

MAINTAINING OR RESTORING WATER QUALITY IN BUILDINGS WITH LOW OR NO USE

Building and business closures for weeks or months reduce water usage, potentially leading to stagnant water inside building plumbing. This water can become unsafe to drink or otherwise use for domestic or commercial purposes. For example, optimal growth conditions for undesirable pathogens, such as *Legionella* bacteria, can occur when hot water temperatures decrease and disinfectant residuals (e.g., chlorine) drop to low levels. Water chemistry changes may also increase corrosion and leaching of metals, including lead, and may cause the formation of disinfection by-products. Turning on the water for immediate use after it has been stagnant can pose a risk to public health if not properly managed. Additionally, turning on water after a prolonged period of non-use could disrupt pipe and plumbing scales to such an extent that microbial and chemical contaminants could be released into the water.

EPA recommends that building owners and managers take proactive steps to protect public health by minimizing water stagnation during closures and taking action to address building water quality prior to reopening.

How can we maintain water quality while buildings/businesses are closed?

While buildings/businesses are closed, proactive steps can be taken to prevent stagnation and maintain building water quality. Maintaining the water quality may help prevent the need to perform more complex restoration steps before reopening. The following are recommended steps to take while buildings are closed:

For building owners/managers:

- **Review and understand the plumbing configuration and water usage in your building.** The U.S. Centers for Disease Control and Prevention (CDC) provides guidance on building water systems in their Water Management Program toolkit (see Resources section below for a link to that guidance).
- **Inspect the plumbing** to ensure it is functioning properly and is in good condition.
- **Contact your water utility** if you have questions on the status of water usage and quality in the distribution system in your area and to coordinate maintenance activities, if necessary. See the “For public water systems” section below for specific information that may be useful to discuss with your water utility.
- **Maintain any water treatment systems used** in the building, such as any point-of-entry or point-of-use filters or water softeners.
- **Maintain the hot water system**, including keeping the temperature at or above 140°F per CDC guidance to prevent *Legionella* growth. See CDC’s guidance for reopening buildings for additional information, referenced in the Resources section below.
- **Flush the building’s plumbing system regularly.**
 - Flush cold and hot water at all water points of use (faucets, showers, toilets, drinking fountains, and water using devices such as dishwashers and refrigerators/ice makers) to replace the water that has been standing in the pipes. Flushing involves opening taps and letting the water run to remove water that has been standing in the interior pipes and/or outlets. The flushing time can vary by the plumbing configuration and type of outlet being cleared.
 - It is important to flush the service line that runs from the water main to the building before flushing the rest of the building’s plumbing system.

- Special consideration should also be given to pipe loops and onsite water storage to ensure these are adequately flushed and maintained.
- Water-using devices may require additional cleaning steps in addition to flushing (e.g., discarding ice). Consult the device manufacturer’s maintenance instructions.
- Flush the hot water until the water reaches its maximum temperature.
- Flushing may need to occur in segments (by floor or room) based on the building’s plumbing design and water pressure. Cold water should be flushed before hot water.
- Consider checking water quality parameters, such as temperature, pH, and disinfectant levels, in the water entering the building and at points of use after flushing to verify that fresh water is being flushed through the entire plumbing system. Achieving stable temperature, pH, or disinfectant levels can be a good indicator that the system has been adequately flushed.
- **Maintain all non-drinking water building water systems** and devices according to the manufacturer’s specifications, such as:
 - Emergency safety devices such as sprinkler systems, eye-wash stations, and safety showers.
 - Decorative fountains/water features, spas, hot tubs, pools, and cooling towers.
 - Sanitary sewer and other water drainage/collection systems in the building, including filling all drain traps with water to ensure that sewer gases cannot enter the building during flushing.
 - See CDC’s guidance for reopening buildings for additional information, referenced in the Resources section below.
 - Consider documenting all steps taken in the building maintenance records for future reference.
- **Consider developing a water management program** for your building water systems and all devices that use water. CDC provides a toolkit on developing a water management program to reduce the risk of *Legionella* growth, referenced in the Resources section below.

For public water systems:

- **Coordinate distribution flushing activities** with nearby building owners/managers.
- **Be prepared to provide information on system disinfection activities** or proactively post information on the utility’s website, such as:
 - Type of disinfectant used (i.e., free chlorine vs. chloramine).
 - Residual level maintained by the water system.
 - Scheduled free chlorine periods (for those systems primarily using chloramines).
 - Any additional measures that may be underway to maintain disinfectant residual levels in parts of the water system experiencing reduced usage.

What should we do when buildings/businesses reopen?

The following are recommended steps to prepare the building’s water system for returning to operation after being stagnant for an extended period of weeks to months. EPA recommends that these steps be performed prior to the building/business reopening. If water stagnation was prevented and the building water systems were maintained following the above recommendations while the building was closed, these steps may not be necessary but could be considered as additional precautionary measures.

For building owners/managers that receive water from a public water system:

- **Follow the steps described above to replace the water in the building’s plumbing and maintain all building water systems.**
- **Consider contacting your local public health department** for assistance if you have specific concerns or to determine if any local requirements are necessary prior to reopening.

- **Review the potential impact that the degraded water quality might** have on your building occupants considering their use of the building and the building's water systems. Factors to consider when evaluating additional steps include:
 - The age range and health of the occupants
 - How water is used in the building.
 - Points of direct use by the occupants, especially for showering or consumption.
 - Past problems with the plumbing system (e.g., leaks, previous *Legionella* issues).
- **Based on your review:**
 - **Consider notifying your building occupants** of the status of the building's water systems and any steps being taken to maintain water quality. See CDC's Water Management Program toolkit referenced in the Resources section below for additional information.
 - **Consider whether limiting access to or use of the water is an appropriate cautionary phase** prior to returning to normal use of water in the building.
 - **Consider whether a proactive disinfection/heat treatment is necessary**, such as that recommended for controlling *Legionella* in ASHRAE Guideline 12 referenced in the Resources section below, to return the building's plumbing and other water systems to safe operation prior to reopening. These procedures should only be performed by trained professionals.
- **Drain and clean water storage facilities and hot water heaters** following the manufacturer's instructions.
- **Follow appropriate regulations and policies for worker safety and health** while performing all activities.
- **For more information on ensuring the safety of your building's water system after a prolonged shutdown, CDC provides guidance for building water systems related to reducing risks of *Legionella* that can be applied to other microbiological contaminants** (see the Resources section below for a link to that guidance).

For public water systems:

- **Coordinate distribution flushing** with nearby building flushing activities and be prepared to provide information on system disinfection activities, as described above.
- **Ensure meters are working and accurate.**

What should we do when a Non-Community Water System (NCWS) reopens?

Buildings, campuses, and other entities that have their own water supply and/or treat their supply are regulated under the Safe Drinking Water Act (SDWA) as NCWSs. These buildings may include schools, restaurants, gas stations, churches, or recreational facilities, among others, that have their own water systems. For these systems, EPA recommends the following steps for reopening facilities:

- **Contact your primacy agency to discuss specific requirements** for restarting operations.
- **Consider following the steps described above to replace the water in the buildings' plumbing and maintain all building water systems.**
- **Consider whether a proactive disinfection/heat treatment is necessary**, such as that recommended for controlling *Legionella* in ASHRAE Guideline 12 referenced in the Resources section below, to return the building's plumbing and other water systems to operation prior to reopening.
- **Consider performing an appropriate start-up procedure**, such as the procedure recommended in the Revised Total Coliform Rule (RTCR) guidance summarized below and accessed through the link provided in the Resources section of this guidance, to reduce the risks from chemical and microbial contaminants that may have accumulated during the period of reduced water usage.

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- Under the RTCR, drinking water primacy agencies are required to develop start-up procedures for seasonal systems. Contact your primacy agency for details on the specific procedures that are required in your area.
- **The EPA RTCR State Implementation Guidance recommends the following start-up steps:**
 - **Inspect water system components**, including source(s), treatment components, distribution lines, and storage tanks. Address any issues identified during the inspection.
 - **Open hydrants and/or faucets. Drain storage facilities.**
 - **Activate source(s) and flush water through the entire distribution system.**
 - **Chlorinate the water system and leave chlorinated water in the distribution system for at least 24 hours. Flush the water system to void any highly chlorinated water.**
 - **Collect coliform samples** at key locations in the distribution system to ensure that the system is free of microbial contamination.
 - **If possible, have a site visit** conducted by the primacy agency or primacy agency-approved third party.
 - **Verify that any historical or current sanitary defects have been corrected.**

Resources

- CDC Water Management Program
 - <https://www.cdc.gov/legionella/wmp/index.html>
- CDC Water Management Program Toolkit
 - <https://www.cdc.gov/legionella/downloads/toolkit.pdf>
- CDC Guidance for Reopening Buildings After Prolonged Shutdown or Reduced Operation
 - <https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>
- ASHRAE Guideline 12-2000 – Minimizing the Risk of Legionellosis Associated with Building Water Systems
 - https://www.techstreet.com/ashrae/standards/guideline-12-2000-minimizing-the-risk-of-legionellosis-associated-with-building-water-systems?product_id=232891
- EPA RTCR State Implementation Guidance
 - <https://www.epa.gov/dwreginfo/total-coliform-rule-compliance-help-primacy-agencies>