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CULTIVATING A CULTURE TO MINIMIZE POTENTIAL FOR WATER QUALITY CHALLENGES

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Agenda

- Inherent Risks of Operating a Water System: Some Version of Flint, MI Could Happen to Any of Us
- Beyond EPA Regulations - What Tools Can Your System Use to Promote Awareness and Readiness? Park City's Program
- Cultivating a Culture to Minimize Risk of Water Quality Challenges

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INHERENT RISKS OF OPERATING A WATER SYSTEM: SOME VERSION OF FLINT, MI COULD HAPPEN TO ANY OF US

While many water systems are addressing lead service lines, many do not understand that there could be other underlying issues that can cause lead or other metals to release in water distribution systems.

Distribution System Water Quality Challenges Case Studies

- Although the events that led to the Flint situation were unique, unintended consequences in distribution systems because of water chemistry changes resulting from source or treatment changes have occurred before and after Flint.
- There are likely many other water systems who could tell the same story as these industry examples

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"Mistakes were made in not preparing the distribution system to receive a different, more complex surface water supply." Journal American Water Works Association, September 2018

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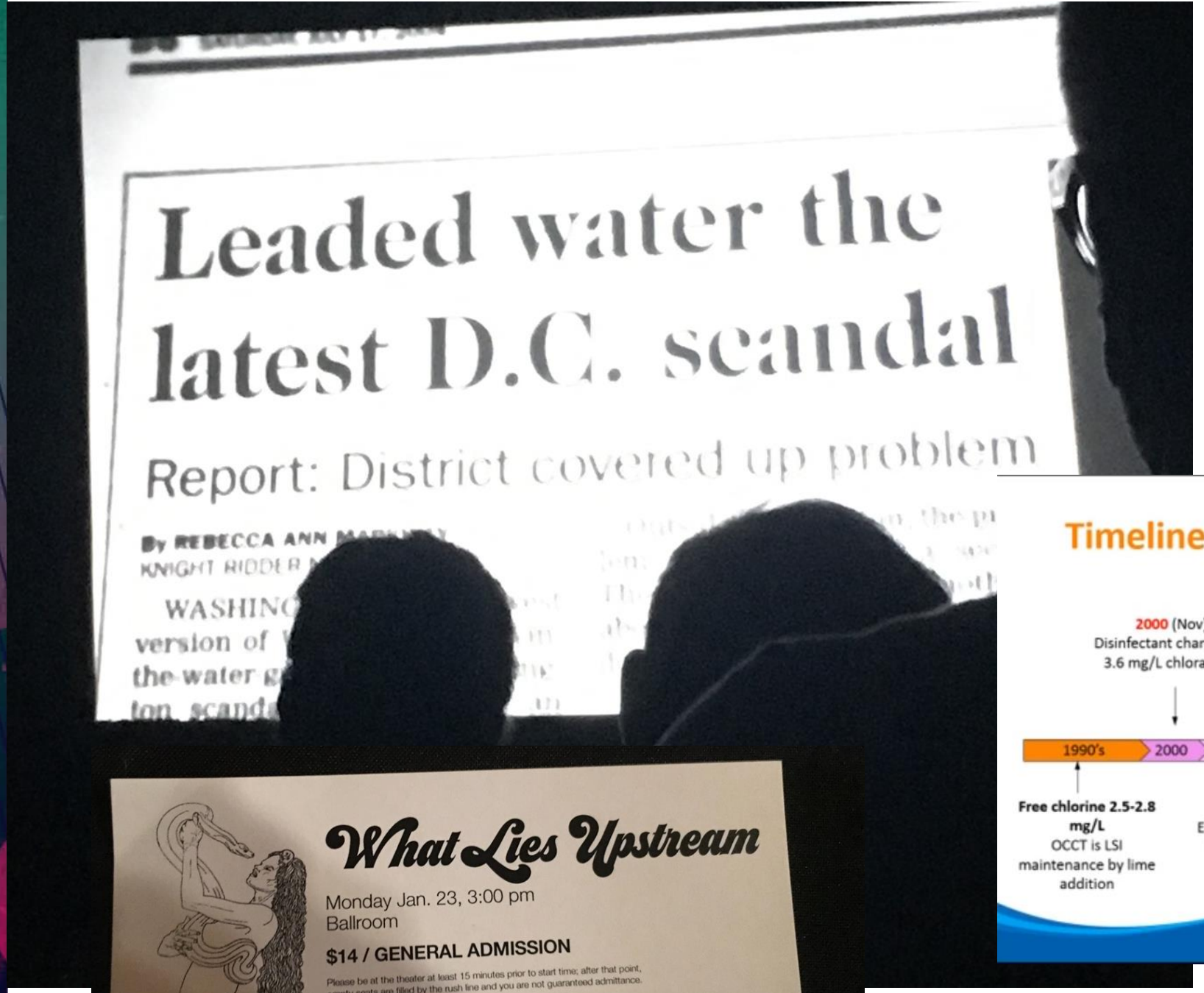
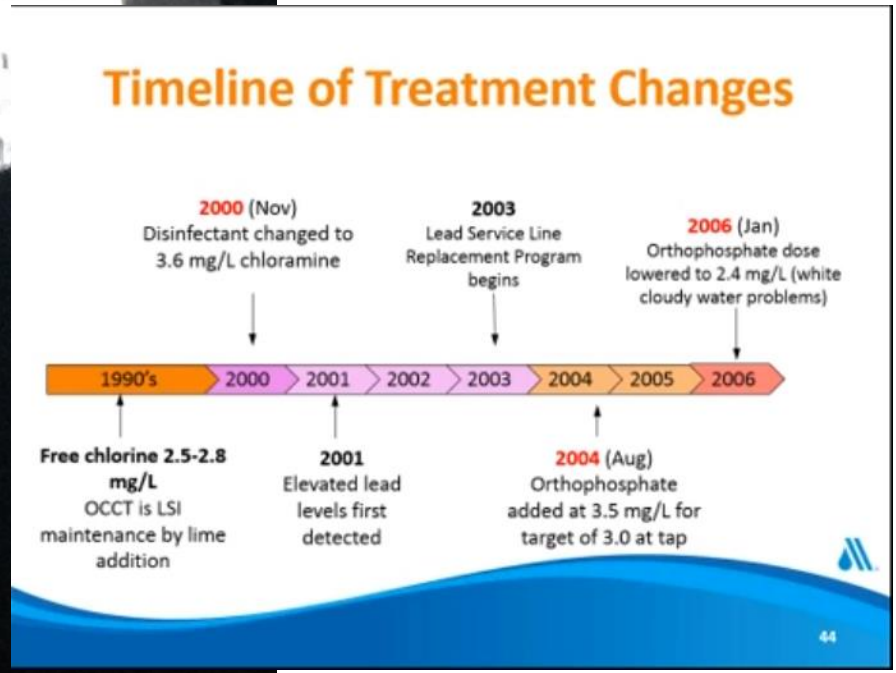

Leaded water the latest D.C. scandal
Report: District covered up problem
What Lies Upstream
Monday Jan. 23, 3:00 pm
Ballroom
$14 / GENERAL ADMISSION
Please be at the theater at least 15 minutes prior to start time; after that point, empty seats are filled by the rush line and you are not guaranteed admittance.


Timeline of Treatment Changes
2000 (Nov)
Disinfectant changed to 3.6 mg/L chloramine
2003
Lead Service Line Replacement Program begins
2006 (Jan)
Orthophosphate dose lowered to 2.4 mg/L (white cloudy water problems)
1990's
2000
2001
2002
2003
2004
2005
2006
Free chlorine 2.5-2.8 mg/L
OCCT is LSI maintenance by lime addition
2001
Elevated lead levels first detected
2004 (Aug)
Orthophosphate added at 3.5 mg/L for target of 3.0 at tap
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Longview, WA: Source Changeover from Surface Water to Groundwater

Mt. St. Helens May 18, 1980 8:32AM

A pipe destabilization mystery

confluence ENGINEERING GROUP LLC

Source: Friedman and Blain, AWWA WQTC 2014

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Sandy City, Utah

DEQ: Elevated levels of lead, fluoride found in Sandy City drinking water

by Alyssa Roberts | Friday, February 15th 2019

Elevated levels of lead and copper have been found in Sandy City's drinking water, the Utah Department of Environmental Quality reported Friday evening. (Photo: KUTV/SBG FILE)

(KUTV) — Elevated levels of lead and fluoride have been found in Sandy City's drinking water, the Utah Department of Environmental Quality reported Friday evening.

- Lead and fluoride concentrations spiked in 600 homes following fluoride pump overfeed after a power outage, illness reported
  - Fluorosilicic acid used to supplement fluoride
  - Low pH water entered system making it corrosive to plumbing materials

Park City, UT: Source Water Metals Accumulation and Release

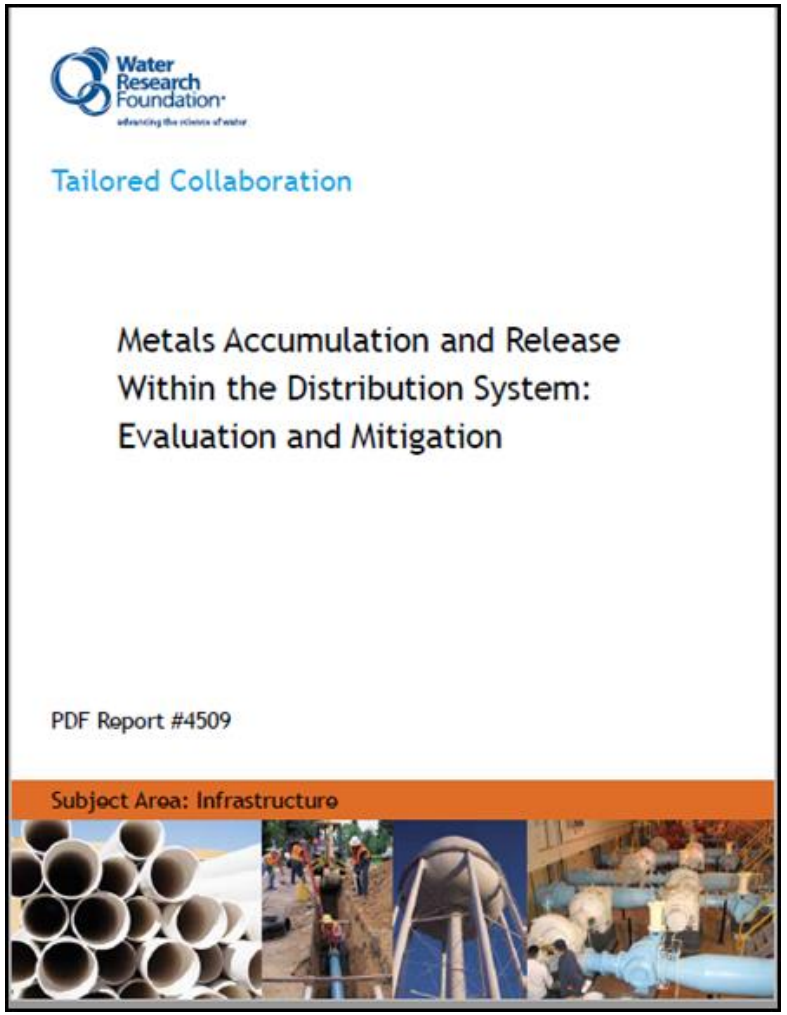
- Supply History Began with Mine Tunnel Water
  - Beginnings started with finding ore; primarily Silver and Zinc
  - Mining and population boom created demand for water
- Over time low levels of metals accumulated onto iron and manganese scale on the interior of distribution system pipe
- Fall 2007 & 2010 customer complaints of discolored brown, coffee-colored water for 10-days
  - Arsenic, thallium, lead, iron, manganese, and mercury released scale
  - Initial reports from operators: earthquake tremor caused
  - Many years later learned that chemical overfeed caused ORP/stability water quality shift

PARK CITY'S CASE STUDY: WHAT TOOLS ARE IN PLACE TO UNDERSTAND WATER QUALITY COMPLEXITIES, MANAGING RISKS, AND SOLUTIONS

Park City had to learn the hard way. Hopefully your system can learn from us and these case studies and avoid repeating history.

Specialized Staff & Commitment to Distribution Water Quality

- Water quality focused reorganization
- Park City sponsored University, Consultant, City staff study
  - 12-month system-wide distribution sampling
  - Internal pipe scale evaluation identified metals on pipe walls and strategies to minimize potential for future release(s)
  - Pilot tested advanced main cleaning to remove accumulated metals from pipe walls



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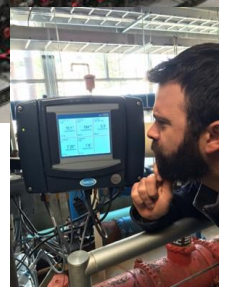
Distribution System - Continuous Monitoring Everywhere

- Established water quality goals for treatment plants & in the distribution system
  - More stringent than regulations
  - Alarms & shutdowns when water quality does not meet goals
- 5 on-line distribution analyzers monitor water quality around-the-clock
  - pH, turbidity, chlorine residual/ORP, conductivity
  - Alarms based on rate of change and daily review
- Quarterly distribution sampling at 13 sites throughout system, results on website
  - Baseline data needed to assess planned and unplanned water quality changes and for comparison if changes



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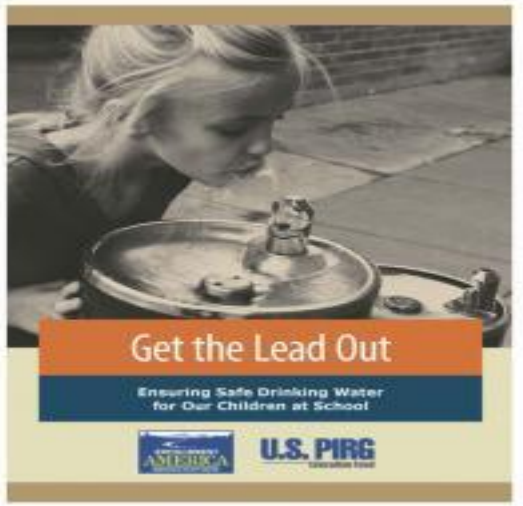
Distribution System Water Quality Management

- Water quality flushing
- Corrosion control
- Tank cleaning
- Advanced main cleaning trials

- Lead testing in homes & City buildings
- Voluntary School District monitoring



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Unidirectional Flushing (UDF)
Current “Industry Standard” Practice

Peak TSS = 10 mg/L

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Foam Swabbing
(Soon to be Implemented: Advanced Main Cleaning)

Peak TSS = 1,000 mg/L
100X more effective

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Ice Pigging
(Soon to be Implemented Advanced Main Cleaning)

Peak TSS = 900 mg/L
~90X more effective

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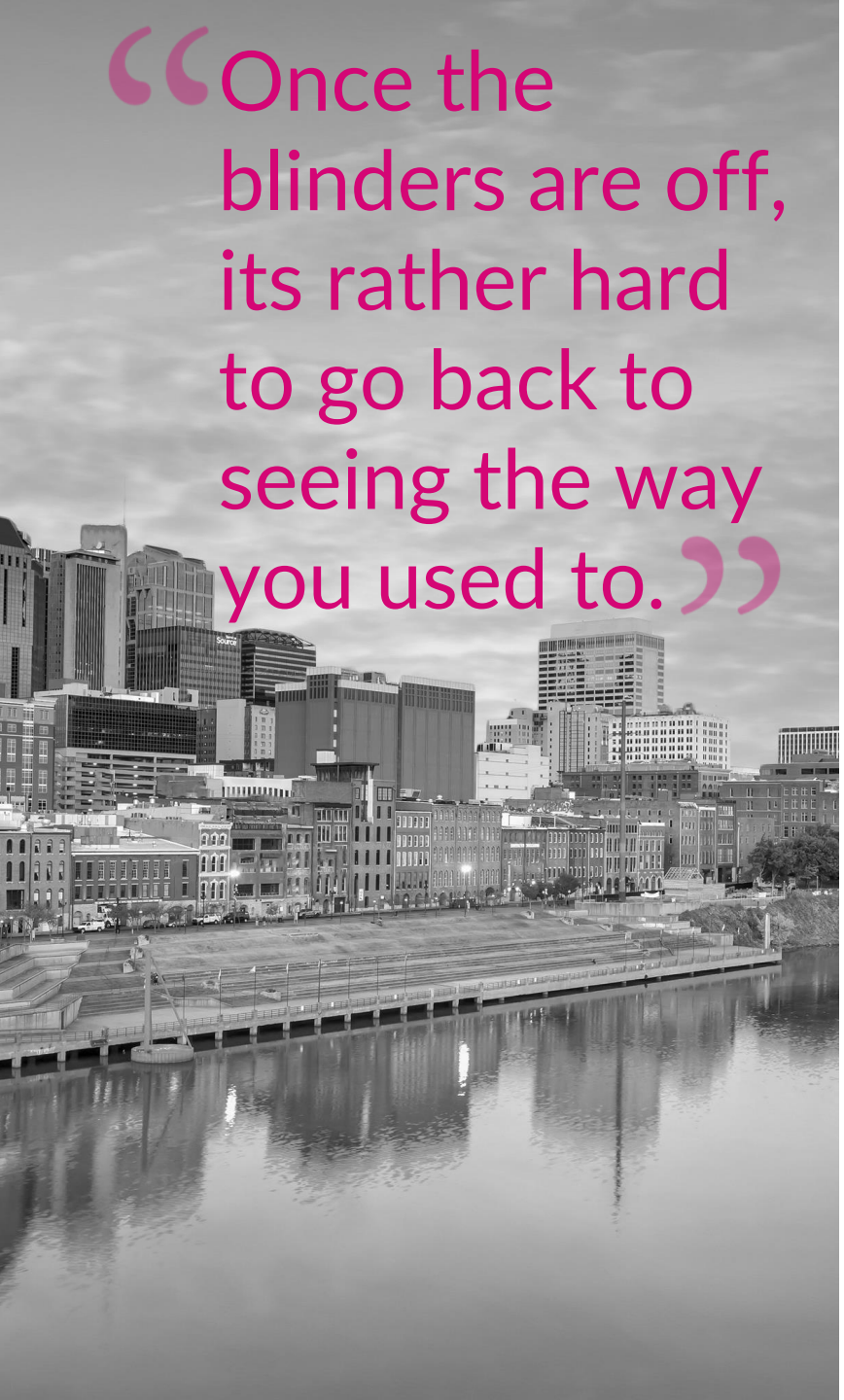
CULTIVATING A CULTURE TO MINIMIZE RISK OF WATER QUALITY CHALLENGES

Water Quality is complicated when operating treatment plants, wells, and distribution systems.

Gain an understanding of risks, causes & solutions.



Is Your Water System Culture Stagnant?

- Many instill a culture of “maintaining compliance”
- Regulations do not require distribution monitoring
- No understanding of potential risks, causes or potential for proactive mitigation

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A Transparent, Learning Culture Is Essential in Mitigating Water Quality Risks

Constantly promote transparent, information seeking culture for preparedness

Ensure water quality specific expertise

Provide investigative sampling funding and internal lab and field testing equipment

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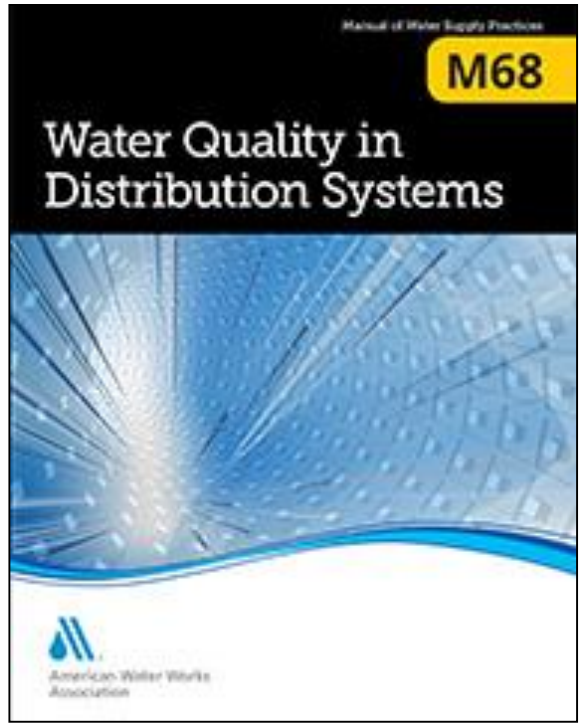
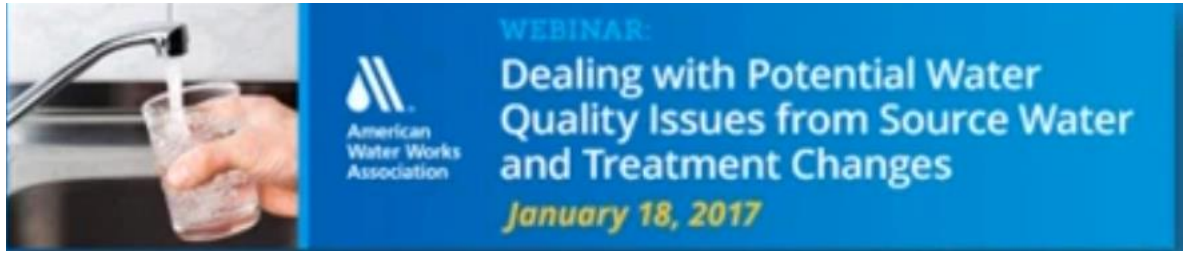
Explore the Resources Available to Open Blinders

- Hire professional water quality staff who support values
  - Transparency internally, with regulators & customers
  - Looks for risk factors and mitigation strategies
- Take advantage of industry expertise
  - Industry training
  - Specialized committee activity
  - Specialized consultants
  - Network with neighboring water systems and regulators





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Are You Asking Your Water Quality Team the Right and Enough Questions?

Are we maintaining compliance? What are we doing above and beyond to ensure future compliance? Have we established internal water quality goals that are better than regs?

Do we have a distribution monitoring program? Are we at minimum trending pH, chlorine or ORP, turbidity & metals throughout the distribution system? Based on the results what are your system specific risks?

If changing sources, what are we doing to prepare? Do we have the resources needed? Should we have online water quality analyzers to monitor for changes? Have we notified our customers of potential changes in water quality?

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THANK YOU

Questions?

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