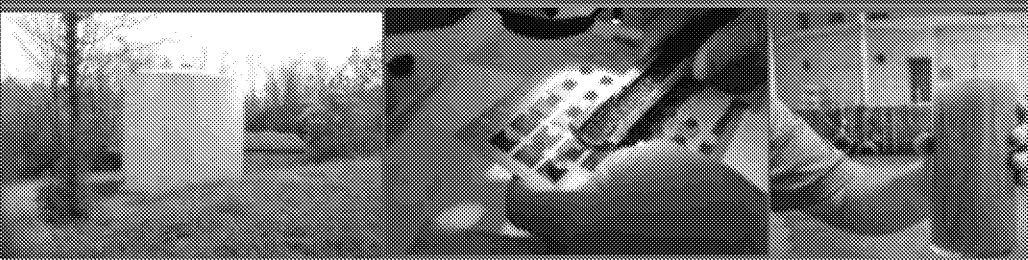
EPA
United States
Environmental Protection
Agency

Drinking Water

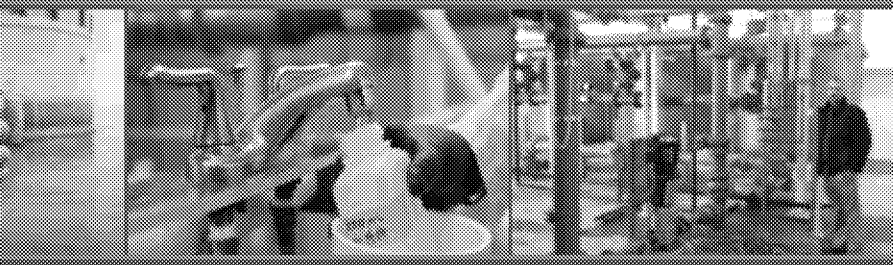


Thomas Speth
US EPA ORD, National Risk Manage

Region 5 States and Neighboring S
February 2, 2018

Office of Research and Development

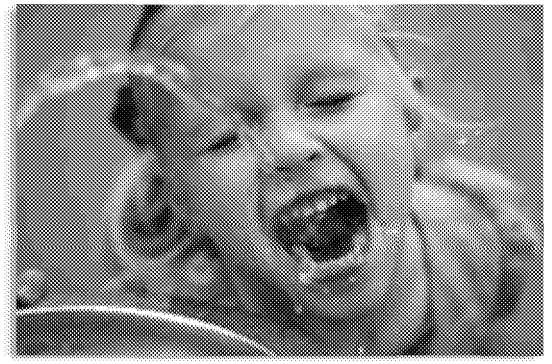
Research



ement Research Laboratory

tates' Visit to US EPA Cincinnati

Drinking Water: Overall Issue



How do we assure safe drinking water and maintain consumer confidence?

- States and communities have full workloads.
- Public perception has become a significant driver for action.
- Communities have to deal with resource shortfalls, especially small systems.
- States have increased responsibilities and decreased resources.

Problems: Lead

How does a community maintain consumer confidence in light of events in Flint, MI?

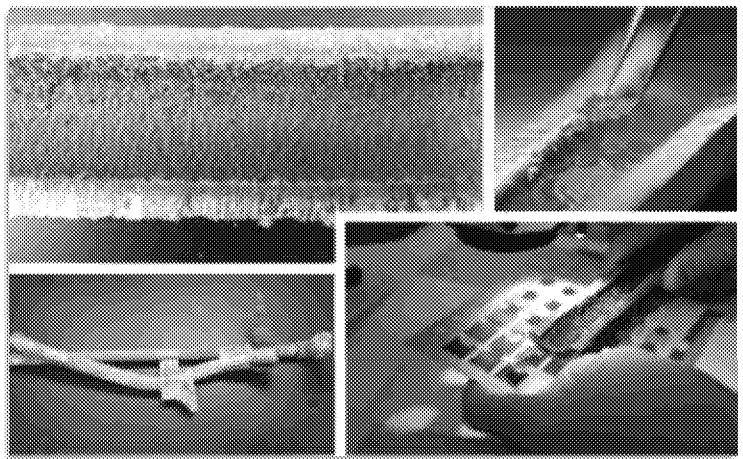
- Lead action level is not health based, making it difficult to explain.
- Lead and Copper Rule (LCR) sample does not capture stagnant overnight water in lead service line and will not catch highest Pb concentrations/exposures.
- Highest lead concentrations can come from variable particulate release.
- Scale on lead-containing materials will differ between utilities.
- Corrosion control techniques (e.g., orthophosphate) seem to have different impacts on different lead sources (service lines, solder and brass fixtures).
- Other factors (e.g., maintaining water quality) can impact lead corrosion.
- Lead-containing fixtures, plumbing designs and water use vary between homes.

Problems: Lead (continued)

How does a community maintain consumer confidence in light of events in Flint, MI?

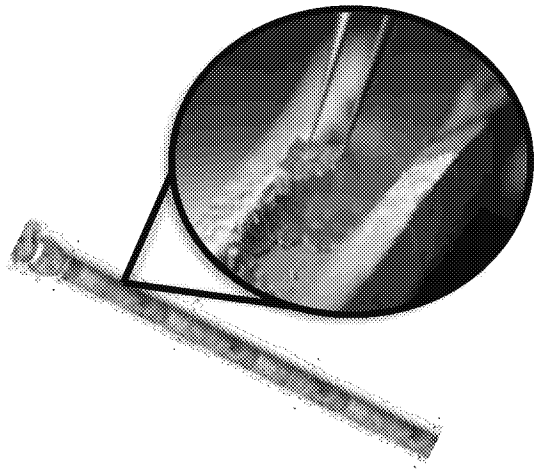
- There are few drinking water lead corrosion experts in the country.

- There are few facilities in the world that can analyze lead scales.



EPA United States Environmental Protection Agency

Actions: Lead



Evaluate Corrosion Scales Across the Nation

	Sampling Purpose
First Draw	-Regulatory (US) -Treatment Assessment
Random Daytime Sampling (RDT)	-Regulatory (UK) -Treatment Assessment
Fixed Stagnation Time (30MS)	-Regulatory (Ontario) -Treatment Assessment
Fully Flushed	-Lead Source Assessment -Treatment Assessment
Sequential Sampling (Profile Sampling)	Lead Source Assessment
Composite Proportional	Exposure Assessment
Particle Stimulation Sampling	-Lead Type Assessment -Exposure Assessment
Service Line Sampling (Second Draw)	--Lead Source Assessment
3T's Sampling for Schools	-Lead Source Assessment

- EPA ORD leads the world in lead dissolution research (water treatment, background chemistry, pipe conditions).
- Serves as a resource to utilities and states needing help.
- Solids analysis facility has analyzed over 350 pipe samples from 18 states.
- Developing technology to determine cumulative lead exposure.

Actions: Lead

Water Quality Impacts Studies

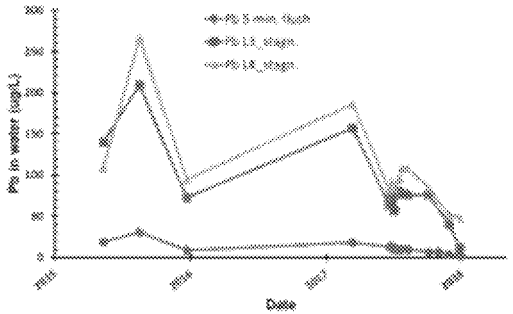
Problem: Water quality changes can result in lead release.

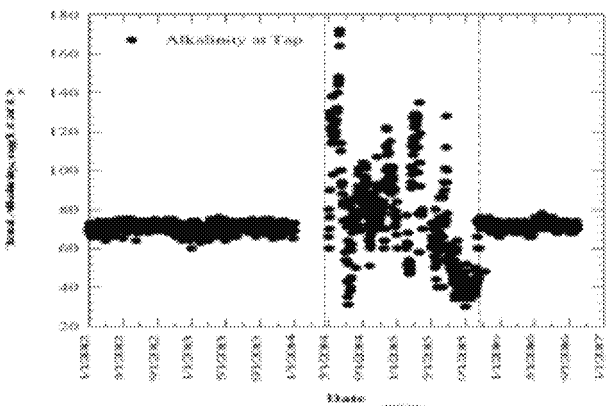
Action: Complete a study at abandoned home(s).

Impact: Providing guidance on handling vacant housing.

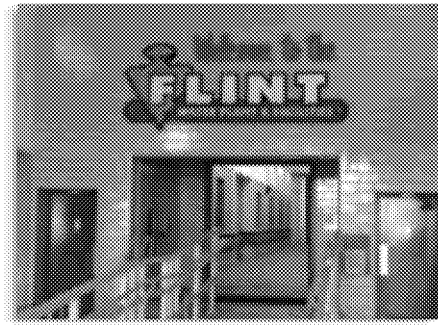
Results:

- Short-term (days to weeks) stagnation does not appear to have adverse effect on lead corrosion.
- Long term (months to years) stagnation can result in lead corrosion.
- The site can return to adequate lead control but only after an extended period of time (3-9 months).





Actions and Impact: Flint, MI



- Flint's Technical Advisory Committee
- Michigan's Flint Water Interagency Coordinating Committee
- US EPA Region 5 Flint Task Force
- US EPA Enforcement Team

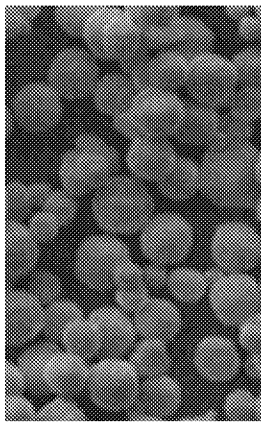
ORD provided assistance:

- Analysis of lead pipes.
- Built pipe loop rigs that incorporated lead pipes removed from Flint homes for corrosion control assessment.

- Disinfectant residual monitoring study.
- Flushing program implemented in conjunction with US EPA's Area-Wide Optimization Program team.
- Distribution system modeling with EPANET.
- Recommendations for plant and distribution system changes.
- Installed data diode and real-time distribution system data system with analysis: EPANET:LINK.

EPA United States Environmental Protection Agency

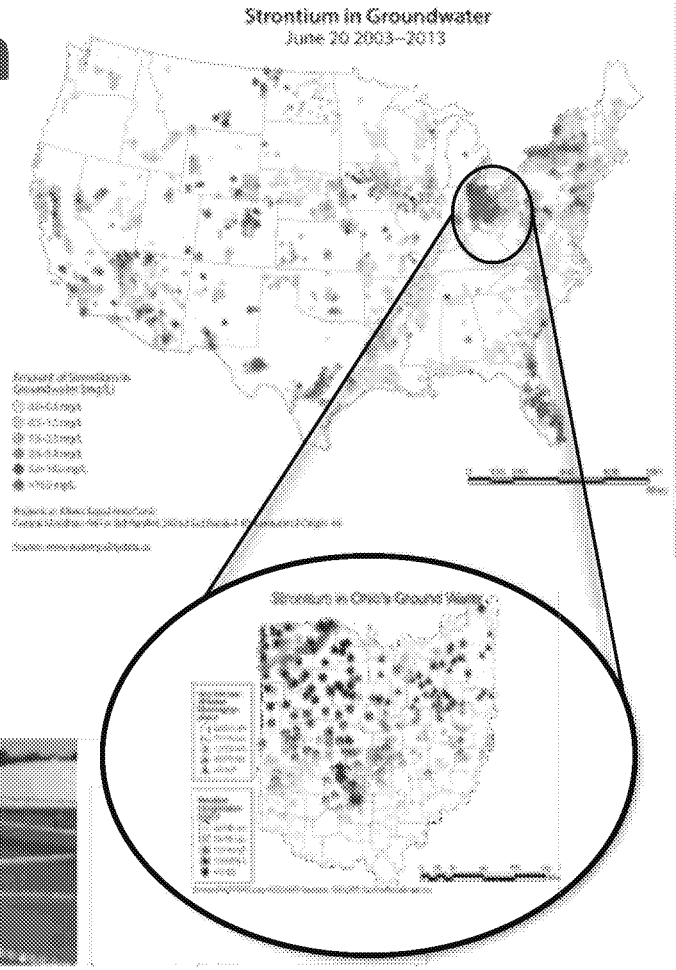
Problems: Strontium



Problem: Naturally-occurring strontium is widely distributed across the US.

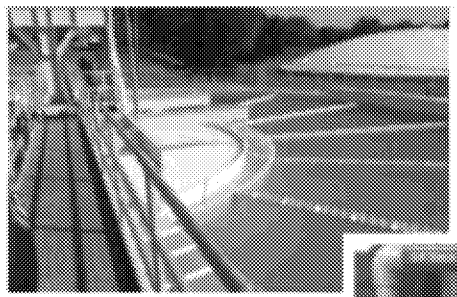
Action: Conducted bench- and full-scale studies at 8 Ohio utilities.

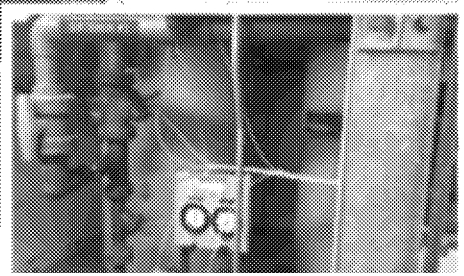
Impact: Provided guidance to utilities and states on effective treatment.



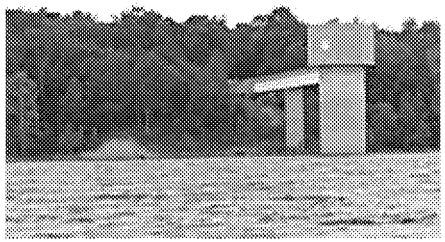
Results:

- Bench testing showed that strontium is effectively removed during lime/soda ash softening.
- Full-scale studies showed that lime softening and ion exchange softening effectively reduce strontium.





Problems:
Brominated Disinfection Byproducts



Problem:

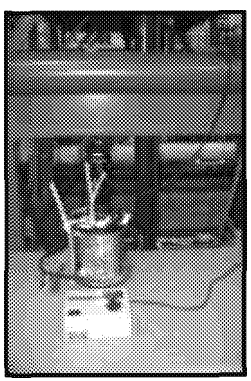
- Public water systems are increasingly facing higher bromide levels in their source waters.
- Increased bromide in source waters will increase total trihalomethane (THM) concentrations and increase brominated DBPs.

Action/Results:

- Investigated relationships between bromide in source water and the formation of brominated DBPs in finished drinking water (8 PWS over two years).
- Estimating the potential increase in bladder cancer risk from an increase in THM4 concentration (and associated DBPs) due specifically to increased bromide in the source water (based on 201 PWS).
- Conducted epidemiological studies to examined the relationship between DBP exposures and health effects.
- Working with utilities and their states on elevated DBPs within their distribution system (distribution system modeling and treatment recommendations).

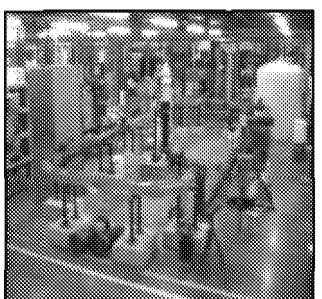
Water Security & Resilience Research

Bench-Scale



- Fate and transport of contaminants in drinking water pipes
- Decontamination approaches

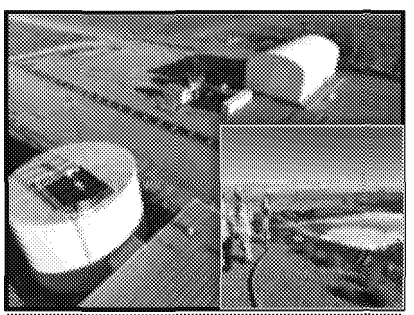
Pilot-Scale



Test & Evaluation Facility

- Effective decontamination and water treatment

Full-Scale

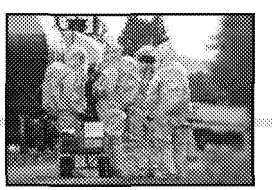


Water Security Test Bed

- Field-testing successful decontamination methodologies

Response and Recovery

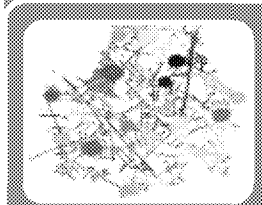
Application to Real Response Incidents



- Charleston, WV, Elk River chemical spill (2014)
- Support to EPA Region 6, Corpus Christi (Dec 2016)
- Support to EPA Region 3, oil spill in Washington DC (Potomac River)

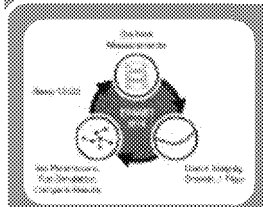
Software Tools to Help Manage Emergencies

- Power outages
- Pipe breaks
- Source water spills
- Natural disasters
- Cyber attacks
- Fires
- Contamination incidents
- Resilience – Optimizing response to disasters



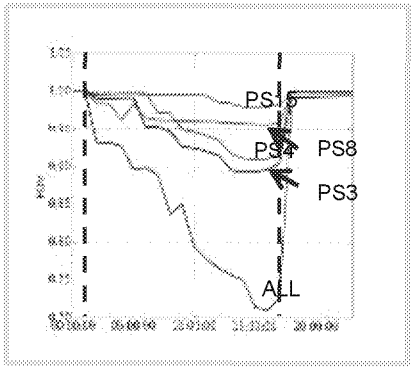
TEVA-SPOT Sensor Placement

- Greater Cincinnati Water Works (2015 MLB All-Star game)
- Montreal Water Utility, Montreal, Canada (*E. coli* notification)
- Water Security Initiative utilities

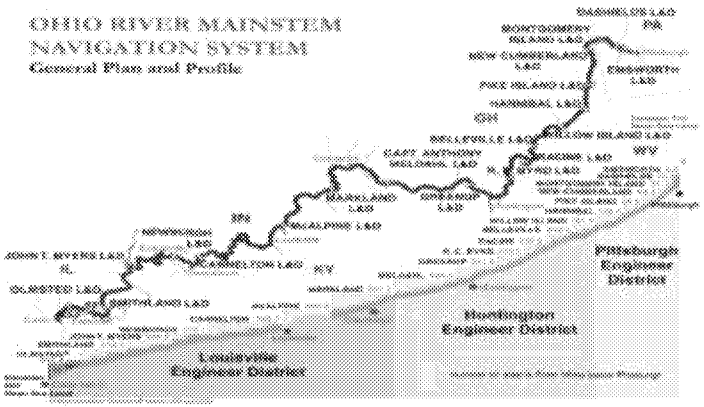


EPANET-RTX Real-time Hydraulic Modeling

- Northern Kentucky Water District (2012-2014)
- City of Milford, Ohio (2014-present)
- City of Flint, Michigan (2016 – present)



Resilience



Small Systems: Workshop

Annual Face-to Face Drinking Water Workshop with Stakeholders

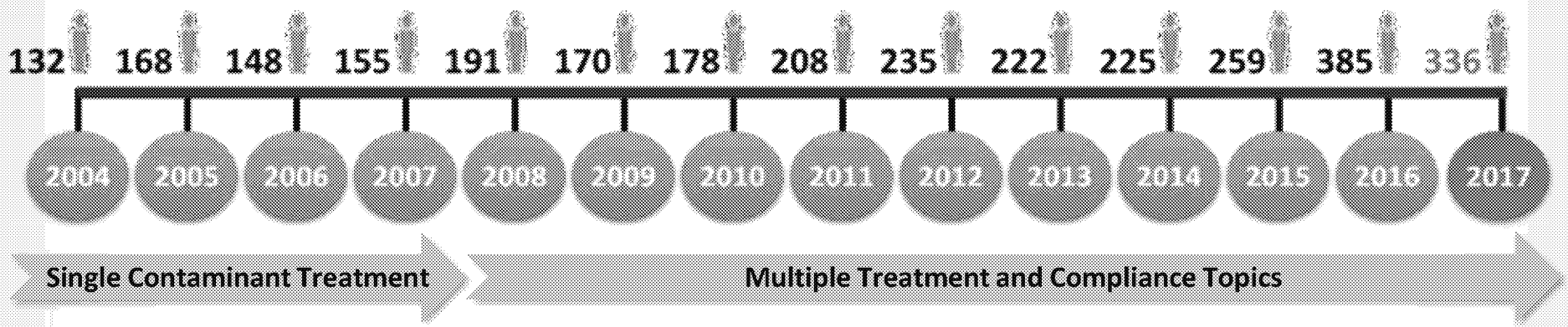
Partnership with the Office of Water and the Association of State Drinking Water Administrators

EPA
States
Academia
Other Agencies

Exchange of current information and solutions, training, networking, partnerships

States
Tribes
Utilities
Consultants

Workshop Attendance History



Workshop held every August/September in Cincinnati, OH

https://www.epa.gov/water-research/14th-annual-epa-drinking-water-workshop-small-systems-challenges-and-solutions

Small Systems: Workshop

Annual Face-to Face Small Systems Drinking Water Workshop with Stakeholders

Partnership with US EPA's Office of Water and the Association of State Drinking Water Administrators

14th Annual 2017 Workshop:

- 43 states and territories
- 4 tribal nations
- 17 water utilities
- 3 other countries
- Federal agencies: US EPA, USDA, USFWS, NIST, VA, Indian Health Service and several military branches

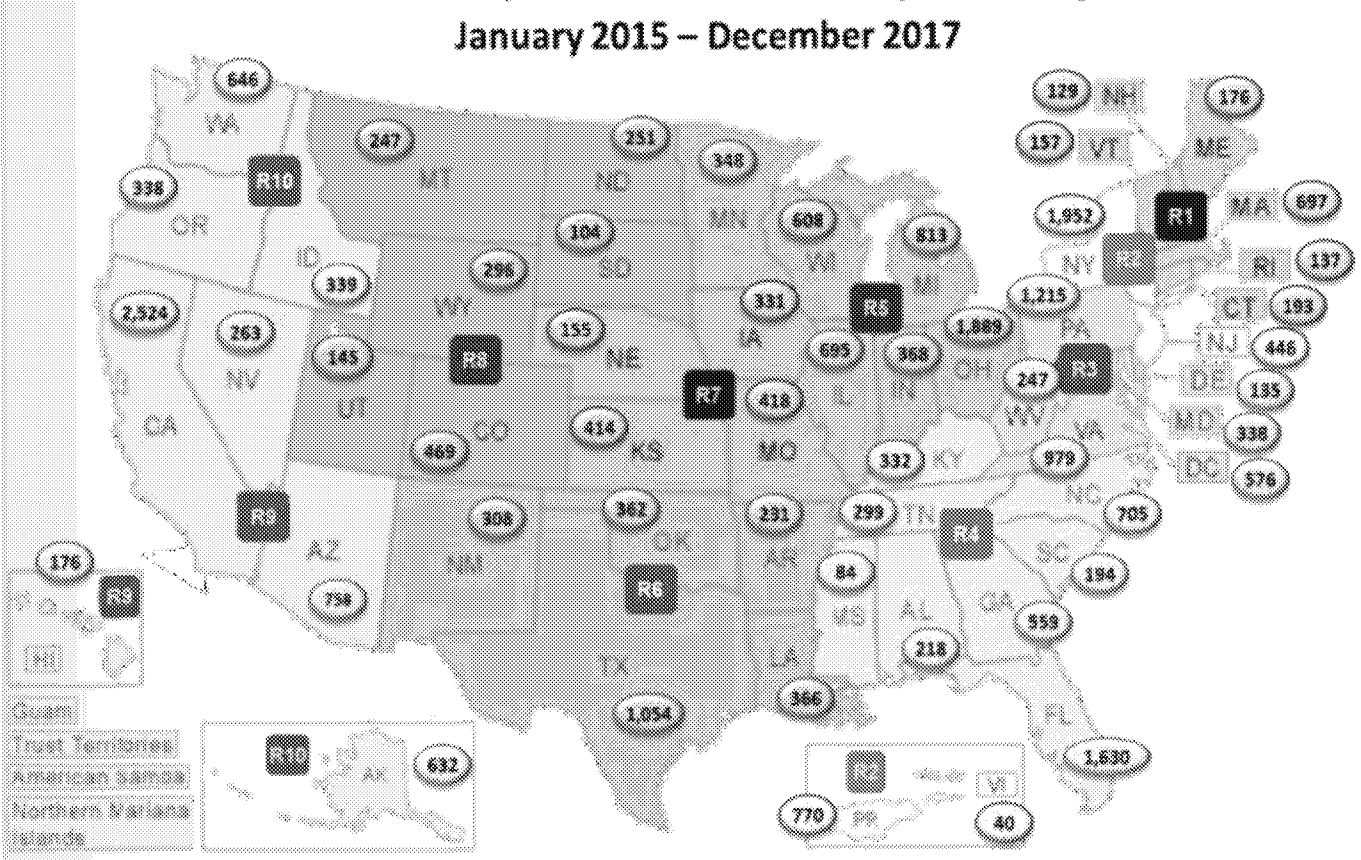
Small Systems: Webinar Series

Monthly Two-Way Information Exchange through Webinars

Partnership with US EPA's Office of Water

Attendees by State, U.S. Territory, and Region

January 2015 – December 2017



- 27,447 attendees
- 16,534 cont. ed. credits
- All 50 states
- 4 U.S. territories
- 35 tribal nations
- 30 other countries

Affiliation Percentages

12%	Federal Government
15%	State Government
13%	Local Government
1%	Tribal Government/Nation
8%	Utility (Public/Private)
9%	Consultant/Tech Assistance Provider
2%	NGO/Association
3%	Academia/Education
1%	Developer/Manufacturer
1%	Medical/Hospital
1%	Other
1%	Military
2%	Corporation/Company

https://www.epa.gov/water-research/small-systems-monthly-webinar-series

Small Systems: Workgroups

Action: Formed in 2011 (14 states represented to date)

Results/Impacts:

- **Communication materials**
- **Identify webinar topics**
- **Identify potential projects**

Example: Identifying Lead Free Certification Marks for Plumbing Products Tool

- Developed document that has had over 53,000 downloads
- Referenced in potential regulations

Example: Technology Acceptance

- Currently conducting study on UV technologies
- Planning for other technologies

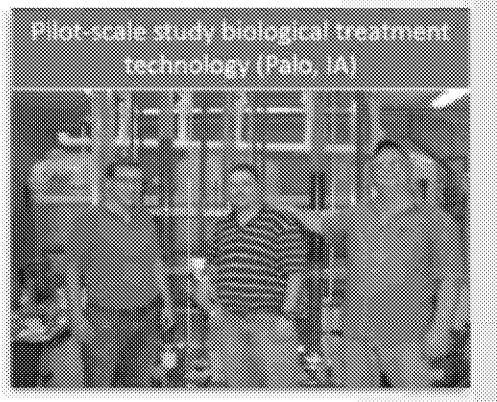
Contact: Michelle Latham

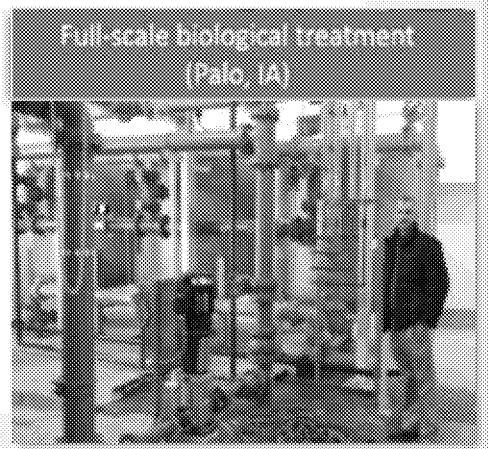
Small Systems: Projects

Action: Treatment Projects for Small Communities

Small Communities in Iowa

- Developed and patented cost-effective technology for treating ammonia, iron, arsenic and manganese.
- Successfully demonstrated technology in the field.
- Worked with consultants, communities, Iowa and Region 7 on implementation.
- Engineering firm built full-scale treatment system in Palo and Fonda (Gilbert soon to follow).
- Communities now have functioning public water systems.





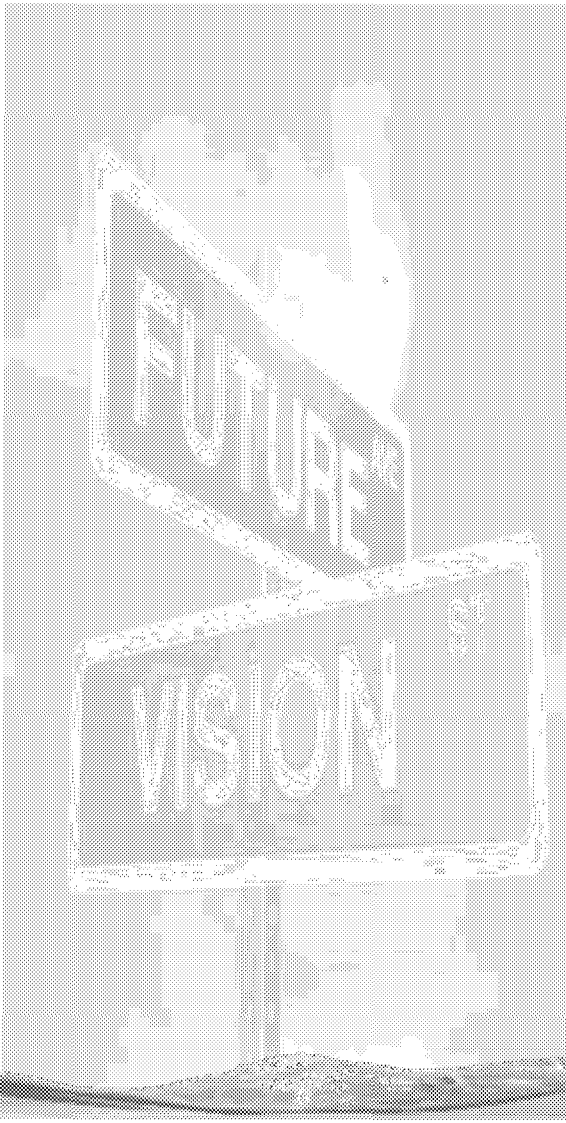
Currently or recently worked with several other small communities in other states (Indiana, Illinois and Ohio)

Summary and Next Steps

ORD Cincinnati has spent decades interacting with states, communities and the water industry on drinking water issues.

Things to remain vigilant about…

1) Incorporating the needs of states and communities into ORD research.
2) Dealing with reduced resources at the community, state and federal level.
3) Working collaboratively on solutions that improve public health.



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Acknowledgements:

Michelle Latham, Darren Lytle, Jay Garland, Valerie Zartarian, Matthew Magnuson, Hiba Ernst and Mike Wright