Developed summer 2017
Last updated spring 2018

Child Care Lead in Water Pilot Project: Testing Protocol

Objective: Pilot a protocol for testing drinking water in child care centers for lead that enables immediate screening and repair of significant sources of lead, followed by more rigorous testing to confirm lead levels meet targets. Refine the protocol based on results of pilot, with the goal of developing best practices for lead testing and remediation at child care centers broadly. Lessons learned from the pilot can be used in promoting and shaping mandatory child care testing requirements in states and other jurisdictions.

Background: The following protocol relies on EPA's 3Ts for Reducing Leading ("3Ts"). It deviates from the protocol in several ways, including:

- Investigation and removal of the lead service line (LSL) prior to testing;
- Hot water and water heater testing;
- Use of the EPA-approved Palintest meter or ANDalyze meter for immediate screening;
- Use of a 3.8 ppb lead risk-based benchmark for all samples at the tap.

This protocol is designed to:

1. identify and remove sources of lead in drinking water through step wise assessment of records, visual inspection, and water testing, and
2. demonstrate the reduction in lead levels following remediation and/or flushing.

PROTOCOL

1) Contact stakeholders to inform them of the project and acquire relevant information.

a) Contact utility to acquire relevant information on whether there may be an LSL. Ask the utility, child care center staff, and property owner the following questions:
   i) *How old is the building?*
   ii) *Was it recently renovated?*
   iii) *Are there any previous water testing results?*
   iv) *Are there relevant records on presence of an LSL?*

b) Inform and engage the local health department. They may be able to provide relevant information about the child care center and any related blood lead or lead hazard testing.

2) Investigate for the presence of an LSL and replace if found.

Unless there is clear evidence from Step 1 that the property does not have an LSL, work with the utility, child care center staff, and property owner to investigate for the presence of an LSL.

a) If an LSL is discovered:

i) Arrange for removal of the full LSL. Contact EDF to arrange for payment for its removal.
ii) Collect pre-replacement water samples following an overnight stagnation, including 10 consecutive 1 liter samples at the outlet closest to the service line and a 250 mL first draw from each outlet.
iii) Follow AWWA's post-replacement flushing protocol (or another approved protocol), including use of lead-certified filter devices.
iv) Collect post-replacement water samples, including 10 consecutive 1 liter samples at the outlet closest to the service line following an overnight stagnation.
v) Complete flushing protocol and wait at least 30 day or until testing confirms that lead levels have gone down before continuing onto Step 3.

b) Proceed to Step 3 when you are reasonably confident that there is no LSL or it has been replaced.

Day 1: Water stagnation

3) Prepare for water stagnation the night before baseline testing: Call or visit the child care center to ensure that all of the water outlets are turned off. Put tape across the handle to remind people not to use it. Water should stagnate in the pipes overnight (at least 8 hours but not more than 18 hours).

Day 2: Baseline testing

4) Collect baseline water samples, clean aerators, and inventory outlets

a) Confirm that tape blocking use of faucets was not disturbed overnight. If it is, note that it may have been used.
b) Collect water samples at all drinking water outlets[1] (see EPA's 3Ts protocol for water coolers[2]):
   i) ***Sample #B1*** ("first draw"): Turn on cold water so that the water gently flows and collect the first 250 mL in a labeled bottle.
   ii) ***Sample #B2*** ("30 second flushed sample"):
      (1) Continue running the water for an additional 25 seconds and collect the water in a separate container.
      (2) Collect a 250 mL sample in a labeled bottle.
   iii) If the outlet has an aerator or screen, remove and clean it and then put it back. Take note of which outlets have aerators, which do not, and which were able to be removed and cleaned.
   iv) Record the volume of the water collected between samples.
c) Inventory each drinking water outlet by noting the type (e.g., bubbler, kitchen sink) and/or taking a photo.[3]

[1] Drinking water outlets include all bubbler and water cooler drinking fountains, sinks in kitchens, sinks in bathrooms *if* there are cups in the bathroom or there are other indications that the water is used for drinking or teeth brushing, and any other outlets that are known to be used for drinking. It usually would not include the sink in the janitor's closet. See p. 41 and pp. 86-88 of the 3Ts document for additional guidance on water coolers.
[2] Record age of water cooler and follow steps outlined on 3Ts pp. 41-44.

5) **Prepare for water stagnation the night before testing:** Call or visit the child care center to ensure that all of the water outlets are turned off. Put tape across the handle to remind people not to use it. Water should stagnate in the pipes overnight (at least 8 hours but not more than 18 hours).

Day 3: Inspection, testing, and remediation

6) Visual inspection and water heater testing:

a) If an LSL was not discovered in Step 2, visually inspect for the presence of an LSL to confirm. If an LSL is discovered at this point, follow steps under 2a.
b) Confirm that tape blocking use of faucets was not disturbed overnight. If it is, note that it may have been used.
c) Inspect visible internal plumbing to:
    i) Determine what it is made of (e.g., copper, steel, plastic, lead). If any visible portion of the interior piping is made of lead, contact EDF.
    ii) Test the solder on copper joints for lead with a LeadCheck Swab or Lockup Lead Instant Lead Test Kit.[4]
d) Water heater testing (Day 2 or Day 3):
    i) As best you can, inspect and photograph certification and age marks on the water heater.
    ii) Make sure the water heater drain valve flows to a drain. If needed, use a hose rather than a bucket.
    iii) **Sample W1 and W2:** Open the valve and after five seconds take two consecutive 250 mL samples of water from the drain on the water heater.
    iv) Analyze 5 mL of the sample for lead using the Palintest or ANDalyze meter and record the results.[5]
    v) Save the remainder of the sample to be sent for ICP-MS analysis in Step 9.
    vi) If possible, flush the water heater to the drain to remove any lead particulates using the manufacturer's instructions. You may need to return on a later date to flush the water heater with the support of a plumber or maintenance operator.
e) As best you can, inspect all drinking water outlets for certification and age marks to determine if fixtures may be leaded, and record:
    i) The age of the faucet (note especially whether before/after 1986)
    ii) Relevant certifications (e.g., NSF/ANSI Standard 61)
f) Test and record presence of lead in fixtures, if accessible. Use the following methods:
    i) LeadCheck Swab or Lockup Lead Instant Lead Test Kit
    ii) X-ray fluorescence (XRF) gun, if you have access[6]

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[3] This can be conducted on an earlier date.
[4] If plumbing is old (pre-1986), lead solder may be a source of lead.
[5] See the Palintest (or ANDalyze) user manual for specific directions on how to use the equipment.
[6] Surface scanned should be clean, dry, and free of coating. Even slight overspray of coatings can significantly reduce lead content readings. Part finishes that remove surface lead, such as acid washes, will affect surface lead

g) If leaded fixtures are discovered, contact EDF for recommended next step.

7) Collect water samples and analyze using a portable meter:[7]

a) Collect water samples (see EPA's 3Ts protocol for water coolers[8]):
   (1) ***Sample #1*** ("first draw"): At every drinking water outlet, turn on cold water so that the water gently flows and collect the first 250 mL in a labeled bottle.
   ii) At the main drinking water outlet(s) in the child care take the following additional samples immediately after collecting sample #1:
   (1) ***Sample #2*** ("5 second flushed sample"):
      (a) Continue running the water for an additional five seconds and collect the water in separate container.
      (b) Collect a 250 mL sample in a labeled bottle.
   (2) ***Sample #3*** ("30 second flushed sample")
      (a) Continue running the water for an additional 20 seconds and collect the water in a separate container.
      (b) Collect a 250 mL sample in a labeled bottle.
   (3) ***Sample #4:*** Collect a 250 mL sample of hot water in a labeled bottle immediately following collection of sample #3.

b) Record the volume of the water collected between samples.

c) Analyze 5 mL of each sample using the Palintest or ANDalyze meter (shake the 250 mL sample gently to mix before pouring a 5 mL sample) and record the results. Save the remainder of the samples for ICP-MS analysis in Step 9.

8) Remediation phase 1: Addressing positive results from portable meter:

a) Sample #1 positive (≥ 3.8 ppb): Consider replacing fixture (with certified lead-free fixture) with input from EDF. If replaced, move to Step 10.

b) Sample #2/#3 positive (> 3.8 ppb): Investigate and try to figure out the source of the lead. Replace the lead source if possible.

c) Sample #1 and #2/#3 positive: Investigate and try to figure out the source of the lead. Replace the lead source if possible.

d) While waiting for ICP-MS laboratory results (Step 9), consult with EDF on fixtures that may need lead-certified filter devices where there was no fixture replacement *and* the screening sample exceeded 3.8 ppb. Provide replacement cartridges and use instructions to the child care center.

9) Send all samples for laboratory analysis at the end of Day 3:

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content readings and may affect the value of the screening analysis. Part size, shape, and condition of the surface can impact reading. Area analyzed should be no smaller than the instrument observation window. Shapes, such as curved surfaces, should be minimized. (Source: California DTSC)

[7] See pp. 28-35 of EPA's 3T's protocol for more detail on water sampling and assigning unique sample identification numbers to each sample collected. Note that flushed samples are taken on the same day as the first draw sample in this protocol, which differs from the 3Ts document.

[8] Follow steps outlined on 3Ts pp. 41-44 for water coolers.

a) Send the following samples to a certified laboratory for ICP-MS analysis:
   i) All #B1 and #B2 baseline samples (Step 4)
   ii) Samples W1 and W2 (Step 6)
   iii) All #1, #2, #3, and #4 samples (Step 7)

Follow-up testing

10) Prepare for water stagnation the night before follow-up testing: Ensure that all of the water outlets are turned off. Put tape across the handle to remind people not to use it. Water should stagnate in the pipes overnight (at least 8 hours but not more than 18 hours).

11) Collect follow-up samples at outlets with fixture replacements:
   a) Confirm that tape blocking use of faucets was not disturbed overnight. If it is, note that it may have been used.
   b) ***Sample #5:***
      i) Turn on the cold water so that the water gently flows and collect the first 250 mL in a labeled bottle from each outlet where there was a replacement the previous day. (See EPA's 3Ts protocol for water coolers.)
   c) Send all #5 samples to a certified laboratory for ICP-MS analysis.

12) Collect follow-up water heater samples after sustained flush.
   a) Following the same protocol in Step 6 above, collect **Sample W3 and W4** (two consecutive 250 mL samples following a 5 second drain flush).
   b) Send all W3 and W4 samples to a certified laboratory for ICP-MS analysis.

Actions based on laboratory results

13) Analyze data
   a) Compare ICP-MS results to Palintest/ANDalyze results to identify areas of concern not flagged by the portable screen.
   b) Assess whether lead levels were reduced in samples #B2, #2 and #3 after flushing, #1 after aerator cleaning, and #5 after replacement(s).
   c) If risk benchmarks are exceeded for any of the lab-analyzed samples (excluding #1 samples that are superseded by #5 samples), continue to Step 14.
   d) Analyze water heater data, including any post-flush data, and discuss next steps with EDF.

14) Remediation phase 2: Addressing positive results from laboratory analysis
   a) Sample #1 positive (≥ 3.8 ppb), not identified by portable screening device: Consider replacing fixture (with certified lead-free fixture) with input from EDF.
   b) Following any fixture replacement, conduct follow-up testing as described in Steps 10-11 above and re-analyze data as described in Step 13 above.

c) If sample #1 <3.8 ppb but sample(s) #2 and/or #3 exceed the action level, investigate and try to figure out the source of the lead with EDF's support. Replace the lead source if possible. Contact EDF for advice on outlets where lead levels cannot be reduced to < 3.8 ppb after two rounds of efforts to reduce lead levels. Lead-certified filter devices may be necessary.

Continual Education

15) Throughout the process, provide results to staff at the child care center in a timely manner and ensure that parents are informed of the results. Also inform staff and child care of all remediation steps taken to reduce lead, including replacements and filters.

16) Educate staff at child care centers about key actions to reduce lead exposure through personal communications and/or handouts.