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Lead Service Line Identification, Inventories, and Replacement

June 23rd, 2020

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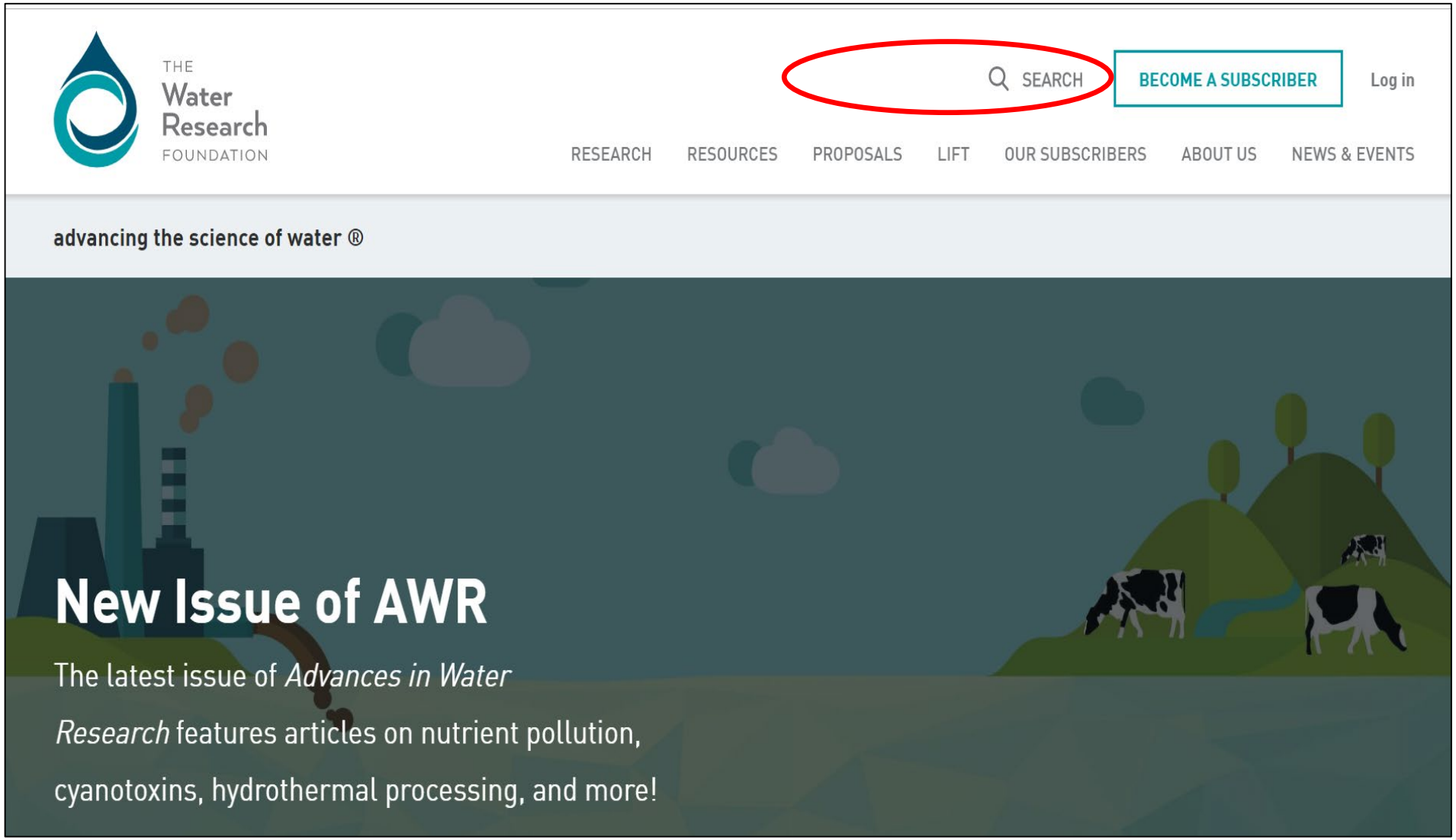
Report Access – waterrf.org



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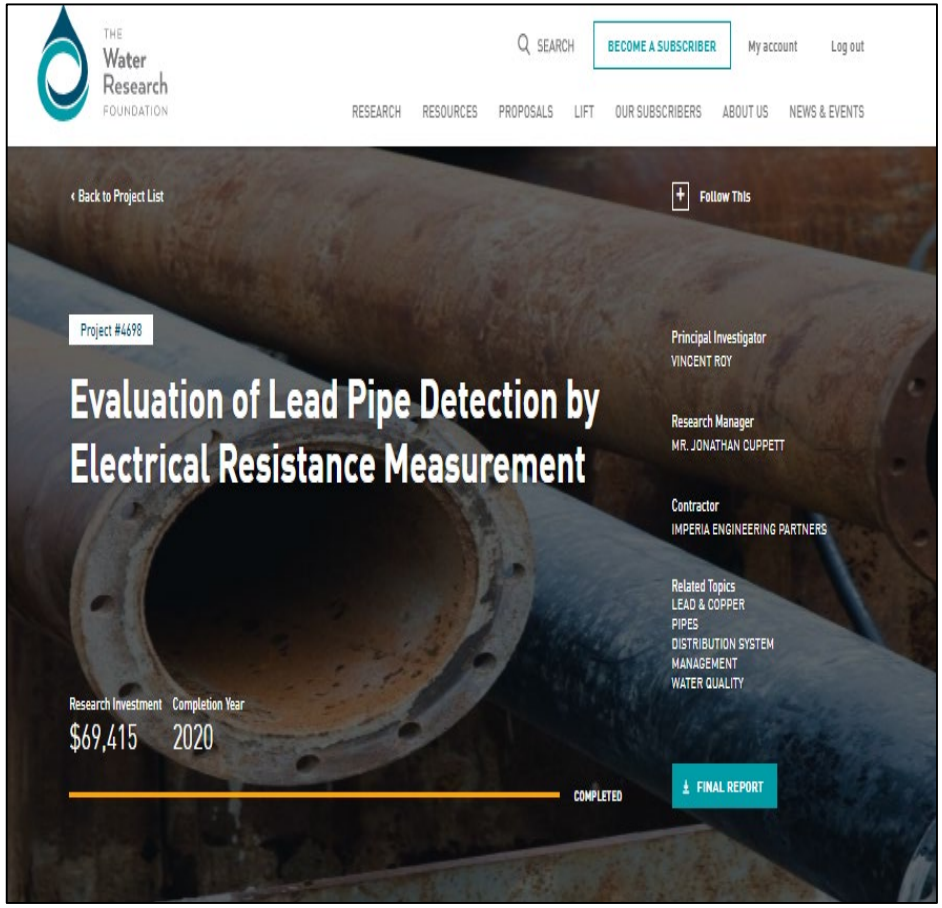
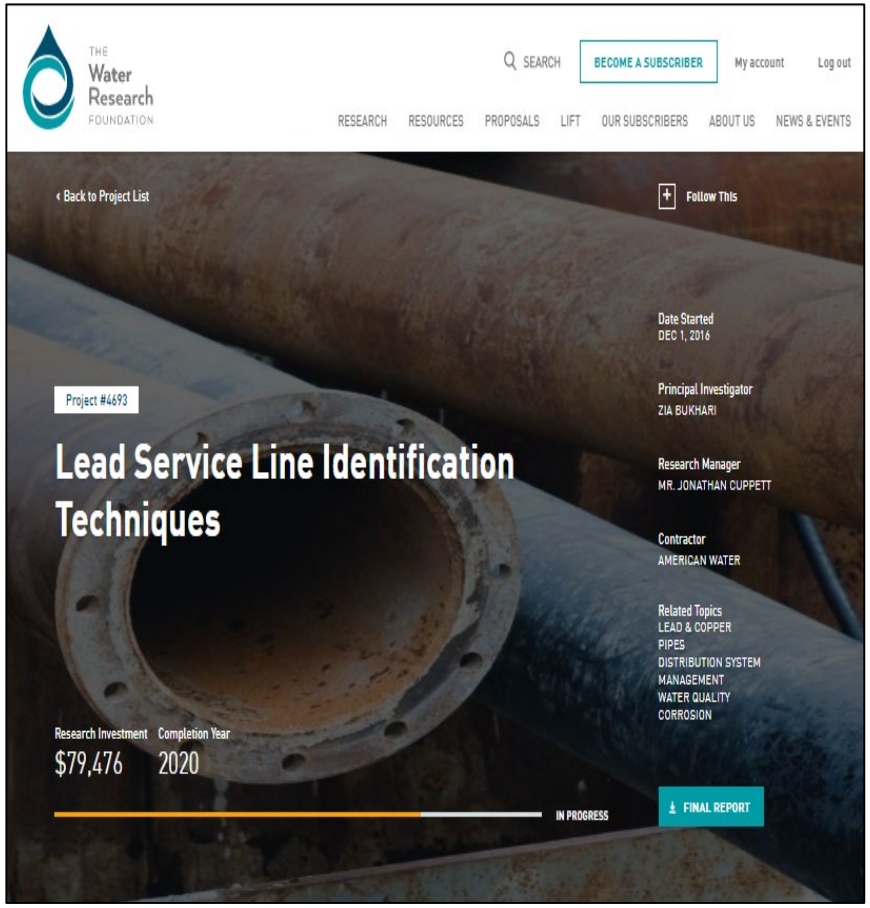
Project Pages for 4698 and 4693 – waterrf.org





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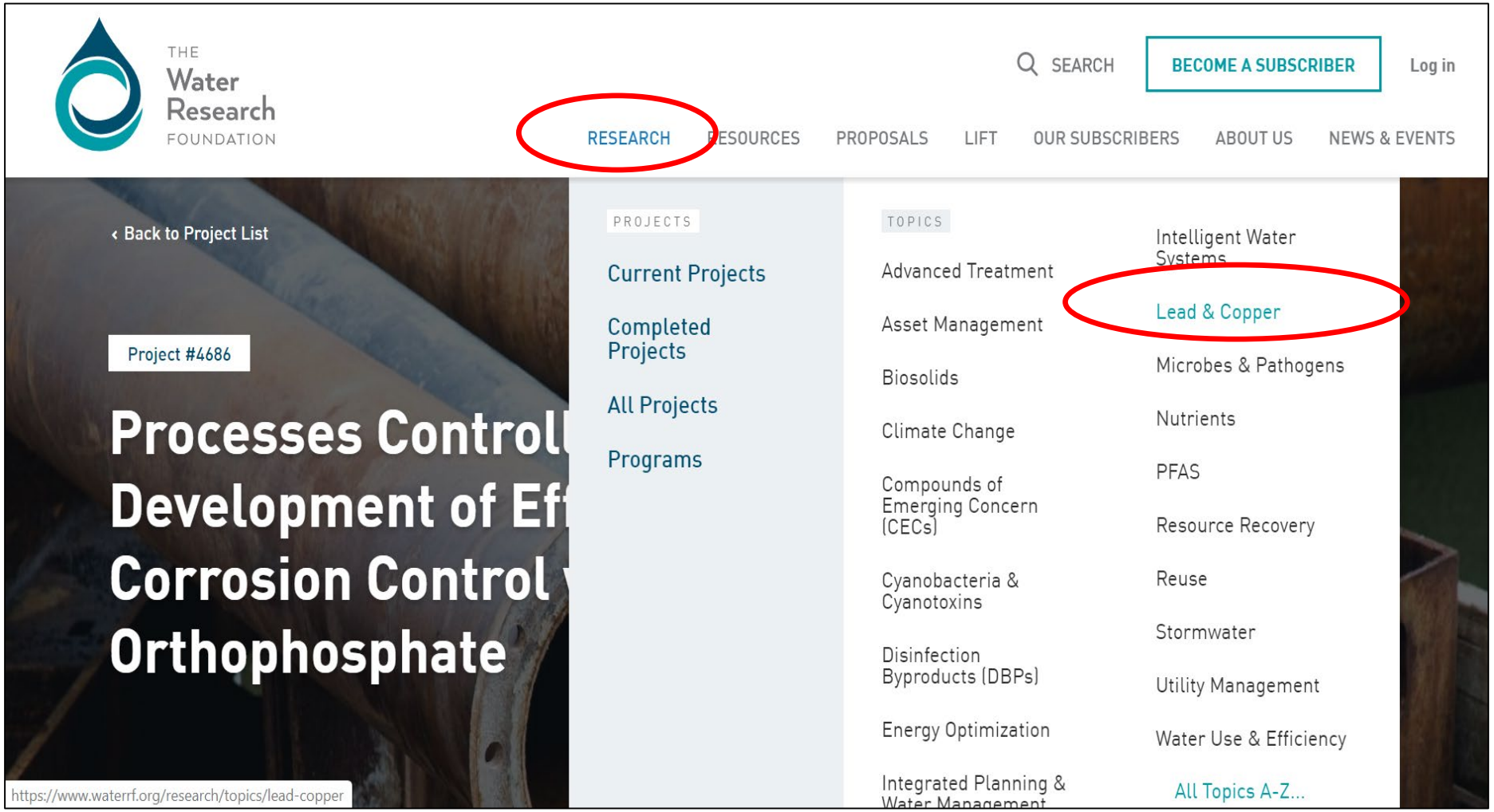
Lead and Copper Research



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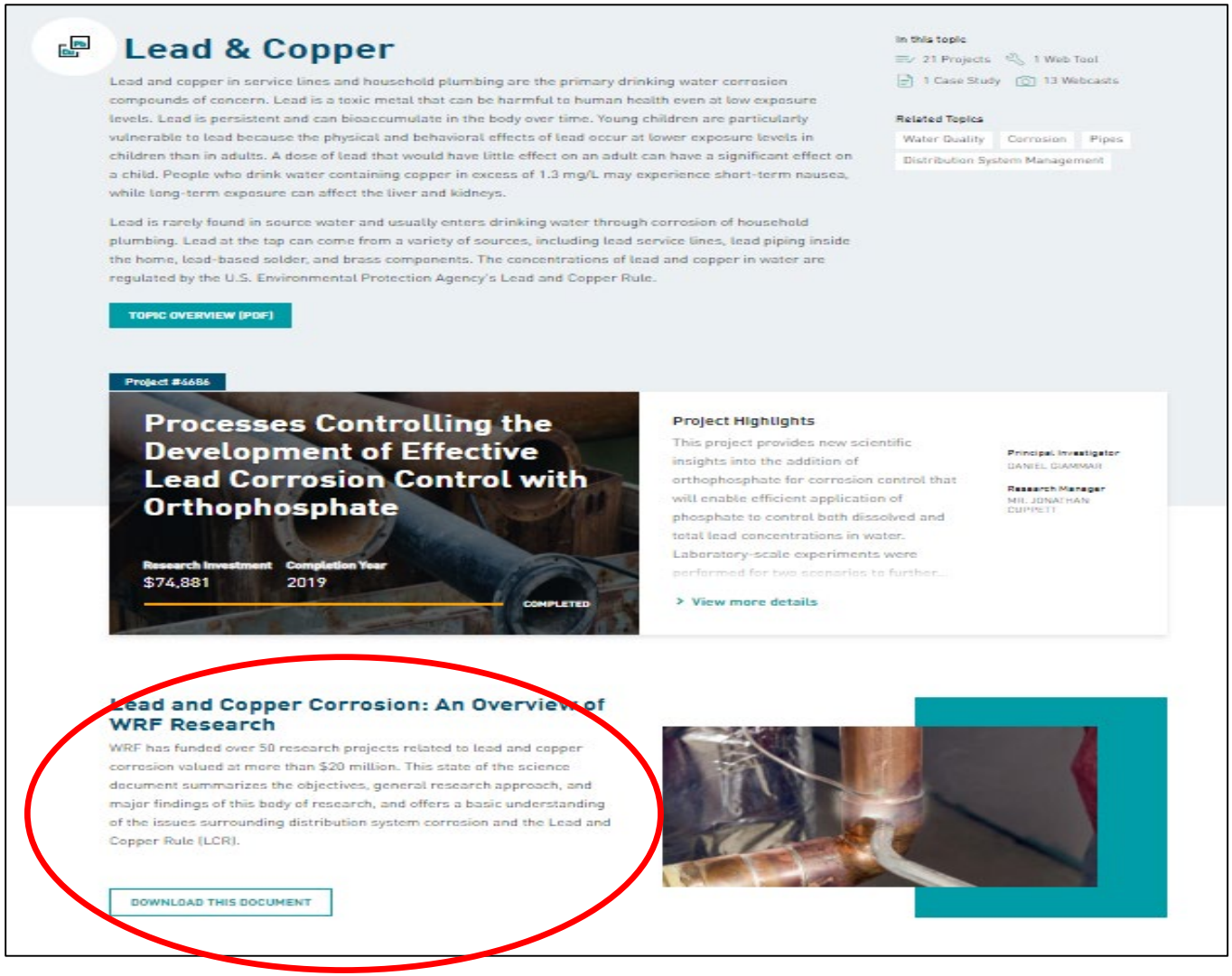
WRF - Lead and Copper Overview



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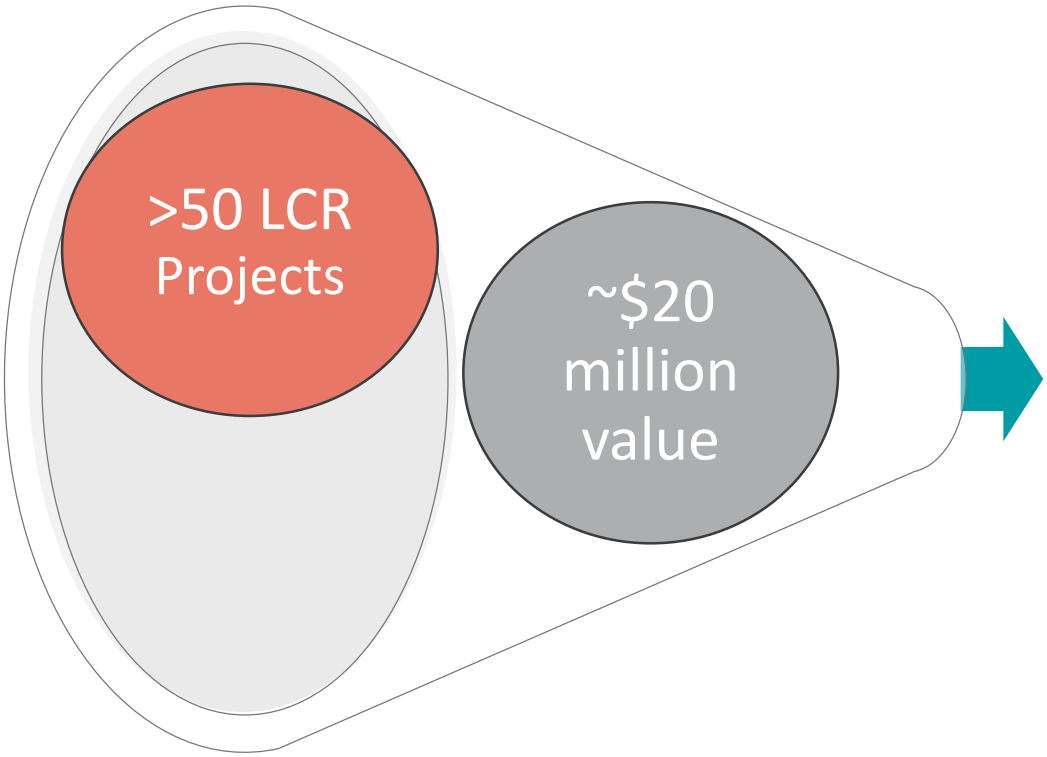
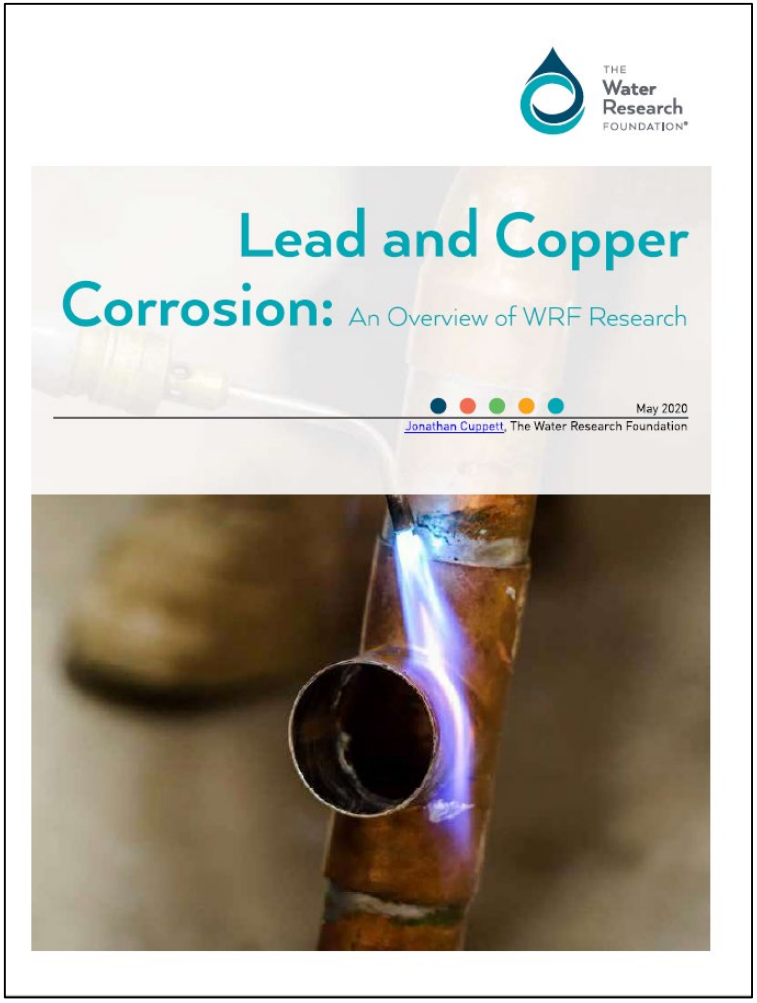
WRF Lead Research since late 1980's





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Lead and Copper Management Research Area: Started 2016

1. #4713 - Full Lead Service Line Replacement Guidance
2. #4910 - Evaluating Key Factors that Affect the Accumulation and Release of Lead from Galvanized Pipes
3. #5032 - Analysis of Corrosion Control Treatment for Lead and Copper Control
4. #5081 - Guidance for using Pipe Loops to Inform Lead and Copper Corrosion Control Treatment Decisions

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- Membership of 26 national organizations
- Replacement practices, preparing an inventory, communication resources, policies and more
- www.lslr-collaborative.org

LSLR COLLABORATIVE

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Evaluation of Lead Pipe Detection by Electrical Resistance Measurement

WRF Project # 4698

June 23rd, 2020

Ron Ballinger, Doug Coates, Hui Lu, Vincent Roy, Agnes Jallouli

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Goal: Identification of LSL

- Develop a simple, fast, easy to use instrument that answers the following questions:
  - Is Lead present: Yes or No?
  - What is the level of confidence of those answers?

- Cost effective: no excavation of the service line needed

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Content

1. **Principle of Current Research**
2. Testing: Laboratory / Field Tests
3. Conclusion/Future Work

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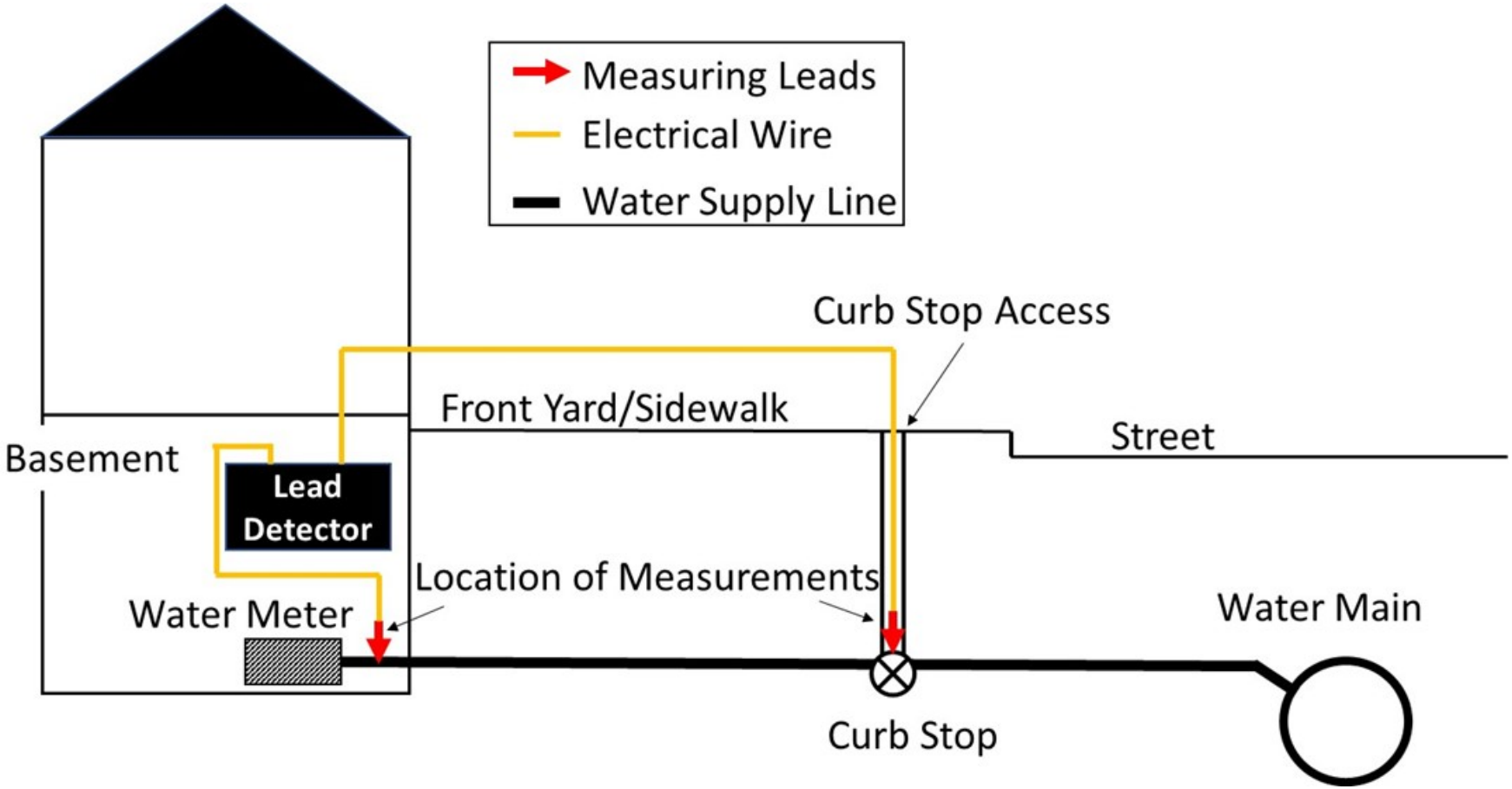
Schematic Representation of Measurement



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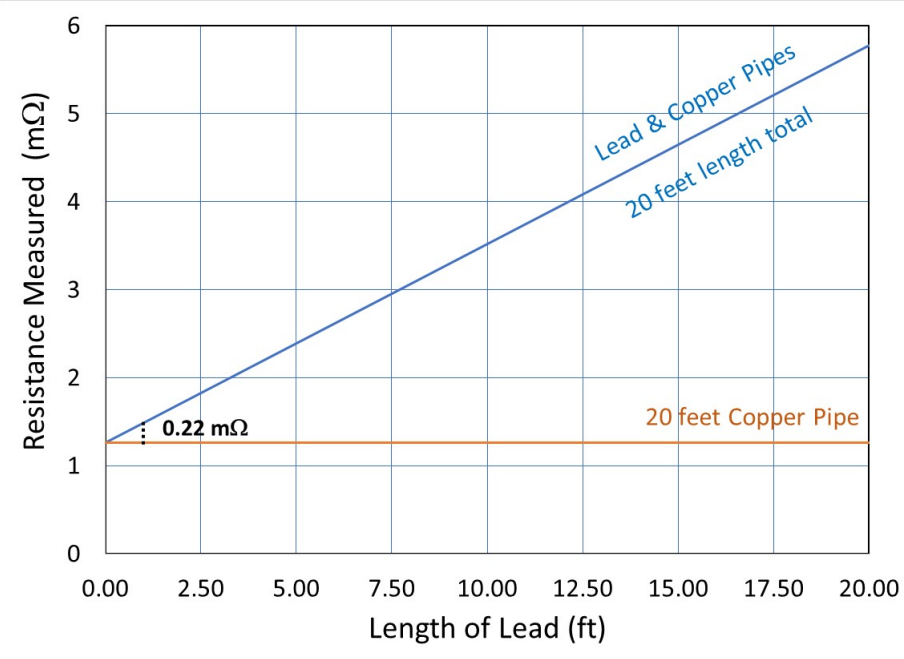
Principle of Current Research

Measurement of the electrical resistance of the water distribution service line as:

Resistivity of Lead		Resistivity of Copper
21.3 x 10^{-8} Ω·m	>>	1.71 x 10^{-8} Ω·m



(With Cu: OD= 0.88”-ID= 0.78” and Pb: OD= 1.07”-ID= 0.84”)

For Example:

20 feet long service line with 1 foot of lead pipe, will have an electrical resistance increase of at least:

0.22 mΩ (over 20% increase)

compared to an all copper service line

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Laboratory Tests - Resistivity

Measurement of resistivity of Cu, Pb, and Brass.

Metal	Measured Resistivity (Ω·m)	Theoretical Resistivity (Ω·m)
Copper	1.9×10^{-8}	1.7×10^{-8}
Lead	$15 \text{ to } 30 \times 10^{-8}$	21.3×10^{-8}
Brass	8.6×10^{-8}	$6 \text{ to } 9 \times 10^{-8}$

Measurements made on samples removed from the field.

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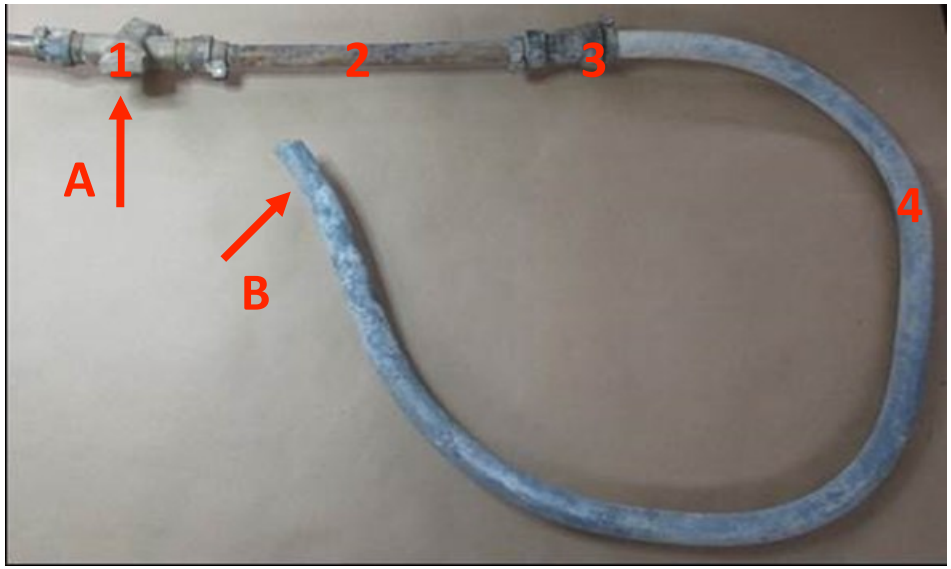
Measurement

1- Curb Stop
2- Copper Pipe
3- Connection Cu-Pb
4- Lead Pipe



R: Electrical Resistance between A and B

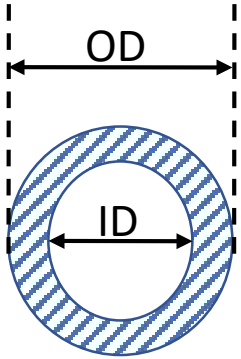
$$R = R_1 + R_2 + R_3 + R_4$$

For R_2 and R_4: $R_{Pipe} = \rho \times L/S$

With: ρ: Resistivity of the metal

L: Length of the Pipe

S: Cross-Section Area



$$S = 0.25\pi \times (OD^2 - ID^2)$$

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Parameters affecting the measurement

Feature	Effect on Measurements	Comments
Coupling	a- Cu-Cu: No effect b- Cu-Pb: Increase resistance	  R_1 < R_2
Curb Stop	Increase the resistance	Function of curb stop design and location of measuring lead on curb stop.
Pipe conditions: 1- Cleanliness 2- Hole, defects 3- Dimension 4- Length	 1- Important at measurement location 2- No effect 3- Resistance decreases with cross-section increases. 4- Resistance increases with length increases.	 1- Need good electrical contact at measurement location 2- None 3- Estimated on the field 4- Measured on the field
Water inside pipe	No effect	
Electrical grounding	No effect	

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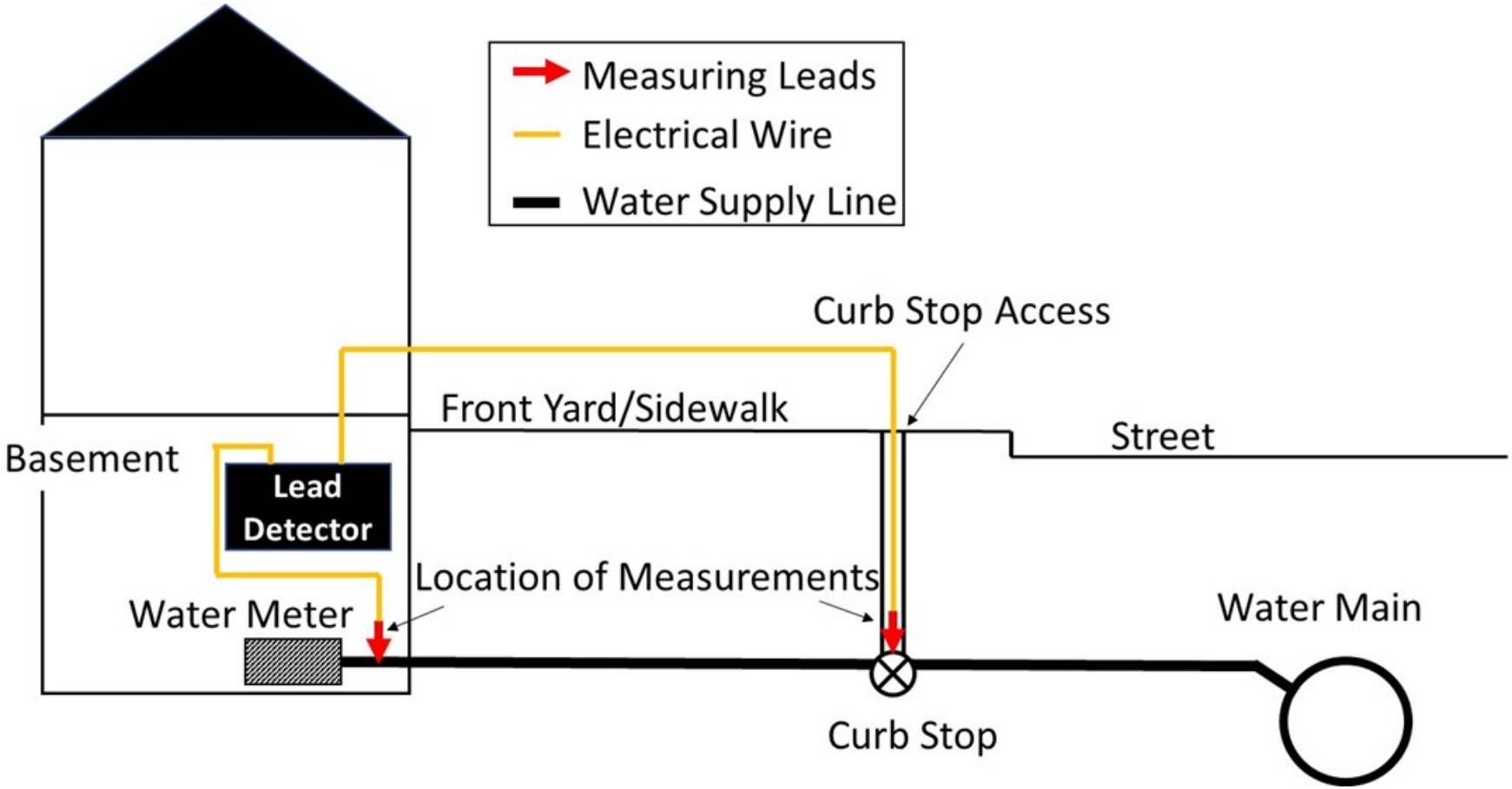
Field Tests Set-Up

Measurements made In Boston, MA, from curb stop to water meter.



- New tools were developed.
- Excavation at curb stop was needed at this time.

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Field Tests - Results

Field Location (House)	Pipe Length (Feet)	Calculated Resistance if all Copper SL (mΩ)	Resistance Measured (mΩ)	Calculated Resistance if all Lead SL (mΩ)	Nature of Pipe
A(1)	7	0.34	70.5	1.6	Lead
A(2)	5	0.24	0.24	1.2	Copper
B(1)	27	1.3	8.2	6.2	Lead
C(1)	8	0.385	10.2	1.8	Lead
C(2)	8	0.385	0.59	1.8	Copper
D(1)	11	0.53	157.8*	2.5	Lead
D(2)	11	0.53	129.3*	2.5	Copper

(1) As found and (2) After line replacement

* Measurement made from top of valve

- Two measurements for Copper SL have similar values as theoretical values.
- All measurements for Lead SL are higher than or close to theoretical values
- Resistance measured for service line with Lead >> same service line with Copper.

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Field Test - Conclusion

- Limited number of testing (6 locations - 8 tests).
- In the field, except when measurement was made on top of valve, we could detect lead vs. copper.
- Curb Stop challenges:
  - Access
  - Cleaning of curb stop
  - Testing lead needs to adapt to different curb stop geometry and condition.

Example of Curb Stop Access in Boston, MA

Curb Stop at Location D

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Conclusion

- Once set-up, fast measurement: Less than 1 minute.
- Easy to use:

  Two access points to the pipe are needed: Curb stop and next to water meter

- Proof of concept: Is lead present Yes or No?
  - Resistance Service Line with Lead >> Resistance Service Line with Copper
  - Detection of Lead confirmed for both lab tests and field tests.

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Patent Pending

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Future Work

To achieve no excavation of the service line:

- Refine field testing lead to work in wide variety of field conditions.
- Improve cleaning techniques for the curb stop.

Additional testing on different couplings, valves, pipe materials, pipe dimensions, soil/structure interactions…

→ …to develop simulation-based Probability of Detection (POD) algorithm.

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Boston Water and Sewer Commission

WATER RESOURCES AUTHORITY MASSACHUSETTS

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Lead Service Line Identification Techniques

23 June 2020

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American Water Team

PROJECT NO.
4693

Lead Service Line Identification Techniques

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Acknowledgments

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Aqua America, Inc.

Supporting Utilities

- Madison, WI
- Green Bay, WI
- Lansing, MI
- Tucson, AZ
- Denver, CO
- DC Water
- American Water-IN

The Water Research Foundation Staff

Jonathan Cuppett
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History of Lead

- Toxic & very abundant (38th)
- >70% larger cities using lead by 1900
  - Most LSLs installed before 1940
- 6 -10 million LSLs in use in the US

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Lead Leaching & Health Effects

Sources:

- Lead or lead-lined pipes
- Lead-tin plumbing solder
- Lead-bearing brass valves and faucets.

Leaching:

- Age
- Material
- Workmanship
- Size of the pipe
- Water quality
- Degree of stagnation

Source: Aquasana, 2020

USEPA has a maximum contaminant level goal (MCLG) of zero for lead. Aspirational goal- No known safe level in drinking water

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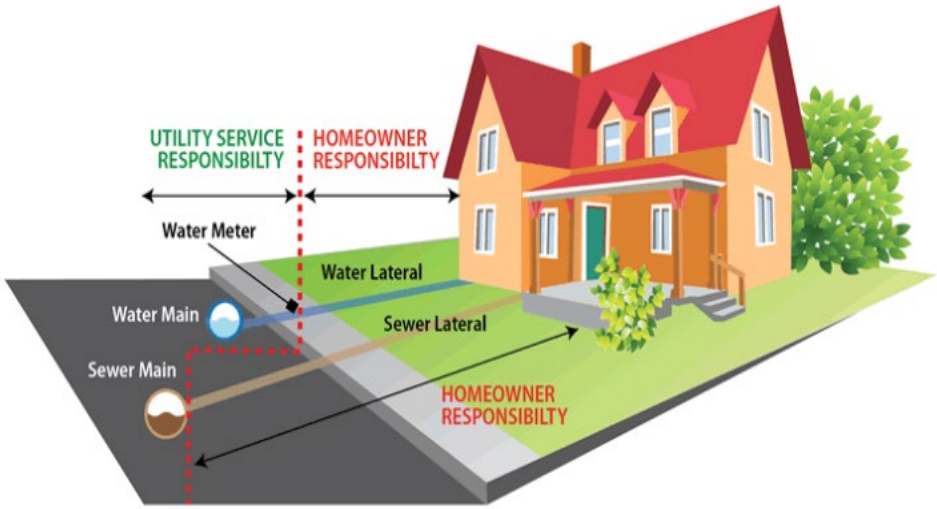
Challenges

LSL inventory incomplete, inaccurate, and/or undermanaged

Reasons include:

- Lack of resources
- Shared ownership between utility and customer
- Limited accessibility
- Neglect due to low failure rate of service line



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Challenges

Risk elimination requires LSL identification and removal

- 6 and 10 million LSLs in active use in the US
- Estimated cost $5,800 per service line

- US replacement of LSLs requires $20-$80 billion

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Objectives

- Tools to quickly/directly identifying LSLs
- Screening to predict likely presence of LSLs
- Case studies of US based utilities

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Direct Screening of LSLs

Physical inspection requires excavation but challenges of public/private ownership

What are desired features of detection technologies?

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Direct Methods

Potholing and vacuum excavation

- Safer, less disruptive & cheaper (<$300 Vs. $1500-$2500)
- Multiple holes may be needed to capture partial replacements

Closed-circuit television (CCTV) Inspection

Rigid or flexible style for pipe inspection

- **External inspection:**
  - Challenges include locating or accessing (concealed with soil, debris, mud etc) the curb box.
- **Internal inspection:**
  - Challenges include ineffective inspection due to interior of the service line being coated with corrosion or scale deposits that conceal pipe surface

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Scratch & Magnet

Quick, simple and effective way to determine pipe material

Magnet test

Magnet does not attach: Lead or copper present

- Use scratch test to verify material

Scratch test

sharp metal object (key, coin etc) to scratch pipe. Lead suspected where:

- Metal scratches easily
- Reveals silver color with shiny luster
- Orange color indicates copper

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Disclosures

- During real estate transactions to reveal ‘defects’ to prospective home buyers
  - Four states (CT, DE, NY, PA) required mandatory disclosure of lead pipes or fixtures
    - For example, Pennsylvania asks “Type of Plumbing”, and the seller checks either copper, galvanized, lead, PVC, unknown, or other
  - Seven states (DC, IL, MI, NM, NC, SC, WI) required mandatory disclosure of pipe material, but lead unavailable as an option

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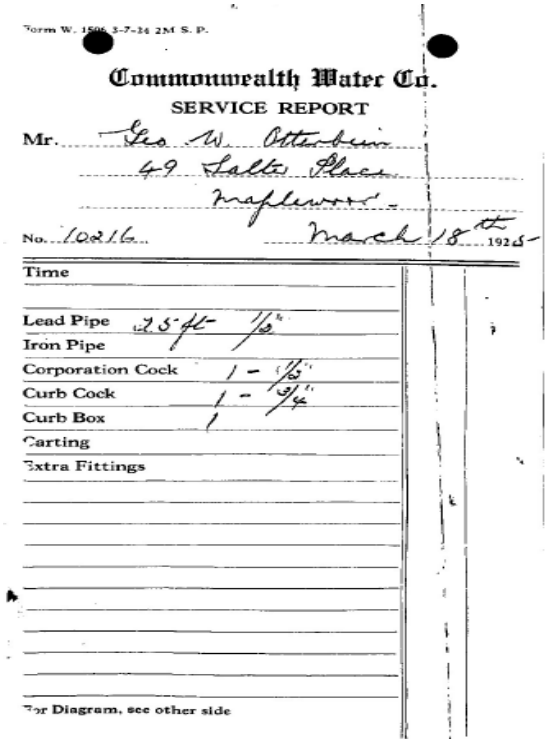
Indirect Methods

Purpose to gather preponderance of evidence for LSLs

Utilities have various historical records that may help assess the likely presence of LSL. Potential sources include:

- **Tap cards**
- **Plans**
- **Historic utility records**
- **Tax records**
- **Plumbing permits**

- Major challenges include missing or inconsistent information


Commonwealth Water Co.
SERVICE REPORT
Mr. Geo W. Ottenheim
49 Saltz Place
Maplewood
No. 10216 March 18th 1925
Time
Lead Pipe 25 ft 1"
Iron Pipe
Corporation Cock 1 - 1"
Curb Cock 1 - 3/4"
Curb Box 1
Carting
Extra Fittings
For Diagram, see other side

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Water Sampling

Monitoring for lead can yield indirect information on LSL in a premise plumbing system

Lead & Copper Rule regulations: First draw (1L) after an extended stagnation (min 6 hr) but with limitations:

- **Positive-** does not differentiate whether lead originates from an LSL, lead solder or leaded-brass fixtures elsewhere in the premise plumbing system
- **Negative-** does not necessarily mean no LSL present, if utility corrosion control practices are highly effective

- WQ profile
- Combine with geospatial analyses and machine learning to improve predicative capabilities

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Summary

- LSLs identification is a significant challenge as no user-friendly direct identification options
  - Available options *in lieu* of excavation include: potholing, CCTV, scratch & magnet plus customer engagement at representative locations
- Indirect methods not 100% reliable. A multipronged approach required to improve accuracy of inventory
  - Supplemental data from routine inspections, main replacement or emergency response events

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Summary

- Utilities should prioritize techniques that are most practical and effective for their unique circumstances

- Case studies showed commonly used approaches in descending order were:
  - Tap cards
  - Construction year
  - Physical inspections (potholing, CCTV, customers, scratch tests)
  - Water Quality Information
    - Mostly validation of drop in Pb levels

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Recommendations

- Invest in digitizing tap card records and add to GIS systems to organize/manage LSL replacement program
- Where possible gather additional intelligence to validate presence of LSLs by:
  - Developing databases for various parameters
  - QA for data completeness and accuracy
  - GIS-based systems for spatial distribution
  - statistical and machine learning tools to aid decisions
- **Knowledge sharing**: Proactively communicate successes, failures, etc in conferences, trade & journal articles and webinars to help others

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Thank You

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Understanding the Proposed LCR Inventory and Replacement Requirements

June 23, 2020

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Overview of the Proposed LCR Revisions

Objectives

- Improve public health protection via a **proactive and holistic approach**
- Require **earlier action to reduce risks** around lead in drinking water
- **Improve transparency and communication** to better protect children and families

Schedule

- Proposed revisions **published November 13th, 2019**
- Final rule expected by **September 2020**
- Some items must be complete **within three years of final publication**

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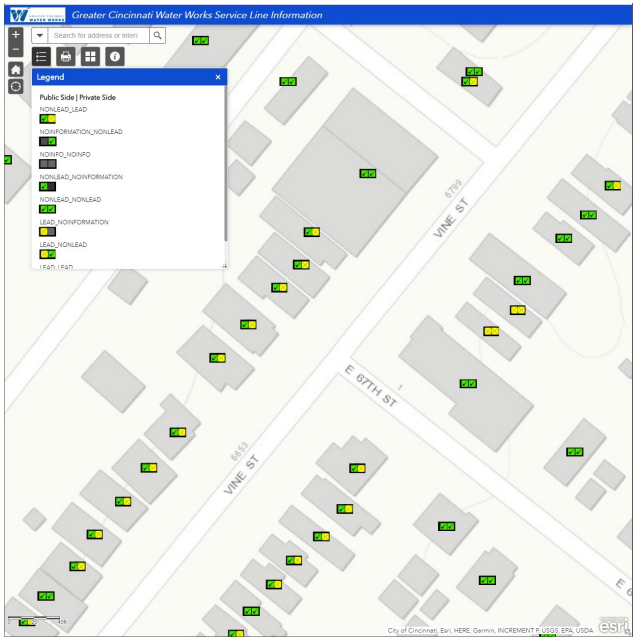
Proposed Lead Service Line Inventory Requirements

- All systems must develop and maintain a publicly accessible inventory of lead service lines and service lines of unknown materials
  - May be a list, table or map w/ location identifier
  - Must include material for both utility- and customer-owned portions
  - Large systems (>100,000) must post on website
  - Submit to Primacy Agency by three years after final rule publication date
  - Update annually thereafter
- Must notify customers
  - Within 30 days of completion of the inventory
  - By mail or other method approved by primacy agency
  - Annually thereafter until customer no longer has a lead service line



Source: https://gcww.maps.arcgis.com/apps/webappviewer/index.html?id=0a170c268c694e46a8a4e394630df0bd

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What is Considered A Lead Service Line Under the Proposed LCR?

Components Between Water Main and Interior Plumbing	Include in LSL Inventory	Counts as a Replacement	Requires Public Education when Disturbed	Include in Tier 1 Sample Pool
Lead pipe anywhere between gooseneck and interior plumbing	Yes	When all lead is removed	Yes	Yes
Unknown pipe material anywhere between gooseneck and interior plumbing	Yes	Where lead pipe is found and all lead is removed	Yes	No
Galvanized pipe if preceded by lead (pipe, gooseneck, etc.) at any time	Yes	When replaced along with any remaining preceding lead pipe	Yes	No
Lead gooseneck with non-lead pipe between gooseneck and interior plumbing	No	No*	Yes	No

*Must replace if utility-owned when encountered during planned or emergency work. Must offer to replace, but not pay, if customer-owned

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What Information Can Be Used to Build An inventory?

Initial Inventory

- Water system records, such as distribution system maps and drawings, installation and maintenance records
- Plumbing codes or permits
- Tax records

Opportunities for Improvement

- During water main repair or replacement
- During meter reading or replacement
- In-home inspection, where possible, by customer or utility

Primacy agency may determine acceptable methods for identification

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Proposed Lead Service Line Replacement Plan

- All systems with LSLs must develop a full LSLR plan that includes
  - LSLR goal rate, agreed upon by Primacy Agency
  - Procedures to conduct full replacements and to notify customer prior to replacement
  - Pitcher filter tracking and maintenance plan
  - Flushing procedures for service line and premise plumbing
  - Funding strategy
    - How the utility will pay for utility-portion
    - Not required to pay for customer-portion, though encourage utility to offer customer financial assistance (e.g., loan, grant, etc.)
- Submit to Primacy Agency by three years after final rule publication date

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Additional Changes Around LSLR

- “Test outs” no longer allowed
- Partials allowed only during emergencies or customer is unwilling or unable as part of planned work
- Must replace utility-owned lead goosenecks, pigtails and connectors (or offer to replace if customer-owned) as encountered
- Must replace utility-owned portion within 45 days of learning of customer’s replacement or intention to replace their-owned portion

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System Actions During Replacements

Provide **education** around risks, mitigation, and flushing procedures to remove particulate lead

Provide **pitcher filter** and replacement cartridges for 3 months

Collect tap sample between 3 and 6 months after completion and provide results to consumer

Update inventory and Tier 1 sampling pool, if needed

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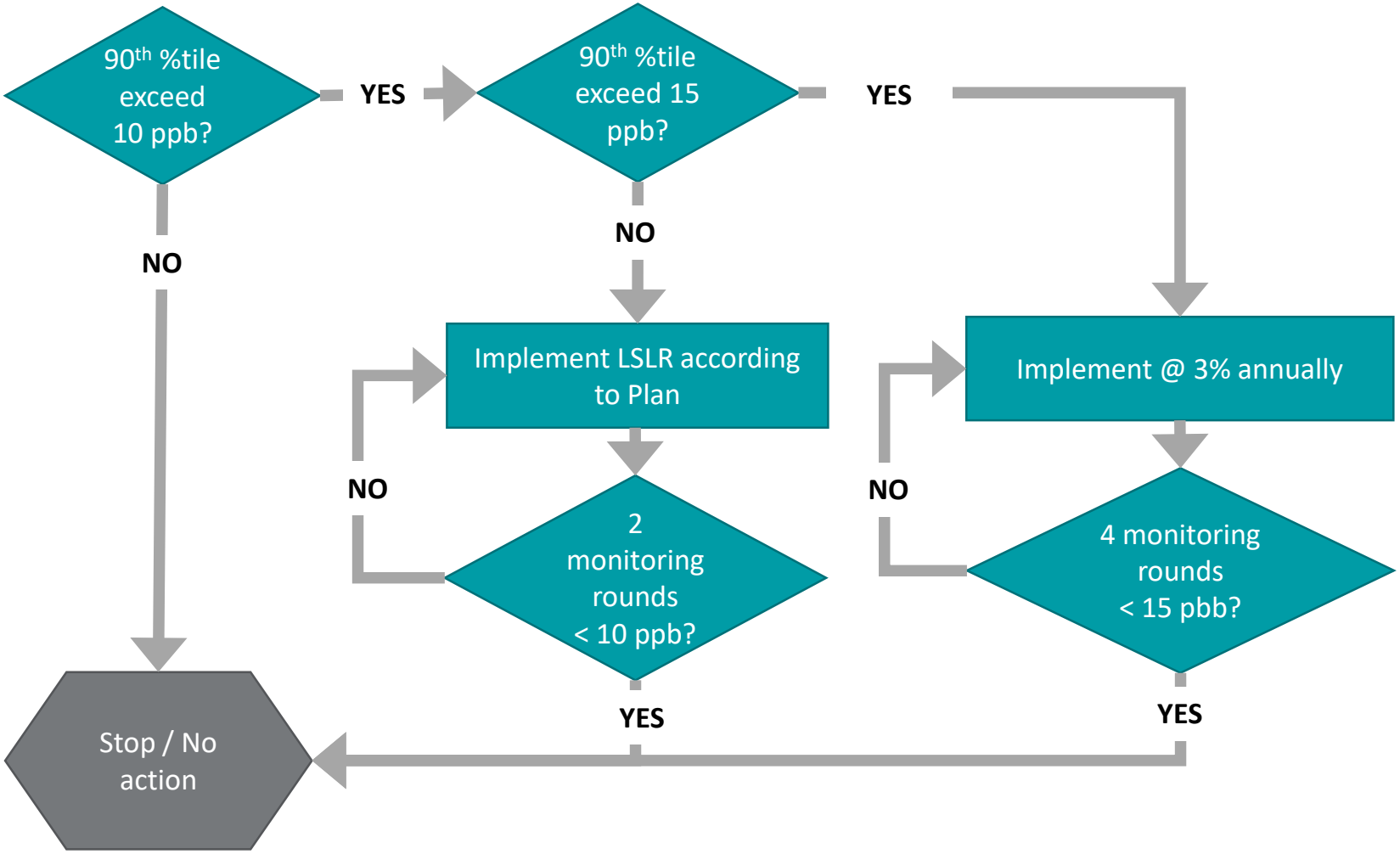
When Is Full LSLR Required?



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Service Line Disturbances and Responses

MINOR

- From water shut-offs
- Provide education around potential for elevated lead and flushing procedure to remove particulate lead*

MAJOR

- From replacement of the water meter or gooseneck, pigtail, or connector
- Same as above ***plus*** provide pitcher filter with 3 months of replacement cartridges*

OTHER

- Such as from other utilities
- EPA encourages outreach and coordination to other utilities to mitigate impacts

*Must be completed before the consumer's water is turned back on.

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Select Comments on LSL Inventories and Replacement

Inventory should include *potable water service lines* only
Clarify definitions for galvanized, goosenecks, and disturbances
Recognize good faith efforts to engage and coordinate with customers
Simplify and consolidate outreach and education requirements
Focus on post-replacement flushing procedures

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Greater Cincinnati Water Works Lead Service Line Replacement

Inventory, Identification, and Replacement

Verna Arnette, Deputy Director

June 23, 2020

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GCWW - Background

- Early 1900's - Cincinnati's New Works
- Lead preferred material for water service lines
- 1927 - Lead pipe usage discontinued in public ROW
- 1950's – rapid expansion of water system outside of municipal boundaries
- 1990's – LCR, GCWW enacted lead program
- Today GCWW provides water to:
  - >800 square miles,
  - >20 other municipal jurisdictions and numerous townships
  - >1.1 million people
  - ~240,000 accounts

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GCWW - Background

- 2016 – After news of Flint, lead issue front and center
- Desire to get customers more information
- GCWW created our Enhanced Lead Program
- Two-tiered approach
  - Enhanced education/outreach
  - Lead Service Line Replacement Program

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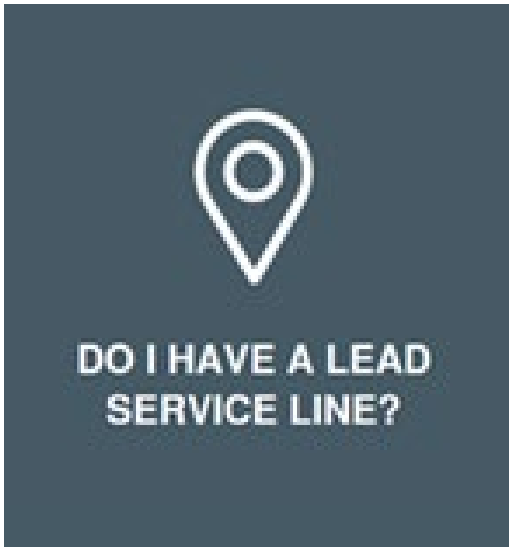
Enhanced Lead Program - Outreach



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LSL Records – Public Side Inventory

- Public side branch material originally kept with billing system data
- 2000 – large effort to populate public side branch material into GIS
  - Billing system information
  - Branch number 101808
  - Watermain project inspection reports
  - ~16,000 public side LSLs

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LSL Record – Private Side Inventory

- Problem – we did not have customer side material type in the GIS
- Solution – (quickly) build a GIS inventory
- What did we know/what info did we have?
  - Branch #101808 – transition from lead to copper
  - Watermain replacement project inspection records
  - Inspection reports of customer-initiated replacements
  - Work orders from CMMS for public side replacement

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LSL Record – Private Side Inventory

- Created and populated new attribute in GIS:
  - CUST_MAT_TYP
- Branch material assignment – Rules
  - Branch numbers ≥ 102000 and ≤2”: copper
  - Branch numbers < 102000:
    - If public side branch contained comment indicating “customer renewed line”: copper
    - Otherwise: lead
  - Review of available records
    - Customer initiated replacement inspection reports, CMMS, watermain replacement project inspection reports
- Did not override public side material
- ~44,000 private side LSLs

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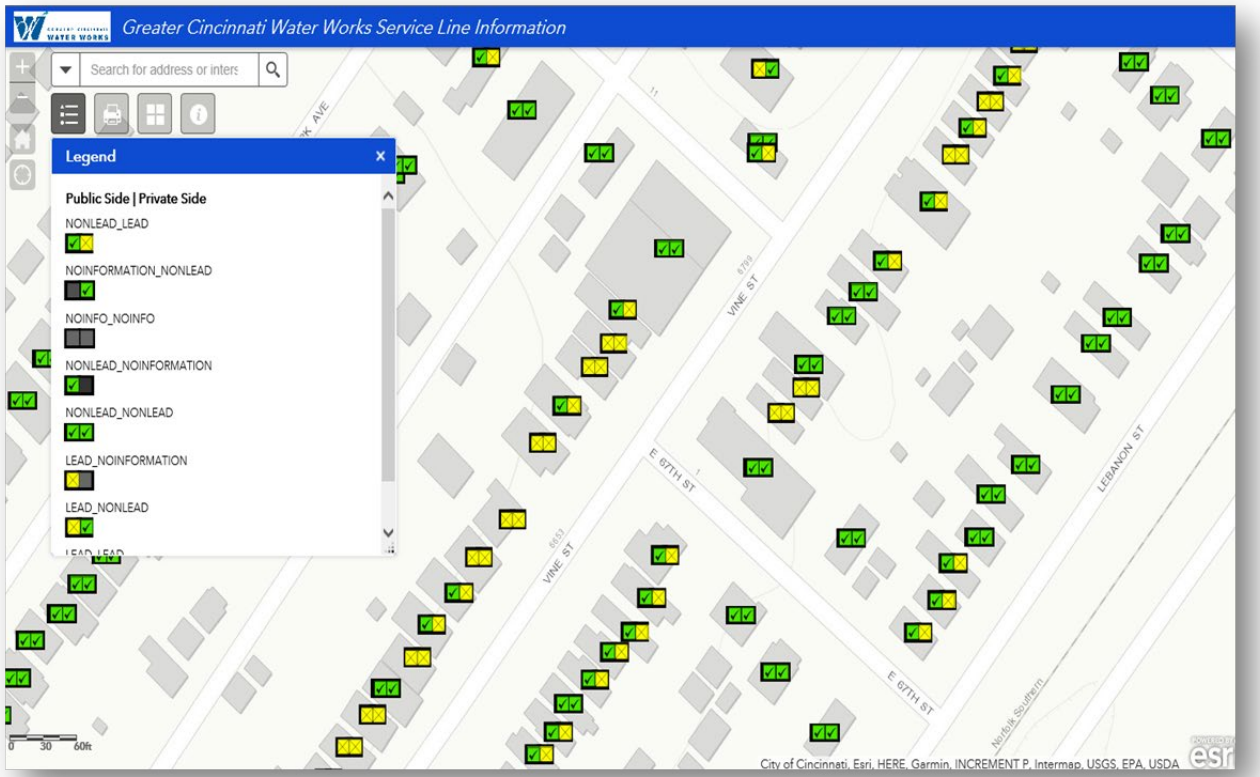
Result: Lead Look-Up Map

- GIS framework: ESRI Web AppBuilder
- Hosted: ESRI's Cloud Mapping solution (ArcGIS Online)
- Searchable map in ArcGIS Online available to the public



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Result: Neighborhood Maps

A Service of The City of Cincinnati
GREATER CINCINNATI WATER WORKS

REPLACE YOUR LEAD SERVICE

WALNUT HILLS

DONATE

Lead Service Line Data for WALNUT HILLS

Public Side: Data as of 1/1/16 to Present

- Public Lead Service Lines: **873**
- Public Lead Service Lines Replaced: **10**
- Public Lead Service Lines Remaining: **863**

Private Side: Data as of 1/1/16 to Present

- Private Lead Service Lines: **1568**
- Private Lead Service Lines Replaced: **13**
- Private Lead Service Lines Remaining: **1555**

Demographics: *Source: Department of City Planning Statistical Database

- Total Population: **6495**
- Population Under 5: **513**
- White %: **18**
- Black or African American %: **79**
- Total Hispanic or Latino Population %: **1**
- Owner Occupied Percentage: **22**
- Renter Occupied Percentage: **78**
- Median Household Income $: **19885**
- Poverty %: **37**

Note: Lead Service Line data will be updated upon field verification.

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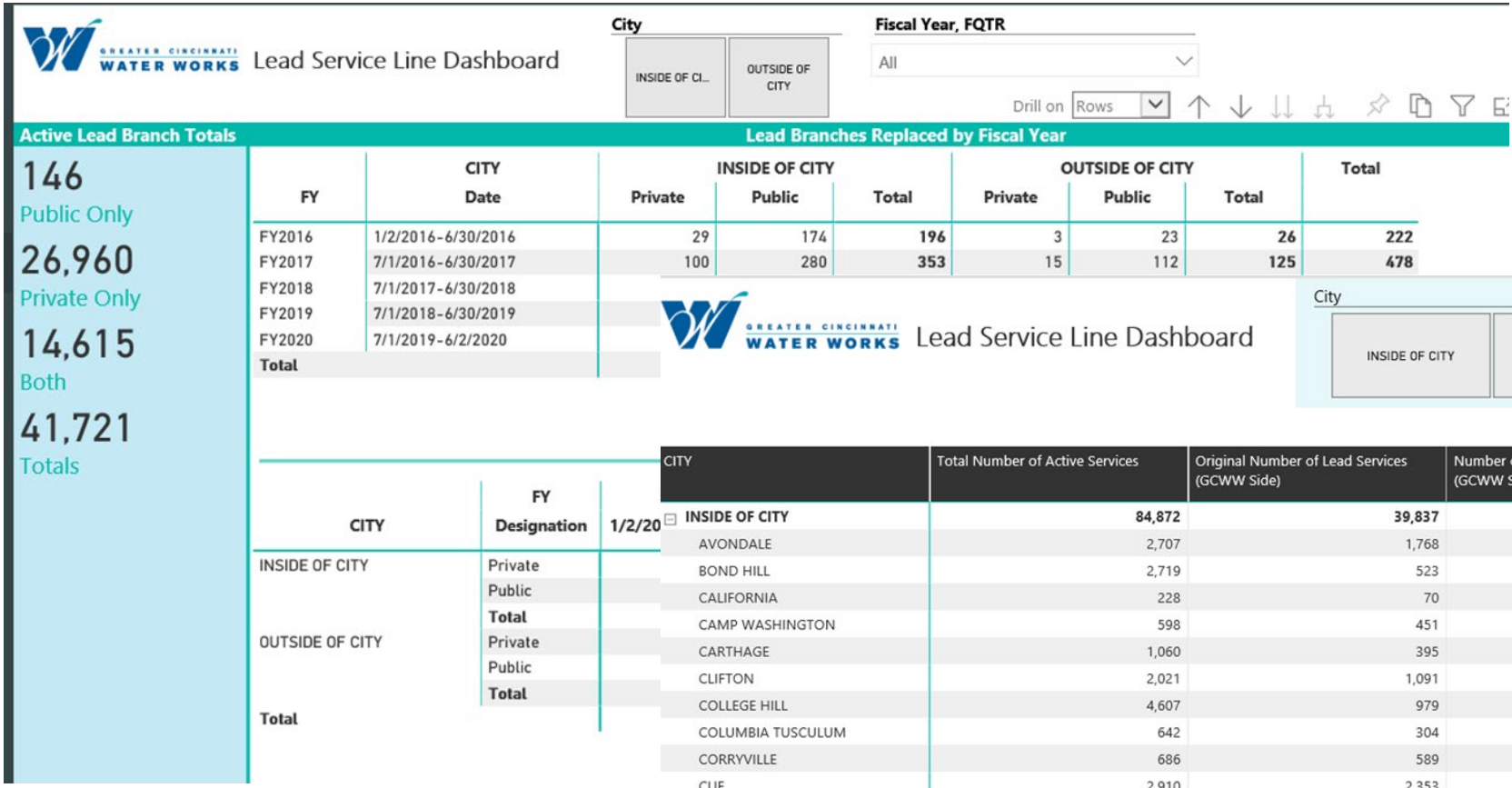
Result: Metrics and Tracking



Lead Service Line Dashboard

City: INSIDE OF CI... | OUTSIDE OF CITY

Fiscal Year, FQTR: All

Drill on Rows

Active Lead Branch Totals

146
Public Only

26,960
Private Only

14,615
Both

41,721
Totals

Lead Branches Replaced by Fiscal Year

FY	CITY Date	INSIDE OF CITY Private	INSIDE OF CITY Public	INSIDE OF CITY Total	OUTSIDE OF CITY Private	OUTSIDE OF CITY Public	OUTSIDE OF CITY Total	Total
FY2016	1/2/2016-6/30/2016	29	174	196	3	23	26	222
FY2017	7/1/2016-6/30/2017	100	280	353	15	112	125	478
FY2018	7/1/2017-6/30/2018							
FY2019	7/1/2018-6/30/2019							
FY2020	7/1/2019-6/2/2020							
Total								

Lead Service Line Dashboard

City: INSIDE OF CITY | OUTSIDE OF CITY

CITY	FY Designation	1/2/20
INSIDE OF CITY	Private	
	Public	
	Total	
OUTSIDE OF CITY	Private	
	Public	
	Total	
Total		

CITY	Total Number of Active Services	Original Number of Lead Services (GCWW Side)	Number of Lead Services Removed (GCWW Side)
INSIDE OF CITY	84,872	39,837	26,6
AVONDALE	2,707	1,768	1,3
BOND HILL	2,719	523	3
CALIFORNIA	228	70	
CAMP WASHINGTON	598	451	2
CARTHAGE	1,060	395	3
CLIFTON	2,021	1,091	8
COLLEGE HILL	4,607	979	7
COLUMBIA TUSCULUM	642	304	2
CORRYVILLE	686	589	3
CUF	2,910	2,353	1,7
DOWNTOWN	715	316	2
EAST END	698	603	3
EAST PRICE HILL	4,257	2,870	1,6
EAST WALNUT HILLS	939	685	4
EAST WESTWOOD	575	130	
ENGLISH WOODS	17		
EVANSTON	2,518	2,204	1,3
HARTWELL	949	410	1
HYDE PARK	4,379	2,340	1,4

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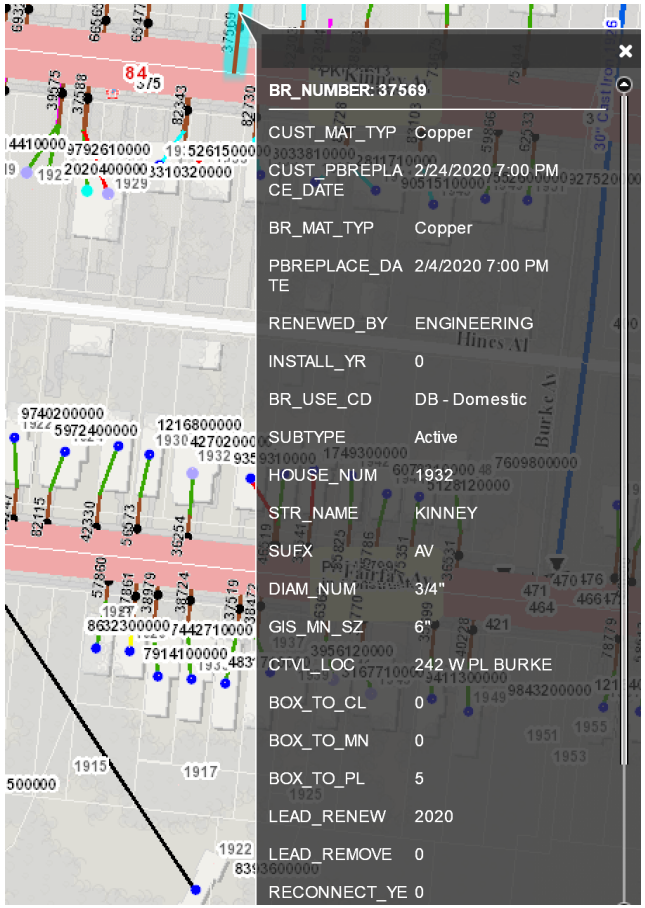
LSL Record – Private Side Inventory

- 2016 – present
  - Much more attention paid to branch material
  - More fields added to GIS under CUST_MAT_TYP:
    - Public side renew date
    - Private side renew date



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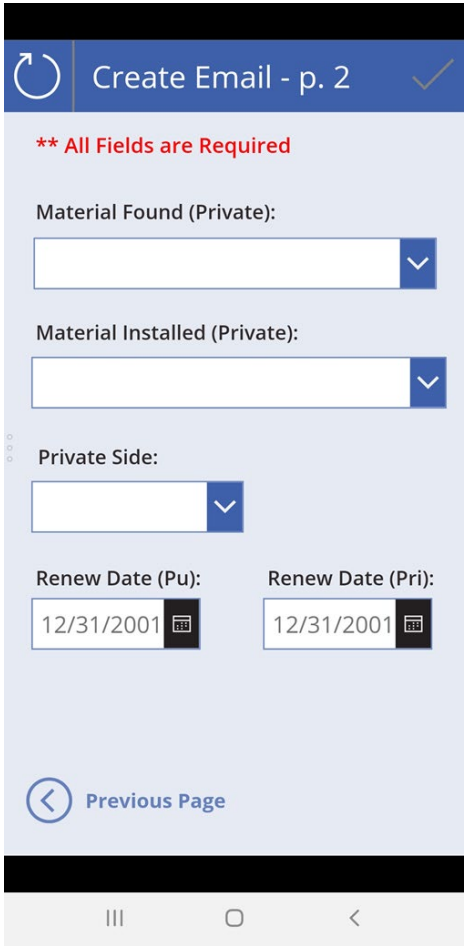
LSL Record – Private Side Inventory

- 2016 – present
  - Watermain project inspection enhancements
    - Electronic form on phone
    - Created with Microsoft Power Apps
    - Updated information is sent directly to GIS Editors
    - Available to the public the next day



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LSL Record – Private Side Inventory

- 2016 – present
  - Customers encouraged to self-id

A Service of The City of Cincinnati
GREATER CINCINNATI WATER WORKS

REPLACE YOUR LEAD SERVICE LINE | HELP PROGRAM | RESOURCES | CONTACT US | MY LEAD ACCOUNT

SELF IDENTIFICATION OF LEAD PIPES

Your private water service line in your basement could be made of three different materials depending on the age of your plumbing fixtures: lead (left), copper (middle), galvanized steel (right).

Please complete the form and select the material that the private portion of you service line is made from. Please upload a picture of your meter setting that we could use to help identify the pipe material. An example of a meter setting is shown below.

Acceptable file formats for the optional file are: .jpeg, .jpg, .png, .gif, .bmp, .tiff

NAME

EMAIL

RETURN PHONE NUMBER

PROPERTY ADDRESS

Browse...

SEND

Enhanced Lead Program - LSLRP

- Ordinances:
  - Declared lead lines as public health/safety risk
  - Declared private LSL replacement costs as a public purpose
  - Prohibits Lead Service Lines (enforcement grace period)
  - Require replacement on repair and disturbance

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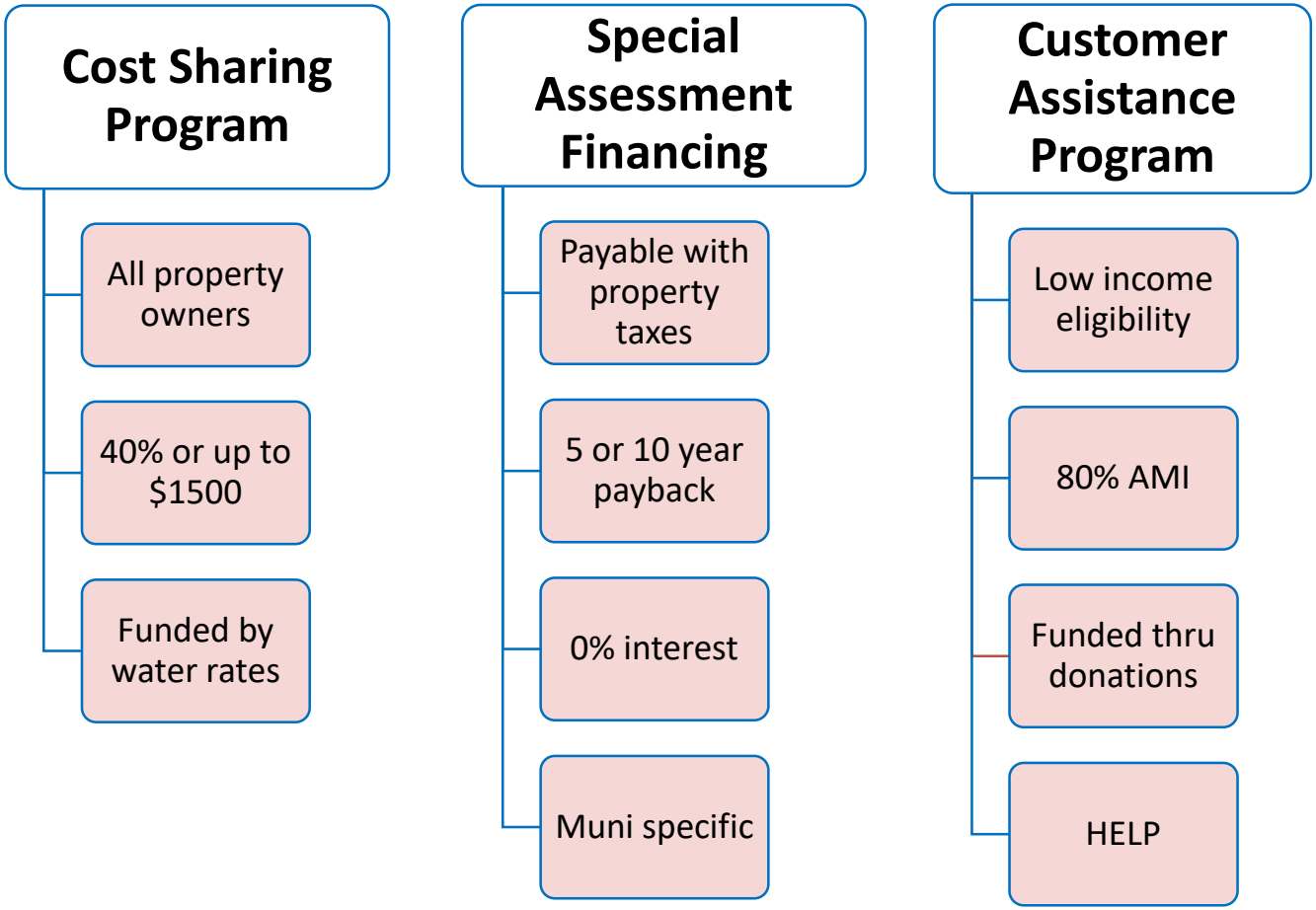
Enhanced Lead Program - LSLRP



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Enhanced Lead Program - LSLRP

- Example:

  $5000 replacement cost
  - $1500 **Cost Share**
  $3500 balance

  Customer elects to pay back over 10 years
  $3500/(10 years x 2 semiannual payments/year)
  = $175 added as **Special Assessment** to semiannual tax bill

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Thank You

Comments or questions, please contact:

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States' Perspective on Inventories And Replacement Plans

June 23, 2020

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Good Times…

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Presentation Outline

- ASDWA's 2019 White Paper on Inventories
- ASDWA's comments on EPA's Proposed Lead and Copper Rule Revisions
  - Inventories
- Development of second White Paper
  - Focus on data

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White Paper Development

Over the Summer of 2019 ASDWA worked to compile State Drinking Water Program efforts around Lead Service Line (LSL) Inventories. The white paper was used by EPA to help inform the proposed LCRR and is intended to be used by State Drinking Water Primacy Agencies to develop interim LSL inventory strategies.

Drivers

Lead and Copper Rule Revisions

Drinking Water Infrastructure Needs Survey

Post Flint & EPA Memo Action

Collection & Review

Worked with Tom Neltner (EDF) - Extensive work on this issue

Reviewed by the States highlighted and the ASDWA Regulatory Committee

Dissemination

Shared with State Administrators and EPA

Posted online and pushed out to partner organizations

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Three Approaches Used by States

States operate under diverse circumstances and therefore have taken different approaches to updating water system materials evaluations under the LCR and/or building LSL inventories.

Updated Service Line Materials Evaluation

In response to a February 2016 EPA memo, four states [Alabama, Louisiana, Kansas, and Texas] asked Community Water Systems to submit updates to their service line materials evaluation required under Lead and Copper Rule

Voluntary Surveys for LSLs

Several states, including Indiana, Massachusetts, North Carolina, and Washington, conducted voluntary surveys of Community Water Systems' service line materials estimates. Some states published this data online.

Mandatory LSL Inventories

Four states [California, Illinois, Michigan, and Wisconsin] now require CWSs to provide summaries of their service line materials. All four states use a website to streamline the process and have integrated reporting into their annual reporting system. Ohio has a limited mandatory map approach, not included in ASDWA white paper

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Mandatory LSL Inventories

Comparison of states with mandatory LSL Inventory requirements

CA	MI	IL	WI	OH*
State Legislation	Revised Rule	State Legislation	Revised Rule	State Legislation
2018	2020	2018	2004/2018 (extended to private-side)	2016
Materials reported LSLs, lead fittings, GSL, copper, ductile iron, plastics, AC, unknowns	Materials reported LSLs, GSLs, unknowns (likely pb, unlikely pb)	Materials reported LSLs, GSLs, copper (lead/non-lead solder), ductile iron (cast), broad plastic, AC, unknown & unknown not lead	Materials reported LSLs, GSLs, copper, steel, cast iron (by age & lined/unlined), some plastics, AC and concrete	Materials reported LSLs – no number, just map
Data available online	Data available online	Data available online	Data available online	Data available online

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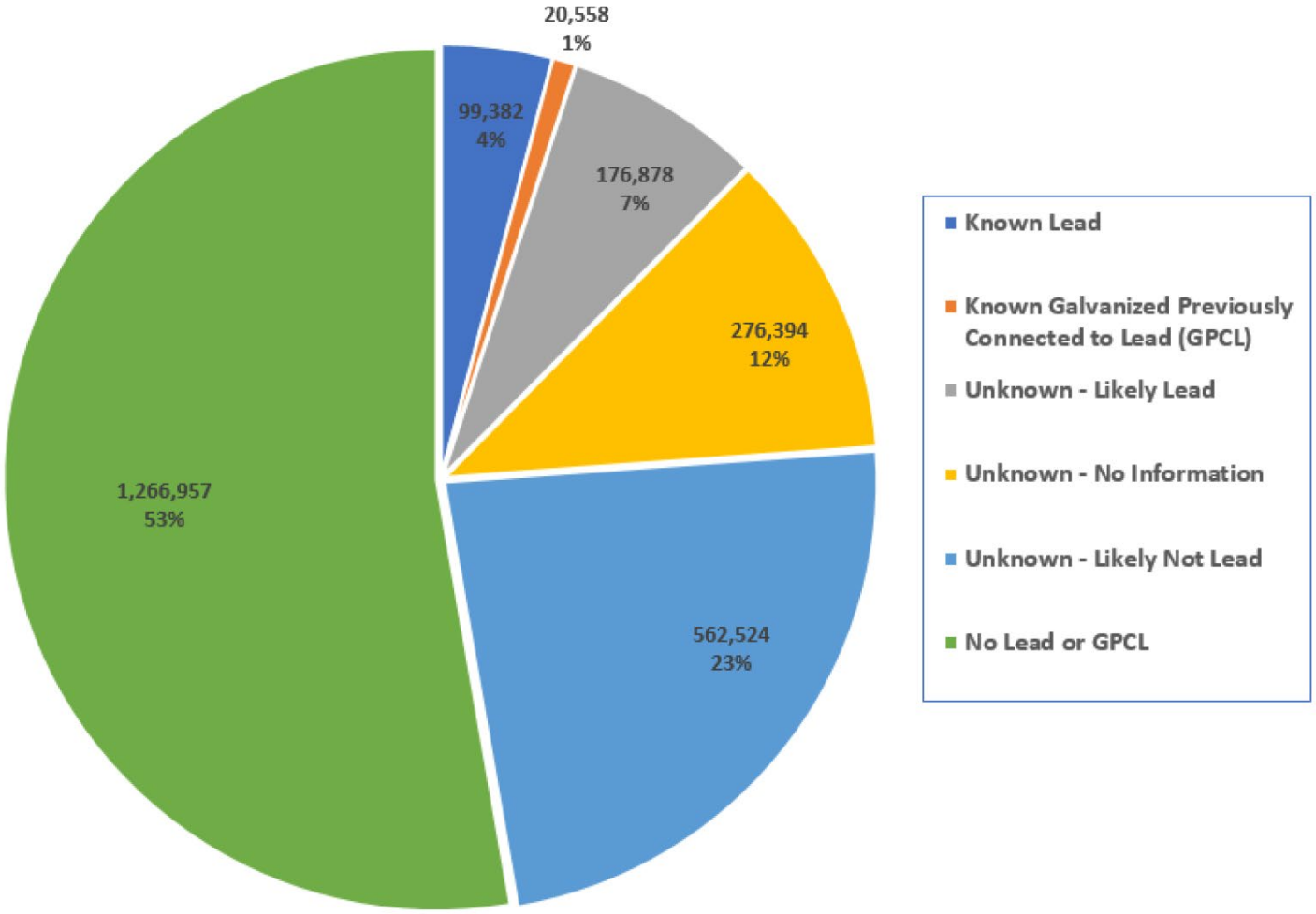
Service Line Materials by Category

Based on Preliminary Distribution System Materials Inventories (PDSMI)

Data set incomplete. Chart will be updated as additional PDSMI data is reviewed.
Check back periodically for updated information. Last updated 3/2/2020.



https://www.michigan.gov/documents/egle/egle-dwehd-PDSMISummaryData_682673_7.pdf

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Inventories Are Not Simple…

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General Recommendations for Developing LSL Inventories

Online Accessibility

Enable CWSs to submit information through an online portal and have data submitted publicly available via online platform.

Report Public and Private Service Lines

Identify materials of the entire service line and include who owns which portions of the service line, the utility or the customer, and the legal basis for that determination.

Address Uncertainty

Provide a means to address uncertainty of service line material via quantitative or qualitative probability due to the great deal of uncertainty for many water systems about the number and/or location of lead service lines.

Clarify Components like Lead Goosenecks

Provide details on how to account for and capture lead components of a service line in the inventory efforts due to the numerous service line configurations that may involve some lead components, such as partial lead service lines, pigtails, goosenecks, and solder.

Use Existing Reporting Mechanisms

The state should consider modifying the existing reporting requirement to include counts of service lines grouped by each type of material commonly used.

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Additional Considerations

State Resources

- Developing/implementing LSL inventory will be a resource intensive project
- Reporting and providing data through an online portal/website may pose significant barriers to some states, particularly when IT services are centralized
- Voluntary survey may be the most attainable option for some states

Preliminary vs Comprehensive Inventories

- Preliminary inventory report followed by a comprehensive inventory report later
- The comprehensive report would generally expect that service lines of unknown material included in a preliminary report would be estimated as containing or not containing lead

Annual vs Bi- or Tri-Annual Reporting

- Initial submission date with an annual update to the inventory is ideal
- May not be practical for every state
- Balancing state resources with the large quantities of data from inventory reporting may mean reducing the updates to a bi- or tri-annual basis.

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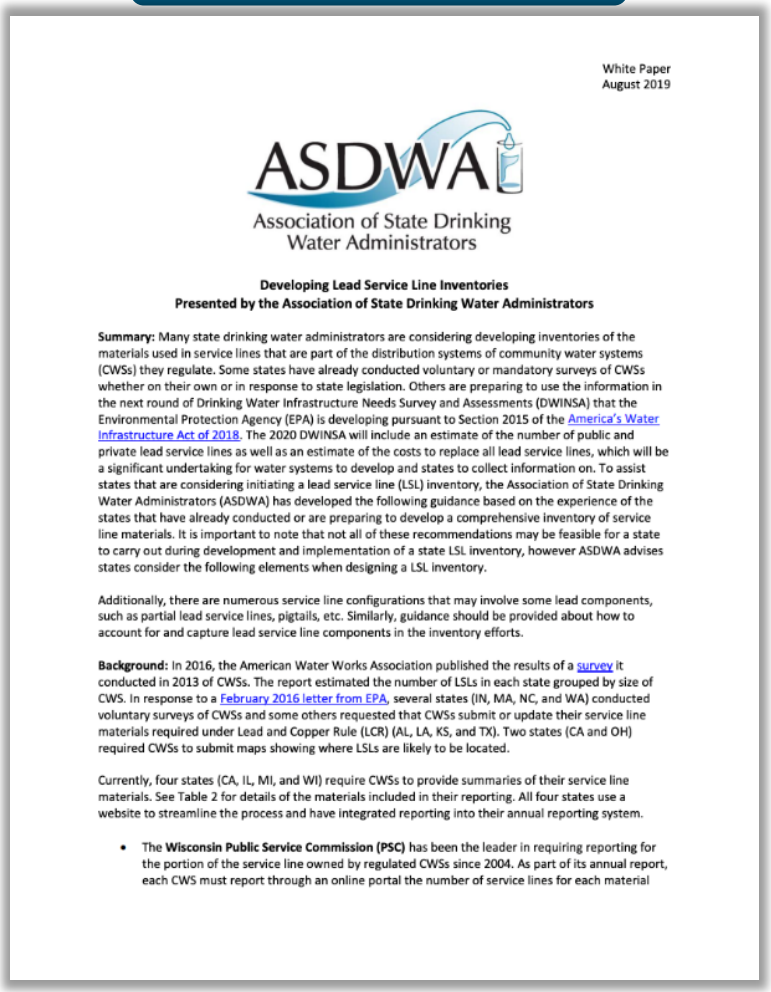
Access ASDWA White Paper

asdwa.org/asdwa-reports/



White Paper
August 2019

ASDWA
Association of State Drinking Water Administrators

Developing Lead Service Line Inventories
Presented by the Association of State Drinking Water Administrators

Summary: Many state drinking water administrators are considering developing inventories of the materials used in service lines that are part of the distribution systems of community water systems (CWSs) they regulate. Some states have already conducted voluntary or mandatory surveys of CWSs whether on their own or in response to state legislation. Others are preparing to use the information in the next round of Drinking Water Infrastructure Needs Survey and Assessments (DWINSA) that the Environmental Protection Agency (EPA) is developing pursuant to Section 2015 of the America's Water Infrastructure Act of 2018. The 2020 DWINSA will include an estimate of the number of public and private lead service lines as well as an estimate of the costs to replace all lead service lines, which will be a significant undertaking for water systems to develop and states to collect information on. To assist states that are considering initiating a lead service line (LSL) inventory, the Association of State Drinking Water Administrators (ASDWA) has developed the following guidance based on the experience of the states that have already conducted or are preparing to develop a comprehensive inventory of service line materials. It is important to note that not all of these recommendations may be feasible for a state to carry out during development and implementation of a state LSL inventory, however ASDWA advises states consider the following elements when designing a LSL inventory.

Additionally, there are numerous service line configurations that may involve some lead components, such as partial lead service lines, pigtails, etc. Similarly, guidance should be provided about how to account for and capture lead service line components in the inventory efforts.

Background: In 2016, the American Water Works Association published the results of a survey it conducted in 2013 of CWSs. The report estimated the number of LSLs in each state grouped by size of CWS. In response to a February 2016 letter from EPA, several states (IN, MA, NC, and WA) conducted voluntary surveys of CWSs and some others requested that CWSs submit or update their service line materials required under Lead and Copper Rule (LCR) (AL, LA, KS, and TX). Two states (CA and OH) required CWSs to submit maps showing where LSLs are likely to be located.

Currently, four states (CA, IL, MI, and WI) require CWSs to provide summaries of their service line materials. See Table 2 for details of the materials included in their reporting. All four states use a website to streamline the process and have integrated reporting into their annual reporting system.

- The **Wisconsin Public Service Commission (PSC)** has been the leader in requiring reporting for the portion of the service line owned by regulated CWSs since 2004. As part of its annual report, each CWS must report through an online portal the number of service lines for each material

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EPA's Lead & Copper Rule Revisions

- ASDWA developed substantive comments on inventories, based on EPA's proposal
  - Inventories should be developed for all service lines
    - Or "demonstrate absence of lead service lines (LSLs)"
  - Inventories should include both public and private sides
  - Knowledge about service line inventories will evolve
    - Not realistic to get the inventory 100% correct the first time
      - But don't "let the perfect get in the way of the good"
  - Any unknowns in the inventory count as LSLs
    - In the context of the LSL replacement plans

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ASDWA's LCRR Comments (cont.)

- Lead service line (LSL) replacement plans
  - Clarify the LSL definition for galvanized service lines and for goosenecks and pigtails
  - Include unknown service lines as LSLs.
  - Replace a minimum of 10% every three years for any system with LSLs
    - All LSLs will be replaced in 30 years
  - Replace a minimum of 20% every three years for systems with a 90th percentile greater than the lead action level (AL) of 15 µg/L
    - All LSLs will be replaced in 15 years

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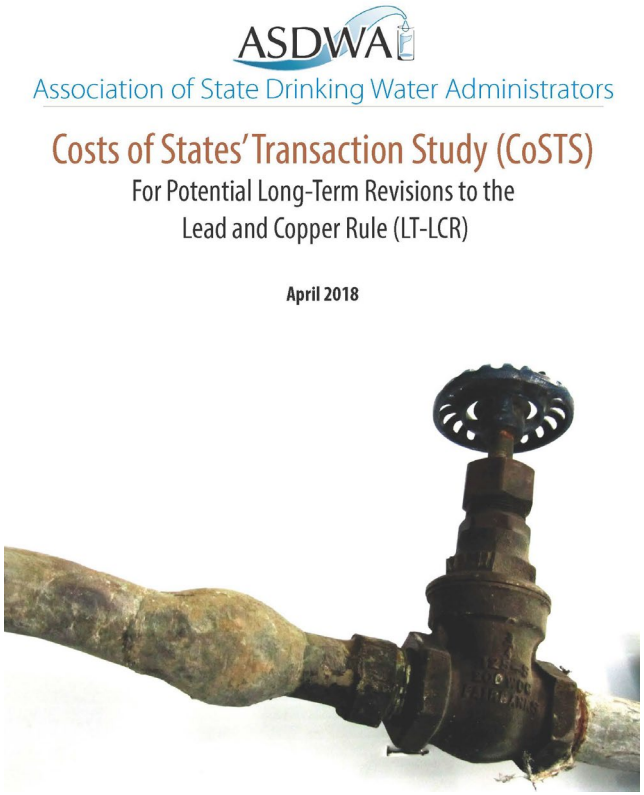
Transactions for Inventories/Plans

- Tracking and reviewing inventories and replacement plans will be a significant effort for primacy agencies
  - Approx. 1,000,000 staff hours to review inventories and replacement plans in the first five years of LCRR



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Ongoing Activity

- Developing a second white paper about data
- Five elements
  1. How to use historical records
  2. Representative randomized sample of service lines
  3. Transparency – public communications
  4. Ability to reproduce analysis (Reproducibility)
  5. Modeling & statistics & hold-out sample accuracy
     - "Here's what we expected to find; here's what we found."
- Will be released this summer

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Questions?

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