

# **EXITING ONE CRISIS – MITIGATING ANOTHER POTENTIAL CRISIS**

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**OMWA - ONTARIO MUNICIPAL WATER ASSOCIATION**

**CWWA - CANADIAN WATER & WASTEWATER ASSOCIATION**

**BRIAN JOBB TRAINING & CONSULTING**



Thank you to all drinking water and wastewater operators that have been working hard to ensure that our water remains safe!



# INTRODUCTION

Indications that the COVID-19 pandemic curve may be flattening is very positive news from a global perspective

Over the next few months it is anticipated that the shutdown requirements will start being lifted

Resuming business as usual in idle buildings should not simply be a matter of turning on the lights and turning up the heat

This presentation is intended to raise awareness of potential problems from stagnation of drinking water inside the plumbing in idle buildings

The problems and remediation guidance outlined in this presentation have been identified by industry experts

# WHY THE CONCERN?

Many buildings have been sitting for an extended period of time

Some buildings may have never been shut down for this length of time

Considerable effort may be necessary to prepare the system for safe operation

Most experts agree that we are in uncharted territory; lack of information available on the effect of a long-term water supply shutdown

Every facility will be different – variable susceptibility of drinking water systems

Due to the unique nature of systems this information can only be general in nature

# WHY THE CONCERN?

- Municipally-owned facilities: municipal staff, operating authorities or contract operators would be expected to flush the system

Non-municipal facilities: may not have staff dedicated to these tasks?

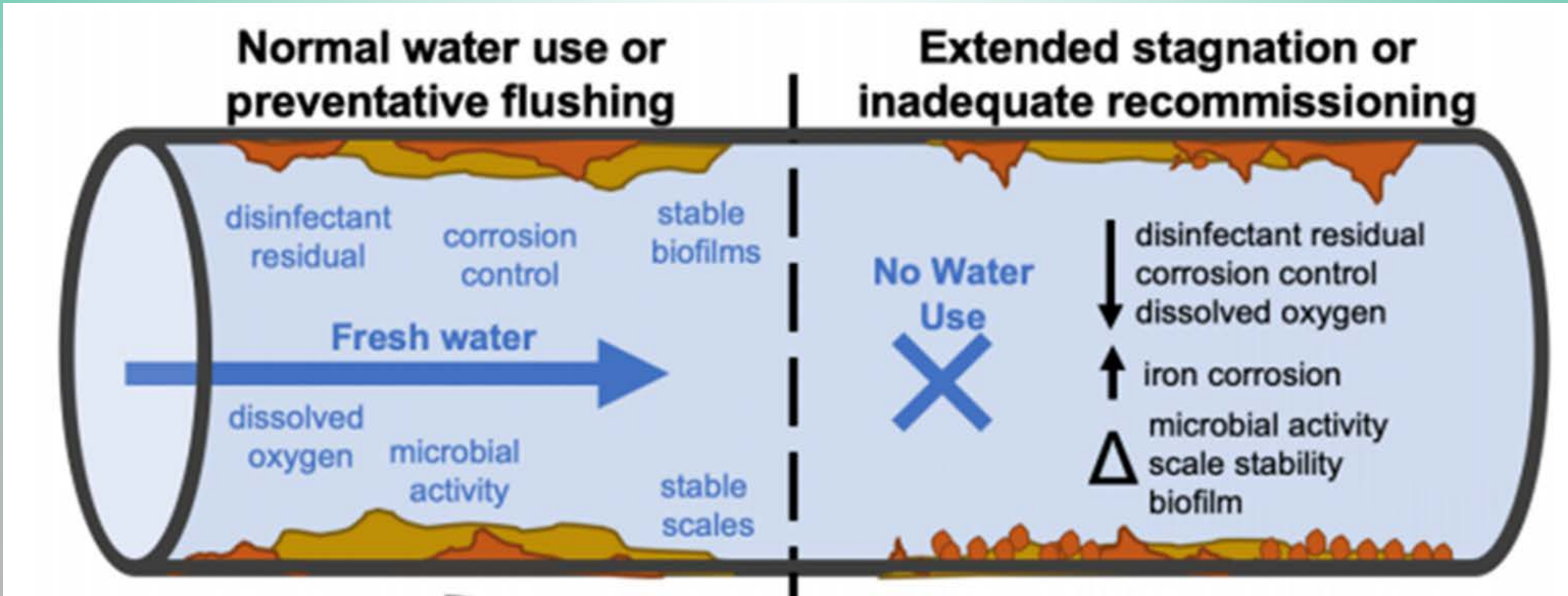
These facilities include virtually any business with a drinking water supply that has not been used

Includes: colleges, universities, public and private schools, factories, office buildings, restaurants, theatres, entertainment complexes etc.

Several links to expert guidance on this subject are included at the end of this presentation

# WHAT HAPPENS INSIDE PIPES?

(building water systems include all plumbing, storage devices and fixtures)



# WHAT HAPPENS INSIDE PIPES?

Some of these microorganisms (if present) may cause disease if they are ingested

Aerosols (tiny droplets) are formed when water is sprayed, such as in a shower or fast-running tap

These aerosols may carry pathogens that cause respiratory disease when inhaled, including:

*Legionella pneumophila* bacteria

MAC (*Mycobacterium avium* complex)

Adenoviruses

# WHAT HAPPENS INSIDE PIPES?

Protective scale on pipes can destabilize allowing dissolved or particulate lead into water used for drinking or food preparation

Potentially harmful substances such as disinfection byproducts (DBPs) may increase

Objectionable tastes and odours may also become problematic

Mechanical equipment such as cooling towers, boilers and pumps, backflow prevention devices may not have received routine maintenance



# PREPARING FOR RE-OCCUPANCY

- NOTE: Some jurisdictions have regulatory requirements for flushing and testing for lead in schools and child care facilities (i.e. Ontario Reg. 243/07)

## General Guidelines:

Flush the entire building, including all appliances and storage devices

Flushing should continue until all stagnant water is removed from the system; ideally until a normal disinfectant residual is detected

Fresh water containing disinfectant will help mitigate problems that could have occurred while the water was stagnant

Start as soon as possible - the sooner flushing is started the quicker the recovery to normal conditions

# PREPARING FOR RE-OCCUPANCY

Other actions that can be taken:

Clean showerheads, faucets and other fixtures that can produce aerosols that people could inhale

Collect water samples for analysis at a qualified laboratory (recommended for high-risk users)

Disinfect with concentrated chlorine solution if there is good reason to believe the building's plumbing system is contaminated with pathogens like *Legionella pneumophila*

In most cases, flushing buildings with water that has normal amounts of chlorine (as supplied by the municipality) will be sufficient for cleaning the water system

# PREPARING SMALL BUILDINGS FOR RE-OCCUPANCY

- The American Water Works Association (AWWA) posted recommendations for returning homes to service (April 3, 2020).

Flushing requirements will vary depending on the structure. This is an area of active research.

Key elements of existing protocols for flushing small buildings include:

1. Remove or bypass devices like point-of-entry treatment units prior to flushing.
2. Take steps to prevent backflow - the siphoning of contaminants back into plumbing (e.g., close valves separating irrigation systems from home plumbing, disconnect hoses attached to faucets, etc.).

# PREPARING SMALL BUILDINGS FOR RE-OCCUPANCY

3. Remove faucet aerators when possible and fully open all outlets (e.g., hose bibs, faucets, showerheads, toilets, etc.) starting with outlet closest to the point where the water enters the structure
4. Typical flushing durations in existing protocols range from 10 to 30 minutes for each outlet (duration varies based on outlet velocity).
5. Flush the cold water lines first, and then the hot water lines. Note: the hot water tank can be drained directly; if not drained, roughly 45 minutes will be needed to flush a typical 40-gallon hot water tank.
6. Replace all point-of-use filters, including the filter in refrigerator.
7. Additional precautions may be warranted if there is excessive disruption of pipe scale or if there are concerns about biofilm development

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

General principles for effective flushing strategies for large buildings:

Based on the experience of industry experts, a single flush may not re-establish good water quality in a large building or complex

Flushing requires an initial flush to remove low quality water and contaminants and subsequent flushes to return to normal water quality

Ongoing flushing draws particles out of the system and brings in disinfectant from the municipal system

The longer service is interrupted, the greater the required level of effort for restoration

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

Before flushing, sketch out the building water system and identify:

“Zones” or branches with a common water supply

Faucet at the zone inlet and the most distant faucet, for each zone

All appliances and devices that are plumbed into the system

Utility sinks, hose bibs, etc.

Piping in place for future installation

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

Flushing should proceed uni-directionally; from the service entrance to the farthest outlet of the plumbing system

All devices and equipment where water is stored should be identified, drained, and flushed with clean cold water

Municipally-owned watermains serving only large buildings or industrial parks may also require flushing

These mains should be flushed before the building is flushed

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

Devices requiring flushing include, but are not limited to:

Hot water storage

Automatic coffee makers

Humidifiers

Cooling towers

Ice machines

Pressure tanks

Dishwashers

Ultrapure water storage

Eyewash stations

Kitchen and bathroom faucets and fixtures



# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

System components that are most important to flush because of higher risk:

Faucets and sprayers used for drinking water or food preparation

Drinking water fountains

Ice machines and refrigerators with ice makers

Showers

Water features that generate aerosols (fountains, spas, etc.)

Features used by children, elderly / susceptible people

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

Initial flushing and cleaning: (Complete before resuming operation)

Flush zone-by-zone starting with the fixture nearest to the building supply

Flush zones progressively outward from the supply

In each zone, flush the cold water plumbing first and hot water second.

Continue flushing until the last tap in the zone is flushed for at least 10 minutes or longer until the cold water temperature at the final tap is steady

Drain or flush hot water tanks

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

Ongoing flushing may be necessary to repair destabilized scale and control biofilms

Re-stabilizing scale and controlling biofilms is an ongoing process and may require 12 weeks or longer (see AWWA Standard)

Monitoring for problematic organisms like *Legionella pneumophila*, for lead and for disinfectant residual are the best ways to assess whether flushing is working and how long it should continue

When the building water system has recovered from a lengthy stagnation, flushing is a best practice, as a part of a building Water Management Plan

# PREPARING LARGE BUILDINGS FOR RE-OCCUPANCY

## Recommendations for ongoing flushing:

Open each tap at least once per day

Flush the entire building water system once per week

Ongoing flushes proceed the same as the initial flush except water tanks do not need to be drained

If possible, measure the disinfectant concentration in fresh water coming into the building and at the most distal cold water tap inside the building

There is no benefit to measuring the disinfectant in the hot water system as the disinfectant will dissipate at elevated temperatures

# RESPONSIBILITIES

The owner of the building or facility is responsible for the drinking water system

Municipalities may own some of these facilities (i.e. recreation centre) and municipal staff (or operating authorities) would normally conduct flushing activities

Many facilities are privately owned and the water quality in the plumbing of these large private facilities is not always regularly monitored

Persons responsible for operation and maintenance of private facilities (landlord, business owner, property manager etc.) need to be aware that a dormant water supply can harbour pathogens

# RESPONSIBILITIES

Municipal staff should collaborate with public health departments to reach out to building owners:

- To discuss the potential problems of water stagnation

- To provide guidance for reducing these risks

Mitigation should be conducted before resuming normal operations in buildings that have been shut down

## CLOSING REMARKS

- Every building that has been sitting dormant should be thoroughly flushed

Be aware that flushing activities could stress both your drinking water plant... and your wastewater system

Start flushing programs well before lockdowns are lifted

More time will be required for large, complex systems

Staggered flushing could be a possible solution if necessary

More guidance on this topic is coming from CWWA (Fact Sheet) and the Ontario Ministry of Environment Conservation and Parks

# LINKS

- Walkerton Clean Water Centre – Drinking Water Resource Library

<https://training.wcwc.ca/en/resources/#>

Considerations for Large Building Water Quality after Extended Stagnation (Proctor et al)

[https://osf.io/qvj3b/?\\_ga=2.37483296.1291321768.1586885649-2021717723.1586885649](https://osf.io/qvj3b/?_ga=2.37483296.1291321768.1586885649-2021717723.1586885649)

Public Works and Government Services Canada MD 15161 – 2013 Control of Legionella in Mechanical Systems. Chapter 6 – Domestic Water

<https://www.tpsgc-pwgsc.gc.ca/biens-property/legionella/chapitre-chapter-6-eng.html>



# LINKS

Water Quality Could Change in Buildings Closed During COVID-19 Pandemic: Study

<https://www.watercanada.net/water-quality-could-change-in-buildings-closed-during-covid-19-pandemic-study/>

Centres for Disease Control and Prevention - Guidance for Building Water Systems

<https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>

American Water Works Association recommendations for returning homes to service (April, 3, 2020).

<https://www.awwa.org/ResourcesTools/Resource-Topics/Coronavirus#10681543-shutoffs-and-return-to-service-guidance>

# LINKS

ASHRAE Standards Committee. (2018) ANSI/ASHRAE Standard 188-2018. Legionellosis: Risk Management For Building Water Systems. Atlanta, GA.

[www.ashrae.org/technology](http://www.ashrae.org/technology)

ESPRI & HA Environmental COVID-19 Flushing Guide

[https://esprinstitute.org/wp-content/uploads/2020/04/FINAL\\_Coronavirus-Building-Flushing-Guidance-20200403-rev-1.pdf](https://esprinstitute.org/wp-content/uploads/2020/04/FINAL_Coronavirus-Building-Flushing-Guidance-20200403-rev-1.pdf)

AWWA

<https://www.awwa.org/Resources-Tools/Resource-Topics/Coronavirus>



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On Behalf of the  
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Thank You!

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