LCRR – Find and Fix Assessments

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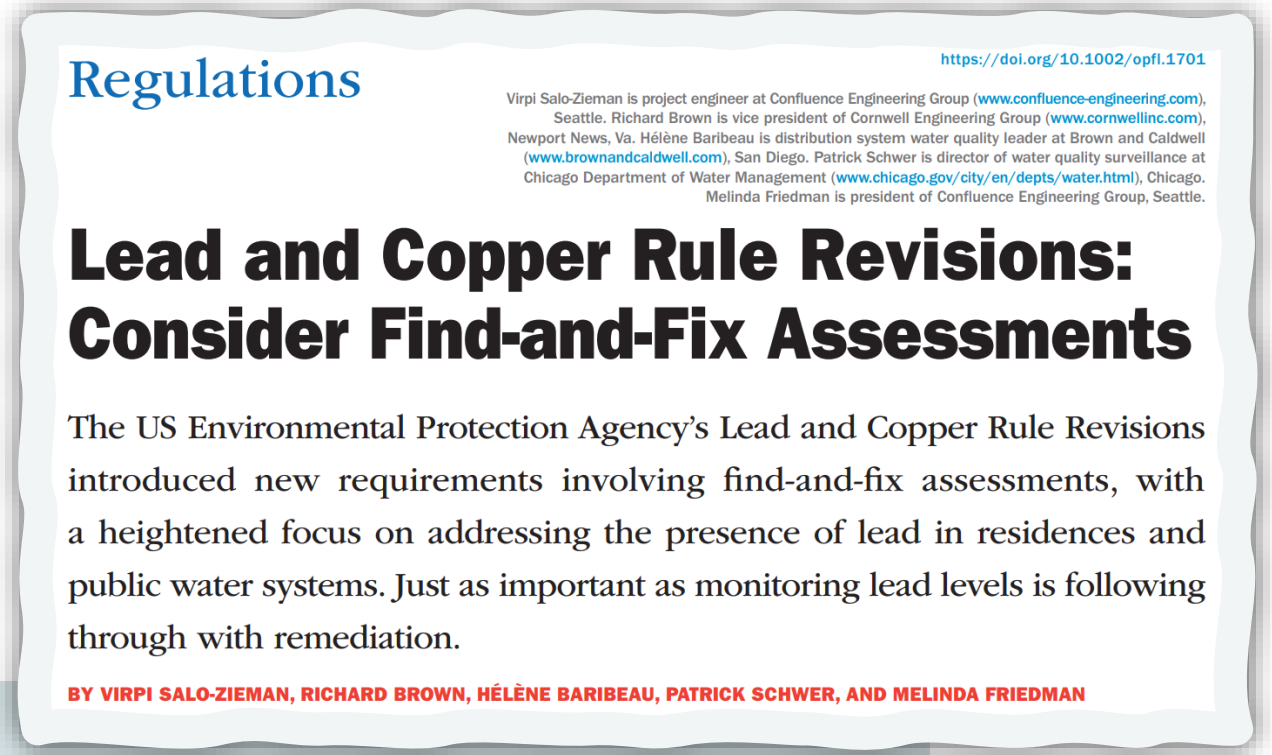
Find-and-Fix Assessments

1. Requirements and Expectations
2. What are you looking for?
3. What to fix?



Regulations

https://doi.org/10.1002/opfl.1701

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Lead and Copper Rule Revisions: Consider Find-and-Fix Assessments

The US Environmental Protection Agency's Lead and Copper Rule Revisions introduced new requirements involving find-and-fix assessments, with a heightened focus on addressing the presence of lead in residences and public water systems. Just as important as monitoring lead levels is following through with remediation.

BY VIRPI SALO-ZIEMAN, RICHARD BROWN, HÉLÈNE BARIBEAU, PATRICK SCHWER, AND MELINDA FRIEDMAN

Based on the following:

- Salo-Zieman, V., Brown, R., Baribeau H., Schwer, P., and Friedman, M. 2022. Lead and Copper Rule Revisions: Consider Find-and-Fix Assessments. Opflow 48:6.
- AWWA Webinar "Preparing for Revised LCR: Adapting to New "Find-and-Fix" Requirement" on October 29, 2021.

Expectations

LCRR Find-and-Fix

- Title 40 CFR § 141.82 (J) Find-and-fix Assessment for tap sample sites that exceed the lead action level
- Complete Find-and-Fix Assessment if a lead result > 15 µg/L in a tap sample
  - Samples monitored under §141.86
- Defines 8 steps for the assessment

§ 141.82 Description of corrosion control treatment requirements.

This section sets forth the requirements applicable to systems and states in the designation of optimal corrosion control treatment for a system that is optimizing or reoptimizing corrosion control treatment. Each system must complete the corrosion control treatment requirements in this section as applicable to such system under § 141.81.

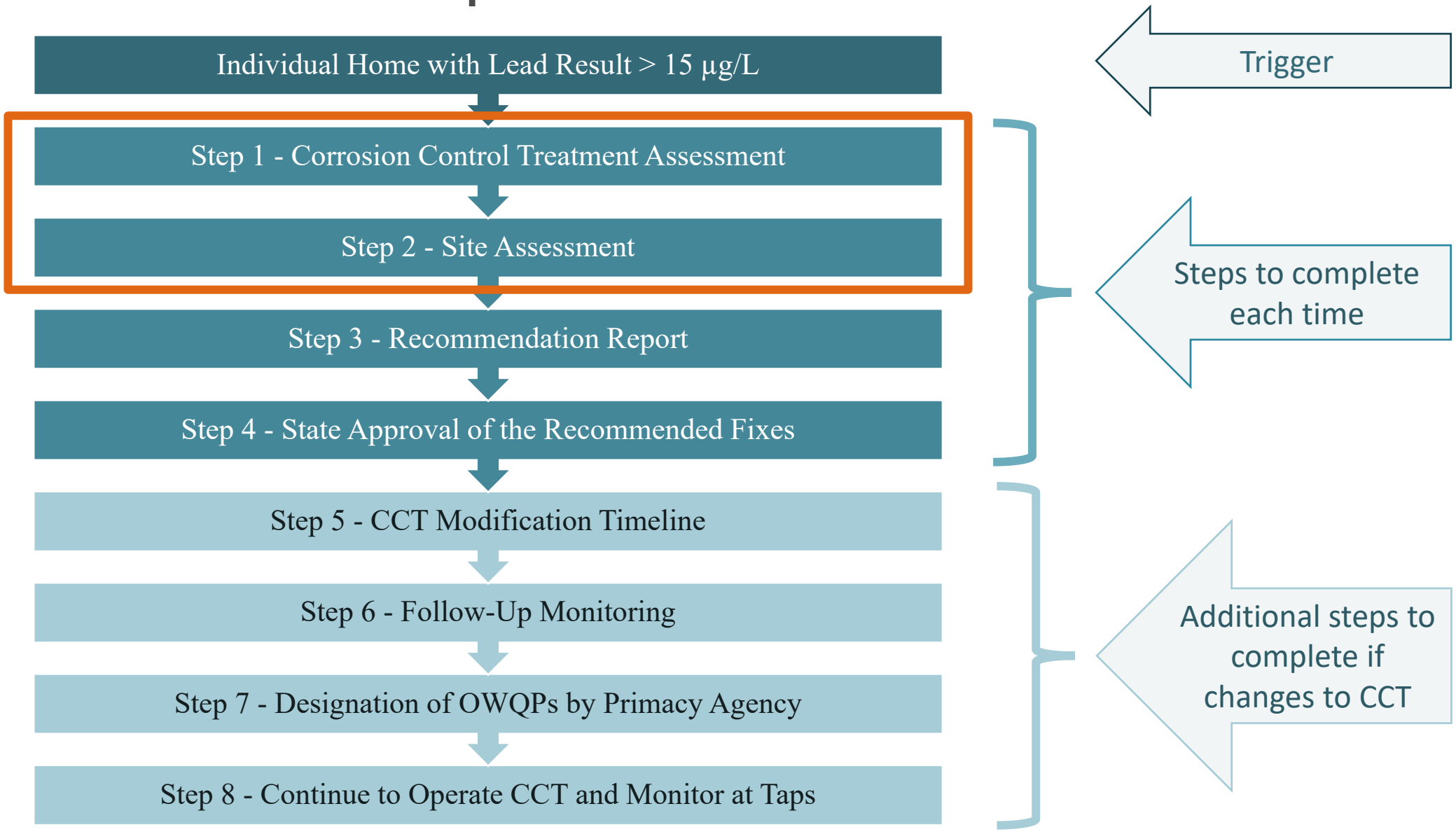
(j) *Find-and-fix assessment for tap sample sites that exceed the lead action level.* The water system shall conduct the following steps, when a tap sample site exceeds the lead action level under monitoring conducted under § 141.86.

§ 141.86 Monitoring requirements for lead and copper in tap water.

(a) *Sample site location.*

(1) By the applicable date for commencement of monitoring under paragraph (d)(1) of this section, each water system shall identify a pool of targeted sampling sites based on the

Find-and-Fix Steps



Step 1 – Corrosion Control Treatment Assessment

- Conduct water quality parameter (WQP) monitoring
  - **Locations:**
    - at or near each site with lead level >15 µg/L
    - Within 0.5-mile radius, same pressure zone, same size water main
    - An existing OWQP monitoring site ok if meets these criteria
  - **Timing:**
    - Within 5 or 14 days (systems with <10,000 people & no CCT)
  - **Parameters:**
    - pH, alkalinity, orthophosphate or silica when used
- Continue to monitor this site as a new WQP site if OWQPs set (quarterly)

	Number of WQP Samples		
System Size	Standard	Reduced	Maximum with find-and-fix
>100,000 people	25	10	50
10,001 to 100,000	10	7	20
3,301 to 10,000	3	3	6
501 to 3,300	2	2	4
< 500	1	1	2

Prioritization of Sample Sites

1. Existing WQP Site
2. Existing TCR Sample Location
3. Hydrant
4. New City or Utility Facility
5. New Customer Hose Bib

Source: Salo-Zieman et al. AWWA Webinar

Prioritization of Sample Sites

- First Choice – Use a Nearby Existing WQP Site
  - Can compare to **historical data**
  - Follow routine WQP **sampling procedures**
  - **Does not increase number of WQP sample sites** to be monitored for compliance
- Second Choice – Use an Existing Nearby Coliform Sample Location
  - Has **some historical data**
  - Follow coliform **sample collection SOP** to ensure WQ representative of distribution system
- Third Choice – Use a Nearby Hydrant
  - Must develop and use SOP for hydrant sampling. For example:
    - Low flow (< 60 gpm) for 5 min until water is cold
    - Use side stream sampling device with hose into overflowing bucket – no air bubbles!
  - Data ok for general water chemistry
- Fourth Choice – New Nearby City or Utility Facility
  - Follow coliform sample collection SOP to ensure WQ representative of distribution system
  - Easy access in the future as well
- Last Choice – New Customer Hose bib
  - Can be difficult to ensure access when needed
  - Ensure sample represents water in the distribution system and not household plumbing

Source: Confluence Engineering Group

Modified from Salo-Zieman et al. AWWA Webinar

Parameters to Consider

Field Parameters

Parameter	Reasoning to include
pH	Chemistry and scale stability
Temperature	Goes with pH, also may help to assess water age
Inhibitor (orthophosphate or silicate residual)	Level of residual for corrosion mitigation
Chlorine residual	Microbial and scale stability
ORP	Scale stability
Turbidity	Biofilm, organics, & metals releases
Conductivity	Source tracing, indicator of chemical release (dissolved deposits) from distribution mains

Bolded = required

Lab parameters

Parameter	Reasoning to include
Alkalinity	Help with source tracing, indicator of chemical stability
Calcium	Impact of cement-mortar-lined mains; assess carbonate scaling
Chloride	CSMR, galvanic corrosion indicator
Sulfate	CSMR, galvanic corrosion indicator

Bolded = required

Modified from Salo-Zieman et al. AWWA Webinar

Monitoring for pH

- Must be measured in the field
- Calibrated probe
- Probe acclimated to water temperature
- Gently (over)flowing sample, minimize contact with air and formation of bubbles
- Use probe meant for your water type (low ionic contents vs others)

Source: Confluence Engineering Group

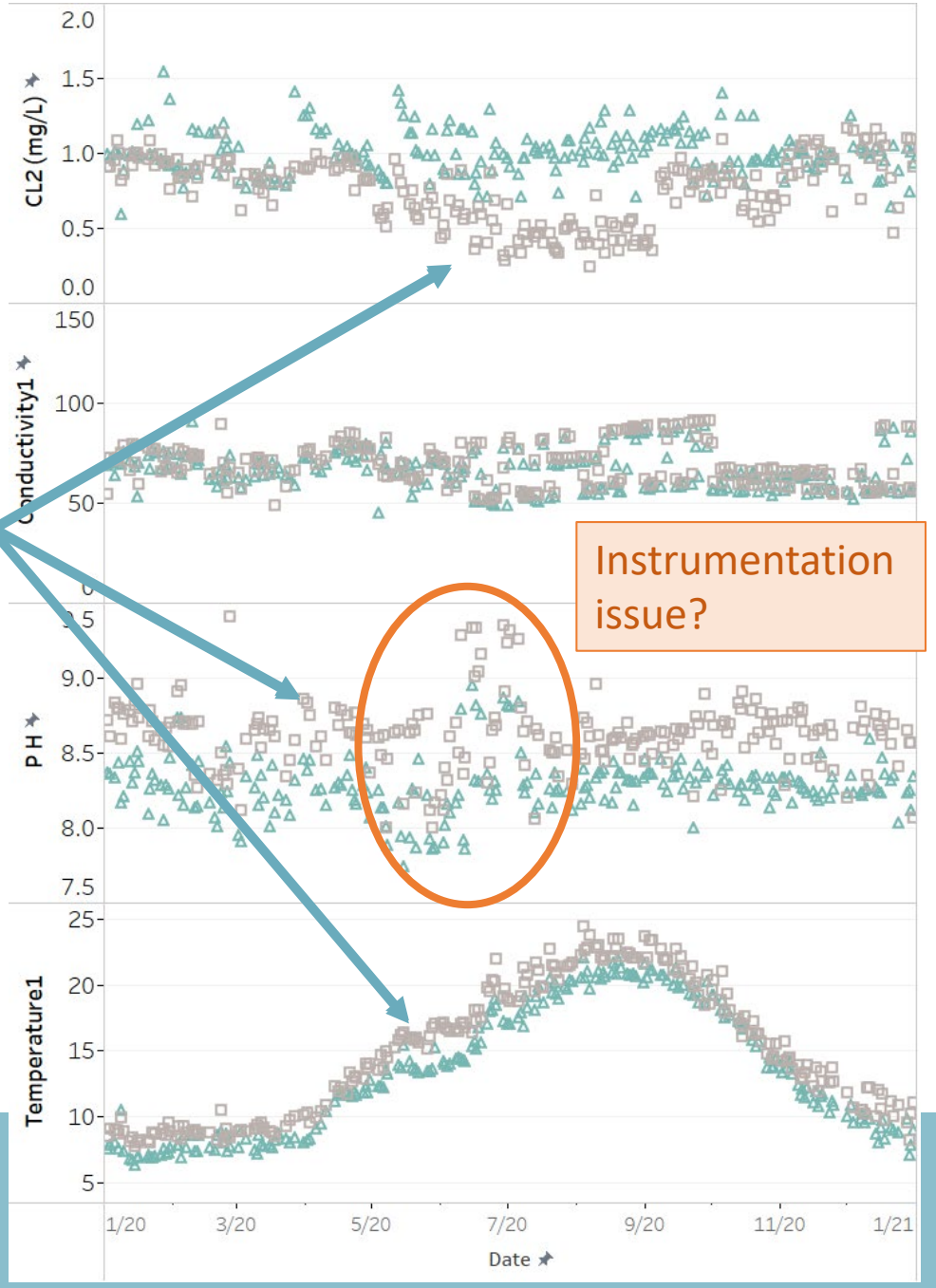
Get accurate pH data! You will be making big decisions based on this data.

Source: Find and Fix Webinar 2021 and Salo-Zieman et al, 2022 Opflow

Distribution System Data

- Two sites, daily monitoring
- Seasonal patterns & site-specific characteristics
  - Chlorine – grey sites had lower residuals in summer
  - Conductivity – a source tracer, both sites supplied by the same source
  - pH – no obvious seasonal pattern, but grey site had consistently higher pH
  - Temperature – Strong seasonal profile, grey site tended to have slightly higher temperature all the time
- June increase in pH at both sites - real or instrument error?

High water age indicators



Instrumentation issue?

Data Interpretation

- System complexity – spatial, temporal, and operational changes
- Drifts in water quality may not be related to the level of corrosion control treatment, but might still reveal needs for action
- System knowledge and data are crucial!

Potential causes for pH drift in the distribution system

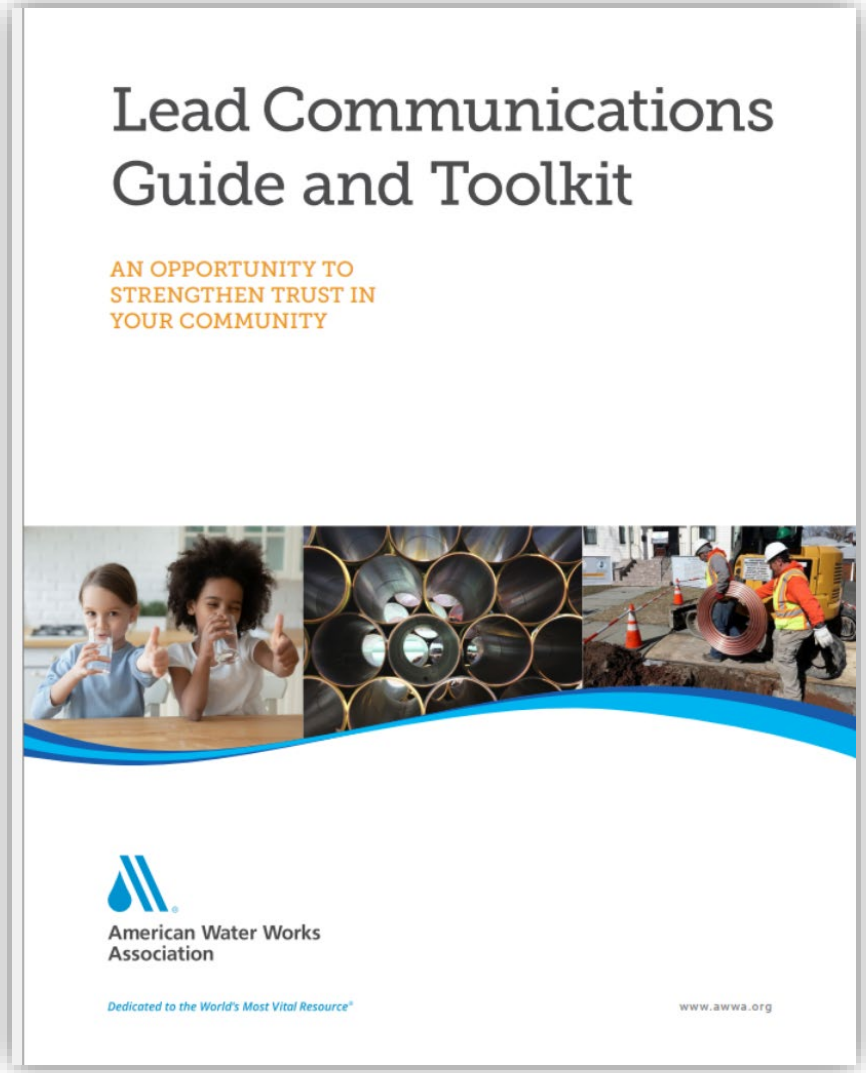
Contributing factor	pH Increase	pH decrease
Poor buffer capacity	✓	✓
Reaction with cement-lined pipes	✓	
Biofilm/microbial activity		✓
Reservoirs open to atmosphere	✓ (GW)	✓ (SW)
Supply blending	✓	✓
Analytical and sampling technique	✓	✓

Source: AWWA, Corrosion Control Training Module 3

Modified from Salo-Zieman et al. AWWA Webinar

Step 2 – Site Assessment

- Collect a follow-up lead sample at each site with lead level >15 µg/L within 30 days after receiving results
  - Purpose is to "assess the source of elevated lead"
  - Any sampling approach acceptable
- Notify customers
  - Within 3 days if Pb > 15 µg/L
  - Within 30 days if Pb ≤ 15 µg/L
- Submit results to Primacy Agency
- Not included in the compliance (90th percentile) calculations
- Document if customer refuses or does not respond (have to try at least twice)



Lead Monitoring Approaches

Repeat regulatory approach

Faucet a suspect

1L First Draw

After ≥ 6-hr stagnation, first draw 1L sample collected

5th Liter First Draw

After ≥ 6hr stagnation, 5th liter sample collected

250mL First Draw

After stagnation overnight, 250mL sample collected (common in schools)

Random Daytime

1L sample is collected at a random time during the day without flushing ("exposure assessment")

30 min Stagnation

Taps are flushed for 2-5 minutes followed by 30 min stagnation after which two 1L samples are collected ("true exposure")

Flush Sample

Flush 5 minutes and then collect a 1L sample (pre-determined threshold value used for identifying LSL)

Composite Proportional

Use of a device that collects 5% of every draw from the tap for consumption during one week

Identify potential source – opportunity to also do smaller volumes that add up to 1L

Sequential Sampling

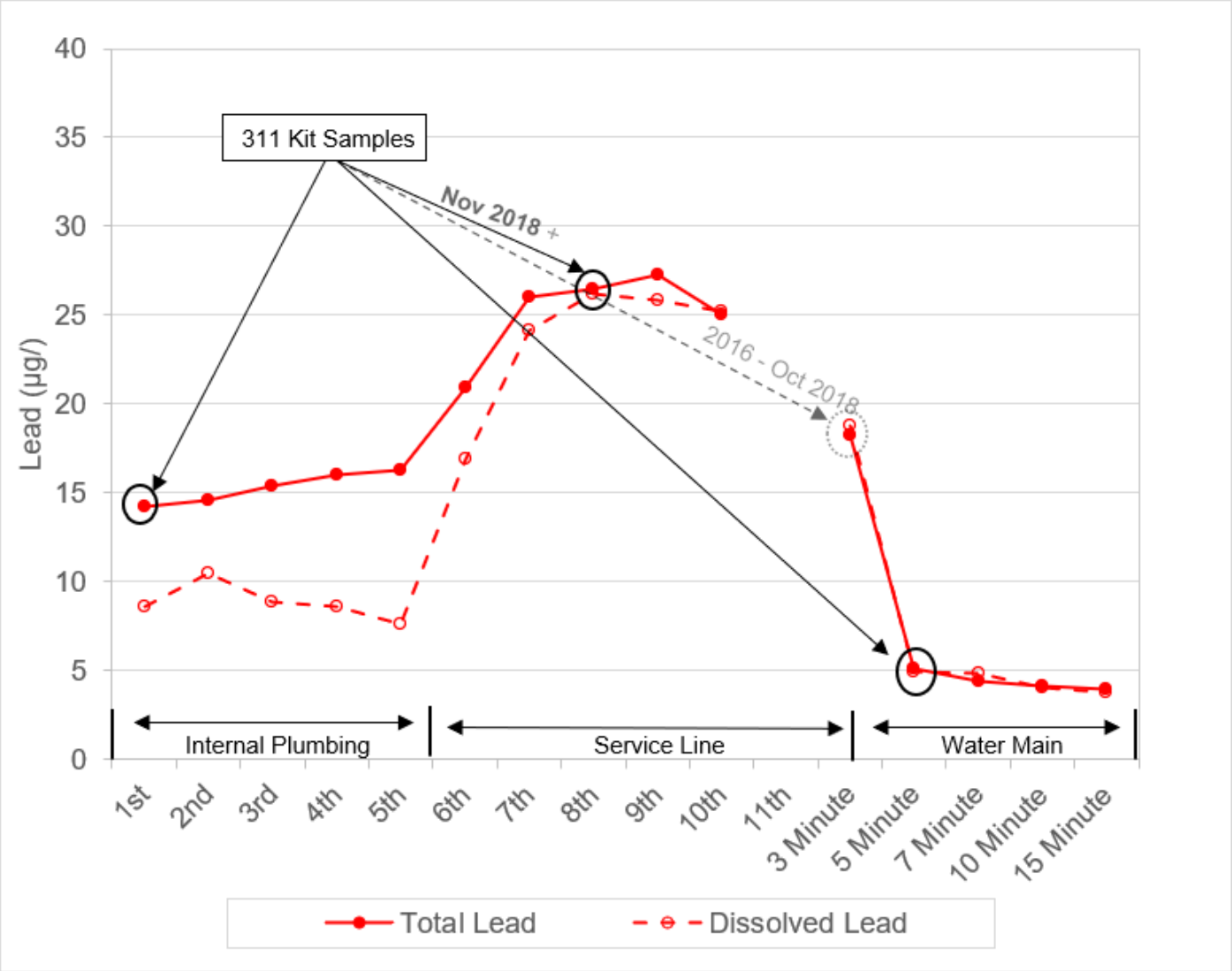
After a defined stagnation time, 10-20 sequential samples collected: 1) 125mL, 2) 250mL, and the rest 1L

Profile Sampling that Stimulates Particle Release

Series of sequential samples collected at increasingly higher water flow rate

Alternative Sequential Samples

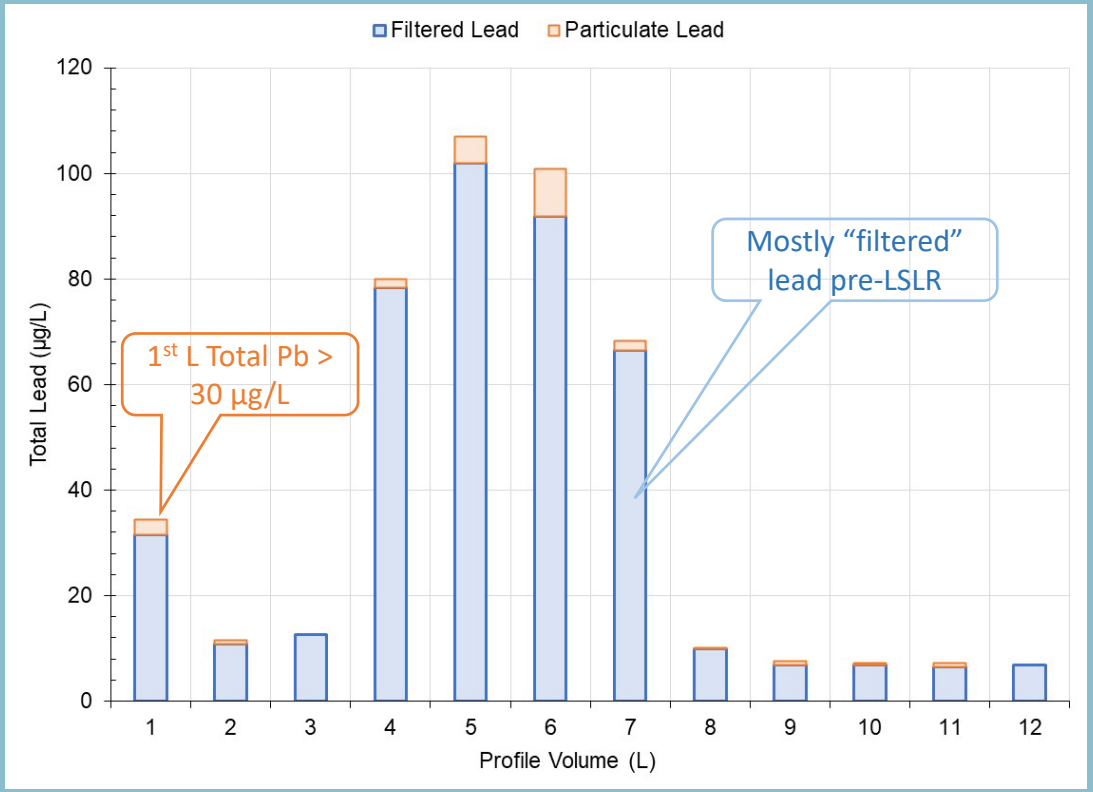
- Example City of Chicago, 311 Lead Test Kit
  - Three samples analyzed for lead
  - LSLs are very common
- If no LSLs, consider including other metals such as Zn or Fe to help identify potential sources of lead (brass, galvanized pipe)



(Graph Source: Schwer et al. AWWA Webinar 2021, City of Chicago Consumer Lead Testing Program)

Sequential Profile

- Particulate vs Dissolved lead
  - Unstable scales?
  - Chemistry issues?
  - Hydraulic disturbances?
- Need for improved CCT/chemistry adjustment?
- Something else to fix?



House with LSL and total lead >100 µg/L

Modified from Brown et al. AWWA Webinar

Cleaning Faucet Aerators

Photos Courtesy of R. Brown (1)

Denver Water (2)

NEWS ARTICLE

The big benefits of cleaning and updating faucet aerators

Small faucet devices — if cleaned regularly — help save water, improve water service and reduce the risk of lead exposure.

April 21, 2021 | By

You may not have
big part in your h

Cleveland.com (3)

Philadelphia Water Department (4)

PHILADELPHIA WATER

IMPORTANT HEALTH INFORMATION FOR: HOMEOWNERS WITH LEAD PLUMBING

Daily cleaning tips

to clean lead from your home's drinking water pipes

If your home is connected to the City water main by a water service line that has sections made from lead, a toxic metal, it can impact your health. Follow the steps below to clean out your home plumbing until lead

CAUTI

Michigan DHHS (5)

Genesee County Health Department

Keeping Your Home Lead-Safe

Clean Your Aerators

MDHHS Michigan Department of Health & Human Services

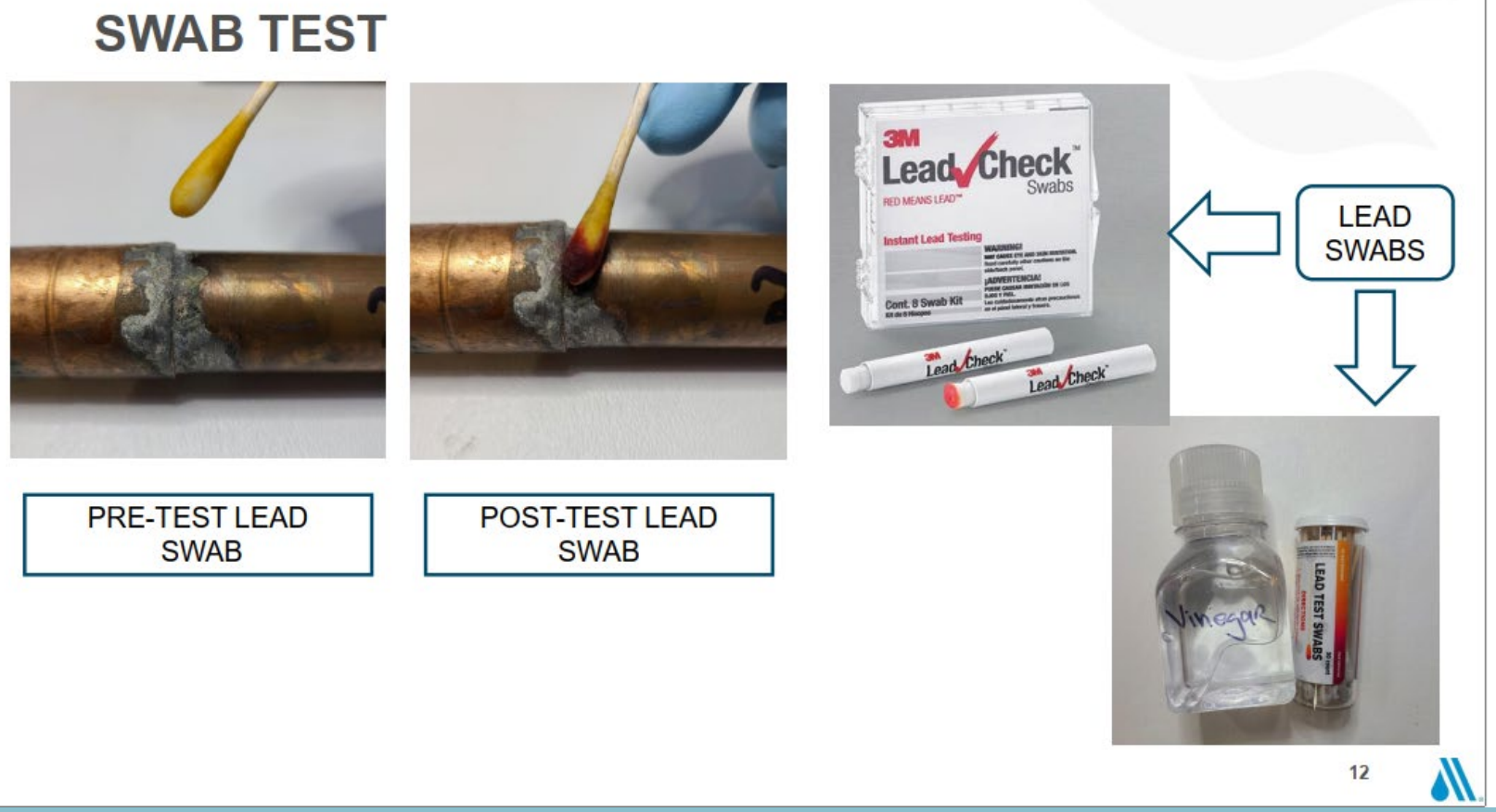
What can you do to keep your home lead-safe?

- Homes built before 1987 are more likely to have lead service lines and pipes. Some faucets and certain kinds of solder could also have lead in them, even those installed recently.
- The lead found in tap water in homes around Michigan is likely from these older pipes, solder, and faucets. You can have your water tested to see if it has lead in it.
- Replacing old pipes, service lines, and faucets is the best way to limit the lead in your tap water. New pipes, solder, and faucets should meet EPA lead-free standards.
- If you can't replace your pipes and faucets, please use an NSF-approved filter for all water that you drink or cook with. You can get a filter that attaches to your sink faucet or you can use a pitcher with a filter inside it. If you live in Flint, call 211 to find out where you can get a free faucet filter, replacement filter cartridges, or a water filter pitcher.

1. Courtesy of R. Brown, AWWA Webinar 2021
2. Denver Water Tap News (https://www.denverwater.org/tap/big-benefits-cleaning-and-updating-faucet-aerators?size=n_21_n)
3. Cleveland.com https://www.youtube.com/watch?v=W3-xoZqhmBM
4. Philadelphia Water Department (https://water.phila.gov/pool/files/daily-cleaning-tips-lead-faucet-aerators.pdf)
5. Michigan Department of Health and Human Services (https://www.michigan.gov)

Lead Source Identification

- Take the opportunity to inspect and/or test



(Brown et al. AWWA Webinar, Salo-Zieman et al. Opflow)

Step 3 – Recommendation Report

- Identify the cause of high lead level and recommend fixes
  - Solely due to the sampling location or unknown: **No action required**
  - Due to corrosive water quality: **Identify suitable fixes/actions**
- Recommend solution(s) to Primacy Agency within 6 months of the end of the monitoring period of the exceedance

Finished Water Stability and Compatibility

Hydraulic Improvements

Pipe Materials and Deposits

Concerns with Data

Changes to Treatment - Requires a Comprehensive Corrosion Control Study

In-home issues – see next slide

(Modified from Baribeau, H., AWWA Webinar 2021)

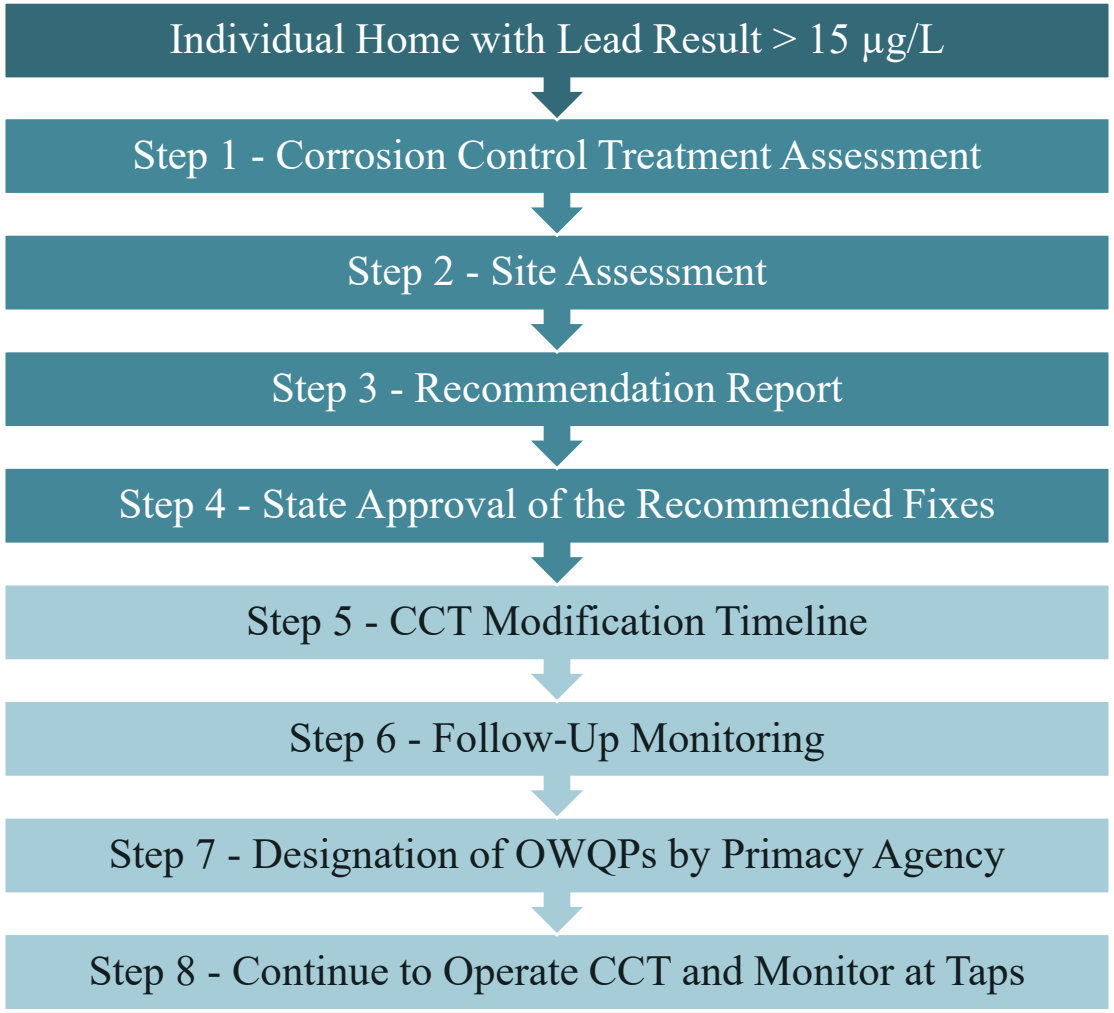
Fix: Issues identified, City of Chicago Program Experience

Issue Found	Recommended Fix
Low water usage (<4,000 gal/month), periods of vacancy, recent rehab	Flush areas of home that aren't used on a regular basis
Faucets (Old, Aerator, Faucet Filters)	Replace older faucets with lead-free models
Dead-end portions of interior plumbing	Remove or valve-off dead end plumbing to prevent stagnation of water
Dielectric unions not used to connect dissimilar pluming metals	Install dielectric unions to minimize corrosion
Low flow	Clean out aerators, replace faucet
Home uses a Boiler for heating	Make sure backflow preventions are checked and serviced
High voltage or stray current on water service	Evaluate and properly ground system
Down or broken valve in the area	Open or fix valves and flush distribution system

Schwer et al. AWWA Webinar 2021

Step 3 – Recommendation Report

- Primacy Agencies have 6 months to approve the (treatment) recommendation or specify a different approach
- If changes in OCCT are required - Follow Steps 5-8
  - 12 months to complete the modifications
  - Follow up monitoring and designation of OWQPs
- Other considerations:
  - Systems without CCT are not required to conduct a corrosion control study or install treatment, unless required by the Primacy Agency
  - Systems in process of optimizing or re-optimizing their CCT do not need to submit a treatment recommendations



Summary

- Find and Fix Assessment for each house with a lead result > 0.015mg/L
  - WQP Monitoring
    - One site - select it carefully – the selected site becomes permanent sample site with regulatory requirements (and consequences)
    - pH, alkalinity, and inhibitor concentration
    - Interpretation of the data can be challenging
  - Lead Monitoring
    - Customer tap
    - Any liter or approach is acceptable
    - Document attempts to access and communicate with the customer
- Determine if localized or centralized action could resolve any identified water quality concern
- Report findings and recommended fixes to the regulatory authority
- A comprehensive assessment (corrosion control study) recommended before treatment changes are implemented

Take Aways

1. **Gather data now**
   - Presence of LSLs
   - Lead history by home
   - Water quality trends and specific characteristics
2. **Data quality** – Follow correct sampling procedures and ensure test equipment are working correctly
3. **Think through where, what, and how you will sample – must be ready in 2025** (LCRR effective October 2024)
4. **Have a customer communications plan**

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Thank You!

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