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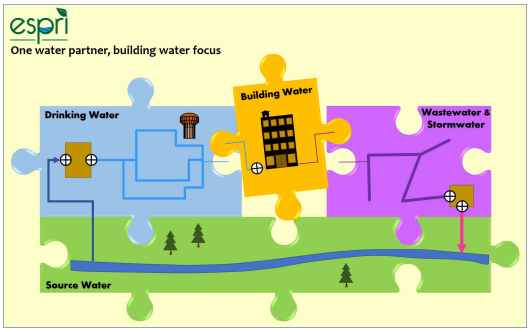
Looking Beyond the CCR and the Water Meter

Gary Burlingame & Tim Bartrand

ESPRI – The Environmental Science, Policy and Research Institute



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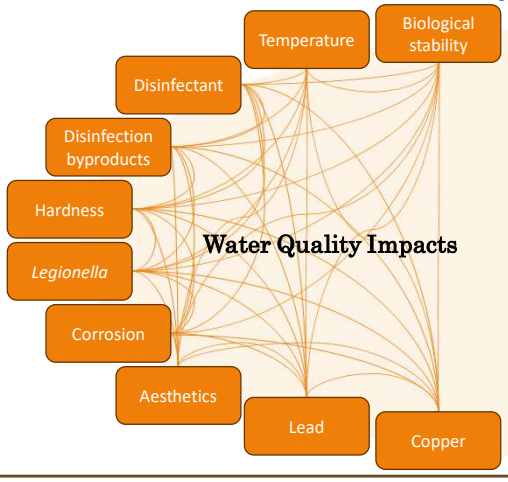
Building Water System Operators need to Understand Water Quality



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Building Water Systems may be required to have Water Management Programs (WMPs)

- Large buildings with extensive plumbing systems
- Especially those who have susceptible occupants
- Must have control of water quality, especially the risk from *Legionella*

- WMP elements include:
  - Understanding building water systems, hot and cold
  - Understanding how water quality can deteriorate and how *Legionella* can amplify
  - Understanding how to apply control measures and monitor them
  - Understanding how to apply mitigations when controls fail to work

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Why should we take on this responsibility?

- All end users of drinking water should experience the quality water that we provide.
- Water problems in building systems reduce the trust that end users have in our water utilities.
- When building water system operators can better prevent and solve their own problems, it benefits everyone.
- There is growing pressure on public water systems to be involved in water quality problems that occur in building water systems.

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How Can We Help Customers who own or operate BWSs?

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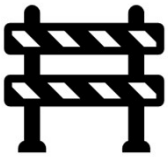
A BWS may need information on the water supply when:

- designing a building's water system



- during construction and commissioning of the BWS

- when operating the BWS

- when making repairs or closing down the BWS for a time

- when handling customer or end-user concerns and complaints

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POU or POE Treatment Systems

BWSs that have water issues or that have additional needs for water quality may install point-of-entry water treatment systems.

Common additions include water softeners and filtration systems.

When a BWS installs a water treatment chemical system, such as to boost the chlorine residual or to form chloramine, then, under the Safe Drinking Water Act, that BWS becomes a consecutive system subject to oversight by the local primacy agency.

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Water Quality Reports for BWS Managers

How does a building water system operator get water quality information?

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The Consumer Confidence Report (CCR)

Example of the reporting of regulated parameters through the annual CCR

The primary message: the water is safe!

Factual and accurate, but how much use is it to a building water system manager?

Copper	90% of homes must test less than 1.3 ppm	1.3 ppm	0.23 ppm	1 out of 89	No	Corrosion of household plumbing; Erosion of natural deposits; Leaching from wood preservatives

CRYPTOSPORIDIUM - *Tested at Source Water to Water Treatment Plants Prior to Treatment*

Treatment Technique Requirement	Baxter WTP One Year Range	Belmont WTP One Year Range	Queen Lane WTP One Year Range	Source
Total Number of Samples Collected	6	6	6	Naturally present in the environment.
Number of Cryptosporidium Detected	15	2	6	
	0.250 count/L	0.033 count/L	0.100 count/L	

Cryptosporidium is a microbial pathogen found in surface water throughout the U.S. Although filtration removes Cryptosporidium, the most commonly-used filtration methods cannot guarantee 100 percent removal. Our monitoring indicates the presence of these organisms in our source water. Current test methods do not allow us to determine if the organisms are dead or if they are capable of causing disease.

BACTERIA IN TAP WATER - *Tested throughout the Distribution System. Over 460 samples collected throughout the City every month.*

	Highest Level Allowed (EPA's MCL)	Ideal Goal (EPA's MCLG)	Highest Monthly % or Yearly Total of Positive Samples	Monthly Range (% or #)	Violation	Source
Total Coliform	5% of monthly samples are positive*	0	0.75%	0 – 0.75%	No	Naturally present in the environment
Fecal Coliform or E. coli		0	1	0 – 1	No	Human or animal fecal waste

Every sample that is positive for total coliforms must also be analyzed for E. coli. If a system has two consecutive total coliform positive samples, and one is also positive for E. coli then the system has an MCL violation. There were no Level 1 and Level 2 assessments required under Revised Total Coliform Rule in 2017.

INORGANIC CHEMICALS (IOC) - *PWD monitors for IOC more often than required by EPA.*

Chemical	Highest Level Allowed (EPA's MCL)	Ideal Goal (EPA's MCLG)	Highest Result	Range of Test Results for the Year	Violation	Source
Antimony	6 ppb	6 ppb	0.4 ppb	0 - 0.4 ppb	No	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Barium	2 ppm	2 ppm	0.044 ppm	0.027 – 0.044 ppm	No	Discharges of drilling wastes; Discharge from metals refineries; Erosion of natural deposits
Chromium	100 ppb	100 ppb	1 ppb	0 – 1 ppb	No	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride	2 ppm*	2 ppm*	0.72 ppm	0.68 – 0.72 ppm	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories

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Water quality information to consider providing to BWS operators include:

- Average concentration and range for hardness, alkalinity, and pH.
- Corrosion control treatment being used by the PWS.
- Type and average concentration and range for total chlorine residual.
- Average concentration and range for total dissolved solids and conductivity.
- Average concentration and range for iron and manganese.
- Explanation of possible taste-and-odor events.
- Answers to common questions that customers have about water quality.
- Link to the PWS's Consumer Confidence Report or annual water quality report.

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Information Designed to Help BWS Operators and Owners

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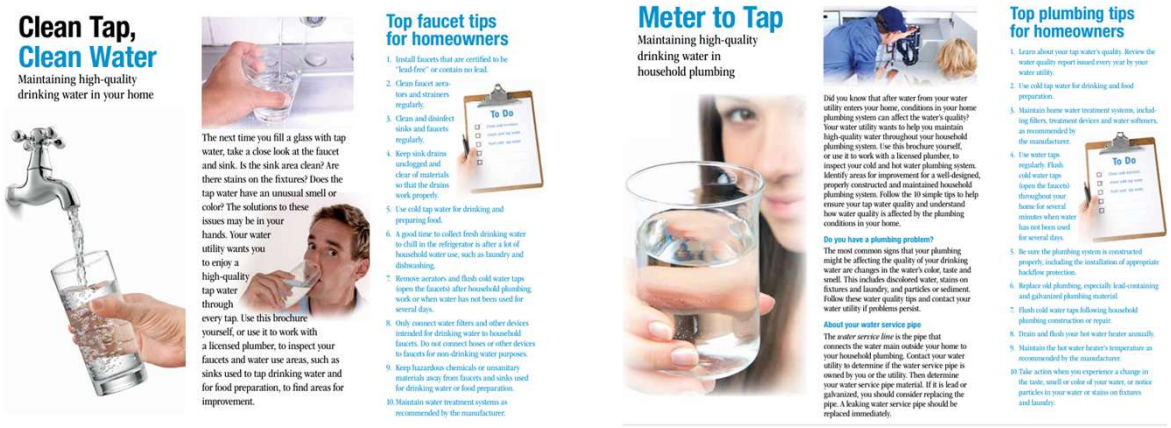
AWWA has information for homeowners



Clean Tap, Clean Water
Maintaining high-quality drinking water in your home

The next time you fill a glass with tap water, take a close look at the faucet and sink. Is the sink area clean? Are there stains on the fixtures? Does the tap water have an unusual smell or color? The solutions to these issues may be in your hands. Your water utility wants you to enjoy a high-quality tap water through every tap. Use this brochure yourself, or use it to work with a licensed plumber, to inspect your faucets and water use areas, such as sinks used to tap drinking water and for food preparation, to find areas for improvement.

Top faucet tips for homeowners

1. Install faucets that are certified to be "lead-free" or contain no lead.
2. Clean faucet aerators and strainers regularly.
3. Clean and disinfect sinks and faucets regularly.
4. Keep sink drains unclogged and clear of materials so that the drains work properly.
5. Use cold tap water for drinking and preparing food.
6. A good time to collect fresh drinking water is chill in the refrigerator is after a lot of household water use, such as laundry and dishwashing.
7. Remove aerators and flush cold water taps (open the faucets) after household plumbing work or when water has not been used for several days.
8. Only connect water filters and other devices intended for drinking water to household faucets. Do not connect hoses or other devices to faucets for non-drinking water purposes.
9. Keep hazardous chemicals or unsanitary materials away from faucets and sinks used for drinking water or food preparation.
10. Maintain water treatment systems as recommended by the manufacturer.

Meter to Tap
Maintaining high-quality drinking water in household plumbing

Did you know that after water from your water utility enters your home, conditions in your home plumbing system can affect the water's quality? Your water utility wants to help you maintain high-quality water throughout your household plumbing system. Use this brochure yourself, or use it to work with a licensed plumber, to inspect your cold and hot water plumbing system. Identify areas for improvement for a well-designed, properly constructed and maintained household plumbing system. Follow the 10 simple tips to help ensure your tap water quality and understand how water quality is affected by the plumbing conditions in your home.

Do you have a plumbing problem?
The most common signs that your plumbing might be affecting the quality of your drinking water are changes in the water's color, taste and smell. This includes discolored water, stains on fixtures and laundry, and particles or sediment. Follow these water quality tips and contact your water utility if problems persist.

About your water service pipe
The *water service line* is the pipe that connects the water main outside your home to your household plumbing. Contact your water utility to determine if the water service pipe is owned by you or the utility. Then determine your water service pipe material. If it is lead or galvanized, you should consider replacing the pipe. A leaking water service pipe should be replaced immediately.

Top plumbing tips for homeowners

1. Learn about your tap water's quality. Review the water quality report issued every year by your water utility.
2. Use cold tap water for drinking and food preparation.
3. Maintain home water treatment systems, including filters, treatment devices and water softeners, as recommended by the manufacturer.
4. Use water taps regularly. Flush cold water taps (open the faucets) throughout your home for several minutes when water has not been used for several days.
5. Be sure the plumbing system is constructed properly, including the installation of appropriate backflow protection.
6. Replace old plumbing, especially lead-containing and galvanized plumbing material.
7. Flush cold water taps following household plumbing construction or repair.
8. Drain and flush your hot water heater annually.
9. Maintain the hot water heater's temperature as recommended by the manufacturer.
10. Take action when you experience a change in the taste, smell or color of your water, or notice particles in your water or stains on fixtures and laundry.

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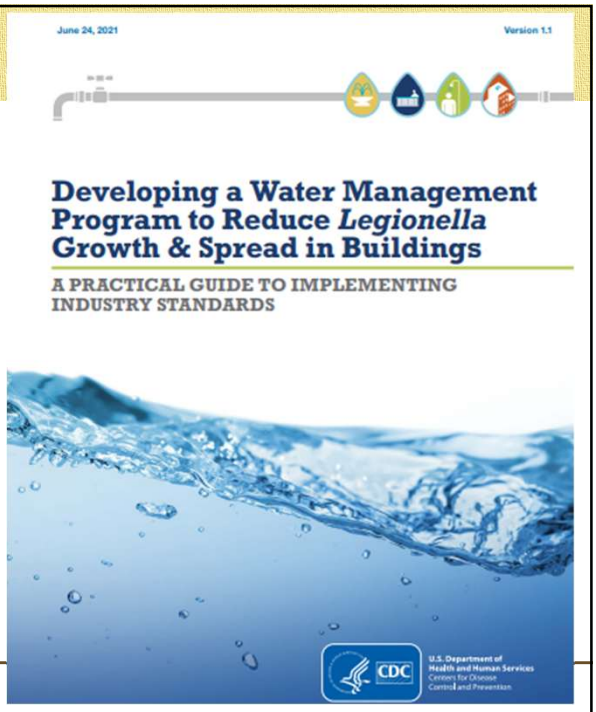
CDC Guidance



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How to Develop a WMP

- *American Society of Heating, Refrigerating and Air-Conditioning Engineers* (ASHRAE) standard for risk management in large building water systems (ANSI/ASHRAE Standard 188-2015).

ASHRAE™

PROGRAM TEAM—Identify persons responsible for Program development and implementation.

DESCRIBE WATER SYSTEMS/FLOW DIAGRAMS—Describe the potable and nonpotable water systems within the building and on the building site and develop water-system schematics.

ANALYSIS OF BUILDING WATER SYSTEMS—Evaluate where hazardous conditions may occur in the water systems and determine where control measures can be applied.

CONTROL MEASURES—Determine locations where control measures must be applied and maintained in order to stay within established control limits.

MONITORING/CORRECTIVE ACTIONS—Establish procedures for monitoring whether control measures are operating within established limits and, if not, take corrective actions.

CONFIRMATION—Establish procedures to confirm that
- the Program is being implemented as designed (verification), and
- the Program effectively controls the hazardous conditions throughout the building water systems (validation).

DOCUMENTATION—Establish documentation and communication procedures for all activities of the Program.

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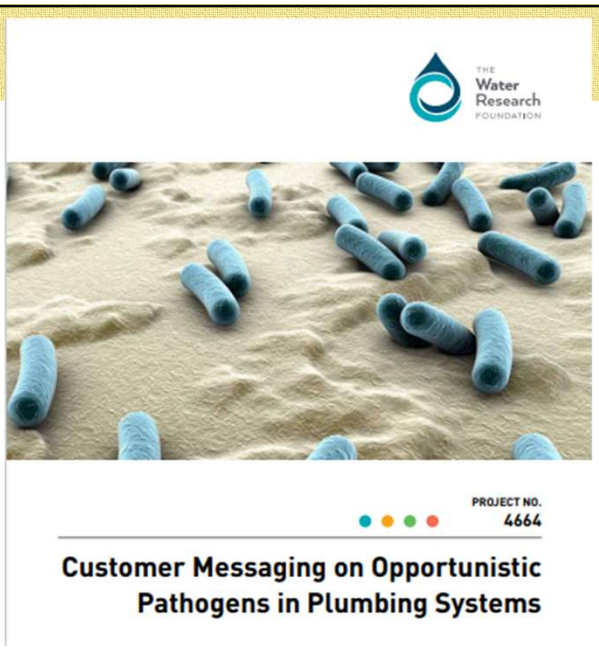
The Water Research Foundation



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AWWA collaborated with the International Association of Plumbing and Mechanical Officials (IAPMO), an accredited codes and standards development organization working in the building plumbing and mechanical field, to publish Manual-2022, *Manual of Recommended Practice for: The Safe Closure and Reopening of Building Water Systems*.

This manual was important for reducing the risk of exposure to *Legionella pneumophila* in buildings that had low or no water use as a result of partial or complete shutdown.

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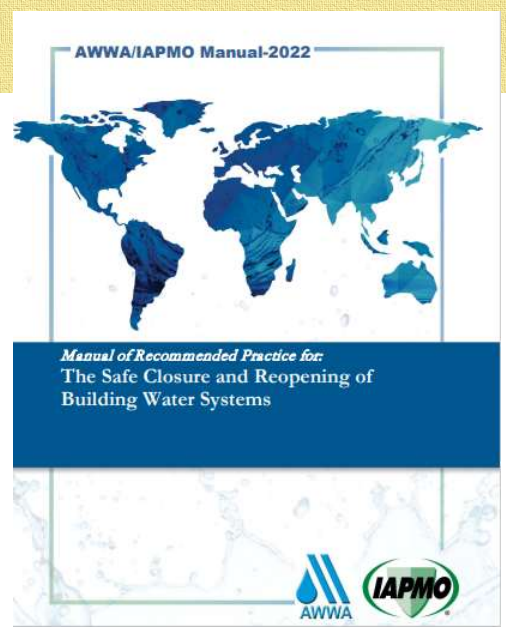
IAPMO Manual-2022 found at:

www.iapmo.org/standards-development/current-standards/manuals



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AWWA, teamed up with IAPMO and professionals active in the BWS field to develop IAPMO's Manual 4-2024, *Manual of Recommended Practices – Construction Practices for Potable Water*.

This manual's purpose is to educate and provide guidance on the design, construction, and commissioning of water systems to reduce the likelihood of contaminating BWSs with biofilm, waterborne pathogens, and chemical contaminants during construction.

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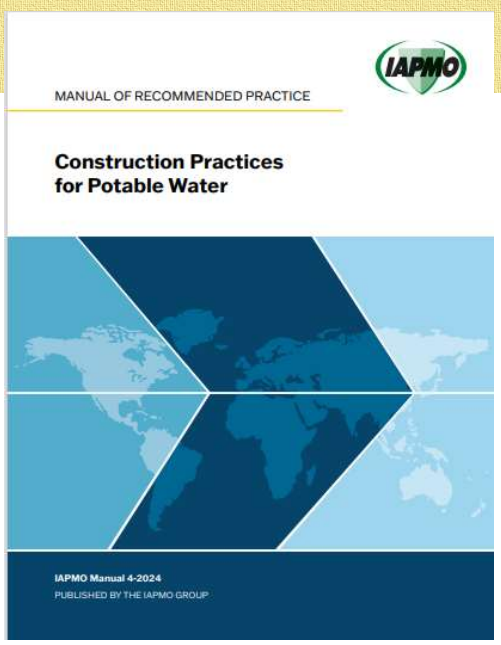
IAPMO Manual 4-2024 found at:

www.iapmo.org/standards-development/current-standards/manuals



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Within this manual is Annex A, *Water Quality for Plumbing Industry Professionals and Building Managers*.

This annex helps them better understand water quality.

It explains how BWS owners and operators can obtain useful information on their water supply from their PWSs, such as information provided in Consumer Confidence Reports provided by PWSs.

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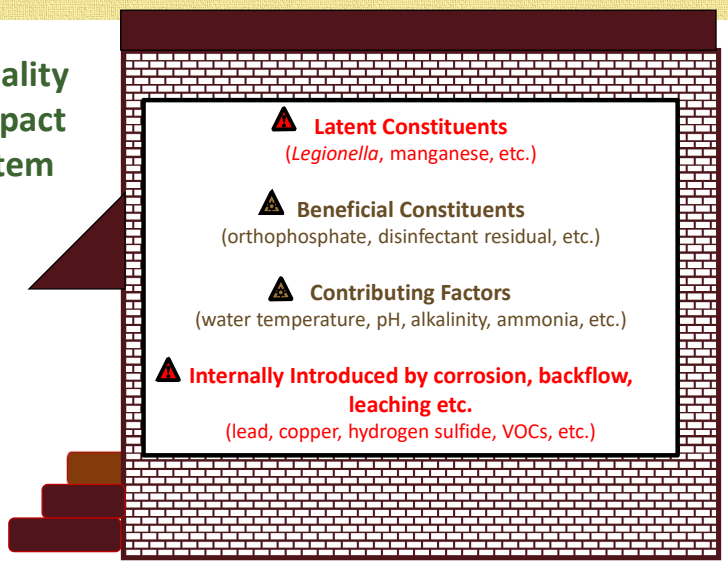
Categories of Water Quality Constituents as they Impact a Building's Water System

Health & Regulatory Concern

Important for Operations & Control



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Training on Lab Services

Sometimes the PWS can visit a BWS and conduct basic water quality tests such as for total chlorine residual, pH, and turbidity.

However, a BWS operator will often need to conduct testing with the help of a contract laboratory or testing on a more regular basis.

The water quality information provided by the PWS can help narrow down the type and number of tests that would be helpful to better understand BWS' operations and maintenance.

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Training on Complaint Response

It would also be helpful for BWS operators to have training in responding to consumer complaints.

For example, what are the common complaints that consumers report for the BWS' water service area? How are these complaints resolved? What critical information needs to be collected to pinpoint the causes of complaints?

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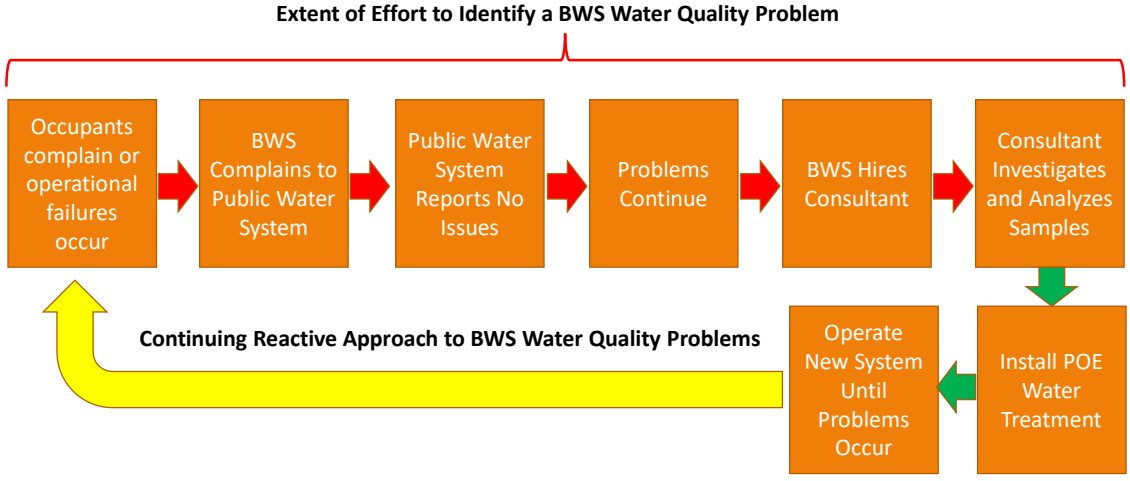
Common Scenario for Addressing BWS Water Quality Problems



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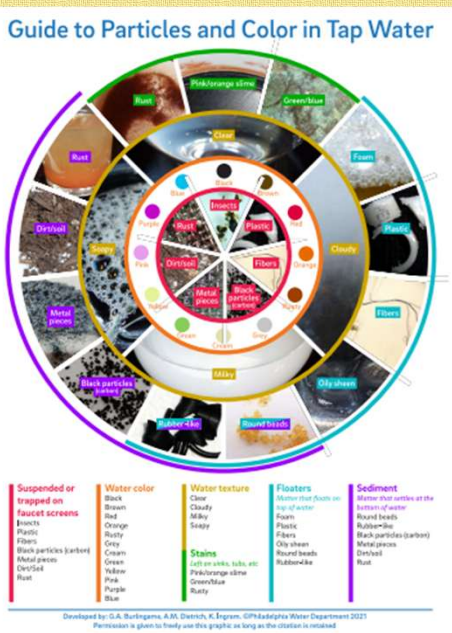
Resources exist to help BWS operators better respond to complaints about the water



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Training on Sample Collection

Building operators are increasingly called upon for collection of samples for microbiological assays such as for *Legionella pneumophila*. Samples for microbiological analyses must be collected aseptically into appropriate sample bottles with reagents to quench disinfectant residual and must be shipped/transported appropriately. BWS operators need to understand the nuances of good sample collection.

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Training on Cl_2 Testing

The measurement of total chlorine residual can be very useful in assessing the likelihood of, and location of water quality changes.

PWS can provide training on how to measure a total chlorine residual including how to interpret results, and how to use a field test kit.

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One Idea for How to Move this Effort Forward

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Provide an Open House at a Water Treatment Plant:

- Educate on water sources and treatment
- Educate on distribution and service
- Educate on water quality information/CCR
- Provide links to valuable resources
- Provide contacts on distribution system ops, water quality, customer relations

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At the Open House, provide :

- Training on total chlorine testing
- Training on sample collection
- Information on contract lab uses
- Education on common customer complaints
- Exposure to a WQ Report for BWSs

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Why Should We Do This?

Because WE have the expertise about drinking water.

Because consumer attitudes about tap water IMPACT OUR WATER UTILITIES.

Because we want ALL END USERS to experience the good quality of drinking water that we work so hard to produce and deliver to the meter.

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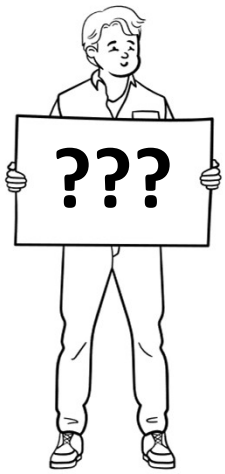

Questions or Comments?