measures

• Facility wide pipe flushing
• Provide bottled water
• Shut off problem outlets
Permanent Measures

- Outlet replacement
- Pipe replacement
- Point of use devices
- Check grounding wire
- Reconfigure plumbing
- Manual & automatic flushing
- Remove problem outlets from service
- Lead free materials
- Bottled water

Questions?
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