

Maintaining and Reopening Building Water Systems Impacted by Prolonged Shutdown or Reduced Operation: Minimizing *Legionella* and Opportunistic Bacteria Growth



Purpose of Document

This is a guidance document for building owners and managers whose building water systems are impacted by a prolonged shut down or reduced operation due to COVID-19 and would like to properly maintain their building water systems and reopen their facilities. Periods of little to no water usage may lead to conditions in building water systems which promote the growth of *Legionella* and other opportunistic bacteria within weeks or months. Each building is different, (e.g., plumbing systems, use patterns, source water) therefore, action plans will need to be tailored accordingly.

What is *Legionella* and legionellosis?

Legionella are a type of bacteria found naturally in freshwater environments such as lakes and streams. *Legionella* can become a health concern when it is introduced and grows within a human-made building water system that is not adequately maintained, such as hot tubs, cooling towers, and plumbing systems. When water containing *Legionella* is aerosolized (droplets in the air), people can become sick when breathing it in. In rare cases, people can contract *Legionella* if the water they are drinking “goes down the wrong pipe” into the lungs.

Legionellosis is a bacterial disease caused by *Legionella* that can present as either Legionnaires’ disease or Pontiac fever. Legionnaires’ disease causes severe pneumonia (lung infection) often requiring treatment in a hospital, while Pontiac fever is generally a milder illness that resolves on its own. Although uncommon, *Legionella* can also cause infections at a body site outside of the lungs, such as heart or wound infections.

How do I know if my building is at risk for *Legionella* growth and transmission?

Legionella are an opportunistic pathogen that grow best in engineered water sources. According to industry standards, any of the following building or population characteristics can increase your building’s risk for *Legionella* growth and transmission:

- Multiple housing units with a centralized hot water system
- More than 10 stories high (including any levels that are below grade)
- Primarily houses people 65 years and older (i.e., retirement home, assisted living)
- Provides healthcare services where patients stay overnight or treats immunocompromised patients
- Open- and closed-circuit cooling towers or evaporative condensers in the building or on site
- Whirlpools or spas in the building or on site
- Decorative fountains, misters, atomizers, air washes, humidifiers, or other non-potable water systems or devices that release aerosols in the building or on site

What happened in my building’s water system while the building was out of use or used less frequently?

When a facility experiences less of a demand on their water system, a variety of internal factors can lead to *Legionella* growth and transmission, including:

- **Biofilm Growth** When water flow is interrupted or stagnant, biofilm (a collection of microorganisms which can grow on pipe surfaces) growth is encouraged. Biofilm not only protects *Legionella* from disinfectants, but it provides the bacteria with food and nutrients it

needs to survive.

- **Fluctuations in Temperature** When water does not flow well, water temperatures can change to levels that promote *Legionella* growth.
- **Reduced Levels of Disinfectant** Disinfectants in your water system can dissipate when the water is not routinely used. Without proper disinfection, microorganisms, such as *Legionella*, can grow on pipes, fixtures, and tanks.

What actions should my facility take to maintain my building's water system during a prolonged shutdown or decreased use due to COVID-19?

- **Ensure your hot water tank is properly maintained and the temperature is correctly set.**
 - Determine if the manufacturer recommends draining the hot water tank after a prolonged period of disuse. Ensure that all maintenance activities are carried out according to the manufacturer's instructions or by professionals.
 - It is recommended that hot water is stored above 140° F and circulated with a minimum return temperature of 124° F, or at the highest temperature allowable by local regulations or codes. To limit the risk of scalding during water delivery, utilize preset thermostatic mixing valves.
 - In buildings that cannot be retrofitted, periodically increasing the temperature to at least 150° F or chlorination followed by flushing should be considered.
- **Flush both cold and hot water at minimum on a weekly basis to prevent water stagnation and to maintain temperature and disinfectant residual levels at all points of use (e.g., sink faucets, showers, tubs).**
 - Flushing involves opening taps and letting the water run to remove water that has been standing in the interior pipes and/or outlets.
 - Some facilities with vulnerable populations, such as healthcare and assisted living settings, may need to flush water at least twice per week.
- **Maintain any water treatment systems used in the building, such as any point-of-entry or point-of-use filters or water softeners.**
- **Ensure safety equipment including eye wash stations and safety showers are clean, flushed and well-maintained** according to manufacturer's instructions.
- **Follow manufacturer's instructions regarding the operation, maintenance, and replacement of system components**, such as boilers, pumps, backflow preventers, etc.
- **Ensure that cooling towers are maintained** (including start-up and shut-down procedures) according to manufacturer's instructions and industry best practices.
- **Ensure hot tubs/spas are safe before reopening.**
 - Check for existing guidelines from your local regulatory agency before use
 - Ensure that hot tubs/spas are free of visible slime or biofilm before filling with water

What steps should my facility take to reopen my building's water system following a prolonged shutdown or decreased use due to COVID-19?

1. Remove showerheads (including hoses) and faucet aerators.
 - Clean all devices per manufacturer's instructions or with an EPA-registered disinfectant to clean out sediment and scale.
2. Flush the entire building at all points of use to replace the stagnant water that accumulated

during your facility's closure or period of low use.

- The optimal flush time is dependent on the size and design of the building's water system.
 - Cold water should be flushed before hot water:
 - Flush water to maintain appropriate disinfectant residual levels. You may need to contact your water utility to better understand their disinfection procedures. It is recommended to use a calibrated digital colorimeter for measuring disinfectant residual levels in potable water systems. Test strips are not recommended for testing potable water due to sensitivity limitations.
 - If proper testing equipment and/or resources are not available, consider using a time-based method. Typical flushing durations can range from 10-30 minutes for each outlet. For large buildings, this can take greater than 30 minutes.
 - For hot water systems, flush water until it reaches its maximum temperature at each outlet.
 - The number of outlets that can be flushed simultaneously will depend on the capacity of the water heater and flow capability of the system.
 - Flushing may need to occur in segments (e.g., floors or individual rooms). Flushing should proceed from the water service entrance to the most distal points in the distribution system. Local building and sanitary codes should be checked for any temperature limits of water discharged to the sewer.
3. Flush, clean, and replace filters (as needed) for appliances and other water-using devices per manufacturer's instructions (e.g., dishwashers, ice machines, etc.).
 4. Re-install showerheads and faucet aerators after flushing has been completed.
 5. Consider assessing the efficacy of your startup procedures by collecting samples for *Legionella* culture.
 - If testing reveals widespread or high levels of *Legionella* in the water system, or you have other concerns, then remedial measures may be needed. Two remedial measures recommended by CDC and EPA are shock chlorination and thermal disinfection.
 - Consult with your local or state health department for further guidance on *Legionella* monitoring and remedial measures.
 6. Document all measurements and maintenance actions in a written log.

How can I maintain a long-term water management program?

Water management programs identify hazardous conditions and steps to take to minimize the growth and transmission of *Legionella* and other waterborne pathogens in building water systems. ASHRAE 188, an industry standard for large buildings in the United States, establishes minimum risk management requirements for a water management program. To help building owners and managers implement an effective water management program that adheres to ASHRAE 188, CDC has developed a [toolkit](#) to help people understand which buildings and devices need a water management program, what makes a good program, and how to develop it.

Additional Resources

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers. (2018). ANSI/ASHRAE Standard 188-2018. Legionellosis: Risk Management for Building Water Systems. Available at: https://www.techstreet.com/ashrae/ashrae_standards.html.

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- Centers for Disease Control and Prevention. (2020). Guidance for Building Water Systems. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>.
- Centers for Disease Control and Prevention. (2017). Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings. Available at: <https://www.cdc.gov/legionella/downloads/toolkit.pdf>.
- Cooling Technology Institute. (2019). Guideline - Practices to Reduce the Risk of Legionellosis from Evaporative Heat Rejection Equipment Systems. Available at: <https://cti.org/pub/cticode.php>.
- New Jersey Department of Environmental Protection (2020). NJDEP Drinking Water Flushing Guidance for Restoring Water Quality in Buildings with Low or No Use. Available at: <https://www.state.nj.us/dep/watersupply/pdf/flushing-guidance.pdf>.

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