



COVID-19 Building Water Stagnation



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Stagnation Increases Health Risks

- Stay-at-home measures have dramatically reduced water usage in buildings across the globe (commercial, hospitality, dorms, arenas, etc.)
- The resulting stagnation in water system equipment, piping, and fixtures:
 - Increases risk for *Legionella* and other biofilm associated bacteria to grow
 - May contribute to unsafe levels of lead and copper in potable water
 - Microbiologically influenced corrosion and biofouling
 - Contribute to aesthetic issues with water at points of use
- Important for building owners to understand the actions they can take while buildings are shut-down and when buildings re-open to help reduce health risks
- If you have developed a WMP, consult with the Program Team and follow the Plan
- Impossible to guarantee the absence of *Legionella* and other health risks
 - Complexity of building water systems
 - Impact of operational and maintenance practices
 - Universal nature of *Legionella* bacteria

Why Stagnation Increases Legionella Risks

- Building water systems can present significant *Legionella* risks even when fully occupied
- Stagnant water increases these risks by favoring the growth of biofilms
 - Microscopic colonies of surface-attached bacteria
 - Biofilms are directly linked to the growth of *Legionella* bacteria
- Without flow:
 - Chlorine added to the building water supply degrades as the it stagnates in potable water system piping, causing residuals to drop to ineffective levels
 - Biocide and disinfectant additions to cooling tower systems, decorative fountains, and hot tubs cannot effectively control microbial growth
 - Water temperatures can stabilize into the ideal range for *Legionella* growth (77° to 108°F).

CDC Guidance

- The CDC Bulletin: **Guidance for Building Water Systems** is posted on IDEAConnect
 - Be sure you have the version that was updated April 22, 2020
- This bulletin provides a good list of WHAT to do
- This presentation is designed to give you some practical suggestions on HOW to do the things that the CDC recommends

Building Water Systems and Devices Impacted By Stagnation Risks

- Hot and Cold Domestic Water Systems
 - Faucets
 - Aerators and Flow-Restrictors
 - Showers and hoses
 - Ice Machines
 - Emergency Showers
 - Coffee machines and drink dispensers
 - Drinking fountains and water coolers
 - Eyewash Stations

Core Strategies for Managing Biofilms and *Legionella* Risks

- Minimize Stagnation By Routine Flushing and/or Circulation
- Keep Systems Clean and Free From Sediment
- Keep Hot Systems Hot and Cold Systems Cold
- Monitor and Maintain Appropriate Disinfectant Residuals
- Develop & Implement a Legionella Water Management Plan



While The Building Is Shut Down



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Flush But Verify*

- Continued maintenance during the low-occupancy period can reduce the need for more aggressive measures when bringing the building back online
- Goal is to replicate normal use of the system while not wasting water
 - Keep P-traps wet to prevent sewer gasses from entering buildings
 - Routine flushing helps minimize risk for elevated lead and copper levels
- Establish a verification method (1 or more)
 - Calculate volume of water in piping and flow rate at fixtures, replace 1-2 volumes of water in all piping
 - Good aesthetic quality (no discoloration or smell)
 - Disinfectant residual
 - Temperature (not always reliable)
- Documentation is critical!

Verifying Disinfectant Levels

- Most states only require a “detectable” level of disinfectant in the distribution systems (some more stringent)
- If your Public Water Supplier (PWS) uses chlorine as it’s secondary disinfectant, you should verify the levels using a **Free Chlorine Test (or Free Halogen Test)**
- If your Public Water Supplier (PWS) uses monochloramine as it’s secondary disinfectant, you should verify the levels using a **Total Chlorine Test (or Total Halogen Test)**

How Much is Enough?

- Degradation in the building is as important as achieving a minimum residual
 - Goal should be less than 0.2 ppm demand from POE to POU (cold water)
- For systems treated with chlorine, most Public Water Suppliers (PWSs) try to deliver 0.2 to 2.0 ppm of free chlorine to water users
 - If below 0.2 ppm at the meter, ask your PWS to boost treatment
- For systems treated with chloramine, most PWSs try to deliver 1.0 to 3.0 ppm as total chlorine
 - If below 0.5 ppm at the meter, ask your PWS to boost treatment
- Consider asking your PWS to increase disinfectant levels in their water supply during the period when you are going to be recommissioning your buildings

Practical Flushing Advice

- Don't open too many faucets at once, you can suck air into the system which causes water hammer in piping
 - This can lead to broken pipes and/or discolored water due to rattling of pipes
- Start at the service line to each building with high volume/velocity flush, and move towards the furthest runs.
 - May be a good idea to keep one sink open at the end of each run to pull water that direction
- If the system has been stagnant, start flushing with sinks and hose bibs to remove debris then proceed to devices with diaphragms and smaller valve openings (e.g., toilets, automatic faucets, etc.).



When It's Time To Re-Open



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Domestic Water Systems

- If you have been regularly flushing the POU's, storage tanks, and hot water heaters in your building, this may be adequate for the main system.
- Follow the equipment-specific procedures outlined elsewhere in this presentation.
- If you have not been flushing regularly, you should take additional more aggressive measures as follows:
 - Heavy system flush with verified disinfectant residual and aesthetic quality verified at all POU's (may be more challenging in hot systems)
 - System disinfection (supplemental chlorine feed and/or superheat and flush)
 - Consider long-term supplemental disinfection
 - Other methods as determined by the Team to be appropriate

Electric and Manual Faucets

Before returning to operation, hot and cold water fixtures should be disinfected in one of the following ways:

- By flowing hot and cold water through the fixtures during a full system disinfection
- By performing extensive flushing with documented disinfectant residuals, temperatures, and aesthetic quality
- By disassembling, disinfecting, and cleaning internal components
- By replacing of fixtures and piping from the wall to the POU

Routine documented flushing may mitigate the necessity of disinfecting the potable water system before the building is reoccupied. A water treatment professional should be consulted to provide a site specific plan.

Aerators and Flow Restrictors

All faucet aerators and flow restrictors should be disinfected prior to use according to one of the following protocols:

- Disinfect in place by flushing water through the aerators and flow restrictors during a disinfection of the entire potable water system. Following disinfection procedure, remove equipment and clean or replace.
- Remove, physically clean, and disinfecting all faucet aerators and flow restrictors by soaking in bleach before reinstalling it back onto the fixture.

Where disinfection is not practical, consider replacing faucet aerators and flow restrictors.

Showerheads, Hoses, and Wands

- All showerheads, hoses, and wands should be disinfected prior to use:
 - In place by flushing water through the all components during a disinfection of the entire potable water system.
 - By removing the showerhead, shower wand and hose assembly, cleaning it, and manually disinfecting it with bleach before reinstalling it back onto the fixture.
- Where disinfection is not practical, consider replacing the showerhead or shower wand and hose assembly.

Ice Machines

- Disinfect the inlet water supply line and install new filters prior to start up. Consider replacing inlet piping from the wall.
- Ice machines should be cleaned, descaled, and sanitized before placing back in service.
 - Cleaning and descaling can be done anytime during shutdown, disinfection should occur as near as possible to re-opening.
- Upon start up, the first 1-3 batch(es) of ice should be dumped and discarded before resuming ice making for human consumption.

Point of Use Water Filters

- POU Water filters are often installed before drinking fountains, refrigerators, soda machines, coffee filters, lab equipment, ice machines, and other equipment
 - The majority of these filters are intended to remove chlorine for taste and odor concerns
- All inlet lines to devices should be disinfected, and new POU filters should be installed prior to these devices being placed back into routine service
 - Consider replacing associated tubing
- If performing full system disinfection, filters should be removed to ensure water with disinfectant is passed to POU

Coffee Machines and Drink Dispensers

- Coffee and other hot beverage machines
 - Water reservoirs should be cleaned and disinfected
 - Disinfect the inlet water supply line
 - Install new filters prior to start up.
 - Consider replacing inlet piping from the wall
 - Prepare and discard the first several cups/pots of hot beverage
 - Equivalent to the volume of the reservoir or 1 gallon, whichever is greater
- Cold Drink Dispensers (i.e., soda fountains, juice dispensers, etc.)
 - Water reservoirs should be cleaned and disinfected
 - Disinfect the inlet water supply line
 - Install new filters prior to start up
 - Consider replacing inlet piping from the wall
 - Prepare and discard the first several drinks
 - Equivalent to the volume of the reservoir or 1 gallon, whichever is greater

Drinking Fountains & Water Coolers

- Wall mounted drinking fountains that are NOT refrigerated and draw directly from the potable cold water system should be treated the same as a cold water faucet
- Refrigerated water coolers:
 - Water reservoirs should be cleaned and disinfected
 - Disinfect the inlet water supply line
 - Install new filters prior to start up.
 - Consider replacing inlet piping from the wall
 - Discard the first several drinks
 - Equivalent to the volume of the reservoir or 1 gallon, whichever is greater

Eyewash Stations and Safety Showers

- Routine flushing of eyewash stations and safety showers should have continued during reduced occupancy
- If full system disinfection procedure is followed, ensure chlorinated water is flushed through eyewash stations and safety showers during disinfection
 - Extremely important to flush systems with fresh water after disinfection

References and Resources

References

1. ASHRAE Standards Committee. (2018) ANSI/ASHRAE Standard 188-2018. Legionellosis: Risk Management for Building Water Systems. Atlanta, GA. www.ashrae.org/technology
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3. CDC. (2020) Guidance for Building Water Systems. CDC. <https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>
4. AWWA. (2014) ANSI/AWWA C651-14. AWWA Standard Disinfecting Water Mains. American Water Works Association. <https://doi.org/10.12999/AWWA.C651.14>.
5. ESPRI, AH Environmental Consultants, Bartrand, T., Masters, S., Hargy, T., Mccuin, R., Clancy, J., Theiss, R., Pommerenk, P., Mccnamara, S. and Hildebrand,

Additional Sources of Information

- Please continue to use IDEA Connect and monitor the IDEA Technical Forum
- Also you should regularly visit the IDEA [COVID-19 Emergency Preparedness Website](#). There, you can find helpful resources and information, including many shared by fellow IDEA members and industry colleagues to provide guidance as you navigate this ever-changing landscape
- For additional information, and support addressing water stagnation issues in building water systems, building water disinfection, supplemental disinfection systems, or any other water management concerns, you may also contact your Chem-Aqua Water Risk Management Services Group for immediate assistance at: 1-866-209-3373
- All of us together are smarter than any one of alone...

Questions

- Feel free to visit the Chem-Aqua website at:

www.chemaqua.com

we will be posting frequent updates and additional material as it becomes available

- If you have specific equipment that was not addressed in the presentation, or would like additional information, you may feel free to contact me by either e-mail or phone:

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