

The Lead and Copper Rule: Possible Changes AWWA Efforts from NDWAC

Nick Pizzi & David Cornwell
EE&T, Inc.

Special Thanks To Water Utilities and Members working on National Drinking Water Advisory Council (NDWAC) LCR Working Group:

Steve Via, Gary A. Burlingame, Matt Corson,
Steve Estes-Smargiassi, David Cornwell



Is Lead Still an Issue?

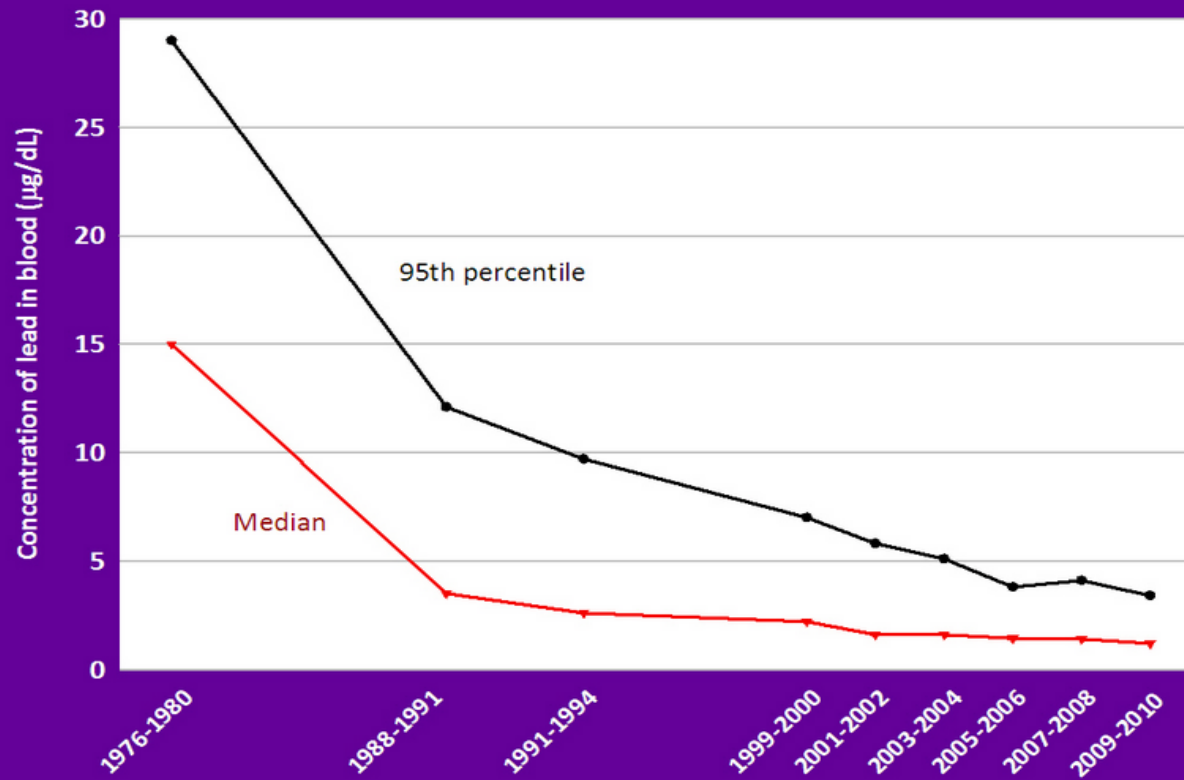
- **Real health concerns**
 - The most vulnerable populations are pregnant women and infants
- **Available epidemiology studies indicate potential additional health risks**
- **Lead is a hazard of concern to the general public**
 - High emotional content
 - Well publicized risk



The Risks are Getting Lower

- **Children's blood levels continue to fall**

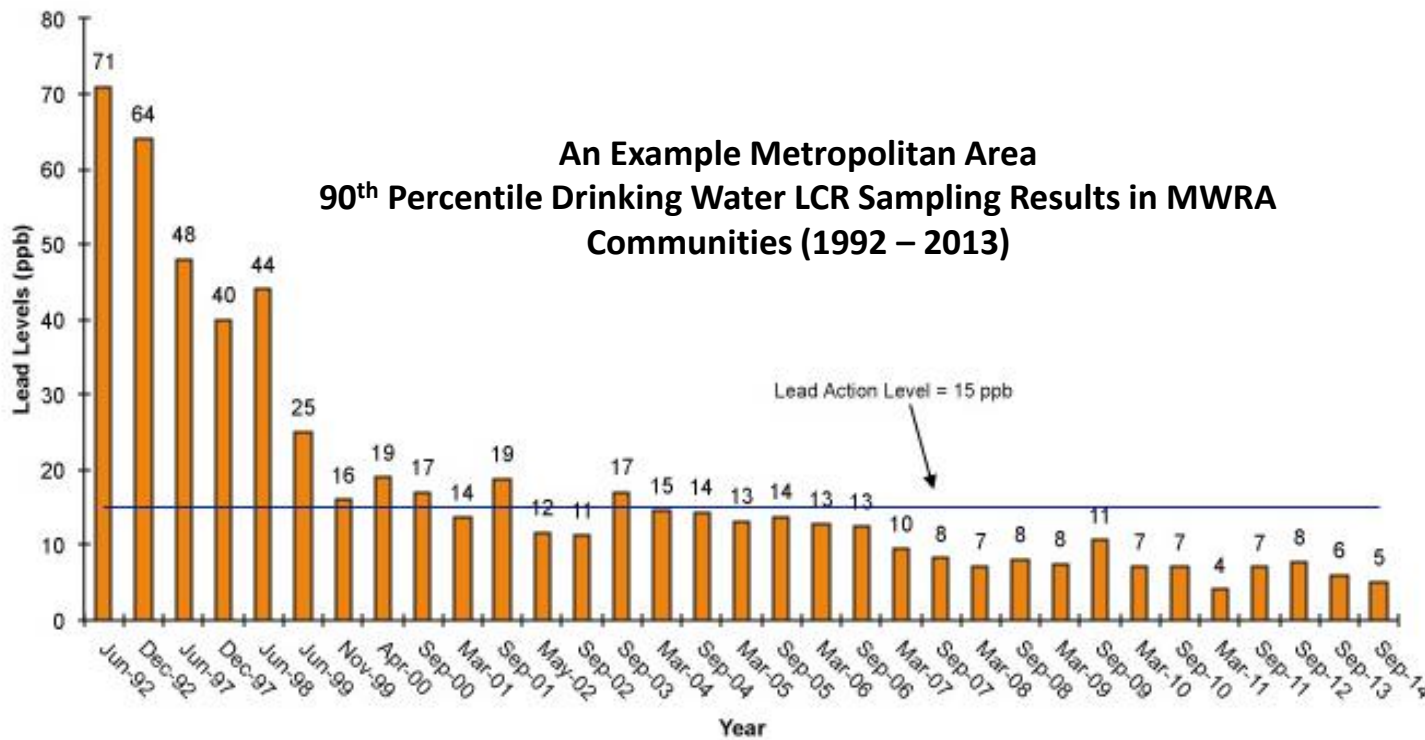
Lead in children ages 1 to 5 years: Median and 95th percentile concentrations in blood, 1976-2010



Source: <http://www.epa.gov/ace/biomonitoring/lead.html>

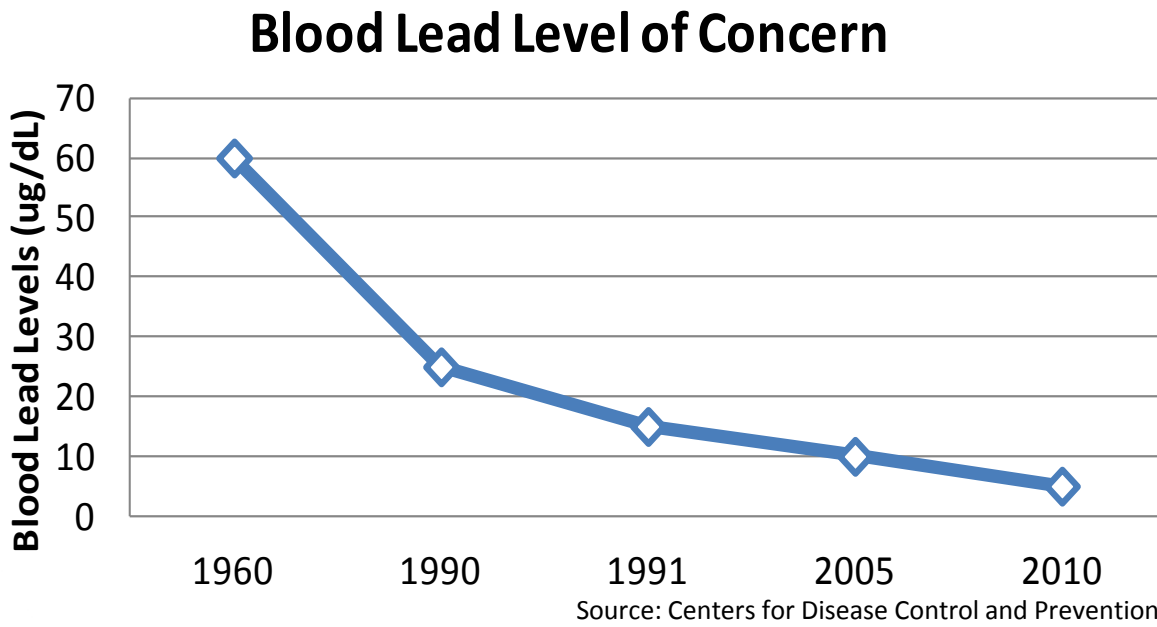
The Risks are Getting Lower

- **Lead levels in drinking water have decreased significantly**
- **Homes contain less lead, including less lead in plumbing materials**



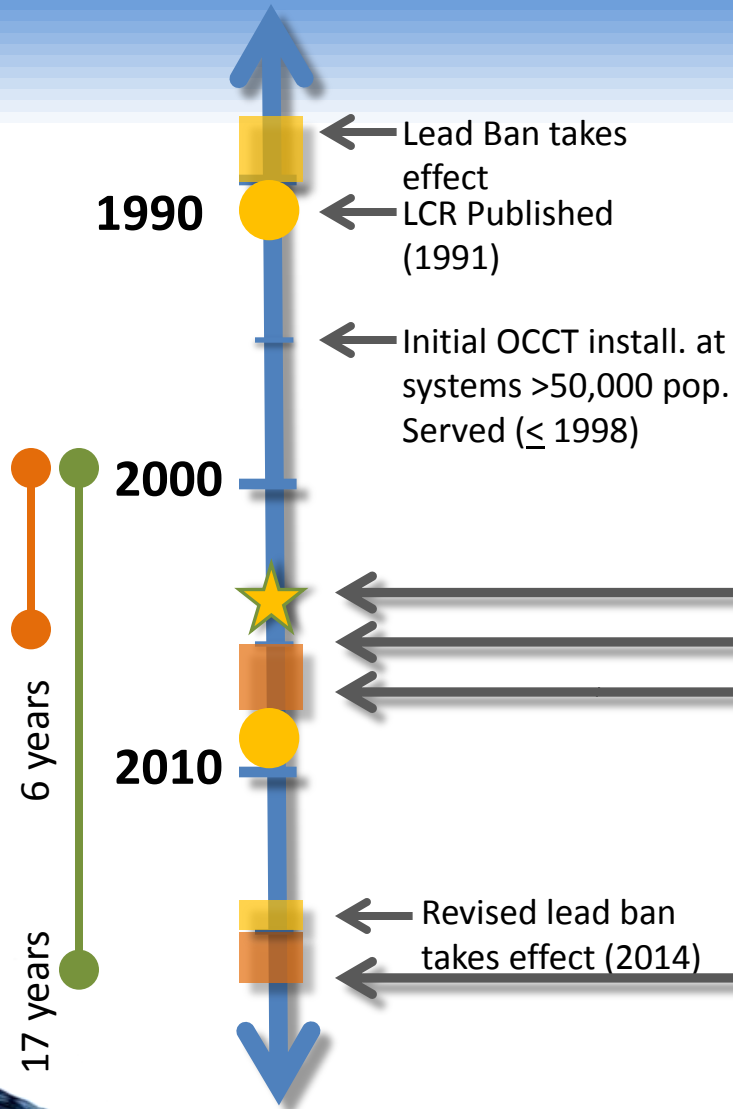
But ...

- **The ultimate goal is zero exposure from all sources**
- **Public “failures” raise concern and lessen public confidence**



**SEATTLE POST-
INTELLIGENCER**
**LEAD-TAINTED WATER
IN SEATTLE SCHOOLS
STUNS PARENTS**
DISTRICT SHOULD HAVE
TOLD THEM OF DANGER,
THEY SAY
By DEBORAH BACH, SEATTLE POST-
INTELLIGENCER, 7/1/04

EPA is Taking Additional Action



THE WASHINGTON POST

LITTLE ACTION ON LEAD WARNINGS

MANY D.C. RESIDENTS REMAIN UNAWARE OF PROBLEM

By Monte Reel and Sarah Cohen, Washington Post Staff Writers

3/14/04

- **NDWAC Work Group** (2005 – 2006) Focused on lead public education (part of national review)
- **Short Term Revisions** (2007) Intended to be a good first step, not the entire solution
- **NDWAC Work Group** (2014 – 2015) Recommendations for Long-Term LCR

Long Term Revision of the LCR

- **Stakeholder process re-opened to get better consensus on most difficult issues**
- **2014-15 NDWAC Working Group made recommendations to National Drinking Water Advisory Council in Spring 2015**
- **NDWAC will make its recommendations to the EPA Administrator later in 2015**



Issues Discussed by NDWAC Workgroup

- **Sampling Procedures**
- **Sample Site Selection**
- **Corrosion Control Treatment**
- **Lead Service Line Replacement**
- **Lead Education**
- **Copper Corrosion**



Sampling – Minor Items We Can Agree On

- **Aerators – on or off – *On***
- **Preflush before stagnation – *No, normal household use***
- **Defined stagnation period – *Yes, but long***
- **Flow rate – *Normal household use***
- **Narrow or wide mouth bottle – *Wide***
- ***Better instructions***



Photo courtesy of M Edwards

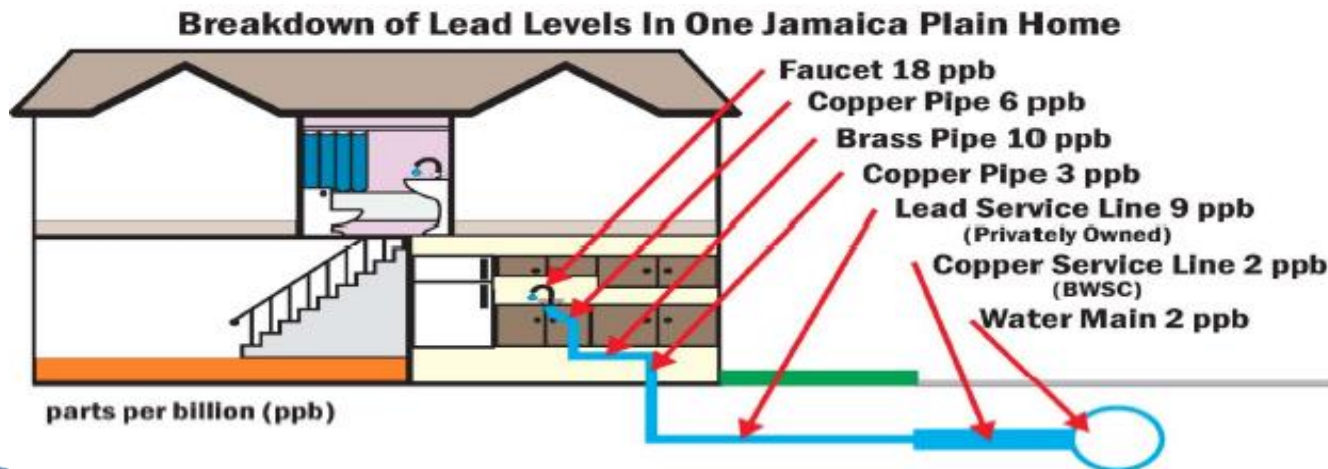
What is the Lead Sampling Pool?

- **Current Rule**

- Typically single family homes with LSL (at least 50%) OR
- Lead Solder (1983 to 1986)

- **Considering for Revised Rule**

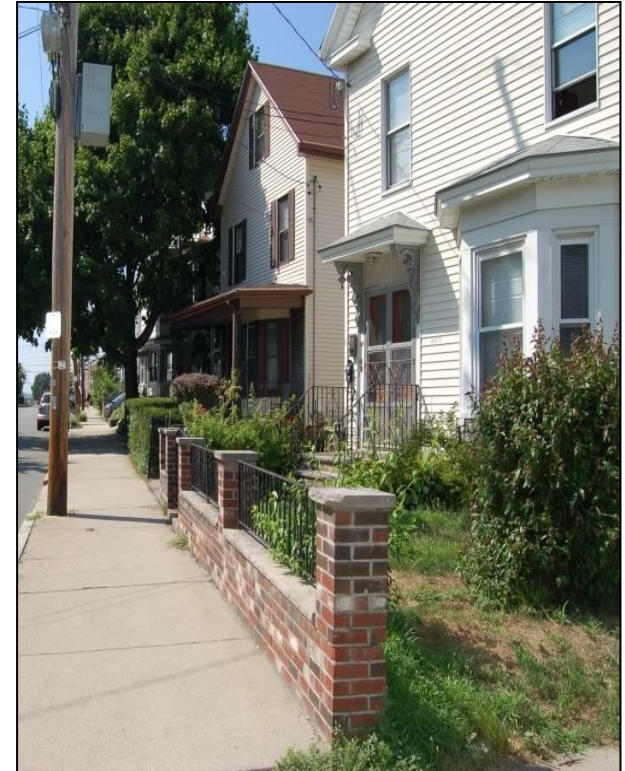
- 100% LSL water system has LSLs to sample
- Should we still sample homes without LSLs?



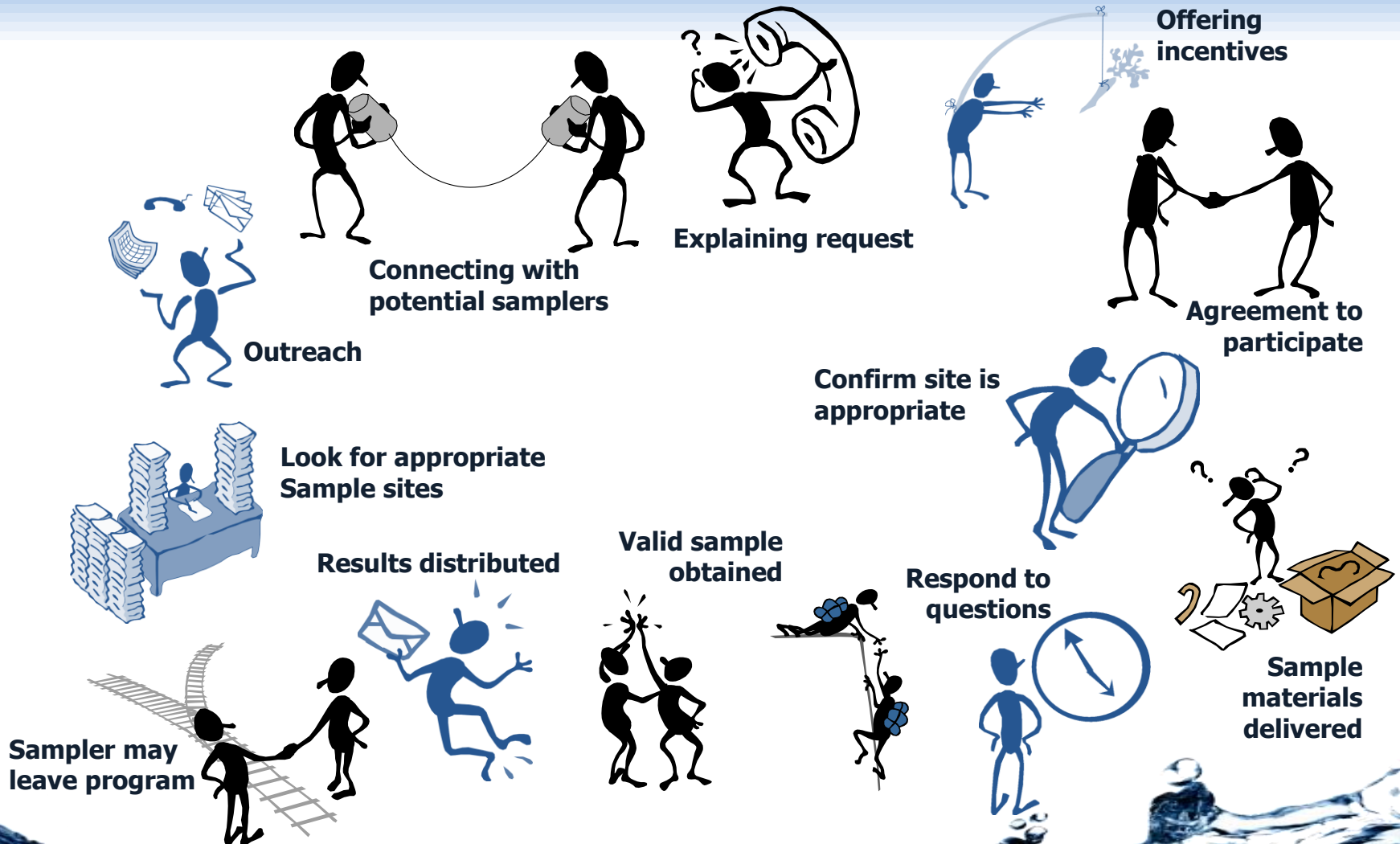
Graphic courtesy of MWRA

Issues with Sampling LSL Sites

- **Increased difficulty recruiting homes to participate**
 - Smaller number of homes
- **May represent a very limited portion of service area**
- **Potential increase in 90th percentile lead levels from increasing number of LSL samples**



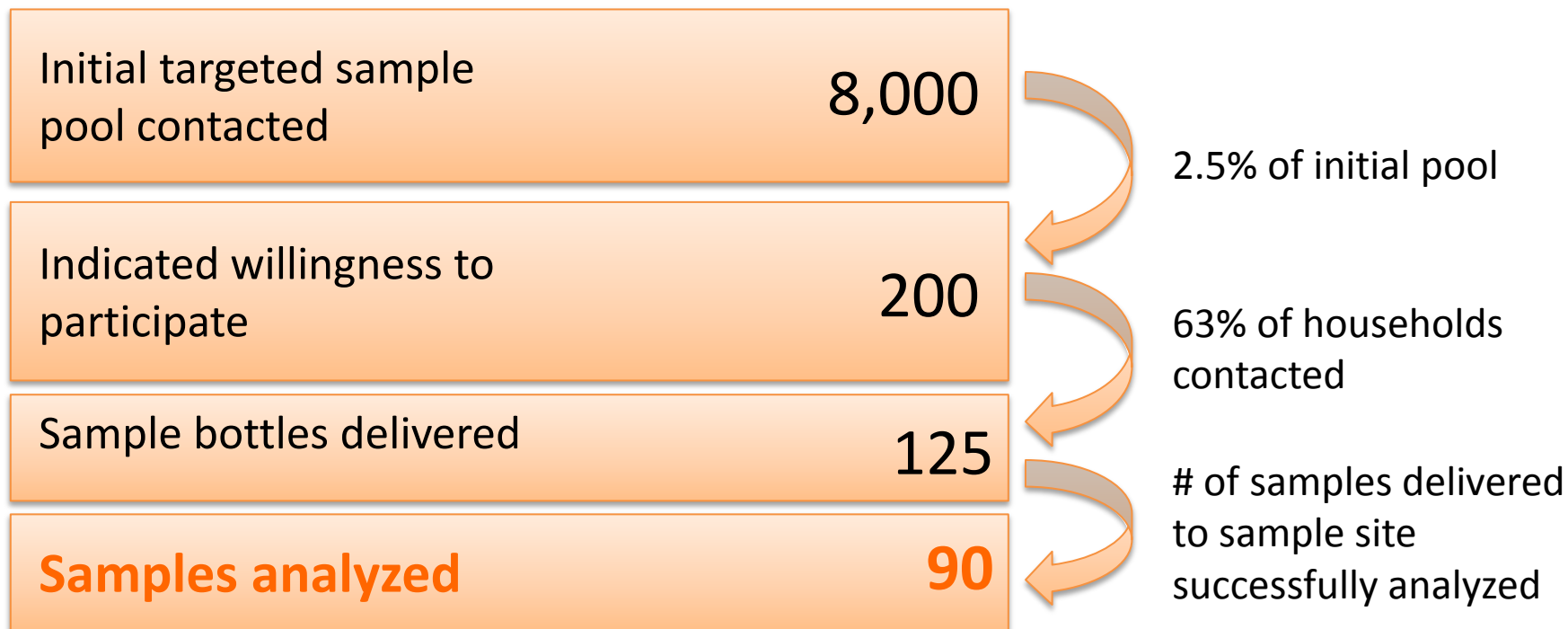
Sampling is a Very Complicated and Intensive Undertaking



Graphic courtesy of M. Rogers

Difficulty with Recruiting Homes

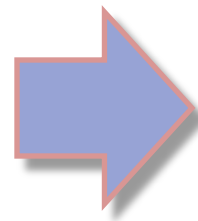
Example City – Mid-Atlantic, Current Sampling Cycle



Graphic courtesy of M. Rogers

Targeting Sampling to Get Water from LSLs

- **Move away from first-draw sample for lead**
- **How could this be accomplished?**
 - Survey is needed for every home's plumbing
 - Specify which liter to collect to get the LSL
 - Fixed specific liter (say 5th liter)
 - Site-specific liter (Based on survey? A single profile?)

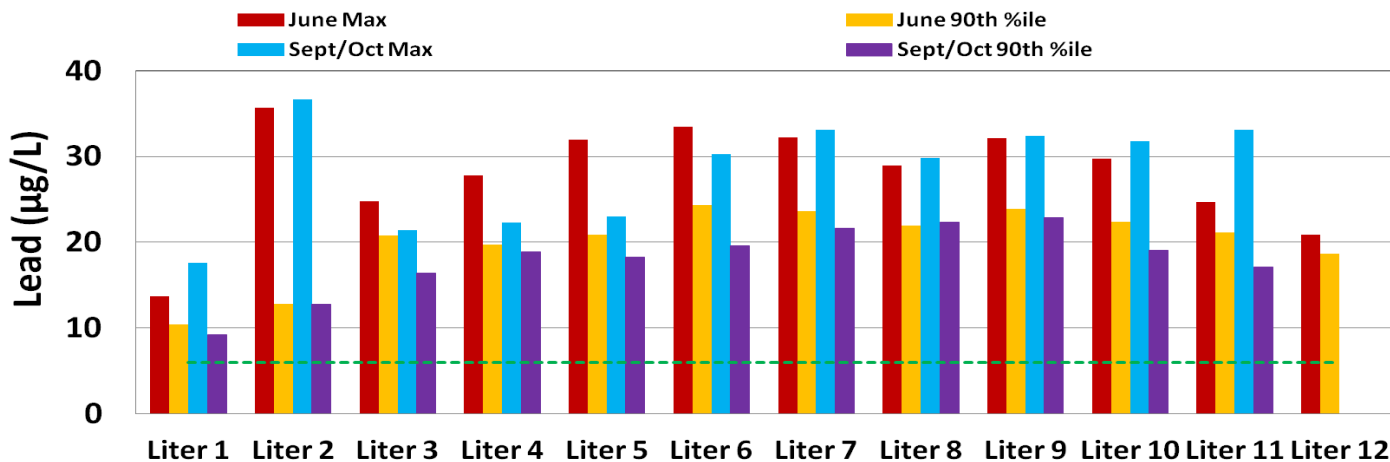


Photos courtesy of J. Swertfeger

Issues with Sampling LSL Homes

- **Increased difficulty recruiting and lower retention of sample sites**
- **Scheduling and cost of profiling individual sample sites**
- **Reduced confidence due to complicated instructions**
- **Likely increase in lead levels and risk of exceedance**

Comparison of System 90th Percentile Compliance Data with Sequential Sampling 90th Percentile and Maximum Values



Graph courtesy of US EPA

Results from LSLs are Difficult to Interpret

- **Dissolved Lead**
 - We have theoretical and practical experience with corrosion control
- **Particulate Lead**
 - Almost no theoretical or practical experience
- **We don't know if it is possible to manage particulate lead release using centralized corrosion control treatment**



Image courtesy M. Edwards

How to Revise the LCR for Everyone?

- **Not Everyone is on Optimal Corrosion Control Treatment (OCCT)**
- **Not Everyone using Phosphate**
- **Not Everyone has LSLs**
- **Large vs Small systems**
- **Different Water Qualities**
- **Wastewater Treatment Issues**



What About Removing LSLs?

- **What we thought we knew**
 - Removal is always beneficial
- **What we know today**
 - All removals likely cause a spike in lead levels
 - Lead levels following a partial replacement do not drop to as low a value nor get to a low level as fast as after a full LSL replacement
 - Lots of partial LSLR under current LCR mandatory LSLR requirement



Photos courtesy of Cincinnati Water

City to subsidize lead pipe project

After heated debate, City Council votes to have everyone share in the expense.

By Dean Mosiman
City government reporter

The city of Madison will subsidize property owners

Lead pipe options explored

State looks at taking financial burden of pipe replacement off homeowners

By Dean Mosiman
City government reporter

In a surprise move, the state will explore options to spare thousands of Madison property owners from requirement to replace water pipes.

The Capital Times
Wednesday, Feb. 2, 2000

Close vote, but pipes have to go

By Aaron Nathans
The Capital Times
Residents on the left may not replace their lead pipes. The

E-Mail Address: Citydesk@captimes.com

The Capital Times ■ The Weekend of March 25-26, 2000

So how much will taxpayers shell out for landlords' pipes?

By Aaron Nathans
The Capital Times
Madison taxpayers are expected to spend thousands of dollars

Private pipes don't need public money
In a letter to the editor published on Wednesday's Opinion page, the manager of the Madison city's plan to

Lead pipes may still be in use

Wednesday, Jan. 5, 2000

Council can't decide who'll pay for pipe repairs

By Aaron Nathans
The Capital Times
Mayor Steve Bauman pledged with the City Council on Tuesday night to bring all

Meeting goes for nearly nine hours
By Aaron Nathans
The Capital Times
It's no secret Madison City Council meetings

The Capital Times ■ Tuesday, January 4, 2000 *

It's lead pipe decision time

By Aaron Nathans
The Capital Times

The City Council is expected to finally vote tonight on whether all Madison water users should share the costs of lead pipe

Council agenda lengthy tonight

means of lowering lead

background checks on all proposed appointments to the Police and Fire Commission. The proposed ordinance comes after the council confirmed Elizabeth Snider-Allen to the PFC last

Council OKs lead pipe replacement

Facing state fines, council approves plan but delays decision on homeowner subsidies.

By Dean Mosiman
City government reporter

A frustrated and ornery Madison City Council on Tuesday narrows its options to the

Homeowners, start scratching those water pipes

Lead pipes often look like steel, he noted. But steel pipes allow pieces for the cut and pipes with lead stress fr

Council delays decision on lead pipe assistance

Council members struggled over whether to subsidize owners for 50 percent of the cost of replacing the water lines.

By Dean Mosiman
City government reporter

Despite four hours of testimony

Lead pipe vote a thriller

By Aaron Nathans
The Capital Times

City Council members would like to take a vote tonight on solving the city's lead pipe problem, but one seems to know how it's

No one knows how the fretting, sweating will end

But she won't support cost sharing. "I don't think it's the responsibility of the citizens of Madison to upgrade a house that belongs to someone other than themselves," Compton said. Verweert said it's an impr

Image courtesy of Madison Water Utility

Safe water and clean lakes

The city of Madison — which so often finds itself at the bottom of this one.

It's time to stand up to EPA

Once again, the Madison City Council is slated to do battle with the issue of lead pipe replacement. On Jan. 4, council members listened to four hours of testimony and debate on whether all city water

Money spent eradicating a nonexistent lead threat is money wasted.

Lead pipe risk rings hollow

When bad or incomplete science drives public policy, it's usually the taxpayers who wind up footing the bill. Such appears to be the case with the plan to make all city of Madison water users share in the cost of lead water lines.

The Environmental Protection Agency wants Madison taxpayers and homeowners to spend millions of dollars eliminating a health threat that doesn't exist. It's time the city stand up to the fed's lead-pipe

Readers react to lead-pipe controversy

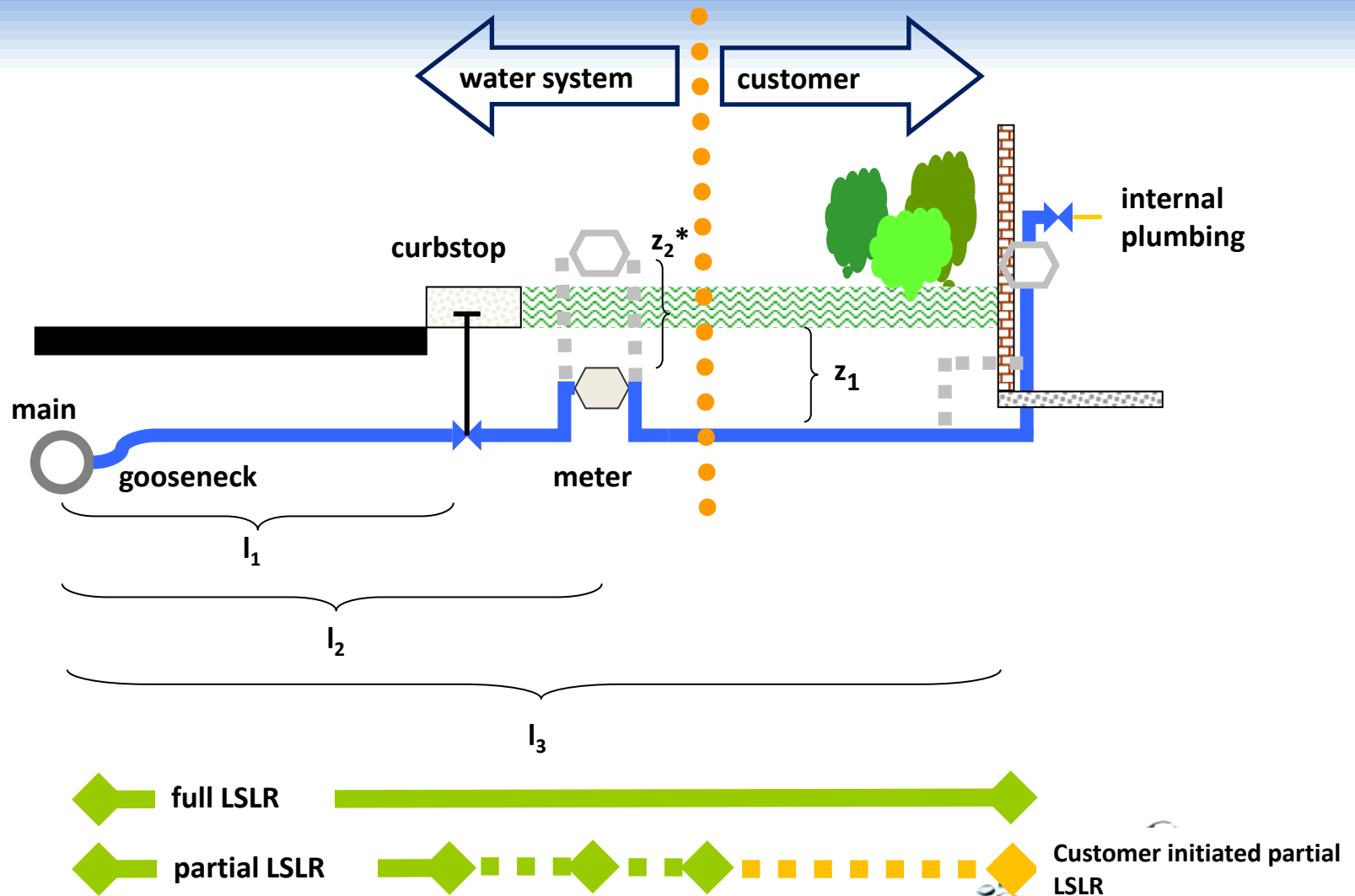
No proof that lead pipes are harmful
This is to add another voice to those who recognize the stupidity of wasting

First lead pipes, then sewer lines
The person who wrote the editorial New 24 about the lead pipe

safeguarding the environment and the health of all of us future generations.

But, inevitably, such an action

What is a Partial LSL Replacement?



What About Removing LSLs? (cont)

- **Current Rule, if system exceeds Action Level:**
 - 7% of lead service lines removed per year
 - Prior notification to affected homes – 45 days
 - Encourage Full Replacement
 - Sample w/i three days, report results w/in three days of receipt of data



Image courtesy of Lansing Water

Most homeowners uninterested in complete removal of lead service line.

Options Being Considered by EPA

Removal

- Eliminate partial LSLR
- Delay mandatory LSLR until after CCT re-optimization
- Retain an enforceable annual percentage for LSLR
- Expand the definition of control to EPA's definition in 1991 LCR proposal
- Elective full-LSLR Program
- Facilitate full LSLRs

Additional Risk Reduction

- Notification of residents impacted by infrastructure replacements, including emergency repairs
- Require water systems to provide impacted owners and residents with
 - Guidance on flushing *and/or*
 - NSF/ANSI certified filters

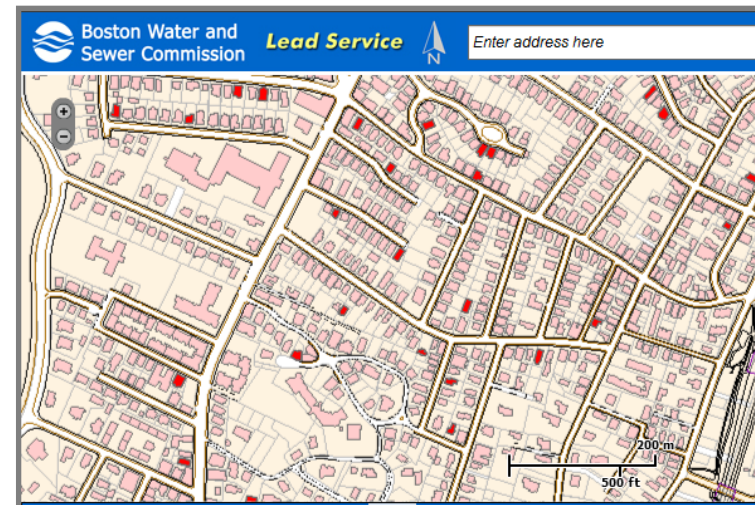
Where are the LSLs?

- Is there an inventory of service lines?
- How can lead service lines be located?
- Are there opportunities to engage real estate and home inspectors?

RETURN OF SERVICE PIPE

Date Laid *May 24-1897* Reg. No. *1077*
Owner of Premises *Chas. G. Thorpe*
Street *2 Harrison Ave.*
Main Pipe *6* inches Diam. Distance Main to Curb Stop Cock *7 1/2* feet
Foreman

COST TO TOWN — Main to Curb Stop Cock inc.		COST TO OWNER	
<i>7 1/2</i> Feet	<i>1/2</i> Inch <i>Lead</i> Pipe	<i>35</i> Feet	<i>5/8</i> Inch <i>Lead</i> Pipe
	<i>1/2</i> Inch <i>1/2</i> Inch Corporation Stop		
	One Inch Curb Stop		
	One Sidewalk Box		
	Couplings		
	Elbows		
	Tees		
	Hours Labor		
	Men		
	Hours Labor		
	Foreman		
	Trucking		
	Stop and Waste		
	Elbows		
	Hours Labor		
	Men		
	Hours Labor		
	Foreman		
	Trucking		
Total		Total	



Images courtesy of Framingham Water and BWSC

Copper is Different from Lead

- **Issue is new copper that is not adequately passivating**
 - Passivation may not occur at all in some aggressive waters
 - Passivation may not occur quickly (may take many months)
- **Currently, rule targets Lead**
- **Targeting new copper will be difficult**
- **However, copper corrosion is well understood**



Images courtesy of Neal Prince Studio, Parkwood Homes, and Gary Phillips Development

A Conceptual Approach to Copper...

- **Categorize systems by finished water aggressiveness**
- **Monitor distribution system water quality**
- **Targeted outreach if water is aggressive**
- **Sample only if water is aggressive**
- **Apply corrosion control when needed**



Revising the LCR will Take Time

- **What can I do between now and then?**
 - **Improve LSL inventory**
 - **Remove LSLs if possible**
 - **Prevent partial LSLs when possible**
 - **Coordinate with health officials**
 - **Develop support for LSL removal incentives**
 - **Stakeholder outreach and consensus building**



So Where is The Process Now

- Lead Working Group has completed its Meetings
- Final Report Being Prepared Now
- Report will go to Full NDWAC
- NDWC will accept or Revise and Report to USEPA
- EPA will Take all under Advisement and Draft a Rule
- Following is Workgroup Recommendations to NDWAC



Overview of Recommendations

- The LCRWGs proposed improvements to the LCR make some fundamental changes:
 - Proactive approach to actions previously triggered by lead action level
 - All systems work with customers to remove LSLs
 - Stronger public education requirements for all systems
 - Establish a household action level; results to health dept. if exceeded
 - Separate requirements for copper; focus on systems w/ aggressive water
- Improvements to CCT and monitoring, with several key issues remaining
- LCRWG seeking to achieve more public health protection than the current rule with this approach taken as a whole



Lead Service Line Replacement Background

- Under the current LCR:
 - LSL replacement triggered by a lead action level exceedance
 - Action is required in a short time frame; results in many partial lead service line replacements (PLSLR)
- Science Advisory Board evaluation of effectiveness of PLSLRs concluded:
 - PLSLR does not reliably reduce lead in the short-term
 - PLSLR often associated with short-term elevated drinking water lead levels for some period of time
 - Full LSLR appears in general to effectively and reliably achieve long-term reduction of lead levels in drinking water



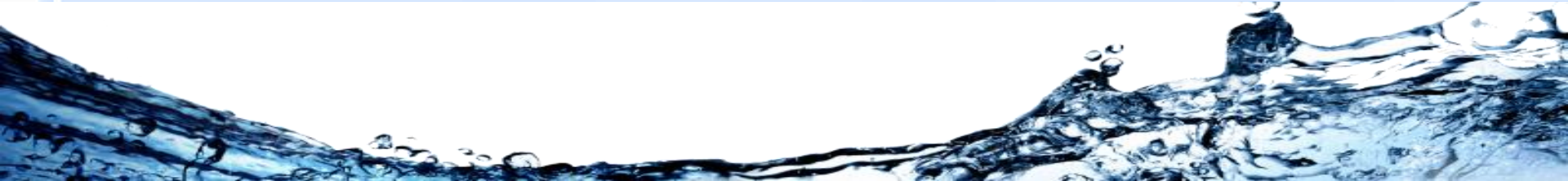
Proactive Lead Service Line Replacement

- All systems should work with customers to replace LSLs.
Recommended framework:
 - Assume lines are lead if prior to a certain date, unless PWS can demonstrate otherwise
 - Targeted outreach to customers with LSLs; no penalty for customer refusal
 - Interim replacement milestones; credit for lines determined not to be lead; increasing outreach actions if milestones are not met
 - No credit for partial LSL replacement
 - SOPs (EPA guidance/templates for small and medium systems) for planned maintenance, emergency repairs, etc.



Proactive Lead Service Line Replacement

- Benefits:
 - Primary source of lead in contact with drinking water will be largely removed over time – reduced public health risk and costs of corrosion control treatment
 - Improved process for planning and replacing LSLs (e.g. can include in capital improvement programs)
 - Improved awareness of location of LSLs and PLSLs
 - Improved communication with consumers and public health partners about the risks of lead in drinking water
- Remaining issues: Will requirement for escalation of actions result in meeting replacement milestones? What if customers refuse? Should it be a violation not to meet milestones?



Stronger Public Education Requirements

- Customers and PWSs share responsibility for reducing exposure to lead
- Public education (PE) and customer outreach is critical to the success of the LCR
- Should convey:
 - No safe level of lead; health risks from lead in drinking water and potential for exposure
 - Shared responsibility nature of the LCR
 - Importance of LSL replacement
 - Measures to minimize exposure (flushing, POU)



Stronger Public Education Requirements

- LCRWG recommends EPA establish a national lead information clearinghouse and
- include the following LCR revisions:
 - Revise the current CCR language to address LSLs and update health statements
 - Require ongoing targeted outreach for LSL customers
 - Add requirements for public access to information
 - Outreach to public health partners



Improve Corrosion Control Treatment

- LCRWG recommends:
 - EPA release a revised CCT guidance manual and update regularly to reflect new science
 - EPA provide increased expert assistance to PWSs and primacy agencies
 - PWS review of updates to guidance to determine if CCT is based on best science; and
 - CCT reassessment when PWS changes treatment or source
- Options/questions under discussion:
 - Additional water quality parameters (WQPs) and tighter ranges
 - Increased frequency (and possibly sites) for WQP monitoring of CCT
 - More rigorous data review/control charts, process controls
 - Role of tap sampling to confirm CCT is actually minimizing lead at the tap



Modify Tap Sampling Requirements

- Currently PWSs conduct tap sampling for lead, with sample site selection tiers and first draw sampling protocol. If the action level is exceeded, small/med systems triggered to CCT and all systems must do PE and LSLR until results are under the AL for two monitoring periods
- Issues with current approach:
 - Sampling protocol may not capture the highest lead levels (not from LSL, inconsistent sampling from customers, variability among properties, etc.)
 - Recruitment is difficult and labor intensive
 - Sampling is infrequent and in relatively few homes
 - Implications for CCT are complicated



Modify Tap Sampling Requirements

- PWSs will test tap samples at customer request
 - Targeted outreach to customers with LSLs and vulnerable populations; available to any customer
 - Tap sampling results will be used to:
 - Inform and empower individual households to reduce risk
 - Report to health officials when monitoring exceeds a “household action level”
 - Evaluate effectiveness of CCT and guide reassessment
 - Implement the transition to the revised LCR



Establish a Household Action Level

- Current lead action level is based on 90th percentile of collected tap samples
- Household action level would be based on lead concentration necessary to elevate a formula fed infant's BLL $\geq 5 \mu\text{g}/\text{dL}$
 - Based on CDC level of concern
- PWS to notify local health department when result of tap sampling is greater than household action level – health department to take action it deems best



Separate Requirements for Copper

- Actions should be based on aggressiveness of water to copper not routine in-home monitoring
- EPA should develop criteria to define water that is not aggressive to copper for purposes of the LCR
- PWSs can choose among options to demonstrate water is not aggressive to copper:
 - WQP monitoring
 - One-time evaluation with tap sampling for copper at homes with new copper
 - Pipe loop study
 - CCT to change water chemistry



Separate Requirements for Copper

- For non-aggressive waters, continue to demonstrate that water is not aggressive to copper
- For systems with water aggressive to copper, initiate and maintain a PE program to inform:
 - Owners of new homes at initiation of service; and
 - Owners of renovated homes or to all customers routinely
- EPA should consider whether and under what circumstances CCT should be required (LCRWG assumes this would be a limited set of circumstances, but option should exist)



What Can a Utility Do Now

- EE&T is Helping Several Utilities Prepare and Get Ahead
- Evaluate Rule Impact on Your System
- Get Inventory of LSL in Place
- Begin a Simplified Public Education Program to Get Customers Accumulated
- Start a Full LSL Replacement / Education Program

