An EDF Pilot: Tackling Lead in Drinking Water at Child Care Facilities

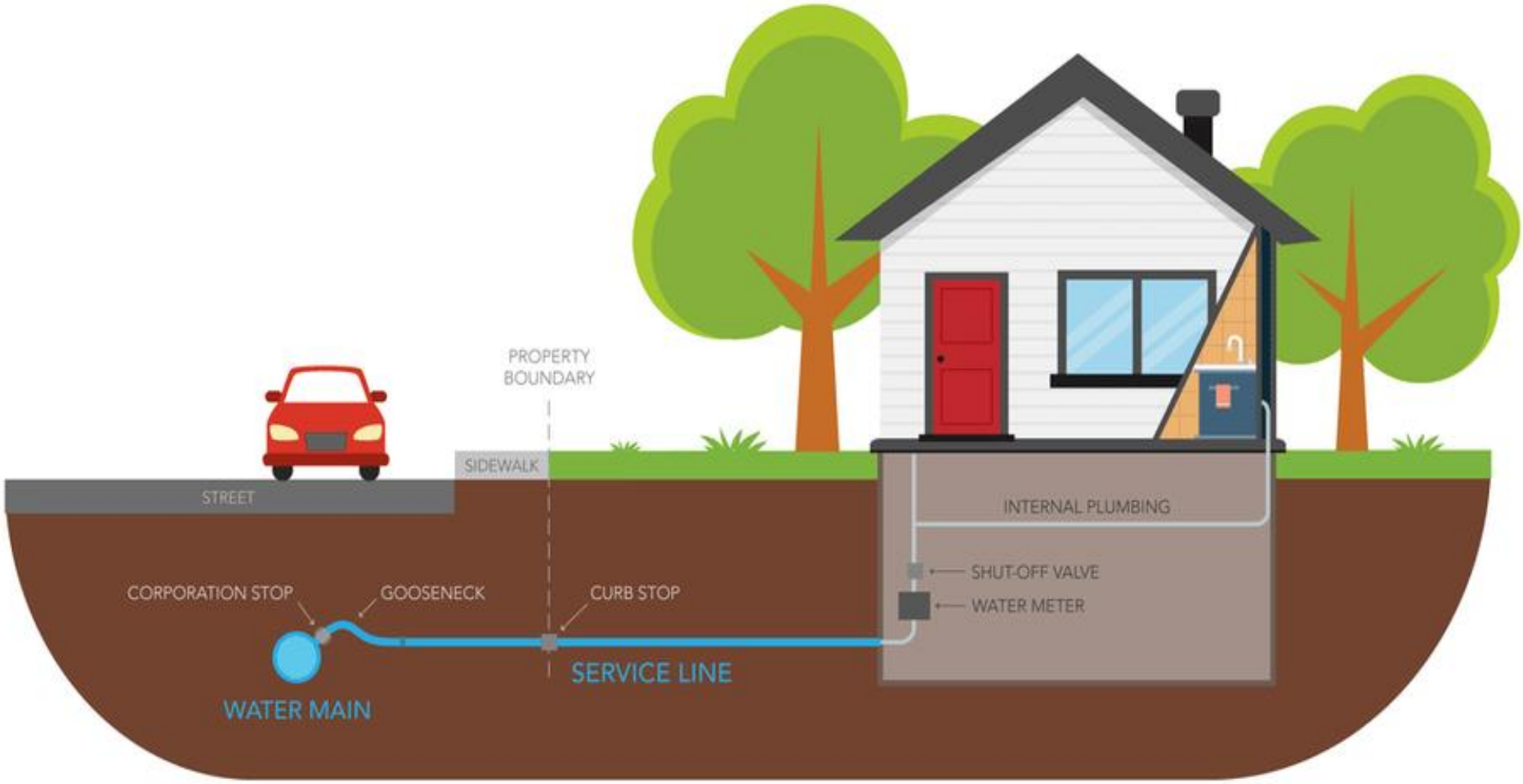
Lindsay McCormick, MPH
Project Manager, Chemicals and Health
Environmental Defense Fund

EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Sources of lead in drinking water

EPA: https://www.epa.gov/ground-water-and-drinking-water/infographic-lead-drinking-water

Lead service line components



Lead Service Line Replacement Collaborative: https://www.lslr-collaborative.org/

Lead in plumbing materials

Legislative history

- In 1986, Congress amended the Safe Drinking Water Act to limit lead in plumbing
  - Banned pipe, plumbing and fixtures not “lead-free,” defined as less than 8%
  - Banned solder and flux not “lead-free,” defined as less than 0.2%
- In 2011, Congress passed Reduction of Lead in Drinking Water Act, strengthening limits used in brass fixtures and fittings – effective 2014, limited to 0.25%.

How big is the problem today?

- Estimated 6.1 million homes served by lead service lines (LSLs)
- Millions of older buildings with lead solder and brass fixtures across the U.S.

Child care: A major gap

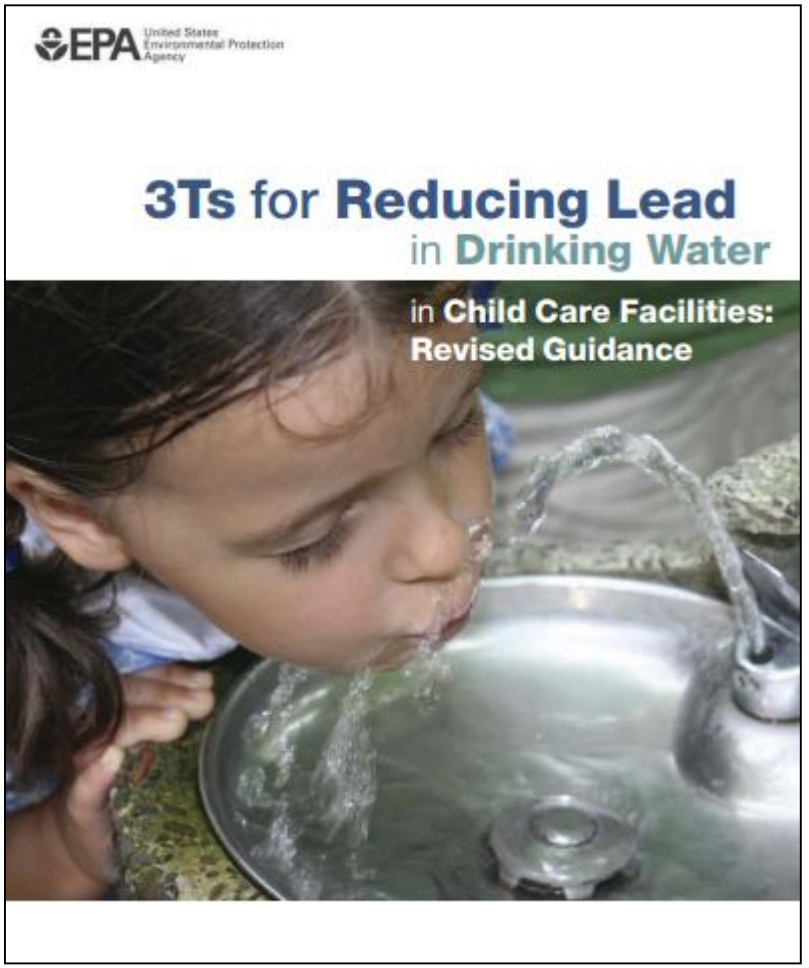
- Approximately 100,000 public schools and 500,000 child care facilities not required to test/report under the Lead and Copper Rule (LCR)

- Additional challenges compared to school setting
  - Children under age six are most vulnerable
  - Facility support system and public accountability
  - Home-based child care more likely to have LSLs than larger operations

- Only 9 states require any lead in water testing at child care facilities:
  - California
  - Connecticut (limited)
  - Illinois
  - New Hampshire
  - New Jersey
  - Maine (limited)
  - Oregon
  - Rhode Island
  - Washington

EPA's 3Ts 2006 voluntary guidance*

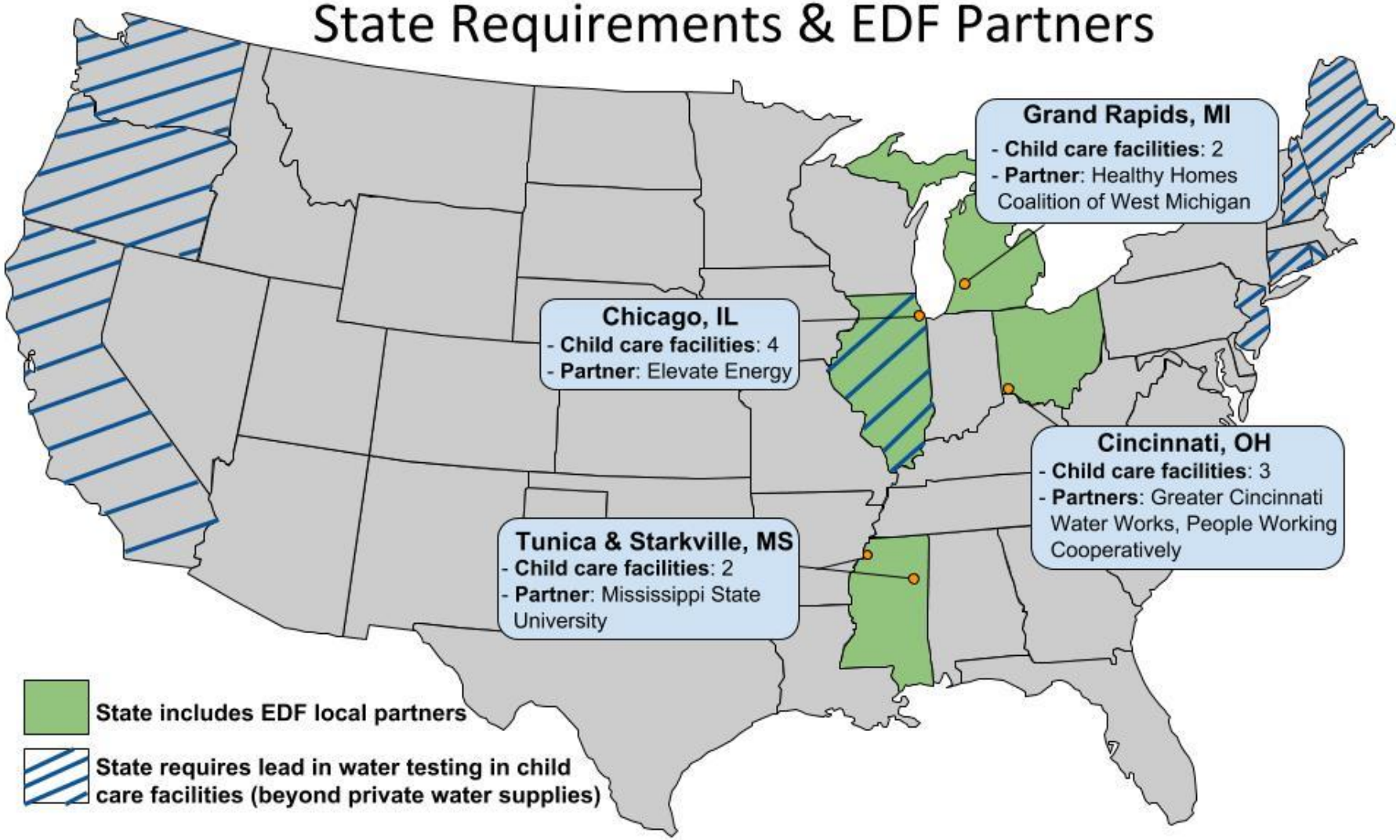
- Adapted guidance for schools
- Outdated "action level" of 20 ppb
- Little attention to lead service lines



*Updated in October 2018

EDF’s Pilot Project

Lead in Water at Child Care Facilities: Existing State Requirements & EDF Partners



What did we do?

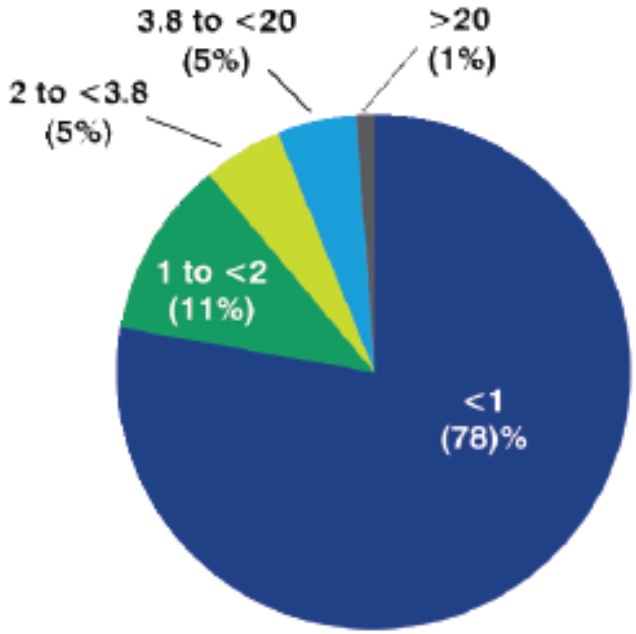
- **Tested**
  - 11 child care facilities serving children from low income families
  - Collected over 1,500 samples at 294 fixtures
- **Remediated**
  - Replaced 26 fixtures based on our health-based action level (3.8 ppb and > 2 ppb in Illinois).
  - Removed LSLs based on visual inspection & records
  - Drained and flushed 10 water heaters to remove lead particulate
  - Routine measures: flushing fixtures and cleaning aerators
- **Explored** novel approaches compared to EPA's 3Ts guidance

Photo credit: Danielle Scruggs

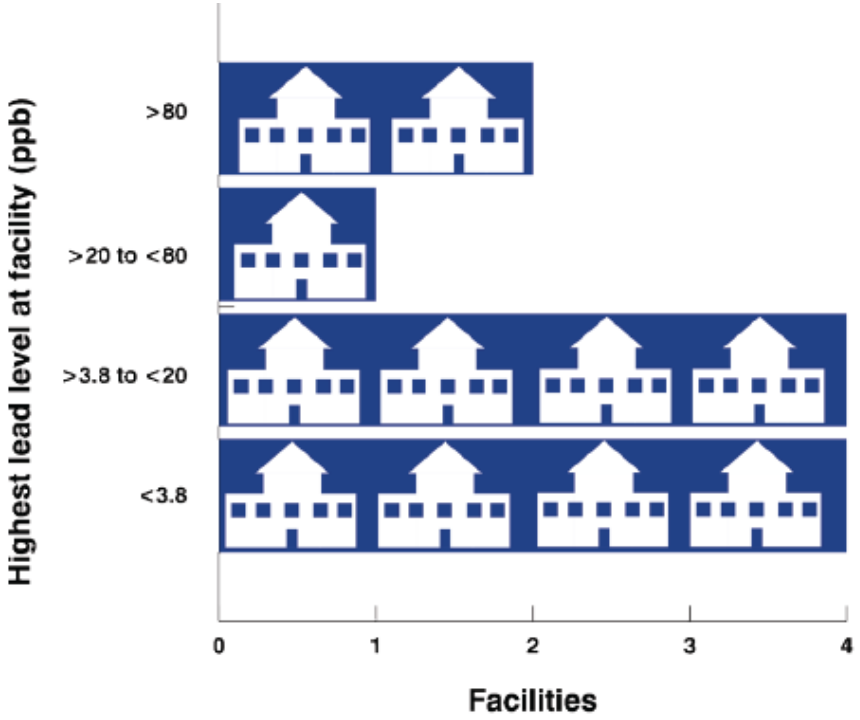
Photo credit: Danielle Scruggs

What did we find?

Lead level in baseline first draw water samples (ppb)



Highest lead levels in water at child care facilities



Results: While more than three out of four samples collected had non-detectible lead levels (<1 ppb), seven of 11 child care facilities had at least one drinking water sample above our action level.

What did we find?

Intervention: Flushing

- 30 seconds: Reduced lead level on average by 3.9 ppb
- 5 seconds: Reduced lead on average by 3 ppb

Conclusion: Flushing fixtures (such as faucets) for as short as 5 seconds may be a practical and effective way to lower lead levels.

Intervention: Aerator cleaning

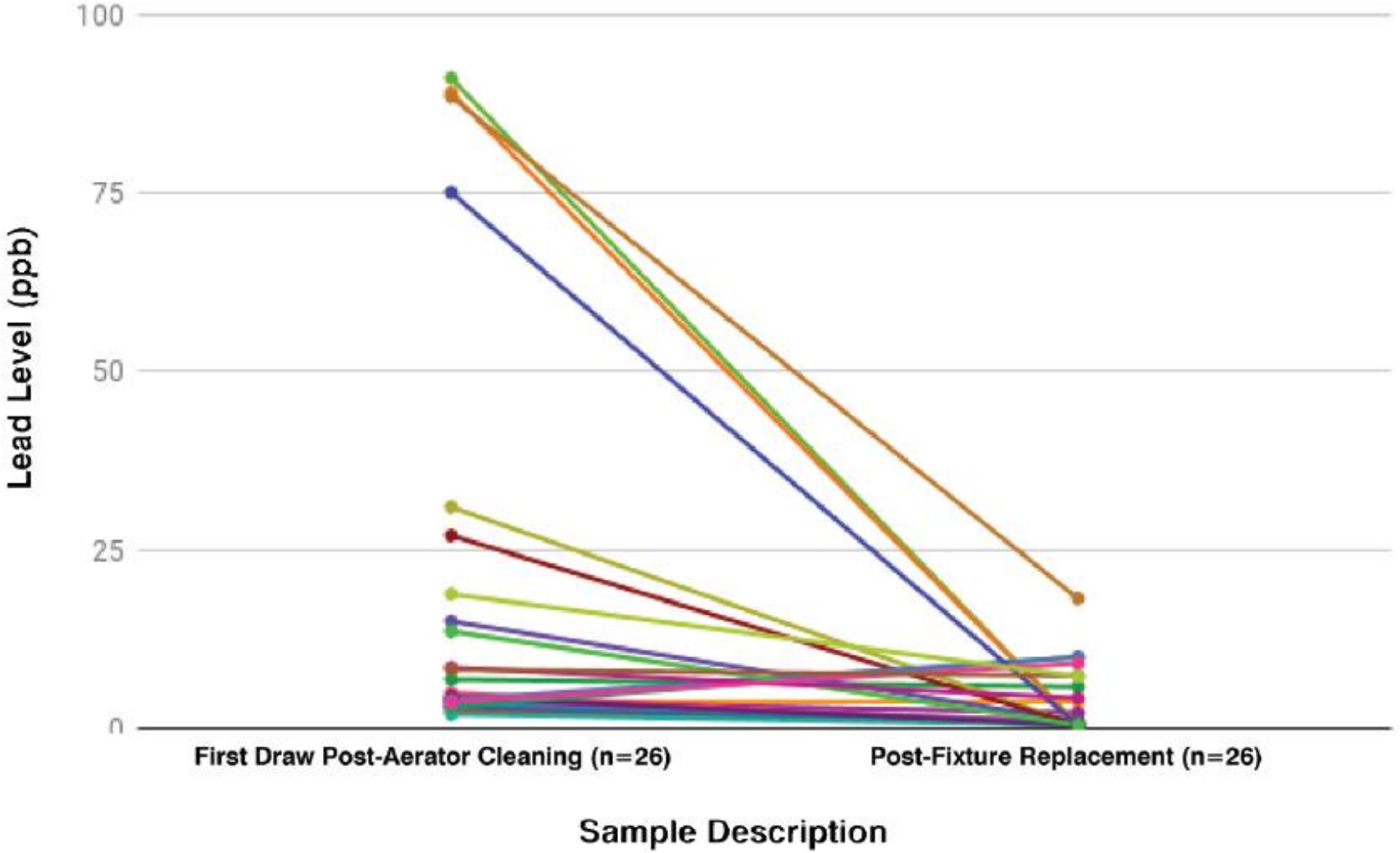
- When lead was detected, aerator cleaning increased lead levels by 4.5 ppb on average.
- Possible reasons?

Partner with Healthy Homes Coalition of West Michigan cleans a faucet aerator.

Conclusion: Soaking aerators in vinegar may reduce the effect by allowing lead particulate to dissolve and easily be washed away. More research is needed.

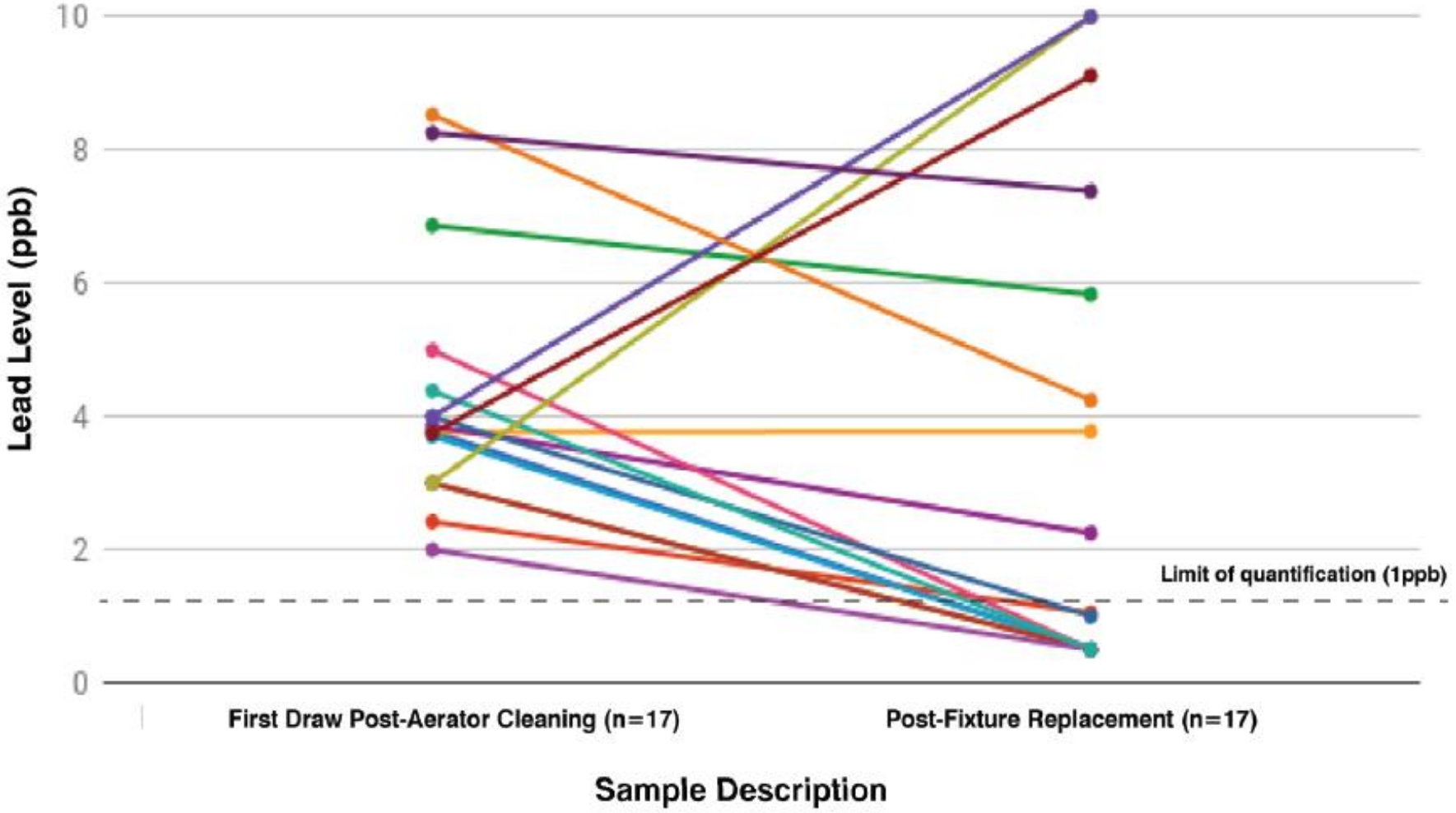
What did we find?

Intervention: Fixture replacement



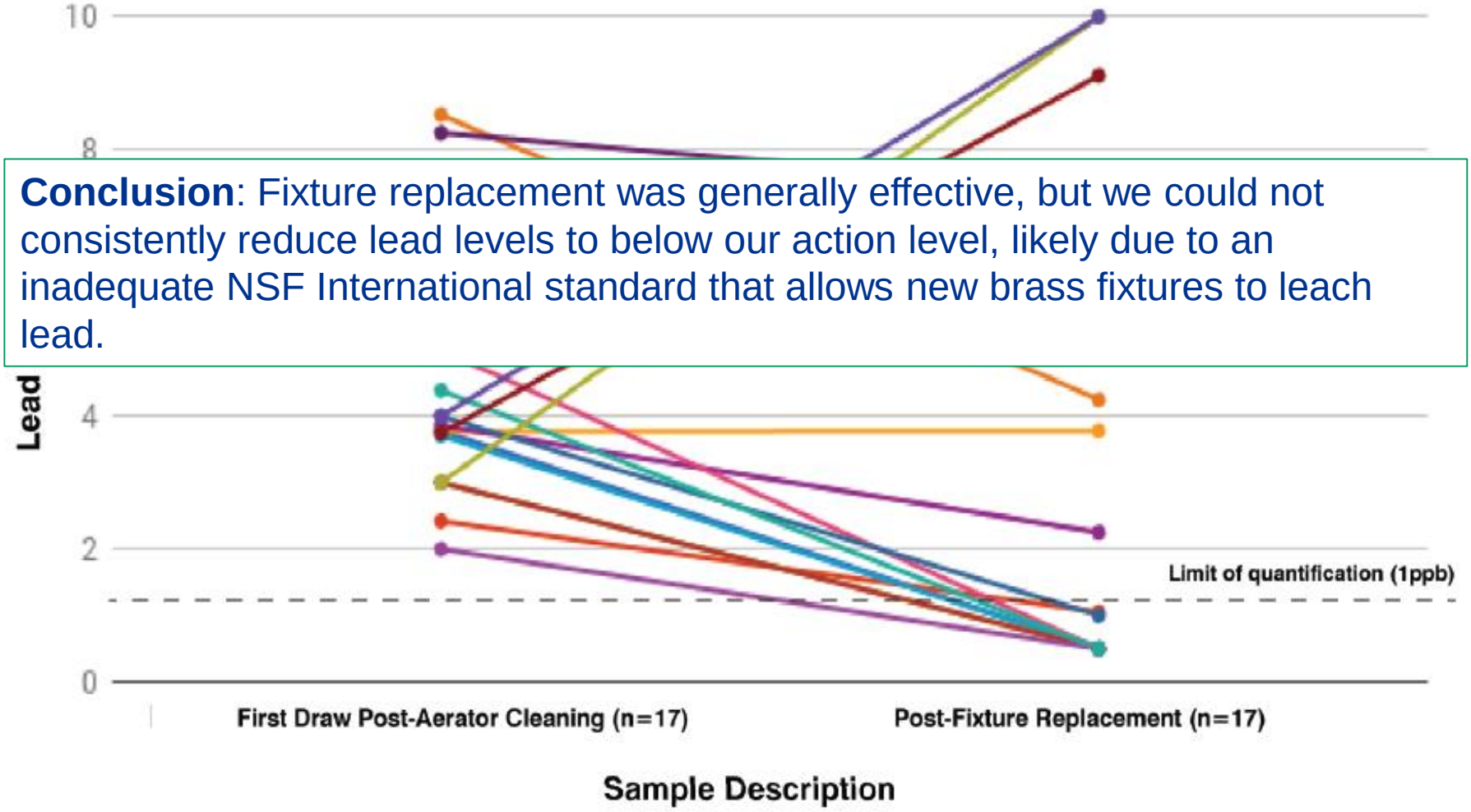
What did we find?

Intervention: Fixture replacement



What did we find?

Intervention: Fixture replacement



Conclusion: Fixture replacement was generally effective, but we could not consistently reduce lead levels to below our action level, likely due to an inadequate NSF International standard that allows new brass fixtures to leach lead.

NSF/ANSI 61 lead standard

- **Lead is allowed to be intentionally added to brass and bronze** provided the level of lead complies with the 0.25% limits of federal law and passes the NSF/ANSI 61 lead leaching protocol.

- A faucet can **pass the standard's lead leaching protocol and still contribute more than 20 ppb** in a 250 mL sample after repeated flushing.

See EDF blog for detail: http://blogs.edf.org/health/2018/11/06/nsf-61-lead-from-a-new-lead-free-brass-faucet/

Novel approaches

Lead service line replacement

- Investigation for the presence of LSLs prior to water testing replacement
  - Reviewed city, water utility, and child care records
  - Conducted a visual inspection
  - Identified and replaced two LSLs

LSL discovered at Chicago-based facility

Health-based action level

- EPA's 2006 3Ts action level of 20 ppb not based on health
- Our action levels
  - 3.8 ppb: Reflects a 1% increase in the probability of a formula-fed infant living in pre-1950 housing of having a BLL of 3.5 µg/dL
  - >2 ppb in Chicago, based on anticipated regulations

See EDF blog for methodology: http://blogs.edf.org/health/2017/02/28/health-based-action-level-for-lead-in-drinking-water/

Novel approaches

Portable meters

- Goal: Screen fixtures for immediate replacement
- Palintest meter results:
  - Tended to underestimate lead levels compared to laboratory analysis
  - Generally was effective in flagging higher levels (>20 ppb)

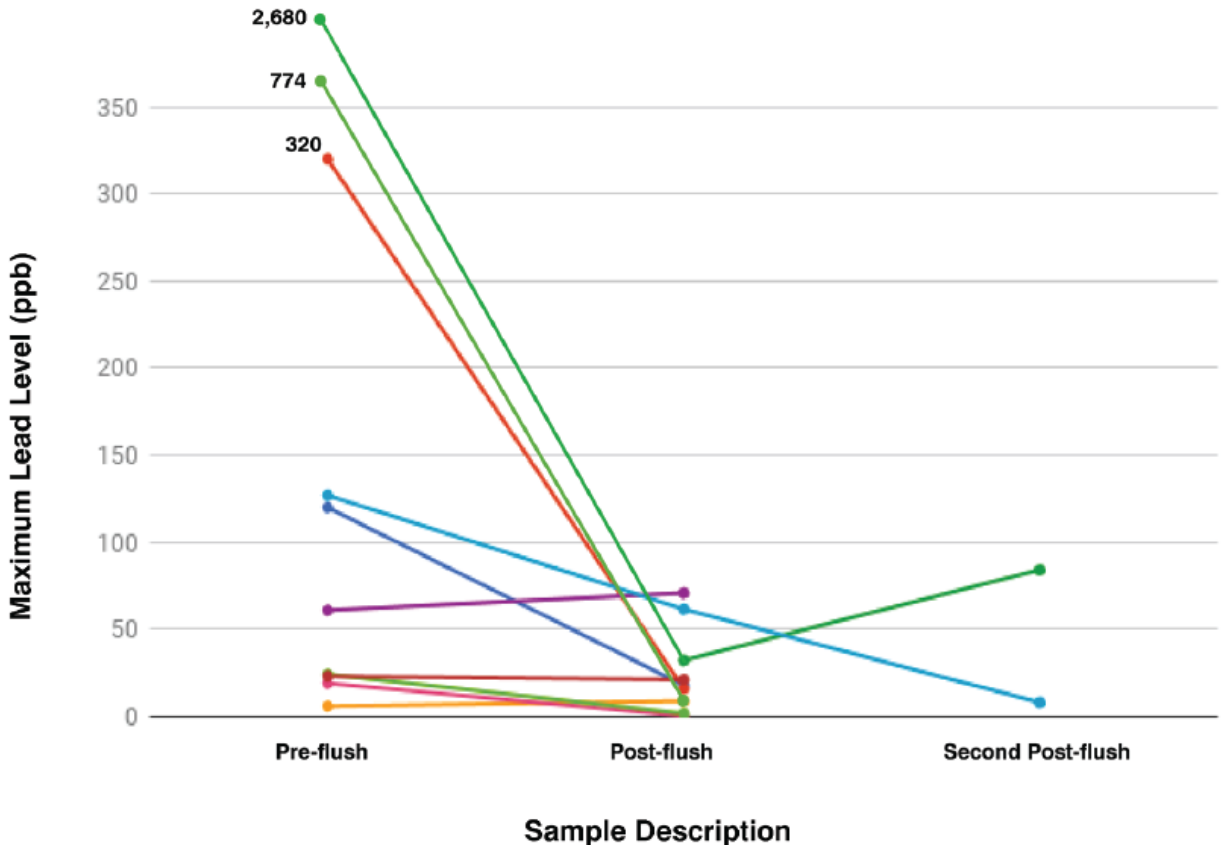
Palintest Lead Analyzer. Photo credit: Danielle Scruggs

Conclusion: Meters tended to underestimate compared to laboratory analysis; thus we did not generally rely on meter results for remediation decision.

Novel approaches

Water heaters

Lead results for 10 water heaters: Before and after flushing



Conclusion: Water heaters may function as “lead traps” for upstream sources. Flushing is effective to reduce lead.

Key recommendations

- Replace lead service lines in child care facilities when found through review of historical records and visual inspection.
- Require testing for lead in water in child care facilities for interior sources of lead.
- Set an interim action level of 5 ppb to investigate and remediate lead sources.
- Strengthen the NSF International 5 ppb leachability standard to reduce lead in new brass fixtures.

Recommendations on EPA's 2006 3Ts guidance

- Lower 20 ppb action level
- Place greater emphasis on identifying and replacing LSLs
- Robust protocol for aerator cleaning
- Address hot water and water heaters as potential sources of lead

EPA updated its 3Ts guidance in October 2018…

EPA's updated 3Ts guidance

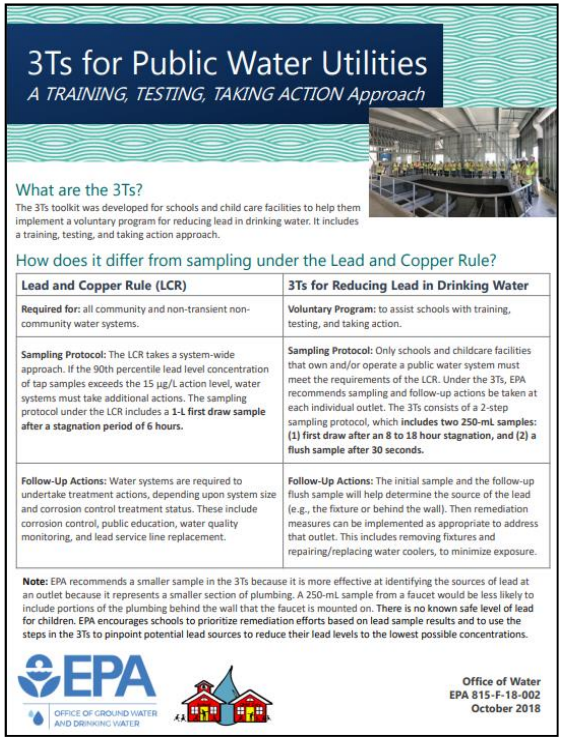
Interactive Web-Based Tool

3Ts Toolkit

- Module 1: Communicating the 3Ts
- Module 2: Learning About Lead in Drinking Water
- Module 3: Planning Your 3Ts Program
- Module 4: Developing a Sampling Plan
- Module 5: Conducting Sampling and Interpreting Results
- Module 6: Remediation and Establishing Routine Practices
- Module 7: Recordkeeping

Download the 3Ts Manual

Downloadable factsheets



3Ts for Public Water Utilities

A TRAINING, TESTING, TAKING ACTION Approach

What are the 3Ts?

The 3Ts toolkit was developed for schools and child care facilities to help them implement a voluntary program for reducing lead in drinking water. It includes a training, testing, and taking action approach.

How does it differ from sampling under the Lead and Copper Rule?

Lead and Copper Rule (LCR)	3Ts for Reducing Lead in Drinking Water
Required for: all community and non-transient non-community water systems.	**Voluntary Program:** to assist schools with training, testing, and taking action.
Sampling Protocol: The LCR takes a system-wide approach. If the 90th percentile lead level concentration of tap samples exceeds the 15 µg/L action level, water systems must take additional actions. The sampling protocol under the LCR includes a **1-L first draw sample after a stagnation period of 6 hours.**	**Sampling Protocol:** Only schools and childcare facilities that own and/or operate a public water system must meet the requirements of the LCR. Under the 3Ts, EPA recommends sampling and follow-up actions be taken at each individual outlet. The 3Ts consists of a 2-step sampling protocol, which **includes two 250-mL samples: (1) first draw after an 8 to 18 hour stagnation, and (2) a flush sample after 30 seconds.**
Follow-Up Actions: Water systems are required to undertake treatment actions, depending upon system size and corrosion control treatment status. These include corrosion control, public education, water quality monitoring, and lead service line replacement.	**Follow-Up Actions:** The initial sample and the follow-up flush sample will help determine the source of the lead (e.g., the fixture or behind the wall). Then remediation measures can be implemented as appropriate to address that outlet. This includes removing fixtures and repairing/replacing water coolers, to minimize exposure.

Note: EPA recommends a smaller sample in the 3Ts because it is more effective at identifying the sources of lead at an outlet because it represents a smaller section of plumbing. A 250-mL sample from a faucet would be less likely to include portions of the plumbing behind the wall that the faucet is mounted on. **There is no known safe level of lead for children. EPA encourages schools to prioritize remediation efforts based on lead sample results and to use the steps in the 3Ts to pinpoint potential lead sources to reduce their lead levels to the lowest possible concentrations.**

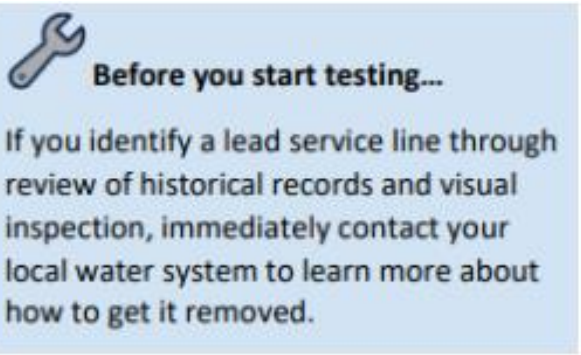
EPA OFFICE OF GROUND WATER AND DRINKING WATER

Office of Water
EPA 815-F-18-002
October 2018

Check out the new toolkit: www.epa.gov/safewater/3ts

EPA's updated 3Ts guidance

- Lower 20 ppb action level
  - ➢ **Removed action level altogether**
- Place greater emphasis on identifying and replacing LSLs
  - ➢ **Improved considerably**
- Robust protocol for aerator cleaning
  - ➢ **Not addressed**
- Address hot water and water heaters as potential sources of lead
  - ➢ **Not addressed**



Additional details: http://blogs.edf.org/health/2018/10/16/epa-updates-3ts-guidance-lead-drinking-water/

Check out the full report

edf.org/lead-child-care

Key resources

- **EDF resources:**
  - **Child care report:** edf.org/lead-child-care
  - **Child care testing requirement tracker:** https://www.edf.org/health/child-care-lead-water-requirements
  - **EDF blog on NSF/ANSI 61 standard:** http://blogs.edf.org/health/2018/11/06/nsf-61-lead-from-a-new-lead-free-brass-faucet/
  - **All lead resources:** www.edf.org/health/lead-toxic-legacy
  - **EDF blogs:** http://blogs.edf.org/health/
- **LSL Replacement Collaborative:** www.lslr-collaborative.org
- **EPA's updated 3Ts guidance:** www.epa.gov/safewater/3ts

The next step in keeping KIDS SAFE from LEAD in water?

Child care facilities.

Lindsay McCormick
Project Manger, Chemicals and Health
lmccormick@edf.org
202-572-3245

EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work