**To:** Rory Macnamara

Interact Media Defined (Pty) Ltd

**Date:** 25 May 2020

**Re:** Guidance to manage *Legionella* risks in building water systems with no or reduced occupancy during COVID-19 lockdown

Dear Rory,

Thank you for your request for advice for plumbers to flush out pipes impacted by water stagnation during the COVID-19 lockdown. The information provided here is intended to raise awareness and provide guidance on water quality issues pertinent to stagnation resulting from the COVID-19 lockdowns with specific reference to *Legionella* risks. The information is based on literature currently available. As more research is done information may change.

**Guidance to managing *Legionella* risks in building water systems with no or reduced occupancy during COVID-19 lockdown**

In compliance to the government COVID-19 lockdown regulations, many buildings including offices, retail outlets, restaurants, hotels, factories, schools, gyms, community centres among others were left unused or sub-operational with no or low occupancy for a significant amount of time. This leads to potential water stagnation in water pipes, fixtures, and storage tanks as water usage was reduced significantly or brought to a halt in some instances. Another possible consequence of the lockdown is the inability to monitor and maintain cold or hot water systems as required. These conditions can create hazards due to deterioration of water quality with possible adverse health risks to returning occupants.

**Building water quality concerns during lockdown**

As the government begins to ease lockdown restrictions and more companies prepare to re-open, it is important that building owners and operators are aware of concerns that could threaten the quality and safety of the water in their premises. An unintended health risk that could result from the fight against COVID-19 is legionellosis. *Legionella* infections can cause Legionnaires’ disease (a severe type of pneumonia) and Pontiac fever (a mild form), collectively known as legionellosis. Persons with compromised immune systems are at risk of contracting the disease, similar to COVID-19.

**A conducive environment for Legionella growth**

* A stagnant water system provides the ‘right’ conditions and a potential breeding ground for bacteria such as *Legionella* to proliferate due to several reasons.
  + Hot and cold water temperatures can stabilise into a range that favours *Legionella* growth (25–40°C)
  + The chlorine disinfectant added to the water supplied to a building can drop to ineffective levels
  + Stagnation can promote biofilms to develop in pipes and fixtures
* Once established in a building’s plumbing, *Legionella* can be dispersed by aerosol generating activities, potentially exposing individuals through inhalation of aerosols

**Building water systems and devices impacted by stagnation**

Systems and devices that are prone to water stagnation during a lockdown include:

* Toilets and showers
* Sink faucets
* Eye wash stations
* Emergency showers
* Irrigation and fire hoses
* Cooling towers
* Evaporative condensers
* Decorative fountains
* Hot tubs and spas
* Misters, atomisers and humidifiers

**Recommendations to safe re-opening of buildings during or after the risk-adjusted easing of COVID-19 lockdown**

Building owners and operators must take all reasonably practicable precautions to control any water hygiene-related risks that may have arisen during the lockdown such as *Legionella* growth. Professional assistance is recommended to evaluate these factors so that appropriate measures can be taken. Given the variability and complexity of plumbing, generalizations are not possible. The main concern is whether the water poses unacceptable health risks to building occupants, which can differ drastically in terms of building size and complexity, length of shutdown, likely integrity of the system, vulnerability of occupants, and water uses. All procedures implemented should be documented.

**Risk assessment**

*Purpose*

Risk assessments are done to check system integrity and should inform measures to be followed to restore water quality to pre-COVID conditions.

*Considerations*

* Review water hygiene and *Legionella* risk assessment to reflect current usage and consider whether there is a heightened risk of *Legionella* as a result of the lockdown.
* Risk assessment should be carried out by a trained and competent person.
* Where risk is identified, appropriate steps (such as interim control measures such as flushing or water testing and/or treatments) should be determined and actioned in a timely manner.

**Flushing**

*Purpose*

Flushing replaces low quality water with high quality ‘fresh water’ from the municipal supply thereby removing contaminants and biofilms that accumulated during stagnation. Repeated flushing maybe required to bring the building water system back to baseline conditions

*Considerations*

* Consider flushing the entire building water system including hot and cold water through all points of use (showers, faucets etc.)
* It may need to occur in segments due to facility size and water pressure issues
* Flushing order also matters and professional assistants might be required to help understand plumbing configurations and flushing volumes
* Flushing should proceed in one direction and zone-by zone, starting from the point of entry going progressively to the distal points of the plumbing system
* It is advisable to flush cold water first followed by hot water
* Consider removing some plumbing components (aerators, showerheads, filters) that restrict flow rates but remember to clean and disinfect bypassed components
* Flushing requirements are site-specific but run the water until a constant cold water temperature is maintained and disinfectant is detected

**Clean and disinfect fixtures**

*Purpose*

Some components of the water system need additional measures because they can generate aerosols. Cleaning of fixtures removes contaminants and biofilms from the complex internal structures at the point of discharge.

*Considerations*

* Remove aerators, faucets, shower heads etc. and clean and disinfect with bleach before returning to service

**Shock disinfection**

*Purpose*

Disinfection is particularly important when the facility serves a vulnerable population, such as immune-compromised individuals or the building is a large system with a history of contamination with *Legionella* or other harmful microorganisms

*Considerations*

* Facility staff can send a high dose of disinfectant such as chlorine through the building or raise temperatures to kill the microbes
* Disinfectants such as chlorine are dangerous to handle and can cause serious damage to plumbing system components if not properly used
* In most cases, flushing buildings with water that has normal amounts of chlorine as supplied by the municipality is sufficient for cleaning the water system
* Get professional assistance regarding methods and chemicals compatible with plumbing material
* Thoroughly flush the system before and after shock-disinfection to improve results and remove disinfectants

**How do you know if your procedure has been effective and water is now safe for use?**

* Consider collecting water samples for *Legionella* and portability tests at a qualified and reputable laboratory
* Verify potable water disinfectant residuals
  + Chlorine residuals should be monitored at the point of entry to verify sufficient disinfectant levels are provided to the building
  + Chlorine residuals should also be monitored at locations throughout the building to ensure flushing minimizes degradation of disinfectant residuals at the points of use
  + Free chlorine residuals should be monitored if the building is supplied with chlorinated water, and total chlorine residuals monitored if supplied with chloramine treated water

**Worker protection**

Ensure safety of workers during the flushing, cleaning and disinfection procedures

* Workers should be competent and appropriately trained for the work they will be doing
* Appropriate PPE e.g. gloves, N95 masks (fit-tested), and face shields, should be worn to prevent exposure from disinfection chemicals, and potentially contaminated splashes and aerosols
* Avoid splashing and creating aerosols during flushing by using hoses to connect taps or shower head ends directly to drains, or by opening outlets slowly
* Prevent exposure of workers to chemicals or high temperature water by using signage or access control
* Social distancing protocols should be observed during risk assessments, cleaning and disinfection procedures

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**References**

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

CDC Guidance for Building Water Systems: Ensure the safety of your building water system and devices after a prolonged shutdown (<https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html>)

Proctor, C., Rhoads, W., Keane, T., Salehi, M., Hamilton, K., Pieper, K. J., … Whelton, A. (2020, April 8). Considerations for Large Building Water Quality after Extended Stagnation. <https://doi.org/10.31219/osf.io/qvj3b>

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