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MEMORANDUM

TO: Building Owners and Operators and Water Supply Operators

FROM: Brian W. Cox, P.E., IDPH Plumbing and Water Quality Manager

DATE: May 13, 2020

SUBJECT: Guidance for Maintaining Water Systems During Reduced Use and Returning Water Systems to Regular Use after Extended Periods of Reduced Use

Background

The IDPH Plumbing and Water Quality Program is issuing this memorandum to building owners and operators, and public water supply operators to provide guidance for maintaining water quality and safety in building water systems and in potable water distribution systems during periods of reduced use and considerations for returning building water systems to regular use.

The Program recognizes that many buildings throughout the State of Illinois have experienced extended periods of reduced use due to measures implemented to help slow the spread of COVID-19. This lack of use will increase water age and stagnation in water distribution systems and other building water systems. Increased water age degrades water quality by corroding pipes and plumbing materials, accumulating sediment in water systems, and reducing disinfectant levels. This contributes to the growth and spread of opportunistic waterborne pathogens (e.g. *Legionella*, *Pseudomonas*, *Acinetobacter*, nontuberculous mycobacteria, fungi, etc.), increases concentrations of metals such as iron, lead, and copper, and can create unpleasant tastes, colors, and odors.

Many businesses and buildings are currently taking steps to reopen, following the release of Governor Pritzker's plan to "Restore Illinois". The Restore Illinois plan may be viewed along with relevant indicators at <http://www.dph.illinois.gov/restore>. We encourage building owners and operators and water system operators to consider the general guidance and recommend actions noted in the remainder of this document to reduce plumbing and water quality concerns.

I. General Guidance for Water Quality and Safety in Plumbing Systems

The best strategy for reducing potential plumbing and water quality issues is to take proactive, preventative measures to maintain water quality. IDPH and CDC recommend that building owners develop and implement water management programs. Water management programs identify hazardous conditions and take steps to minimize the growth and spread of *Legionella* and other waterborne pathogens. Developing a water management program is a multi-step process. For response to COVID-19, IDPH recommends prioritizing the following actions:

- Identifying and describing the building water system(s) in and around the building or premises;
- Identifying areas where *Legionella* could grow and spread or where other water quality concerns like lead contamination could exist; and
- Decide what actions can be taken in the building water system(s) to prevent water quality issues.

If your building is a significant user on a public water supply system, you should notify your water provider whenever your building will experience a significant change in water demand for an extended period of time, immediately after becoming aware of the anticipated change in demand. This will allow the public water supply system to make any necessary adjustments to treatment and distribution to maintain water quality.

Following periods of lack of use, it is common for building water systems and drain waste and vent (DWV) systems to experience leaks, blockages, and other mechanical issues such as air-locking, water hammer, and malfunctioning valves and fixtures as a result of corrosion, sediment accumulation, and entrapped air. To reduce these concerns, valves should be opened and closed slowly and turned on systematically (see Attachment A). Additionally, the fluid maintaining trap seals on DWV systems may have evaporated over time. These traps are intended to prevent sewer gases and vapors within the DWV system from entering the building. Therefore, all traps should be filled by slowly pouring water into all fixtures (sinks, tubs, showers, floor drains, etc.), until all trap seals have been properly restored.

The Program recommends consulting with a licensed plumber prior to returning systems to use, as it may become necessary to repair leaks, clear blockages, and repair or replace malfunctioning plumbing fixtures, fittings, and appurtenances. Plumbing must be performed by plumbers, licensed and registered in accordance with the [Illinois Plumbing License Law \(225 ILCS 320/\)](#) and installed in accordance with the [Illinois Plumbing Code, Title 77 Ill. Adm. Code Part 890](#).

After building owners and operators have followed recommended actions for start-up (see Attachment B), IDPH recommends facilities maintain water quality by adhering to a comprehensive water management program which includes regular monitoring of water quality parameters such as temperatures, pH, and disinfectant levels.

II. Shock Disinfection of Plumbing Systems

Prior to reoccupying buildings that have been vacant for an extended period of time, building owners and operators may consider performing a shock disinfection of the building water system(s). Shock disinfection refers to introducing high concentrations of disinfectant or high temperature for a relatively short period of time. Before disinfecting building water system(s), facilities considering disinfectants for shock disinfection should ensure appropriate measures to protect the public water supply are in place and communicate their proposed actions to the appropriate authorities. Operators of buildings connected to a public water supply should contact their water supplier prior to disinfecting. Operators of buildings connected to a private water supply or private sewage disposal system should contact their local health department prior to disinfecting. Appropriate measures to protect the connected water supply or water source include isolating the building's water system(s) and verifying backflow devices are installed where required and tested by a certified cross connection control device inspector (CCCDI), as required by [Title 77 Ill. Adm. Code Section 890.1130](#). Notification of the proposed disinfection should be given to all individuals who may be on the premises during disinfection activities. Additionally, protective measures should be put in place to ensure users are not harmed by disinfection, e.g. signage, disabling fixtures, providing alternative sources of water, etc.

Following disinfection events, facility owners and operators should determine that the water is safe for use and safe for discharge. When disinfectants are used, particularly where concentrations may exceed [maximum contaminant levels](#), facilities should ensure that water is flushed, and residual disinfectant has returned to its normal concentration. Where temperatures have been increased for disinfection, facilities should ensure that water temperatures at outlets are returned to a temperature safe for use.

When considering shock disinfection, facilities should be aware of possible adverse effects on the integrity of the building water systems, DWV systems, and sewage treatment systems, e.g. corrosion, pin-holing, temperatures exceeding pipe ratings, incompatible plumbing materials, and interference with sewage treatment systems. These negative effects are amplified when disinfection is performed improperly, e.g. too often, too high of temperatures or too high of concentration of disinfectants. Direct dischargers should notify the Illinois Environmental Protection Agency's Division of Water Pollution Control to determine if any additional actions are necessary to prevent pollutants from entering waters of the State. The Program recommends disinfection

only be conducted by professionals with expertise in these processes and with knowledge of applicable regulations.

III. Buildings Primarily Serving Children including Schools and Day Care Facilities

Lead and other heavy metals can enter drinking water when plumbing materials containing lead corrode or wear away. Some common plumbing materials that contain lead are lead service lines, brass fixtures and appurtenances, chrome-plated brass faucets, galvanized pipes, and pipes, fittings, and fixtures joined with lead solder. Lead-bearing plumbing is more likely to be found in older buildings but especially in those constructed before 1987. The concentration of lead in water increases with the duration of time the water sits (stagnant) in plumbing systems and may vary depending on system's age, materials present, and water chemistry. Young children and infants are particularly vulnerable to the harmful effects of lead. Therefore, operators of water systems at schools, day cares, parks, or other facilities serving children should prioritize lead in drinking water as a possible hazard and take necessary steps to flush their plumbing system following periods of absence or lack of use. The Program recommends that all facilities reopening take actions to flush their systems prior to reoccupying. It should be noted that levels of lead in water can increase relatively quickly after flushing, therefore routine system flushing, flushing fixtures immediately prior to use, and utilizing point-of-use filtration when water is used for drinking and food preparation may be necessary to further reduce exposure to lead in drinking water. More information about best practices to reduce lead and water can be found in the [IDPH Lead in Drinking Water Fact Sheet](#) and in the resources below.

Schools and licensed day cares that have conducted lead in water testing to comply with regulations should review testing information and remediation plans to inform decisions when reopening.

For additional questions or concerns about lead in drinking water, please contact the Program at DPH.LeadH2O@illinois.gov.

IV. Other Building Water Systems

Buildings can have many different types of water systems including decorative water features, swimming facilities, HVAC systems, and cooling towers that may contribute to the growth and spread of *Legionella*. When reopening buildings, building owners and operators should identify and address all water systems in the building and on the premises. For these building water systems, the Program recommends reviewing national standards, manufacturer's recommendations, industry best practices, and applicable regulations. When determining appropriate measures, facilities may consider consulting with one or more consultant(s) with experience and expertise in managing such systems or devices.

CDC guidance offers general recommendations for decorative water features, hot tubs/spas, and cooling towers in their [Guidance for Building Water Systems](#).

V. Public Water Supply Operators

With many buildings unoccupied or operating with reduced use, public water supplies may experience issues maintaining disinfectant levels throughout their distribution system. A few examples of areas where water demand may be significantly reduced include distribution zones primarily serving school campuses, commercial, retail, bar/restaurant districts, and certain industrial areas. Through this time of reduced demand, water suppliers should monitor water use and water quality on their distribution system to focus flushing efforts (install auto-flushers or increase frequency of hydrant flushing) on distribution zones impacted by reduced use and maintain disinfectant residuals. Special attention should be given to impacted distribution areas supplying at-risk populations and buildings served by dead end water mains.

Many preventative and responsive measures for building water quality rely on incoming water having appropriate levels of residual disinfectant and corrosion control. As buildings and businesses take steps to reopen, IDPH's Plumbing Water Quality Program is recommending they consider the effects of prolonged stagnation on their building water systems and take appropriate actions. These recommendations include communicating with water suppliers about topics like anticipated changes in water demand, water distribution system flushing, backflow prevention at service lines to buildings, proposed disinfection of building water systems, and general questions about water quality in their area. Water suppliers are a critical participant in recommissioning building water systems safely. Where feasible, the Program encourages water suppliers to support their users by:

- Communicating: Inform users of the type of disinfectant used, inform users of the residual disinfectant levels, and note any recent disruptions or proposed changes in the water treatment and supply;
- Assisting: Work with building owners and operators to ensure standard checkpoints near the building or at the meter to the building have recently been checked; and disinfectant residuals entering buildings meet expected standards.
- Flushing: Install auto-flushing devices or increase hydrant flushing in areas experiencing reduced use.

VI. Additional Resources

Resources on Recommissioning Building Water Systems

Purdue University, Center for Plumbing Safety -

https://engineering.purdue.edu/PlumbingSafety/covid19/index_html

U.S. Environmental Protection Agency, Information on Maintaining or Restoring Water Quality in Buildings with Low or No Use - <https://www.epa.gov/coronavirus/information-maintaining-or-restoring-water-quality-buildings-low-or-no-use>

CDC, Guidance for Building Water Systems - <https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>

Resources on Preventative Water Management for Legionella

CDC, *Legionella* (Legionnaires' Disease and Pontiac Fever), Prevention with Water Management Programs - <https://www.cdc.gov/legionella/wmp/index.html>

IDPH, *Legionella* Response Compendium - <http://dph.illinois.gov/sites/default/files/publications/legionella-prevention-response.pdf>

Resources on Lead in Drinking Water

U.S. Environmental Protection Agency, Basic Information about Lead in Drinking Water -

<https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water>

CDC, Lead in Drinking Water - <https://www.cdc.gov/nceh/lead/prevention/sources/water.htm>

USEPA, 3Ts Flushing Best Practices - https://www.epa.gov/sites/production/files/2018-09/documents/flushing_best_practices_factsheet_508.pdf

USEPA, Consumer Tool for Identifying POU Drinking Water Filters Certified to Reduce Lead -

<https://www.epa.gov/water-research/consumer-tool-identifying-pou-drinking-water-filters-certified-reduce-lead>

CDC, Lead in Drinking Water - <https://www.cdc.gov/nceh/lead/prevention/sources/water.htm>

Resources for Hotels and Resorts

CDC, Considerations for Hotel Owners and Managers - <https://www.cdc.gov/legionella/wmp/hotel-owners-managers.html>

Attachment A
Recommendations and Checklist for Returning Building Water Systems to Regular Use after Extended Periods of Reduced Use

The following checklist contains recommended actions to be completed prior to occupying buildings after periods of reduced use. Additional documentation may be necessary to confirm completion of certain items. Please note, the actions in this checklist should be completed in addition to developing and implementing a comprehensive water management program.

Building Water System Checklist Returning Buildings to Regular Use	
Recommended Action	Date of Completion
<input type="checkbox"/> Contact your water supplier: Identify incoming water quality data, recent water system disruptions or water quality changes, determine if water mains should be flushed, and notify of planned disinfection activities and occupancy.	
<input type="checkbox"/> Consider having a licensed plumber available: Building operators may anticipate malfunctioning valves, leaks, and blockages and should ensure a licensed plumber is available to correct plumbing deficiencies as water systems are restarted.	
<input type="checkbox"/> Verify backflow devices have been tested within the last 12 months by a certified cross-connection control device inspector (CCCDI).	
<input type="checkbox"/> Identify all treatment equipment, i.e. water softening, filtration, etc. Follow manufacturer’s recommendations for startup after periods of disuse. Assess whether to bypass treatment when flushing.	
<input type="checkbox"/> Remove faucet aerators (screens) and filters throughout building water system, i.e. filters on ice machines, refrigerators, or beverage dispensers, etc.). Aerators should be disinfected or discarded, and replaced after flushing is complete.	
<input type="checkbox"/> Flush cold and hot water systems starting with the service line(s) (pipes that connect the potable water source to the building plumbing system). For general flushing strategies see Attachment B. To ensure complete flushing, it is recommended that facilities develop flushing procedures specific to their building’s plumbing system.	
<input type="checkbox"/> Ensure water heater(s) is set to at least 120 degrees Fahrenheit and verify mixing valves and safety devices are installed, functional, and adjusted to prevent scalding.	
<input type="checkbox"/> If possible, measure residual disinfectant at point(s) of entry and at representative points of use in the building water system, i.e. points closest to and furthest from where the water enters the building. Contact your water supplier to determine the disinfectant being used and whether to measure free or total chlorine.	
<input type="checkbox"/> Ensure safety equipment including fire sprinkler systems, eye wash stations, and emergency showers are properly functioning and have been flushed, cleaned, and disinfected in accordance with manufacturer’s recommendations.	
<input type="checkbox"/> Facilities should consider risk to building occupants and assess whether to collect water samples to test for heavy metals or harmful organisms (see Attachment B).	
<input type="checkbox"/> Ensure all traps on drain, waste, and vent systems are properly sealed	
<input type="checkbox"/> Follow other building water systems startup procedures (Cooling tower, spas, etc.)	
<input type="checkbox"/> Ensure all plumbing fixtures have been properly cleaned and disinfected prior to use	

Attachment B

General Flushing Strategies for Returning Buildings to Regular Use after Extended Periods of Reduced Use

The purpose of flushing is to replace all water inside building piping with fresh water. The following outlines a general strategy for moving water through a supply system. Flushing plans should generally be developed specific to a building water systems' characteristics including flow rate, configuration, and operation. Flushing is most effective when a target contaminant is identified and considered. Where possible, facilities should develop flushing procedures in consideration of such factors. This strategy highlights a one-time flushing event and not a routine flushing procedure.

I. Prepare for Flushing Fixtures

These steps should be completed prior to starting flushing activities.

1. To ensure safety while flushing, appropriate training and PPE should be considered. You can find guidance on worker safety for *Legionella* control and prevention on the [OSHA website](#).
2. Follow water treatment equipment manufacturer's recommendations prior to restarting treatment equipment (e.g. filters, softeners, etc.) and assess if treatment should be bypassed when flushing.
3. Remove faucet aerators, disinfect or discard, and replace after flushing is completed. Aerator removal increases flowrate and limits the amount of sediment to become trapped during flushing.
4. Override automatic (hands-free) and metered faucets to ensure flushing is not disrupted by timed shut-offs.
5. Remove shower hoses, wands, and heads, disinfect or discard and replace them after flushing.
6. Note: The number of outlets that can be flushed simultaneously will depend on the capacity of the water heater and the flow capability of the system; flushing many fixtures at once may reduce in pressure loss.

II. Step-by-Step Procedure

1. Find the fixture closest to the point of entry into the building. Make sure the aerator has been removed. Turn the cold water on and let run for as much time as necessary to clear out the building's service line. This time will vary depending on several factors: pipe size and length of service line, water pressure, and flow rate for the fixture used. This fixture should be flushed for approximately 20-60 minutes or until temperature stabilizes.
2. Drain water heaters and other water storage tanks.
 - a. It may be necessary to shutoff isolation valves to prevent draining the entire hot water system. Isolation valves must be reopened prior to operating water heater.
 - b. Make sure that your water heater is set to at least 120°F. Higher temperatures can further reduce the risk of *Legionella* growth. Prior to increasing temperatures, ensure your DWV materials can handle the selected water temperature.
3. Ensure all actions in Part I have been completed, and begin flushing at the fixtures or points of use nearest to the point of entry (where the water enters the building from the water supply) and continue outward to the distal fixtures until all fixtures have been flushed.
4. Showers, sink faucets, and bathing tubs. These fixtures are frequently used during normal operations and are most likely to expose people to potentially contaminated water and should be prioritized in flushing efforts.
 - a. Run **cold** water until temperature stabilizes at full flow. If possible, confirm that that fresh water is being delivered by measuring residual disinfectant at representative points of use. Generally, this takes between 1-5 min. at each fixture but may take longer based on design.
 - b. Run **hot** water until temperature stabilizes at reduced flow. The goal is to sustain hot water temperature through the outlet and avoid exceeding the capacity of the hot water system to

maintain water temperature. Generally this takes between 1-5 min. at each fixture but may take longer based on design.

5. Drinking Fountains and beverage dispensers. Run **cold** water for at least 5 minutes.
6. Ice machines: Prior to use, discard ice from all ice machines. Clean and sanitize ice machines in accordance with manufacturer's recommendations. Ice machines should be run through at least 3 cycles with ice discarded after each cycle.
7. Dishwashers and Washing Machines: Run an empty cycle of all dishwashers and washing machines to ensure fresh water is present and prevent any potential staining of items.
8. Other appliances: Drain, flush, and disinfect all other plumbing appliances as appropriate.
9. Toilets. Flush each toilet twice after faucets, bathing tubs, and showers have been flushed.

III. Establish Routine Flushing Procedures

A one-time flushing event is unlikely to bring building water quality back to normal operations. IDPH and CDC recommend establishing and implementing a routine flushing program to maintain water quality after water systems have been returned to operation. Routine flushing programs should consider incoming water quality, flow rates, plumbing system design, and feasibility of implementation. Appropriate flushing duration and frequency will be depending on these factors.

When water quality concerns include lead, facilities should consider applicable guidance including the U.S. Environmental Protection Agency's guidance for schools and day care facilities, [3Ts Flushing Best Practices](#).

IV. Document Flushing Activities

Documentation is necessary to verify that flushing activities are occurring according to your flushing plan and procedures. Those completing flushing activities, either start-up or routine, should document that flushing has occurred and any observations/concerns from flushing and corrective actions taken. Documentation should include the date of the activity, name or initials of the individual completing the activity, any observations or concerns that may require corrective actions, and corrective actions if taken.

V. Validating Actions with Water Quality Testing

Where possible, facilities should measure water quality parameters including disinfectant and temperature to validate that flushing activities are effective at maintaining water quality. Facilities can determine this by understanding the water quality coming into the supply system and determining if there is significant loss of residual disinfectant or temperature at outlets.

Recommissioning actions can also be validated by collecting water samples from appropriate points and testing for heavy metals (e.g. lead and copper) and harmful organisms (e.g. *Legionella*). The decision to perform environmental sampling should be based on a variety of factors including a risk assessment of the water system (building occupancy, function, and source of exposure) and water quality data.

Attachment C

Additional Considerations by Building Use and Plumbing Fixtures and Appliances

The following information is intended to identify fixtures and appliances that building owners and operators should consider and address in addition to recommended actions in Attachment B. Plumbing appliances may have small amounts of water storage. Building owners and operators should review manufacturers' recommendations for draining and cleaning before reopening.

Food Establishments and Bars

- Beverage dispensers: Food establishment may have specialized beverage dispensers that are plumbed to cold water supply systems. Building owners and operators should review manufacturers' recommendations or contact the contractor to determine appropriate actions in addition to flushing.
- Ice Machines: Prior to use, discard ice from all ice machines. Clean, maintenance, and sanitize ice machines in accordance with manufacturer's recommendations. After cleaning, servicing and sanitizing ice machines, machines should be run through at least 3 cycles with ice discarded after each cycle.
- Glass rinsers: Bars may have equipment to rinse glasses. These fixtures should be cleaned in accordance with manufacturers' recommendations and in addition to flushing.
- Misting devices or systems: Food establishments may have equipment designed to produce mists or aerosols. These devices or systems should be evaluated, flushed, and cleaned in accordance with manufacturers' specifications and applicable regulations.

Beauty Salons

- Salon sinks: Salon sinks generally have a hose and sprayer that are used to wash hair before cuts or after treatments. These hoses may have small amounts of water stored in their lines after periods without use. In addition to flushing, building owners and operators should remove, disinfect or discard, and replace hoses and sprayers.

Dental Offices

- Dental units using water: Dental offices may use appliances that are connected to the cold water supply. After periods of reduced use, dental unit water lines may have biofilm accumulation. Building owners and operators should clean, disinfect, and replace units and lines as appropriate in addition to flushing.

Hotels

- Beverage dispensers: Food establishment may have specialized beverage dispensers that are plumbed to cold water supply systems. Building owners and operators should review manufacturers' recommendations or contact the contractor to determine appropriate actions in addition to flushing.
- Ice Machines: Prior to use, discard ice from all ice machines. Clean, maintenance, and sanitize ice machines in accordance with manufacturer's recommendations. After cleaning, servicing and sanitizing ice machines, machines should be run through at least 3 cycles with ice discarded after each cycle.