Ohio | Department of Health

Ohio Ohio Environmental Protection Agency

Recommendations for Water Supply Flushing for Reopening of Buildings Under Statewide COVID-19 Transition Plan

Dear Building Occupants, Owners, and Tenants,

In accordance with Ohio's statewide transition plan announced April 27, 2020, and as buildings re-open that have had little to no water usage during the Stay at Home Order due to the COVID-19 pandemic, it is important to flush water that has been stagnant in both cold- and hot-water distribution lines and fixtures. Low water usage can contribute to bacterial growth, including *Legionella* which can cause a serious type of pneumonia called Legionnaires' disease. It can also cause other water quality issues with potential health risks due to the build-up of lead and copper in stagnant water that's been collecting in older pipes and fixtures.

As buildings reopen, it is critical to drain, flush, and if necessary, based on a review of building conditions, disinfect the hot and cold-water systems to remove harmful contaminants. Devices that store water, such as drinking water fountains, water heaters, storage tanks, and any droplet or mist-forming devices such as cooling towers, humidifiers, showerheads, and certain medical and manufacturing devices and process equipment should also be flushed and disinfected in accordance with manufacturer's recommendations or industry best practices.

The Ohio Department of Health and the Ohio Environmental Protection Agency have issued the attached "Guidance for Premise Plumbing Water Service Restoration."

Please note that this guidance applies to the water systems of all types of buildings that are unoccupied or partially occupied during the COVID-19 pandemic, including but not limited to office buildings, manufacturing facilities, medical offices (e.g., physician and dentist offices, ambulatory surgery centers, outpatient centers, etc.), government facilities, and religious institutions. If you are a tenant of a building, we recommend that you share this information with the building owner, building manager, or management company and ask them to consider taking these precautions.

If you have any questions, please contact:

Ohio Department of Health
Bureau of Environmental Health & Radiation Protection
(614) 466-1390
BEH@odh.ohio.gov

Ohio Environmental Protection Agency
Division of Drinking and Ground Waters
Emerging Contaminants Section
(614) 644-2752

Sincerely,

Amy Acton, MD, MPH
Director
Ohio Department of Health

Laurie Stevenson
Director
Ohio Environmental Protection Agency

Ohio Environmental Protection Agency

Ohio Department of Health

Guidance for Premise Plumbing Water Service Restoration

When buildings and homes are vacated, the stagnation of potable water within the premise plumbing can lead to water quality deterioration that may be associated with public health risks.

Applicability

This guidance offers considerations for water service restoration to minimize risks associated with water quality degradation related to stagnant water. It is applicable to structures regardless of their status of a public water system as defined by Ohio Revised Code Section 6109.01 and Ohio Administrative Code Rule 3745-81-01 and is not meant to restrict any facility or water system's more comprehensive water management plan or guidance.

Water Quality Issues in Closed or Partially used Buildings

Buildings and homes are often closed or vacated for a variety of reasons including, but not limited to, housing demand, economics, tenant turnover, remodelling, and business or school closures. For example, schools close for summer vacation, office buildings go vacant based on patronage, hospital wings close for remodeling/expansion or lower patient census, and apartment buildings close for renovation. During such vacancies, water usage may decrease or cease causing stagnation in the plumbing leading to water quality degradation.

Even in buildings without a history of vacancy, premise plumbing faces several key challenges in the delivery of potable water throughout the building. These challenges include:

- High surface area to volume ratio
- High water age
- Multiple types of plumbing materials
- Multiple points for cross connections
- Temperature gradients

Building maintenance, regular water usage, and flushing programs are essential for managing water quality and to decrease the health risks associated with water quality degradation. In vacant buildings these challenges should be managed to prevent the accumulation or growth of contaminants with-in the premise plumbing.

Potential Contaminants in Stagnant Waters in Premise Plumbing

- Metals (lead and copper)
- Opportunistic pathogens (Legionella, Pseudomonas, non-tuberculosis mycobacteria)
- Organics (disinfection byproducts: trihalomethanes and haloacetic acids)

When buildings close or usage decreases for extended periods of time, the stagnation of potable water within plumbing can lead to deterioration of the water quality, including loss of disinfectant residual, microbial growth, accumulation of sediments and metals, and increased disinfection byproduct formation. Stagnant periods as short as a few hours can lead to reductions in water quality. Portions of a building that are allowed to remain vacant should also be considered for water quality management. For example, unused rooms allow for stagnation in the lines connecting the plumbing fixture to the main water riser.

Water quality degradation can impact drinking water safety within a building. When water service is returned to the building after an extended period of closure or low usage, it is important to address the stagnant water in the building's plumbing before consumption and usage is permitted.

Guidance for Premise Plumbing Water Service Restoration

Addressing Contaminants to Protect Public Health

For buildings with long periods of closure, consideration should be given to ensuring the safety of water when the service is restored to the building. Factors to consider when restoring service include:

- Section of the building that will be used – If vacant floors or sections will still exist, these areas are to be flushed and managed to prevent localized stagnation.
- Anticipated use of the building – Buildings with susceptible populations such as hospitals, nursing homes, schools, or daycares may consider additional efforts to address contaminants to which the population of the building is most susceptible.
- Regulatory requirements that must be met – Buildings should comply with all state and local laws related to premise plumbing.
- Materials used in the plumbing system – Buildings with lead plumbing or solder should be aware of the potential for leaching or particle build up in aerators and stagnant waters. Materials may vary throughout the building due to maintenance, repairs, and renovations.
- Age of the plumbing system – The age of the plumbing system can be an indicator of the materials used, the integrity of the system, and maintenance that may be required once service is restored.
- Potable and non-potable distributions – Large buildings often have multiple types of water distribution networks. This can increase the potential for improper cross-connection and backflow to non-potable networks (fire protection, irrigation, etc.).
- Types of potable water distribution – Domestic cold water, hot (tempered) water distribution networks exist in buildings. Heated water is typically stored and produced in hot water storage tanks that can accumulate sediment, reduce disinfectant residual, and harbor opportunistic pathogens.

Ohio Agencies that may Regulate Premise Plumbing

- Ohio Department of Commerce
  - Building Code
- Ohio Environmental Protection Agency
  - Public Water Systems
- Ohio Department of Health
  - *Legionella* Water Management Plans

Consideration of these factors will help determine what kind of flushing or disinfection the building may require before serving potable water again, and what additional asset management or maintenance the building may require when in use.

Premise Plumbing is a Nexus of Regulations

In facilities not defined as a public water system by Ohio Revised and Administrative Codes, managing water quality is the responsibility of the building maintenance personnel, manager, owner, commercial plumbers, or individual occupants. These groups are often not water quality professionals and the building water system is often not their primary responsibility. In facilities designated as a public water system, the water distribution system is the responsibility of the Professional Operator of Record (ORC) certified by Ohio EPA or owner. The traditional knowledgebase for an ORC is in-ground water distribution systems typical to municipal water utilities. Premise plumbing, which is regulated by the state building code, can present a knowledge gap for ORCs when buildings become designated as public water systems.

Utilizing Water Management Programs for Ongoing Maintenance and Monitoring

Water management programs (or plans) should the the primary means to maintain water quality in premise plumbing. They can also can be an important tool for preventing stagnation of water in both occupied and unoccupied buildings and are generally used to address *Legionella*. However, the principles of water management plans are also applicable to ensure the highest level of water quality and minimize other contaminants. If a water management program has not been established for a facility, one should be created using ASHRAE 188 and CDC Guidance ***cdc.gov/legionella***.

Facilities that utilize a Water Management Program can reduce or eliminate the risks associated with water stagnation and reduce the need to address contaminants of concern when reopening buildings.

Guidance for Premise Plumbing Water Service Restoration

Recommendations for Returning Buildings and Homes to Service without a Water Management Plan

Despite the impact that building closures and low water usage can have on water quality, there is no consensus of best practices for returning water service to a building or premise plumbing. It is important to communicate with the local water utility and other state/local agencies prior to performing flushing or disinfection as they may provide guidance on any associated regulations. In general, and prior to human consumption or use, Ohio EPA and ODH recommend a combination of the following methods to ensure the delivery of water throughout the premise is of the same quality that it was when it entered the building. Vacant or unoccupied buildings should flush, test, then consider disinfection based on testing results for contaminants of concern and the possible health effects on the population served. Disinfection and testing are particularly important when the facility serves a sensitive population, such as immunocompromised individuals. Structures with lead service lines may consider using an NSF/ANSI Standard 53 filter for lead reduction. These filters are available in both faucet mounted and pitcher formats.

I. Flushing

Flushing should be the first step when buildings and homes are returned to service after an extended period of discontinued service (e.g., weeks or months). Someone should be present to ensure that the meter works, leaks are minimized, wastewater piping is functional, and the building's plumbing is flushed. Flushing instructions will vary depending on the size and configuration of the structures internal plumbing. Flushing procedures may also vary depending on the specific contaminant being mitigated. Flushing can be used as a preventative measure during the periods of closure to prevent water stagnation. Flushing can also be used to address the potential effect of stagnation on premise plumbing.

> Flushing does not require installation of special equipment, can be implemented by anyone, and can address multiple contaminants. The procedures included in the Appendix can be distributed to the general public as a guide to improve water quality, particularly after water service is restored to vacant structures.

In general, flushing involves opening taps and other fixtures (including showerheads) starting closest to the building entry and working towards the distal end and letting the water run to remove any stagnant water within the plumbing and fixtures. It does not require the installation and maintenance of additional water treatment equipment and is not complex to implement. The length of flushing required to remove all the stagnant water in the buildings plumbing will depend on the number and type of fixtures that are opened for flushing, and the length and diameter of pipe that needs to be flushed. Flushing may help remove particle build up that contributes to poor water aesthetics and to high lead or copper levels. Replacing stagnant water with fresh water may increase the disinfectant residual within the building plumbing, in turn, help destroy microbial growth and prevent re-growth.

Flushing should continue long enough to ensure that accumulated material is removed, which can be verified by testing. Additionally, faucet aerators should be removed prior to flushing to allow for complete removal of material and avoid clogging or accumulating materials in the aerator. It is also recommended to clean faucet aerators prior to reinstallation.

Flushing should be conducted in a way that ensures water stagnation is reduced throughout the entire premise plumbing system, including hot water distribution lines. A systematic flushing procedure is necessary to remove potential contaminants from the premise plumbing and restore adequate disinfectant residuals before returning the building to service and using water for drinking, cooking, and washing. While there is no one standard to flush a system for all contaminants, Appendix B contains directions for flushing a single-family structure with lead service line to remove particlulates as well as flush stagnant water.

> Cold water plumbing should always be thoroughly flushed before hot water taps are used or flushed.

Guidance for Premise Plumbing Water Service Restoration

II. Testing

Testing can be used in two ways. First, testing for contaminants of concern should be performed to evaluate water quality during flushing or disinfection procedures. Water pressure, temperature, and disinfection residual should be measured at varying locations in the building to check for consistency while flushing. Second, testing should be performed to evaluate the effectiveness of flushing or disinfection at mitigating the contaminants of concern. For instance, inorgaic testing should be performed at taps to ensure flushing has removed any accumulated metals. Bacteriological testing should be performed at various locations throughout the building to ensure the elimination of coliform bacteria and other opportunistic pathogens. In any circumstances that unsafe levels of metals or microbial pathogens are found, building owners should supply filters to the occupants until safe levels are achieved. A list of Ohio EPA certified drinking water labs can be found at ***epa.ohio.gov/Portals/28/documents/labcert/Combined-Lab-List.pdf***. Facilities sampling for *Legionella* should send samples to a CDC Elite Certified Lab for analysis. A list of ELITE certified labs is available at ***cdc.gov/elite/Public/MemberList.aspx***.

III. Disinfection

There are two types of disinfection, temporary and continuous. Temporary disinfection, sometimes referred to as shock disinfection, acute treatment, or disinfectant burn, are easier to implement. The results of temporary disinfection should be evaluated through appropriate water testing to determine if desired water quality parameters have been achieved. Depending on the building complexity, water testing results, and the population served, the installation of continuous disinfection equipment may be necessary to control microbial growth, such as *Legionella*, in the water system.

Temporary disinfection is defined as treatment that operates for less than 60 days. Buildings that are designated as a public water system should contact their Ohio EPA district office for guidance on disinfection.

For buildings that choose to utilize temporary disinfection, flushing should occur prior to disinfection. Buildings may consider following Ohio Department of Commerce's disinfection rules for new buildings cited in OAC 4101:3-6-01 Section 610 or Ohio Department of Health guidance in Appendix A for *Legionella* control. Disinfection of the building water system should be administered under the auspices of a building water quality professional, a *Legionella* consultant (when applicable) or a professional water operator in accordance with all state and local regulations.

Continous disinfection systems installed for greater than 60 days in a calendar year may be needed to control microbial growth such as *Legionella* in buildings with sensitive populations or where testing shows temporary disinfection is not effective at mitigation. Continuous disinfection equipment must be installed by a qualified water management professional, and the facility should consult with Ohio EPA, Division of Drinking and Ground Waters to determine if the installation of continuous disinfection equipment will designate them as a public water system. For those continuous disinfection systems operating over 60 days in a calendar year, at minimum, and until a determination is made Ohio EPA, disinfectant levels should be monitored at least twice weekly to ensure uniform distribution of disinfectant on all floors, loops, and distal locations in the water distribution system. It is also important that disinfectants do not exceed maximum allowable levels. For more information about becoming a public water system, or federal safe drinking water standards contact Ohio EPA's Division of Drinking and Ground Waters at (614) 644-2752.

Occupational Health and Safety Considerations

When recommissioning a building with stagnant water in the plumbing, precautions should be taken to avoid risks associated with exposure to water and chemicals used for disinfection. Personal protection equipment (PPE) should be worn throughout the process. In addition to the risks associated with recommissioning stagnant building plumbing, additional hazards may be present in buildings that are closed or unoccupied for an extended period of time, including hazards related to electrical systems, HVAC systems, water intrusion, structural components, and other physical hazards that may be present during building reoppening. Workers and building owners/operators should exercise caution and remain aware of these additional potential risks while working on site.

Guidance for Premise Plumbing Water Service Restoration

Additional Resources

There are many resources available online with more information.

- ***http://www.clevelandwater.com/actions#top***
- ***https://www.awwa.org/Store/Product-Details/productId/65628258***
- ***https://epa.ohio.gov/Portals/28/documents/pws/PWS-06-001.pdf***
- ***https://www.epa.gov/sites/production/files/2018-09/documents/flushing_best_practices_factsheet_508.pdf***
- ***https://www.michigan.gov/documents/egle/egle-tou-dweh-WaterReconnectionActions_683801_7.pdf***
- ***https://www.michigan.gov/documents/egle/egle-tou-dweh-FlushingAppliancesForWaterConsumption_684205_7.pdf***
- ***https://www.waterrf.org/resource/evaluation-flushing-reduce-lead-levels-0***
- ***https://engineering.purdue.edu/PlumbingSafety/project/covid19-response***
- ***https://epa.ohio.gov/Portals/28/documents/rules/rtcr/SeasonalStart-UpProcedureTraining.pdf***
- ***https://www.health.ny.gov/environmental/water/drinking/docs/water_startup.pdf***
- ***https://epa.ohio.gov/Portals/28/documents/rules/rtcr/SeasonalStartupChecklist.pdf***
- ***https://www.health.state.mn.us/communities/environment/water/docs/ncom/startup.pdf***
- ***https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/sitemap/seasonal.shtml***
- ***https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/legionella-environmental/legionella-environmental-welcome***
- ***https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html***
- ***http://www.clevelandwater.com/blog/getting-back-business-should-start-important-plumbing-step***
- ***https://www.nsf.org/newsroom/in-the-time-of-covid-19-building-water-systems-with-low-demand-require-care***
- ***https://dec.vermont.gov/water/drinking-water/public-drinking-water-systems/tncws/seasonal-systems***

Contacts

Ohio Department of Health's Bureau of Environmental Health at ***BEH@odh.ohio.gov*** or (614) 644-1390.
Public water systems: Emerging Contaminants Section at (614) 644-2752 or your Ohio EPA district office inspector

Appendix A

ODH Recommendations for Unoccupied to Partially Occupied Buildings for Flushing and Disinfection to Reduce Legionella Growth ***https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/Legionella-Environmental/welcome/***

Appendix B

https://epa.ohio.gov/Portals/28/documents/pws/flushing-home-plumbing-when-water-service-is-restored.pdf