



**Water  
Research  
Foundation®**

**Celebrating 50 Years  
1966–2016**

# Review of key lead research issues addressed by WRF

March 29, 2016

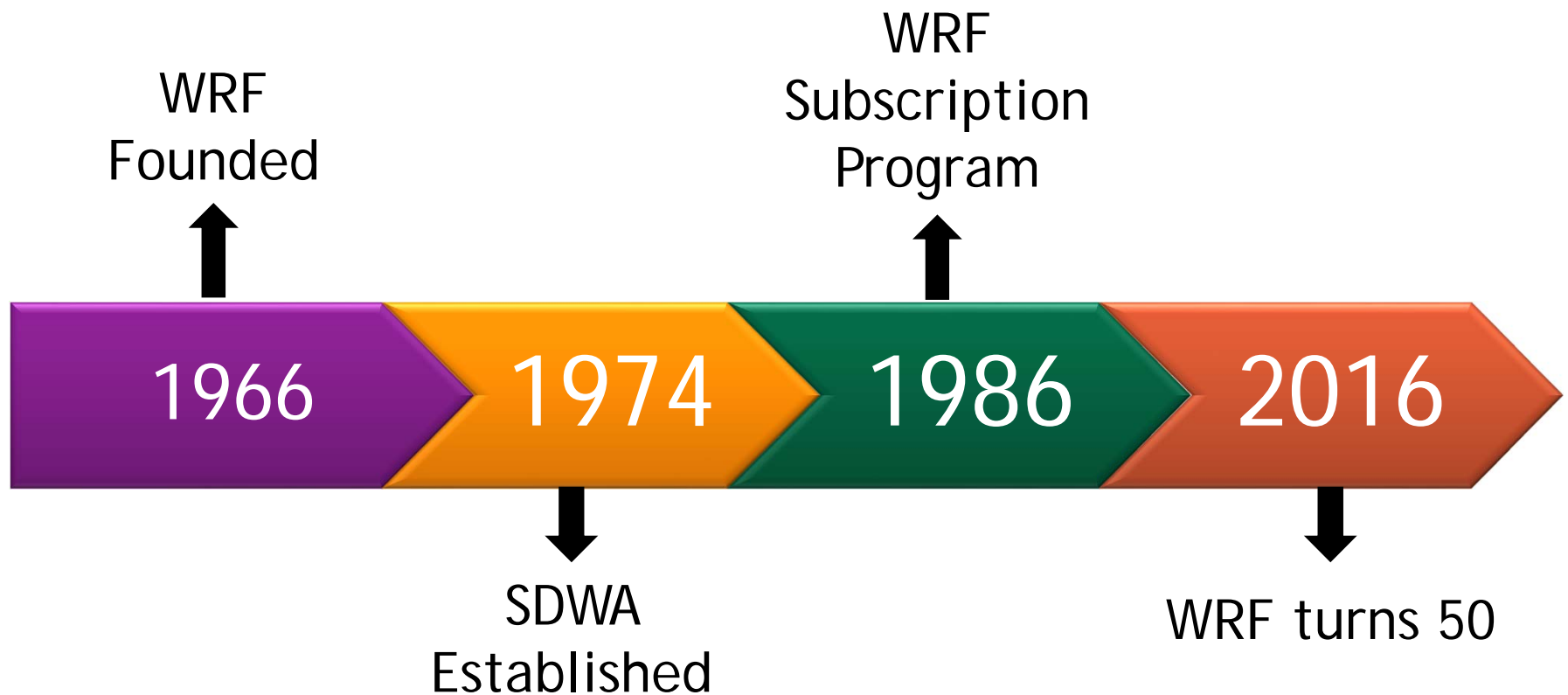
advancing the science of water



Jonathan Cuppett  
Research Manager  
Water Research Foundation

advancing the science of water

# 50 years of water research

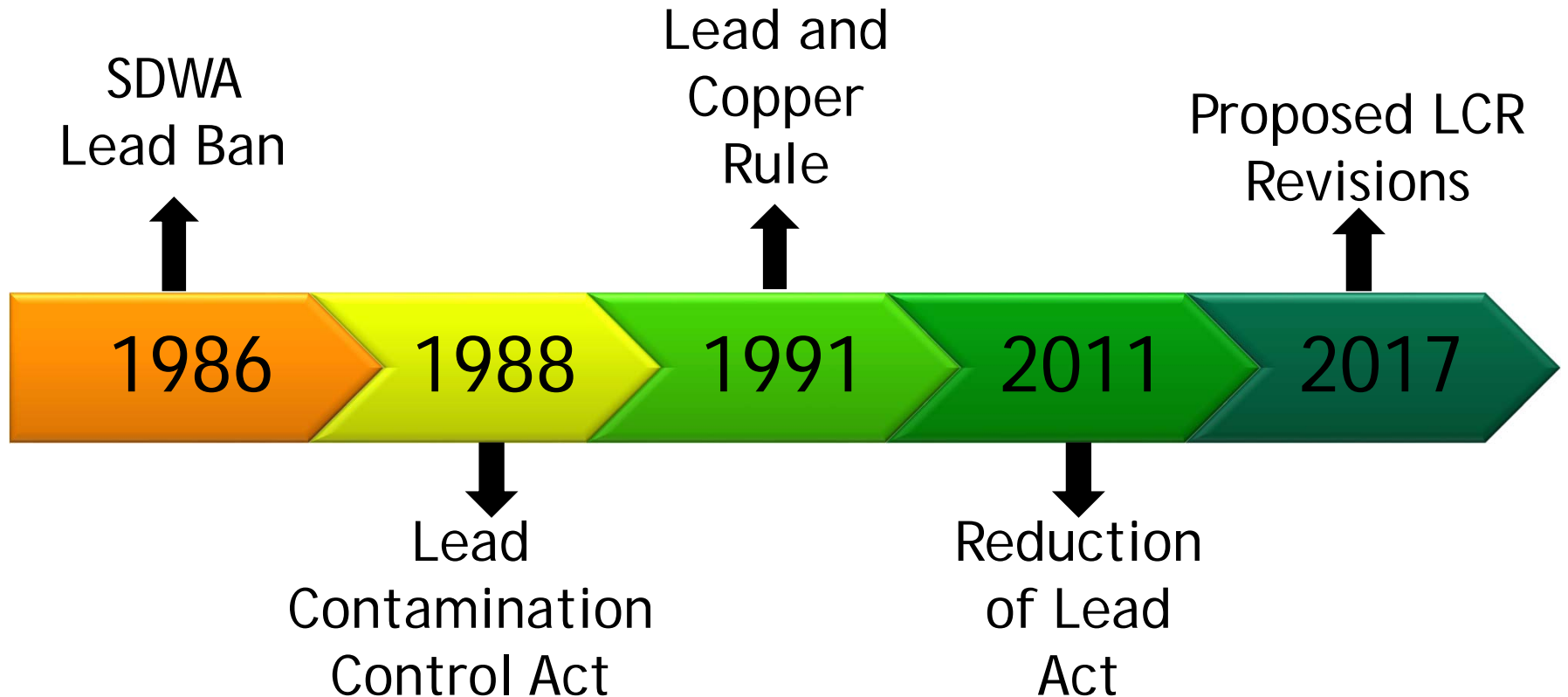


# Presentation Overview

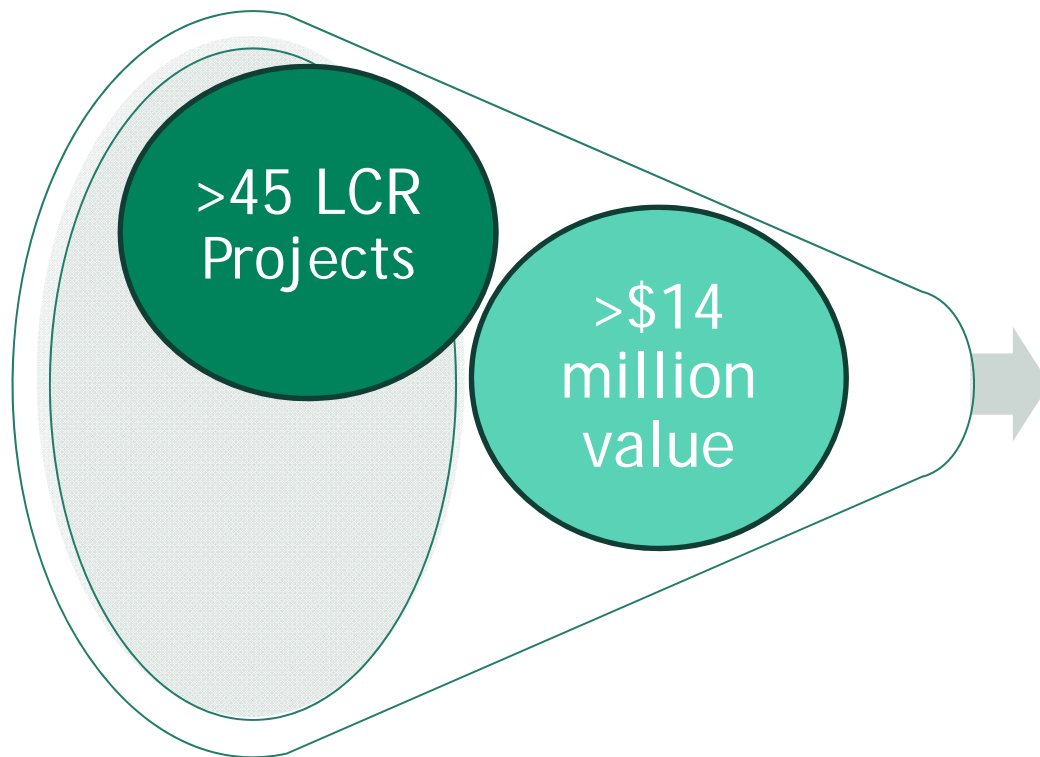


WRF LCR research

# History of SDWA Lead Regulation



# WRF Lead Research since late 1980's



**Water Research Foundation**

The Foundation

lead

You've seen this result before  
**Lead** and Copper Rule:

- ✓ Special Report: Lead and Copper Corrosion: An Overview  
[www.waterrf.org/pages/PublicSpecialReports-detail.aspx?ItemID=9](http://www.waterrf.org/pages/PublicSpecialReports-detail.aspx?ItemID=9)
- ✓ Project: Lead, Copper Corrosion Control in New Construction  
[www.waterrf.org/Pages/Projects.aspx?PID=4164](http://www.waterrf.org/Pages/Projects.aspx?PID=4164)
- ✓ Project Paper: Research Review on Galvanic Corrosion  
[www.waterrf.org/pages/PublicProjectPapers-detail.aspx?ItemID=3](http://www.waterrf.org/pages/PublicProjectPapers-detail.aspx?ItemID=3)

PDFs for "lead"

- Lead** and Copper Corrosion: An Overview of WRF Research  
Table 1. **Lead** and copper regulatory framework Copper **Lead** AL (mg/L) 1.3 0.015 Health Based ... In **lead** service lines, the **lead**-surface-area-to-water-volume ratio is similar to that in a ...  
[www.waterrf.org/resources/.../LeadCorrosion.pdf](http://www.waterrf.org/resources/.../LeadCorrosion.pdf)
- When water utility customers complain about their drinking water...  
Advancing the Science of Water: WRF and Research on ... Taste and Odor in Drinking Water ... In addition to making sure the water at customers' taps is safe to drink, water providers must ...  
[www.waterrf.org/resources/.../TasteandOdorResearch.pdf](http://www.waterrf.org/resources/.../TasteandOdorResearch.pdf)

# Lead and Copper Corrosion: An Overview of WRF Research

- 1 Project Summaries
- 2 Summary of Common Themes
- 3 Ongoing Projects
- 4 List of all Projects



January 2016 Update

## Lead and Copper Corrosion: An Overview of WRF Research

*Jonathan Cuppett, Water Research Foundation*

This summary of relevant Water Research Foundation (WRF) research projects, both completed and ongoing, provides a basic understanding of the issues surrounding lead and copper corrosion and the Lead and Copper Rule (LCR).

### BACKGROUND

In 1991, the U.S. Environmental Protection Agency (EPA) published the LCR, which established that all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs) would be subject to the rule requirements. The primary purpose of the LCR is to protect public health by minimizing lead (Pb) and copper (Cu) levels in drinking water. Pb and Cu enter drinking water mainly from corrosion of Pb- and Cu-containing plumbing materials. A unique aspect of the LCR is that lead and copper have action levels (AL) of 0.015 mg/L for lead and 1.3 mg/L for copper, and therefore do not have Maximum Contaminant Levels (MCLs). The action level for lead is a screening technique for optimal corrosion control based on treatment feasibility, and is not a health-based threshold. The action level for copper does have a health reference based on the prevention of nausea. Copper also has a secondary MCL (SMCL) of 1.0 mg/L, which is based on aesthetics or taste and staining. Table 1 highlights the different regulatory levels of Pb and Cu.

Table 1. Lead and copper regulatory framework

	Copper	Lead
AL (mg/L)	1.3	0.015
Health Based Action Level	Yes	No
MCL	N/A	N/A
MCLG (mg/L)	1.3	0
SMCL (mg/L)	1.0	N/A

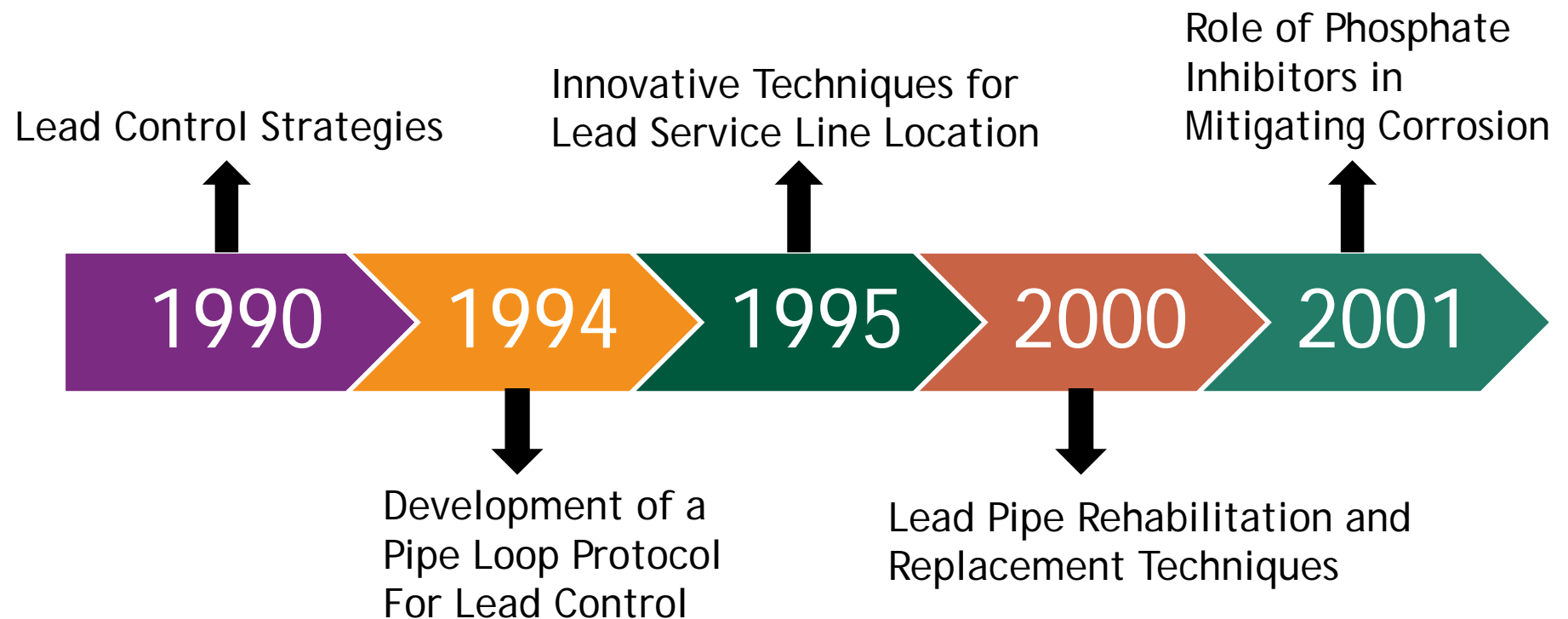


# WRF Lead Research

## Past, Present, Future



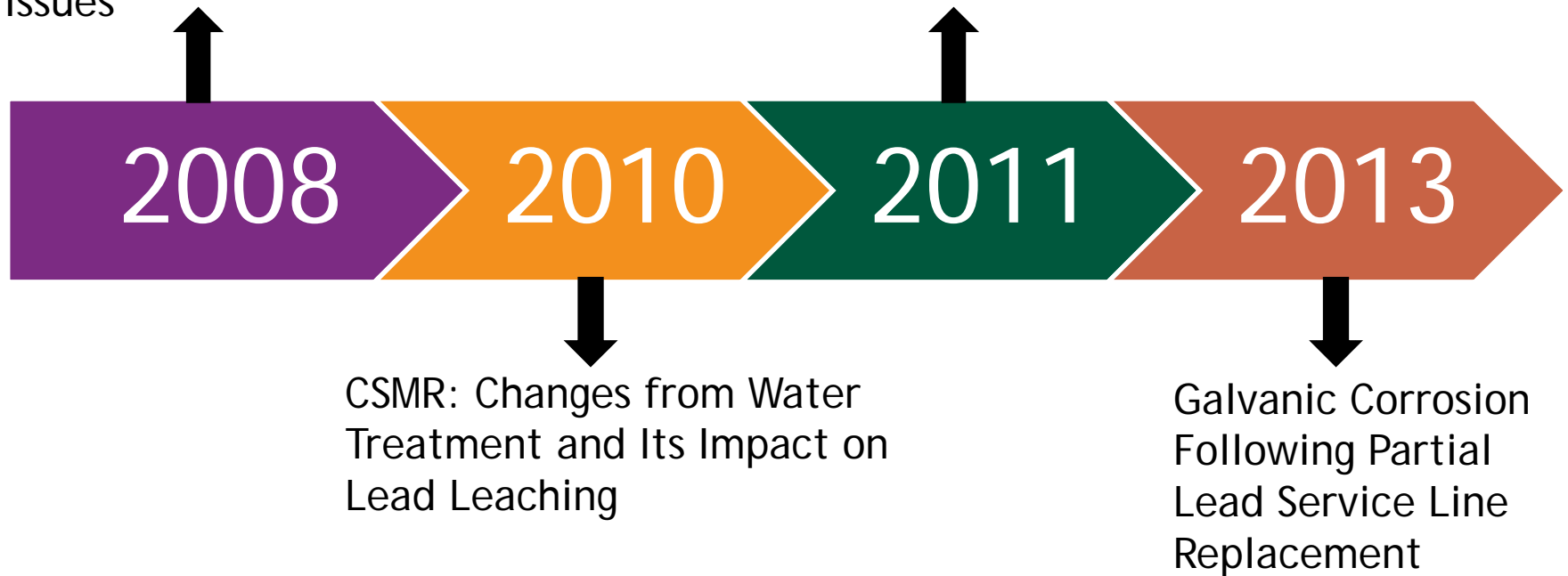
# Notable Past WRF Projects



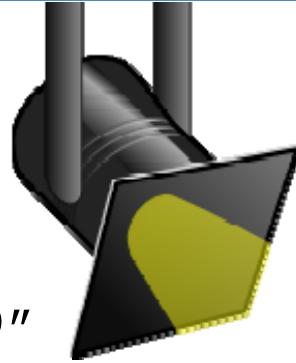
# Notable Past WRF Projects

Contribution of Service  
Line and Plumbing  
Fixtures to Lead and  
Copper Rule Compliance  
Issues

Lead and Copper Corrosion  
in New Construction



# Project



# Spotlight

- 2015 publication "4569"
- WRF - AWWA collaboration
- Response to attention to profile sampling
- Highlighted challenges with customers performing profiles
- No sampling method was particularly proficient at finding the peak lead level compared to doing a full profile for each sampling event
- Webcast available
- JAWWA publication forthcoming

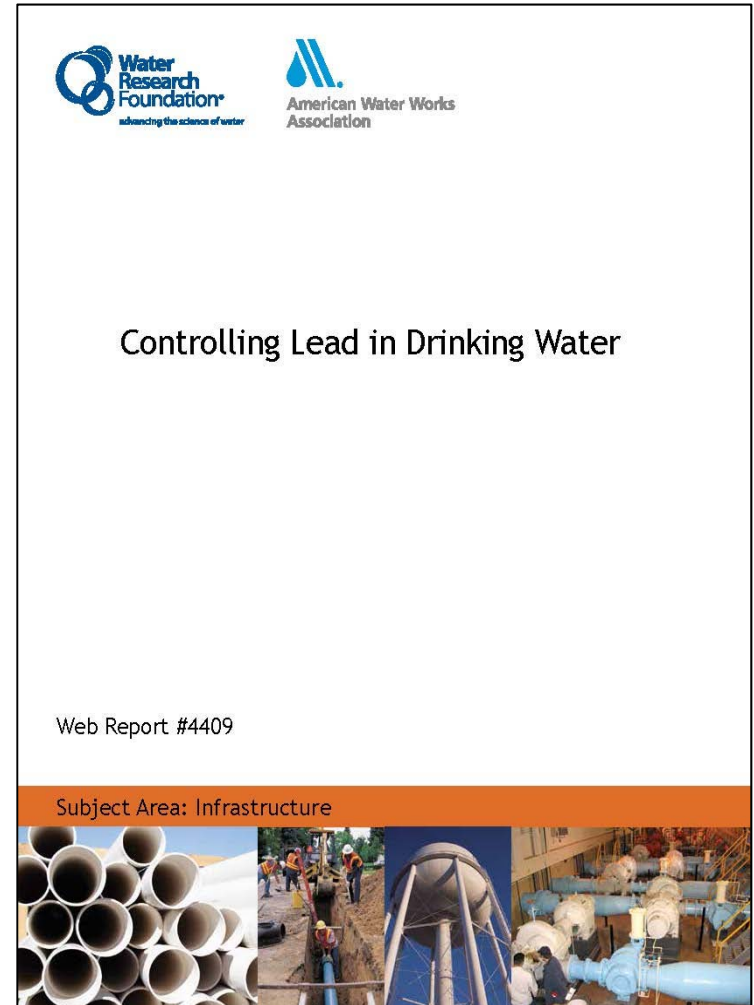
The image shows the cover of a web report. At the top left is the Water Research Foundation logo with the tagline "advancing the science of water". At the top right is the American Water Works Association logo. The title "Evaluation of Lead Sampling Strategies" is centered in the middle. Below the title, it says "Web Report #4569". A pink horizontal bar contains the text "Subject Area: Water Quality". At the bottom, there is a collage of four images: a water tap with water spraying, a person in a lab coat looking at a device, a hand holding a glass of water under a tap, and a person in a lab coat working with several beakers containing colored liquids.

# Project



# Spotlight

- 2015 publication "4409"
- WRF - AWWA collaboration
- Overview of Lead in drinking water and corrosion chemistry
- Lead service line replacement strategies
- 6 - OCCT Case Studies



# Present LCR Projects

2016

- Evaluation of Lead Service Line Lining and Coating Technologies
- Evaluation of Flushing to Reduce Lead Levels

2017

- Optimization of Phosphorus-Based Corrosion Control Chemicals and Flushing for Lead and Copper Control
- Corrosion of Nonleaded Pump Impeller Alloys in Chlorinated Potable Water

# Future of WRF LCR Research

WRF Webcast: April 21, 12-2 MT

“Lead and Copper Rule:  
Potential Regulatory Changes,  
Corrosion Chemistry, and  
Stakeholder Communication”

\*Registration available on WRF website

- Expert Symposium
- LCR Focus Area request in 2016
- Potential Research Needs
  - Service line material identification
  - Water corrosive to copper
  - Communication Issues



The Foundation

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### Celebrating 50 Years of WRF Research

As part of our year long 50th anniversary celebration, WRF will be highlighting several utility stories, showcasing subscriber utilities that have achieved great things, in part because of their use of and participation in WRF research projects.

### Research Results and Tools

Access to Project reports and updates, Case Studies, Web Tools, State of the Science documents, and more.

### Advances in Water Research Magazine

The Year in Review issue features key research results from 2015, including summaries of projects on cyanotoxins, emerging contaminants, water audits and dozens of other topics.

### Knowledge Portals

Energy Management  
Utility Finance  
Asset Management  
Water Efficiency  
Microbiols  
Desalination and Reuse  
Chemicals of Emerging Concern  
Customer Service  
Advanced Treatment

# Get Involved!



## Controlling Lead in Drinking Water

Web Report #4409

Subject Area: Infrastructure



Sign up for the Webcast!



Comments or questions, please contact:

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For more information visit:

[www.waterrf.org](http://www.waterrf.org)



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