

Flushing Buildings to Restore Water Quality After Periods of Stagnation

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CHESAPEAKE BAY AND WATER RESOURCES POLICY COMMITTEE (CBPC)



Background for Today's Webinar

Due to the COVID-19 pandemic, life has changed drastically.

In some instances, buildings have been shut down or are not operating near capacity.

This affects water quality in the building.

When water is not used or water use is significantly reduced , building water quality degradation is a silent but serious issue.

How to flush and reopen buildings.

NOTE: Coronavirus (SARS-CoV-2) is not in the tap water nor spread by water.



Stagnant water in vacant buildings poses a health risk

- Drinking water has a shelf life and water quality degrades over time.
 - Wine improves with age, water does not.
- The building itself is an ecosystem and it exerts effects on water quality.
 - Changes happen when water isn't moving through a building & creates biofilm.
 - Chemical changes can lead to leaching of heavy metals, corrosion
 - Biological changes include growth of bacteria that can cause disease



Building owners/managers are responsible for actively maintaining water quality once it enters the building



Flush the System

What is Flushing?

- Bringing fresh water into the pipes, storage tanks and fixtures in a building.
- Moving fresh water through the system flushes out stagnant water and maintains building water quality.
- Good practice all the time, not just in response to COVID-19.

Building Water Quality and Coronavirus: Flushing Guidance for Periods of Low or No Use

The scientists and engineers at the Environmental Science, Policy & Research Institute (ESPRI) and AH Environmental Consultants, Inc. (AH) developed this brief guidance material to help those who are responsible for maintaining building water systems. We have decades of water quality and treatment experience, including building water quality and operation issues, and wanted to share our insights on this topic.

As buildings have been shut down or used less frequently, building water quality degradation becomes a silent but serious issue. This document is meant as a starting point to bring awareness of the issue of water quality degradation in building plumbing when it is not used, or water use is significantly reduced. We kept this brief and provide it as a general roadmap for how to flush contaminants from the building and get the plumbing system water quality back to pre-stagnation conditions. Each building is different, and flushing will need to be tailored accordingly.

Many thanks to those who reviewed and provided suggestions to this material.

Please feel free to circulate and post this information. And stay well in these challenging times.

ESPRI – Tim Bartrand, Sheldon Masters, Tom Hargy, Randi McCuin & Jen Clancy espr@esprinstitute.org

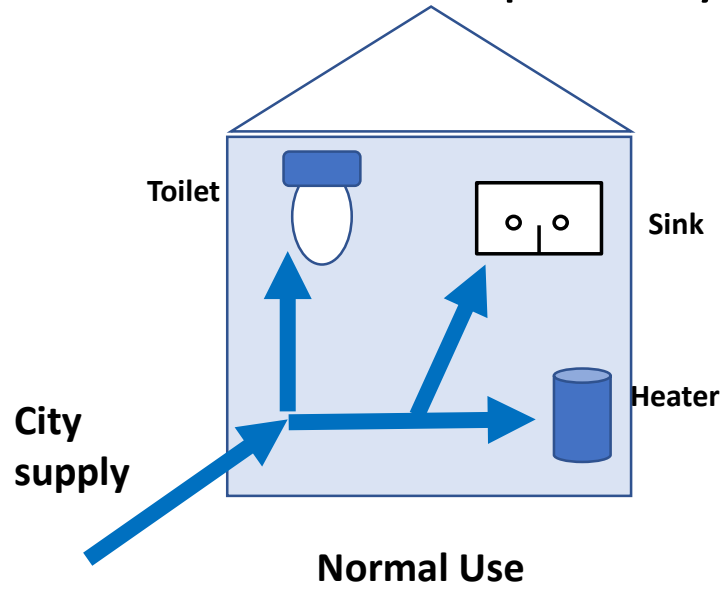
AH – Rich Theiss, Peter Pommerenk, Sean McNamara & Dave Hildebrand (solutions@ahenv.com)

What happened in my building water system while the building was out of use?

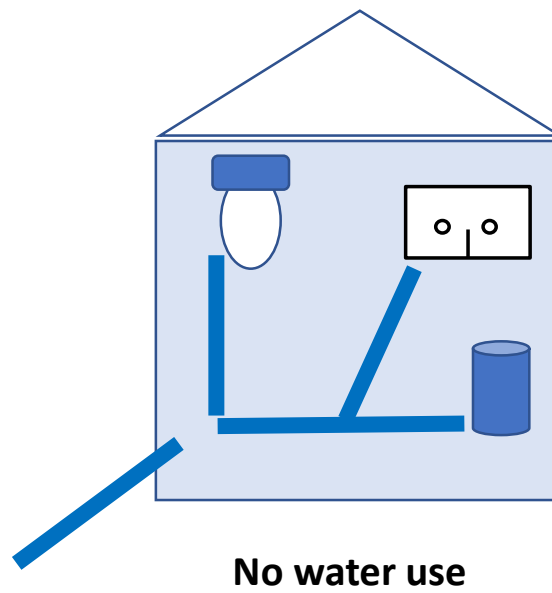
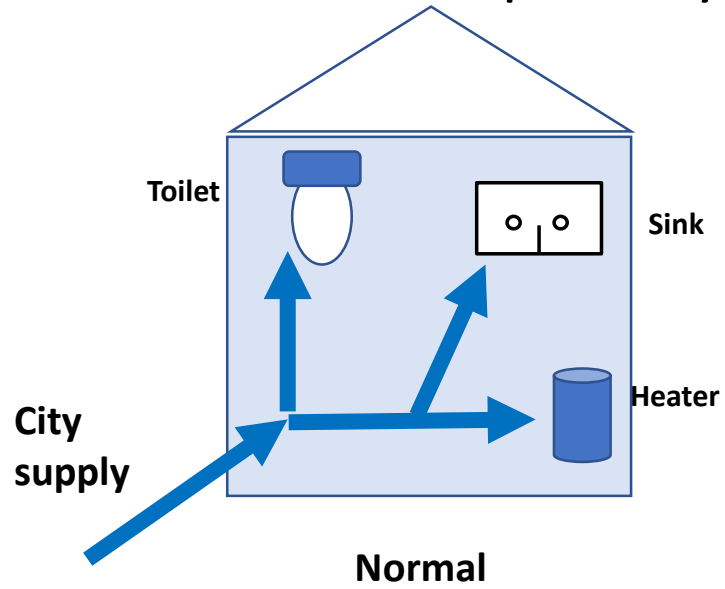
- The building water system begins at the meter where water enters the building and includes all plumbing, storage and fixtures to each distal tap.
- When the water was not used, the disinfectant in the water dissipated. Without the disinfectant, microorganisms grew on pipes, fixtures and tanks. Some of these may cause disease if they are consumed or inhaled as droplets (particularly while showering).
- The protective scale on pipes could have destabilized. Without the protective scale, toxic metals like lead can dissolve or shear off as particles and end up in water used for drinking or food preparation.
- Potentially harmful substances such as disinfection byproducts (DBPs) built up.
- Mechanical equipment such as cooling towers, boilers and pumps may not have received any routine maintenance. Backflow preventers may have missed annual test cycles.



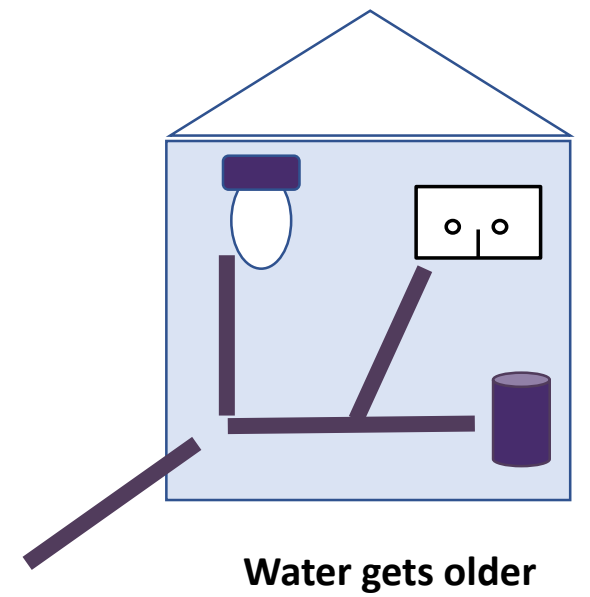
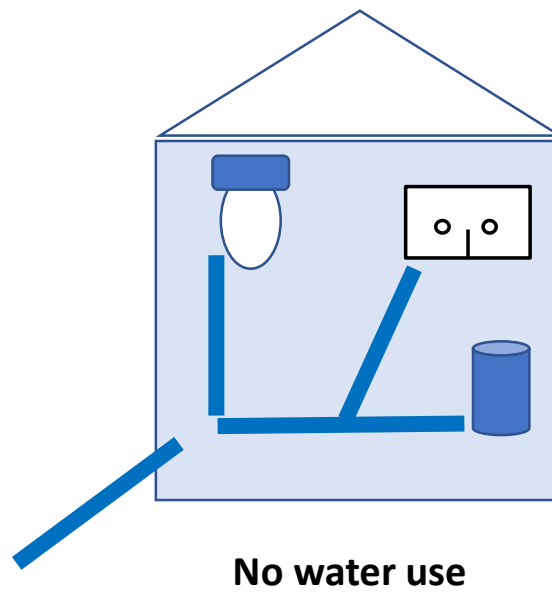
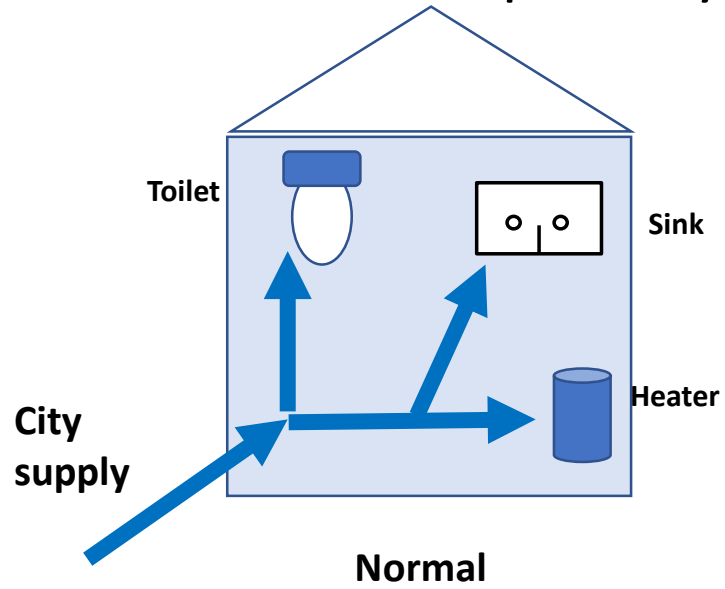
Water quality degradation with low or no use



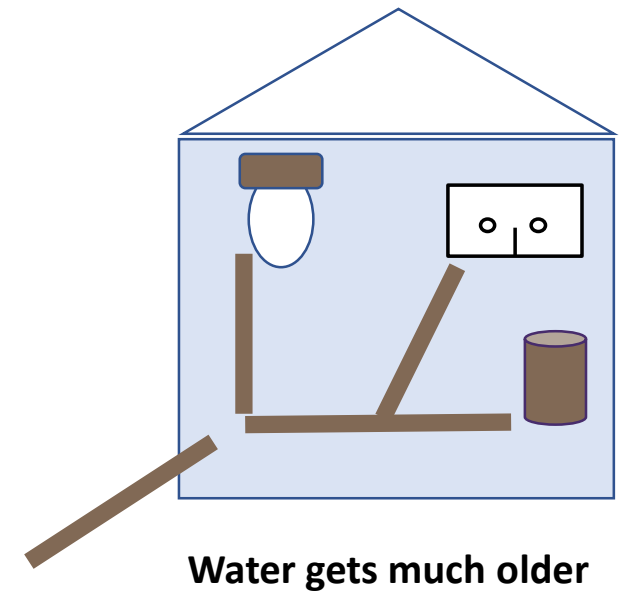
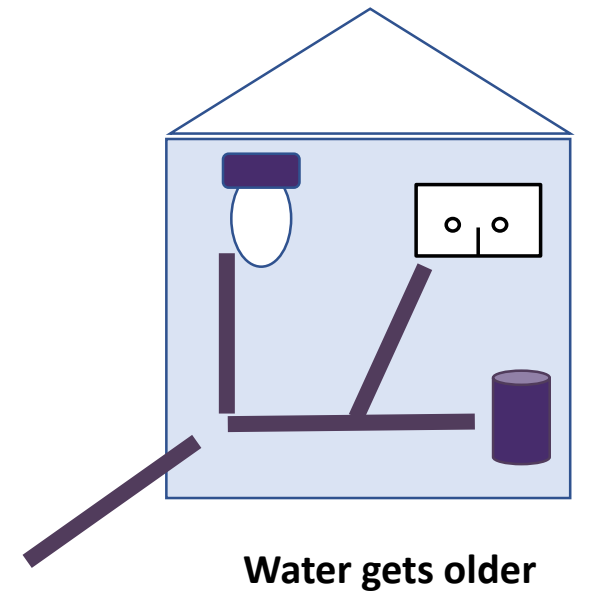
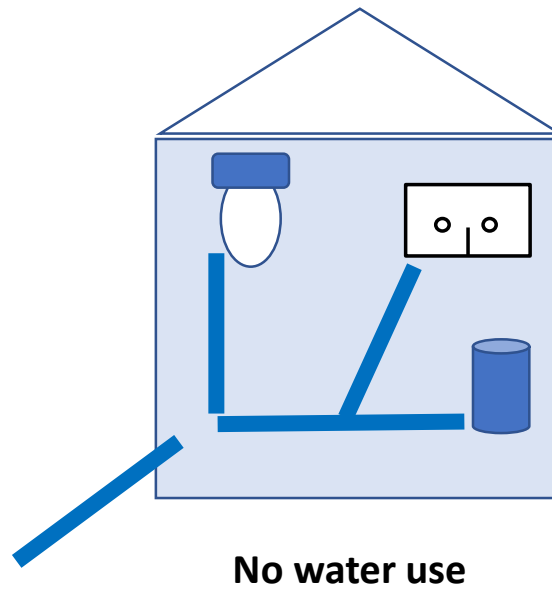
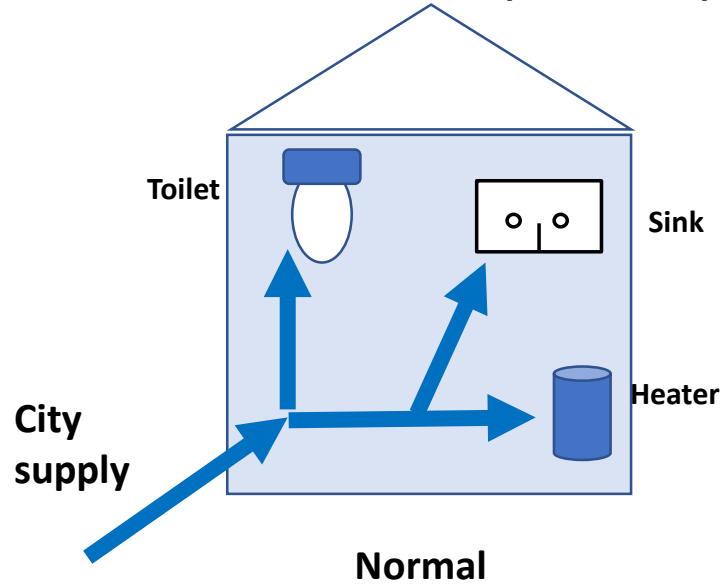
Water quality degradation with low or no use



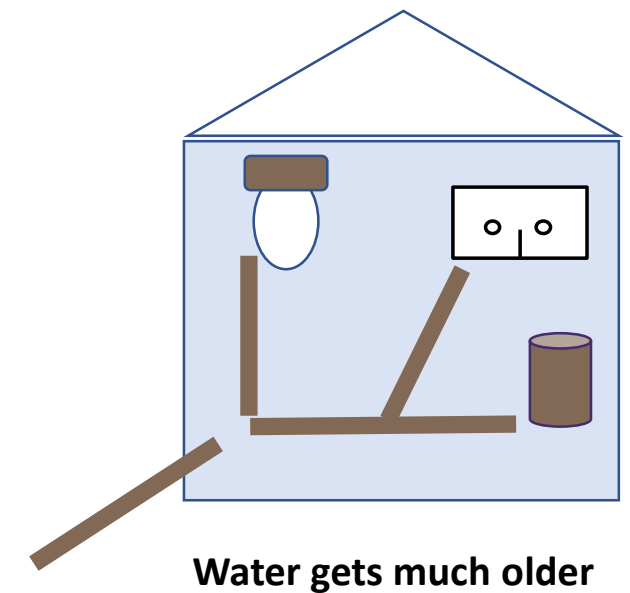
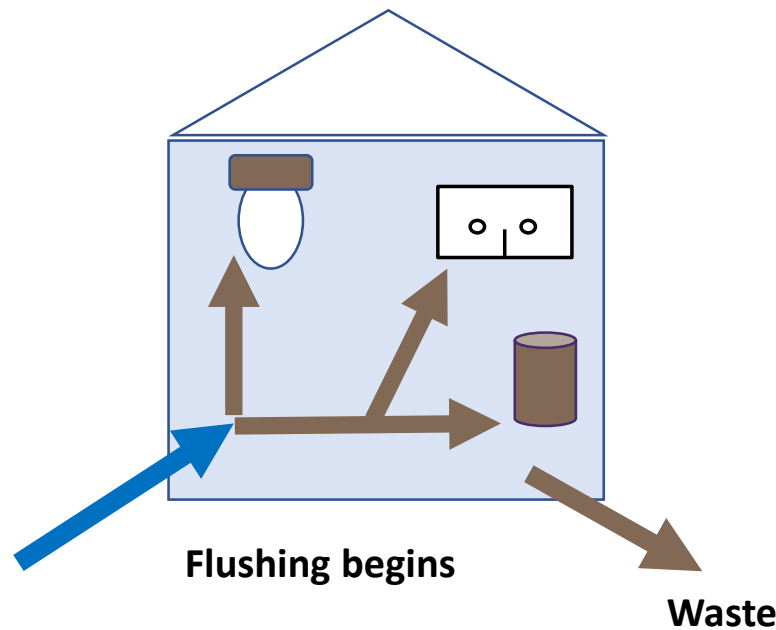
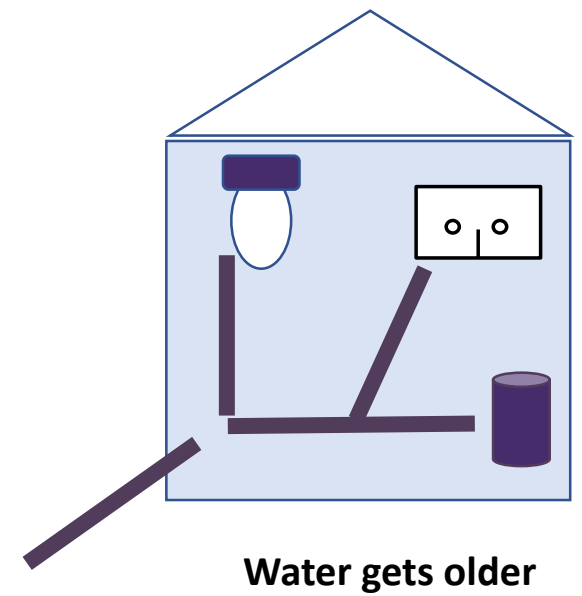
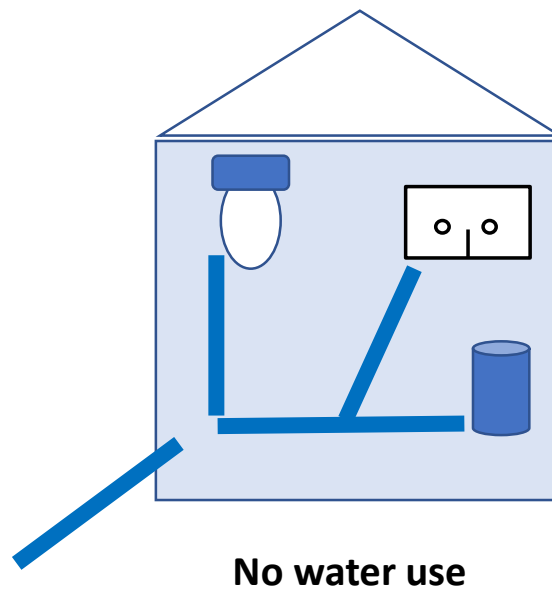
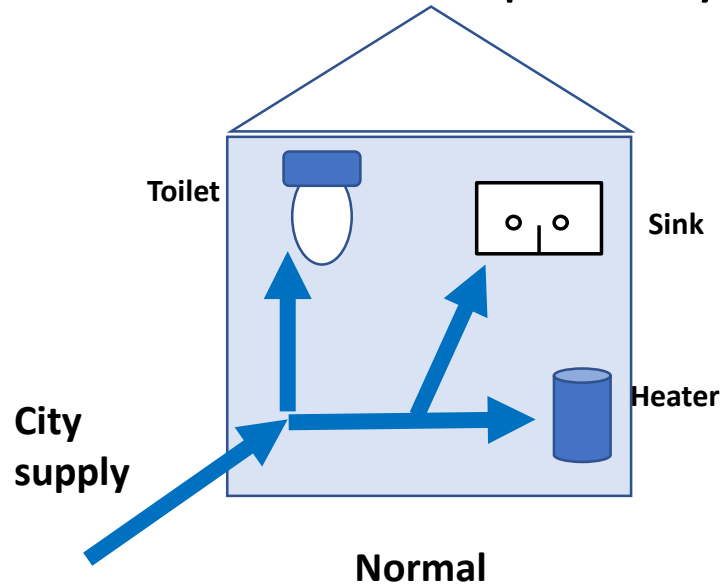
Water quality degradation with low or no use



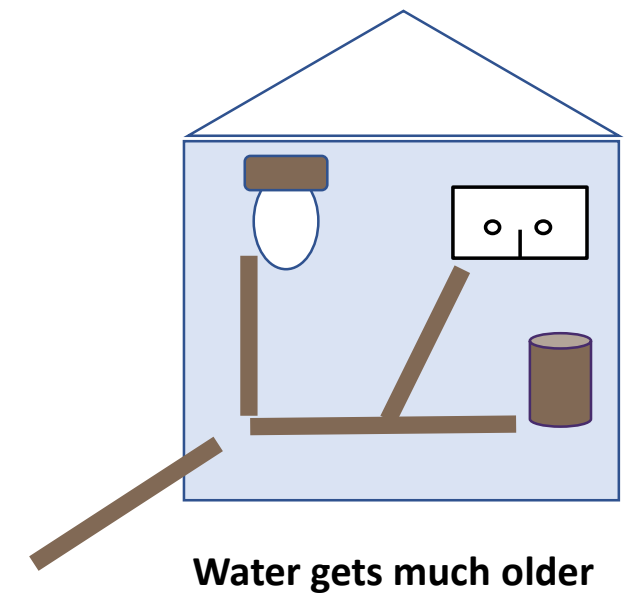
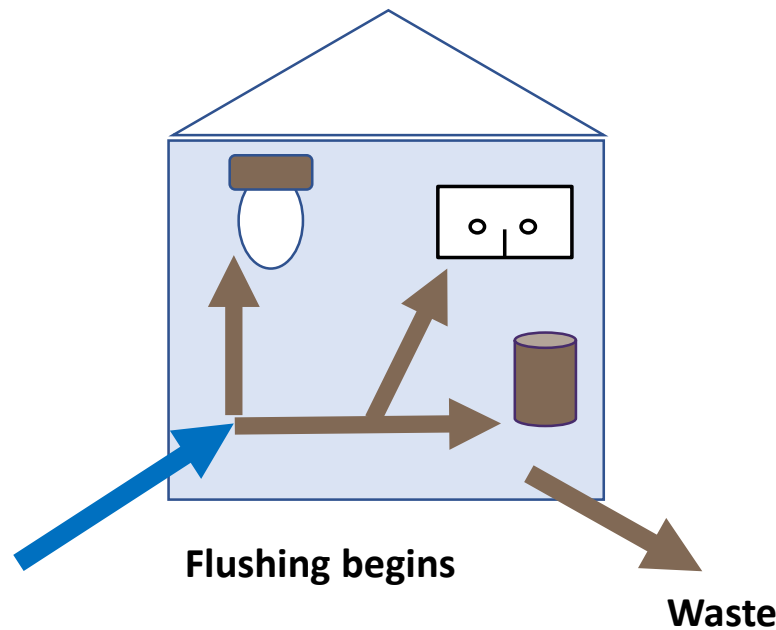
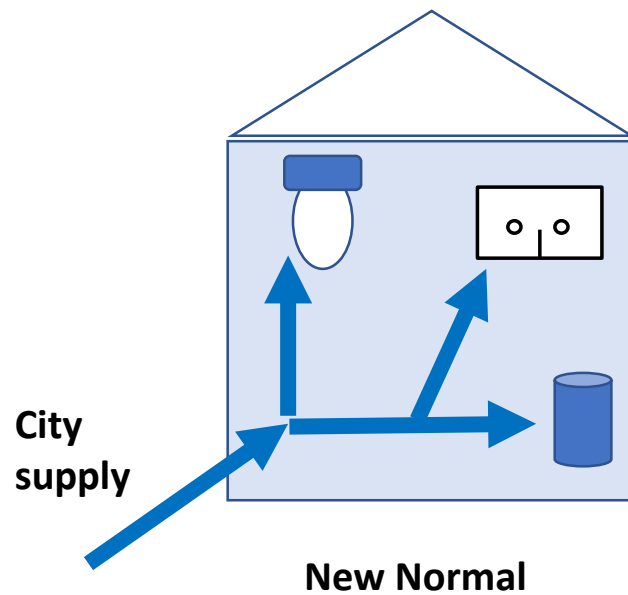
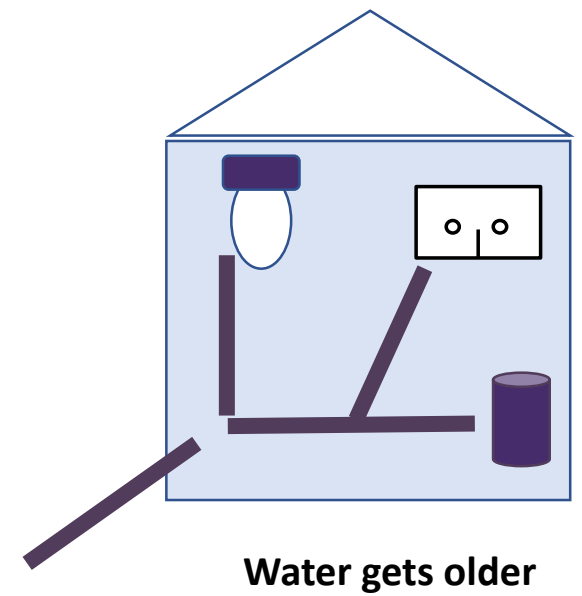
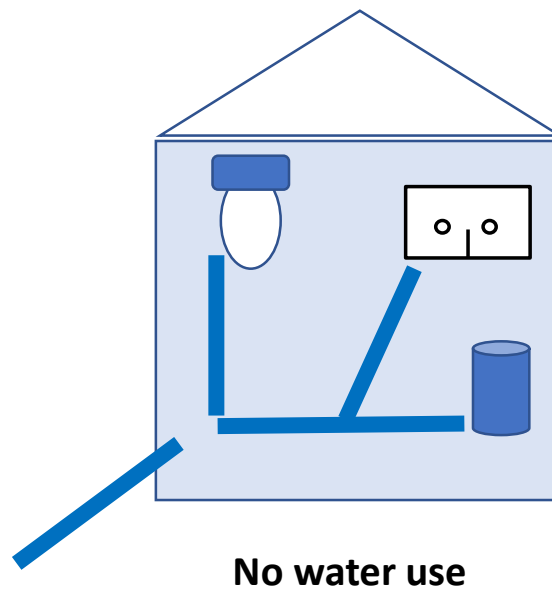
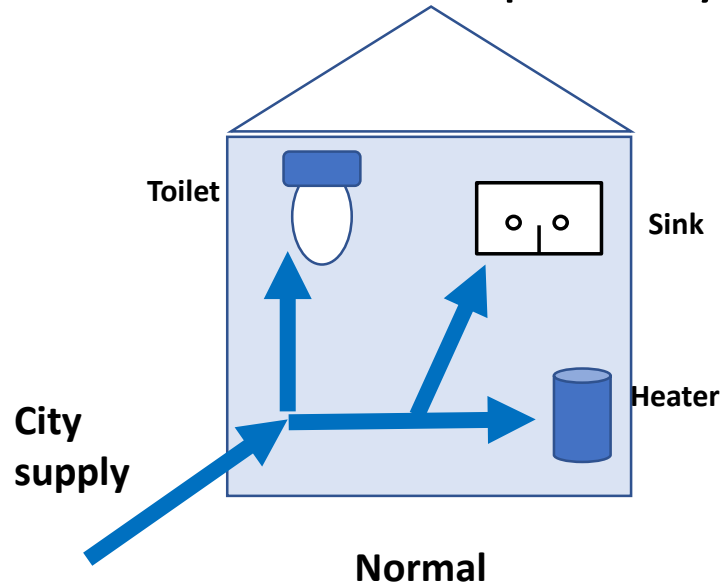
Water quality degradation with low or no use



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Water quality degradation with low or no use



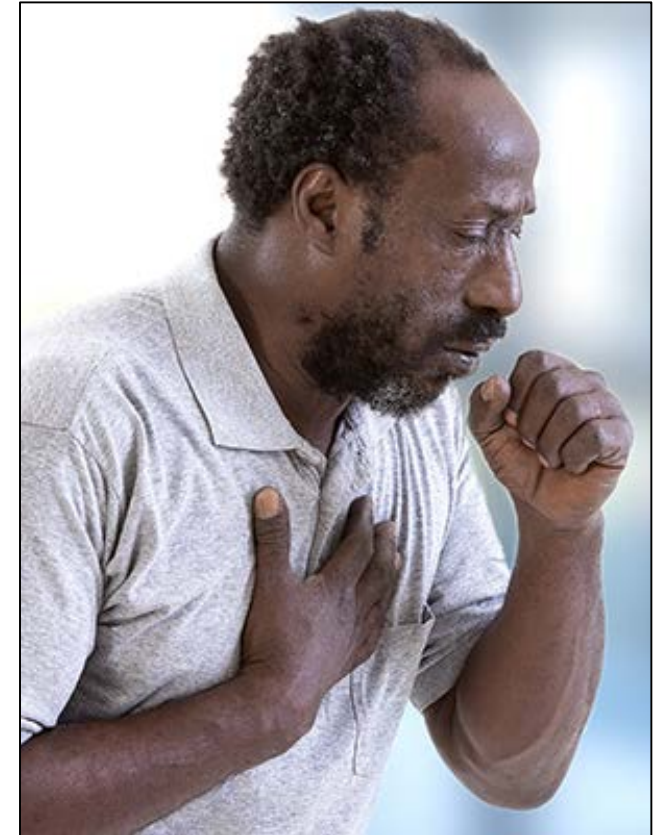
Legionella pneumophila poses the highest risk



L. pneumophila is a waterborne pathogen...



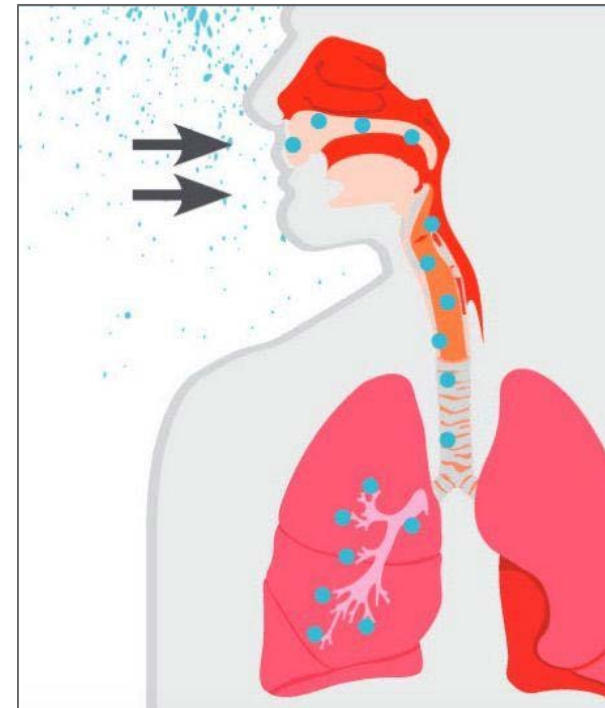
...that can grow in building water systems...



...and cause Legionnaires' disease.

Legionnaires' disease is a public health risk

- Severe form of pneumonia
- Treatable with antibiotics, but fatal in 10-33% of cases
- Contracted from inhaling water droplets contaminated with *Legionella pneumophila* bacteria
 - *NOT Transmitted person to person*
- Increasing incidence in the US
- CDC says LD is the #1 waterborne disease in the US
 - 600% increase since 2000 in US

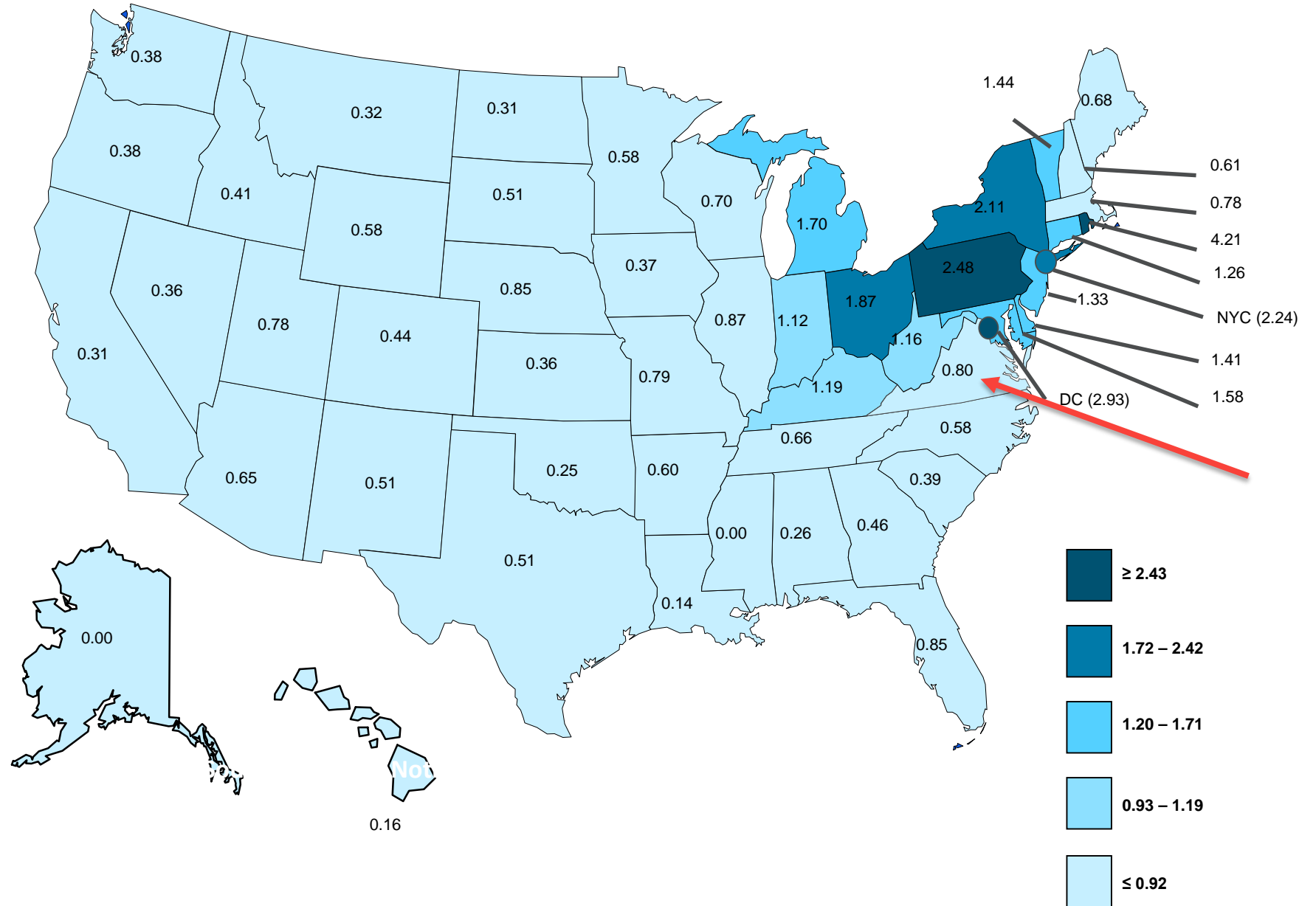


Legionellosis: US case rates 2007

Reported cases by
state

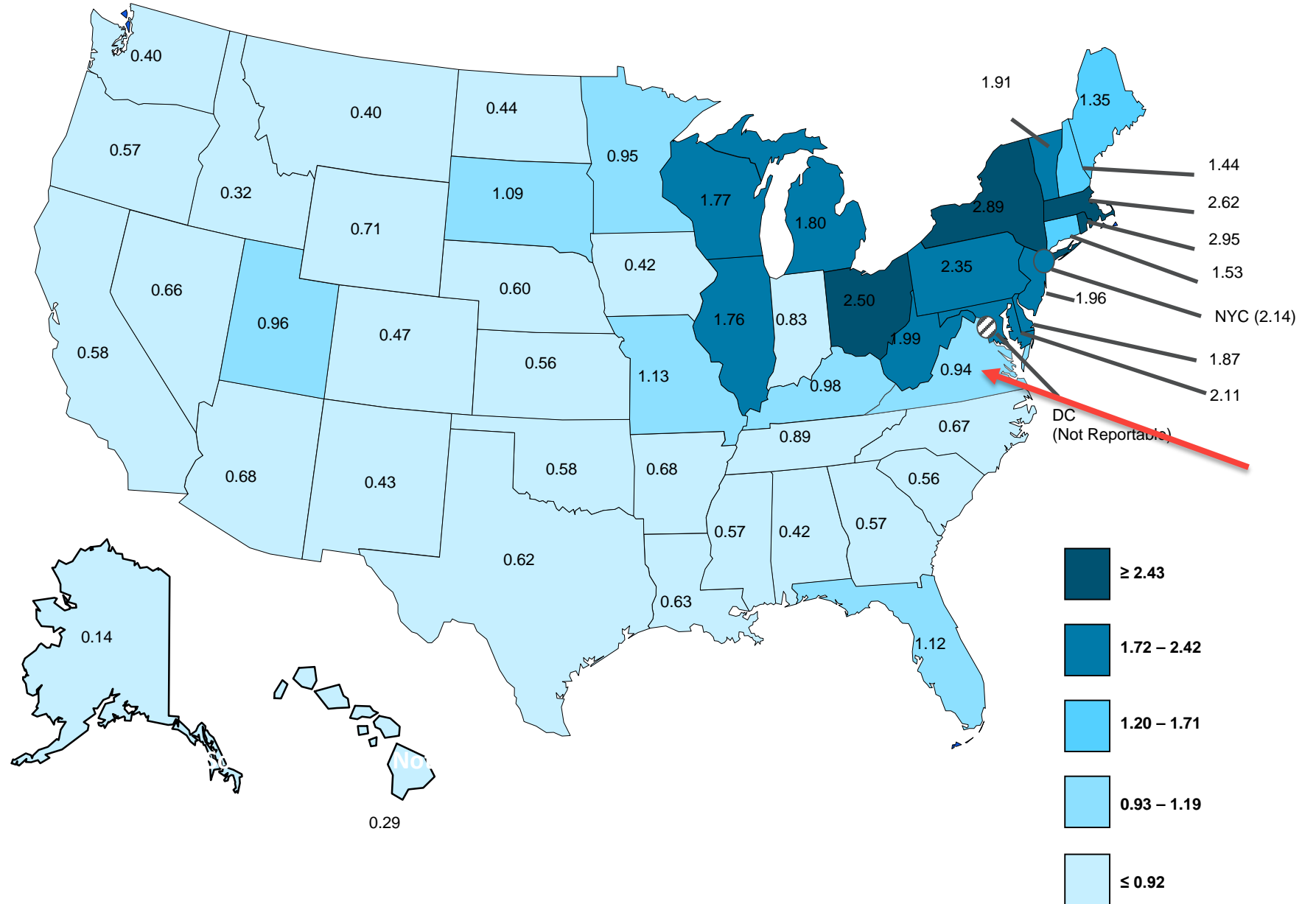
2007

Cases/100,000
population



Legionellosis: US case rates 2012

Reported cases by state
2012
Cases/100,000 population

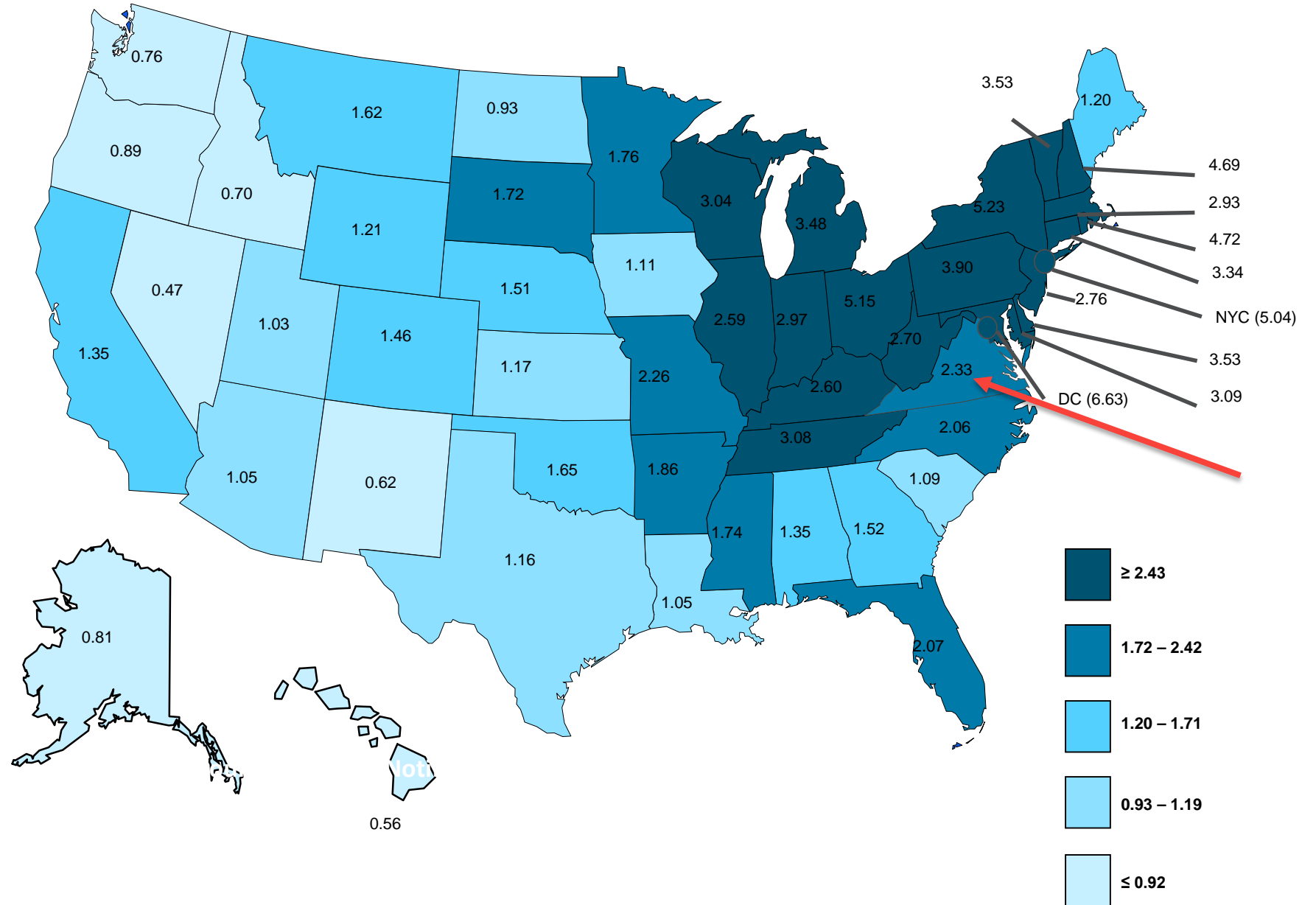


Legionellosis: US case rates 2017

Reported cases by state

2017

Cases/100,000 population



Back to Flushing

Work with building personnel to ensure effective flushing.

Develop a flushing plan

For all buildings with your Director of Facilities, Operations, or maintenance (whoever takes care of the pipes and fixtures).

Consider each building's specific features and occupants

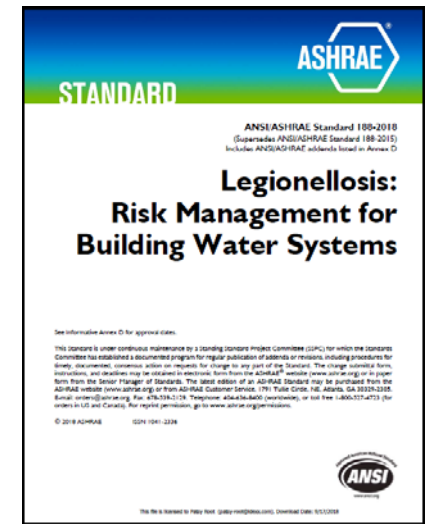
Each building is unique and requires a plan specific to that building (hospitals vs offices).

Develop and implement plans well in advance of re-openings.



What to do after flushing

- **Implement a Water Management Plan (WMP)**
 - WMP - set of procedures, including risk management, for reducing the occurrence of Legionnaires' disease
 - To maintain high quality water in a building at all times, building owners and operators should implement a WMP that follows industry recommendations, e.g., ASHRAE 188 (2018), EU Guidelines for *Legionella* Control (2017).
 - Health care facilities are mandated to have a WMP per Centers for Medicare and Medicaid Services (CMS, 2017).
 - Uses the CDC's 2016 Toolkit
 - Flushing is one of the water quality management tools in WMPs.



References

- ASHRAE: Guidance on Reducing the Risk of *Legionella* www.ASHRAE.org
 - Standard 188
 - Guideline 12
- Centers for Disease Control and Prevention (CDC): Information on *Legionella* (www.cdc.gov/legionella) and the CDC Toolkit <https://www.cdc.gov/legionella/downloads/toolkit.pdf>
- CMS: <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-17-30.pdf>
- EU Guideline: <https://www.ecdc.europa.eu/en/publications-data/european-technical-guidelines-prevention-control-and-investigation-infections>
- https://esprinstitute.org/wp-content/uploads/2020/04/FINAL_Coronavirus-Building-Flushing-Guidance-20200403-rev-1.pdf



Thank you for inviting me.

QUESTIONS AND COMMENTS