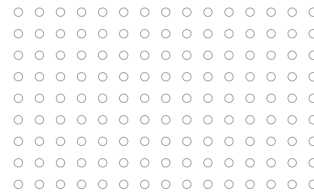


September 2020



Legionella in Building Water Systems

Managing the Risk of Legionnaires' Disease During COVID-19

As the COVID-19 pandemic has caused building closures or reduced activity for a number of months, the dormant water systems within are at increased risk for growth of harmful bacteria, such as Legionella, which can present a significant risk for illness to building occupants. Legionella and Legionnaires Disease can present life threatening conditions for some. Proper management and maintenance of building water systems and some HVAC systems is critical to preventing the presence of the legionella bacteria in these systems.

Legionella and Legionnaires Disease

The Legionella bacterium was discovered after an outbreak in 1976 among individuals attending an American Legion convention in Philadelphia. Those affected suffered from a type of pneumonia that eventually became known as Legionnaires' disease. Earlier, in 1968, cases of "Pontiac" fever occurred in Pontiac, Michigan, among persons who worked at or visited the city's health department. After the 1976 Philadelphia Legionella outbreak, public health officials were able to show the same bacterium causes both diseases.

Legionellosis, including Legionnaires' disease and Pontiac fever, is a respiratory disease caused by the bacterium, Legionella pneumophila. People get Legionnaires' disease when they breathe in a mist (aerosolized water droplets) containing Legionella bacteria. Unfortunately, Legionnaires' disease has respiratory symptoms that are similar to certain COVID-19 symptoms (such as cough, shortness of breath, fever, muscle aches, and headaches), which could make identifying an outbreak of either disease more complicated as buildings and businesses re-open.

Legionellosis can be treated successfully with antibiotics, but even among generally healthy persons, hospital care is often necessary. Still, medical complications are frequent with the disease causing lung failure and death with a fatality rate of ~10%, and up to 25% if acquired in a healthcare setting. As with many illnesses, older persons, current or former smokers, those with chronic lung disease, weakened immune systems, those with cancer and other underlying medical conditions are at increased risk of getting sick.

Legionella occurs naturally in fresh water environments, like lakes and streams. It can become a health concern when it grows and spreads in human-made building water systems.

Since first identified, Legionnaires disease is on the rise in both the United States and in Canada.. In the US, cases are up from ~1,000 in 2000, to nearly 10,000 in 2018. In Canada, the rate of reported cases has tripled since 2010. Now In the midst of a pandemic, COVID-19 building closures and other related conditions may be creating opportunities for uncontrolled growth of the bacteria.

Legionella, COVID-19 and Building Water Systems

Pandemic!

The COVID-19 pandemic was declared on March 11th, 2020 after which many businesses across a broad range of industries curtailed or ceased operations based on imposed travel restrictions and "stay at home" directives. Following widespread closures, buildings may now have an increased risk of Legionella in their water systems due to: lower water usage, reduced water treatment and the natural breakdown of disinfectants, furloughed or laid off maintenance staff, generally deferred maintenance, and other attempts at cost savings. As a result, all buildings should have a specific and detailed plan to deal with the potential risk of Legionella in their re-opening plans.

Prevention

Preventing the growth of the Legionella bacterium in building water systems is critical to preventing the occurrence of Legionellosis in building occupants, visitors and even casual pedestrian traffic. General principles of an effective water management program include:

- Maintaining water temperatures outside the ideal range for Legionella growth,
- Preventing water stagnation,
- Ensuring adequate disinfection, and
- Maintaining devices to prevent scale, corrosion, and biofilm growth, all of which provide a habitat and nutrients for Legionella

Water management programs, once established, will require regular monitoring for potentially hazardous conditions and the use of predetermined responses to remediate such conditions if detected.

Water Management Programs and Maintenance of Building Water Systems (USA and Canada)

Water management programs are an industry standard for large buildings everywhere. The following details local resources to best support your organization and its efforts to mitigate the hazards of Legionellosis.

United States of America

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and the American National Standards Institute (ANSI) have published: *ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems* (and earlier editions) which establishes minimum legionellosis risk management requirements for building water systems. The standard can be purchased at: [ASHRAE Standard 188-2018, Legionellosis](#).

Canada

In Canada, the Canadian Water and Wastewater Association (CWWA/ACEPU) published the "[Safely Re-Opening Buildings: A Fact Sheet for Building Owners / Operators](#)". This document details important steps building owners and operators can take to reduce water contamination and a safe re-opening of their buildings following shut-downs due to COVID-19.

Water Systems: Risk Management

Identifying conditions that will contribute to the growth and transmission of Legionella and other waterborne pathogens in building water systems is a first step in reducing the risk. It is a multi-step process that will require continual review.

The US CDC lists 7 elements for a Legionella water management program to include:

1. Establishing a program team
2. Description of the building water system using text and flow diagrams
3. Identifying areas where Legionella could grow and spread
4. Deciding on where control measures should be applied and how to monitor them
5. Establishing interventions when control limits are not met
6. Ensuring the program is effective and running as designed
7. Documenting all the activities associated with the plan and communicating with stakeholders as necessary

Each building is unique and the water management program must be tailored as such. Items to consider include the size and structural features of the building, its age, the particular site and surrounding conditions, any unique areas of risk for Legionella growth and spread, and even the susceptibilities of those persons using the facility. Building code, water treatment regulations, healthcare accreditation and public health reporting requirements may affect program options as well. For example: anti-scald regulations may limit maximum allowable water temperatures.

Some institutions, like hospitals, and large buildings with complex water systems may require a sophisticated program to encompass the entire building or campus. Small buildings and systems may require a more simplistic program with a focus on devices that aerosolize water, such as a decorative fountains, hot tubs / spas, ice machines, showers or cooling towers.

Considerations for Healthcare Facilities

General principles of Legionella water management programs apply to healthcare facilities in helping to reduce the risk of disease. However, there are additional considerations healthcare facilities need to be aware of.

A water management program can have additional benefits in controlling other water-related healthcare-associated infections. Programs should therefore be monitored for their efficacy in reducing the risk for other pathogens, such as gram-negative bacteria (e.g., *Pseudomonas*, *Burkholderia*, *Stenotrophomonas*) and nontuberculous mycobacteria.

Also, in rare cases, some Legionella-specific interventions may create an environment in which other pathogens can increase. For example, increased colonization by nontuberculous mycobacteria in building water systems following the introduction of monochloramine, an agent effective in reducing *Legionella* colonization of biofilm.

According to the CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) [Guidelines for Environmental Infection Control in Health-Care Facilities](#) and [Guidelines for Preventing Health-care-associated Pneumonia](#), healthcare facilities have two options for validating the efficacy of their water management program (i.e., confirming the water management program is working as intended):

- 1) perform environmental sampling for *Legionella* or
- 2) perform active clinical surveillance for infections due to Legionella.

In June 2017, the Centers for Medicare & Medicaid Services (CMS) released a [survey and certification memo](#) stating healthcare facilities should develop and adhere to ASHRAE-compliant water management programs to reduce the risk for *Legionella* and other pathogens in their water systems.

CDC guidelines specific to healthcare can be found [here](#).

Considerations for Hotels & Resorts

Hotels & resorts have been frequent sources of legionnaires disease outbreaks in the past. Guest and employee safety should be the first priority, and comprehensive water management programs can help to prevent problems that could increase the risk of outbreaks. When outbreaks do occur, they can interrupt normal operations, potentially shut buildings down, and negatively impact the reputation of the organization.

Common High Risk Areas:

- **Cooling Towers** – Vacant or temporarily closed properties can lead to decreased water flow. This allows for disinfectant levels to become low and cooling tower fans can spray water containing Legionella.
- **Unoccupied Floors** – Lowered occupancy levels decreases water flow, which creates more stagnant water and can decrease disinfectant levels and increase the risk of Legionella growth.
- **Showers** – Legionella can grow in and spread through showerheads, especially with decreased occupancy levels and usage, which contributes to low water disinfectant levels.
- **Hot Tubs** – If hot tubs are not well maintained, the warm temperature supports growth of the bacteria, which can then be spread through the water jets.
- **Decorative Fountains** – Being aware of the safe water temperature levels is important in preventing Legionella growth. It can grow in warm areas of a fountain and splashing can lead to the spread of water containing Legionella.

CDC guidelines specific to hotels can be found [here](#).

Legionella Control Plan – Example

Plan Contents

Minimally, the plan should have the seven (7) topical elements, as suggested by the CDC, to address the control of Legionella in the facility and building water systems. These elements are:

- Establish a Program Team and Structure
- Describe Building Water Systems
- Identify Areas Where Legionella Could Grow and Spread
- Decide on Where Control Measures Should be Applied and How to Monitor
- Establish Interventions When Control Limits are Not Met
- Ensure the Program is Effective and Running as Designed
- Document all Activities and Communicate with Stakeholders

Establish a Program Team and Structure

Team members should be chosen to reflect their impact or responsibility in the management of, or involvement in the building and its water systems; their technical expertise, and functions related to the building water systems. The reason (skills/knowledge/experience) for their placement on the team should be documented, and the responsibilities for team members should be clearly stated. Their position/title in the organization and contact information for each should be listed.

Describe Building Water Systems

This section should include basic information about the location such as: the facility name and address, and persons responsible for the program. Actions to complete include developing, cataloging and assessing:

- The water supply system
 - a. Provide details on incoming water both potable and non-potable - its source, treatment before entering the building, location of entry points, reliability of incoming water, treatment within the building, and any emergency supply including its source and quality.
 - b. Inventory system components - such as #, age, material, etc.; for HW tanks, cold water storage, water treatment, pipework, outlets, valves, backflow prevention, ice machines, cooling towers, fire protection systems, humidifiers, and other components that use water.
- Water uses and users within the building
 - a. Uses can include: drinking (including feeds to ice machines & water dispensers), clinical uses (if any), pools (swimming & hot tubs), bathing, toilet flushing, laundry, fire fighting & fire suppression, air conditioning, food preparation (including ice making), grounds irrigation, decorative fountains, and others.
 - b. Users can include: building tenants, clients, patients, guests, vendors & contractors; clinical users (if any); and many others using or in the building.
- Fully describing the water system, including water treatment features and provide flow diagrams, schematics and plans of the system.
- Reviewing the quality of incoming water
 - a. Things to consider are: disinfection residual on water entering the building, temperature, pH, turbidity, water chemistry, metals, bacteriological quality, etc.

Identify Areas Where Legionella Could Grow and Spread

Include actions to:

- Identify potential hazards of the building water supply system.
 - a. Describe any potential events or conditions that could affect the water quality and promote legionella colonization and growth – such as incoming water contamination, loss of supply, failure of backflow prevention devices, failure of solar preheat systems, failure in hot & cold water storage systems, failures in pipework & plumbing, water stagnation, sludge build-up in tanks, treatment system failures, unused or poorly maintained outlets and plumbing features, etc.

Decide on Where Control Measures Should be Applied and How to Monitor

Risk management includes actions to:

- Make sure you have identified existing control measures, if any - pipe flushing, chlorination, thermal disinfection, sampling, etc.
- Identify all control measures that could be applied to the water system(s).
- Establish a monitoring process and schedule to ensure that chosen control measures are effective.
- Perform a risk assessment to include qualitative measures of the likelihood and consequences to be able to calculate the level of risk for different potential outcomes.
 - b. The likelihood of an event can range through the continuum: rare, unlikely, possible, likely, and almost certain.
 - c. The consequences/impact can be: insignificant, minor, moderate, major, to catastrophic.
 - d. A simple risk matrix can help determine levels of risk from low, moderate, high, to very high. Higher level risk would be the focus of improved actions to reduce the risk.

Establish Interventions When Control Limits are not Met

Risk management includes actions to:

- Document exactly what steps are to be taken and by whom when control limits are not met or control measures are determined to be ineffective.
- Document steps to be taken when Legionella is detected or a case of Legionella is identified. (See 'Detection and Case Response' section below.)

Ensure the Plan is Effective and Running as Designed

The plan and associated activities needs to be very dynamic as things change continually. Actions in this category include:

- Preparing a schedule for routine plan review.
- Listing situations when a non-routine review and update of the plan is necessary.
- Examples include: any changes in infrastructure, detection of Legionella, new staff or changes in team roles, changes in standards or legislation, etc.

Documentation and Communication

The plan and all associated activities needs to be documented with a communications plan to ensure all stakeholders are kept apprised of the status of the water management plan, any deviations in control limits, failures in control measures, detection of Legionella, and any reported cases. This is critical in helping to management the program effectively.

Appendices

Appendices should include lists of key contacts and documents.

Detection and Case Response

Legionnaires' Disease outbreaks occur when two or more people are exposed to legionella bacteria in the same place and develop symptoms around the same time. Local health authorities will take the lead in investigating outbreaks, and will contact the facility and implement control measures to remove the bacteria from the water identified as the source of the infection. Understanding the control measures that are typically expected is important because they will need to be implemented in a timely manner:

- Obtain professional consultation from a qualified water systems expert (i.e. - industrial hygienist), who will need to be approved by the health department.
- Retrieve a copy of your facility's blueprints so that the industrial hygienist will be able to develop a testing procedure, which will need to be approved by the health department.
- Identify a local ELITE certified lab capable of analyzing the water samples collected:
 - If the samples contain levels of Legionella bacteria above acceptable thresholds, a treatment plan will need to be developed by the industrial hygienist and approved by the local health authority.
- During the ongoing investigation:
 - Facilities will be required to notify anyone on premises, including employees and patrons
 - Depending on the nature of the facility previous patrons may need to be notified as well
 - Additional control measures will be provided by the health department depending on the nature of the facility's operations.

Other considerations that should be taken into account are the legal and public relations ramifications. Be prepared to enlist the services of an attorney and public relations firm with experience in handling Legionnaire's Disease outbreaks.

Actions in this category include:

- Identify measures for responding to Legionella detections and cases in various scenarios.
- Identifying key persons and their responsibilities when responding to detections or actual cases.
- Developing written procedures for required actions in those scenarios.

Insuring the Legionella Risk

The impact of legionella contamination is unquestionable, in terms of bodily injury, cost to treat and remediate, and loss of income to the business. While this exposure is generally excluded under standard general liability programs, it can be insured elsewhere.

Premises or site specific pollution programs can be written to cover specified locations, and can include legionella as part of the definition of covered pollutant. In addition to coverage for BI, PD and Cleanup, if purchased, business interruption coverage can help address the loss of income as the facility is being remediated.

Contractors Pollution and Professional policies can also provide coverage for legionella-related claims. A plumber who installs piping incorrectly, or a mechanical contractor who designs the water processing system for a hotel could both be responsible for legionella-related losses.

For both contractors and facilities, the key to this coverage is having the correct preventive procedures in place. Facilities have to invest in robust policies and procedures for their physical plants, and contractors have to be able to show that they are cognizant of the risks and are using best practices in their work. For insureds who have quality procedures in place, coverage is available from excellent environmental insurance partners.

Please contact your local HUB office for assistance in your coverage needs.

Sample Legionella Assessment Checklist

Building Address:		Assessor's Name:	
Date:		Time:	
Identification			
Elements:		(Yes/No/NA)	Comments:
Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems or weakened immune systems?			
Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?			
Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?			
Does your building have more than 10 stories (including basement levels)?			
Does your building have a cooling tower?			
Does your building have a hot tub/spa that is not drained between each use?			
Does your building have a decorative fountain?			
Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?			
Preventative Maintenance			
Elements:		(Yes/No/NA)	Comments:
Are water heaters cleaned and disinfected once per year?			
Are cooling towers and associated pipes used in air conditioning systems cleaned and disinfected regularly (at least twice per year)?			
Are water storage tanks, cooling towers, and visible pipe work inspected monthly? All coverings must be intact and firmly in place.			
Does the property keep cold water below 68°F (20°C) at all times? (This may not be possible when the ambient temperature is high, but every effort should be made to keep cold water entering the premises below this threshold.			
Does the property keep hot water heated to and circulating at approximately 122° to 140°F (50° - 60°C) at all times?			
Are gardens in populated areas irrigated using potable (drinking quality) domestic water supply?			
Are ornamental water features cleaner and disinfected regularly?			
Is there a spa pool (whirlpool spa, "Jacuzzi", or spa bath)? If so: <ul style="list-style-type: none"> • Is it continuously treated with 2-3 mg/l chlorine or 3-5 mg/l bromine and the levels are monitored at least three times per day? • Is at least half of the water replaced each day? • Are sand filters backwashed daily? • Is the whole system cleaned and disinfected once per week? 			
Are daily records of all water treatment readings, such as temperature, pH, and chlorine concentrations kept and checked regularly by the manager?			
Water Management Program			
Elements:		(Yes/No/NA)	Comments:
Do you have a written and documented water management plan for legionella prevention?			
Do you have one named person responsible for Legionella control? If not, is it outsourced?			
Do you have designated water sampling points identified?			
Are each of the sampling point's results checked, documented, and are appropriate actions taken in the event of positive results?			

Sample Re-Opening Legionella Prevention Checklist

Building Address:		Assessor's Name:	
Date:		Time:	
Before you Start:		(Check/NA)	Comments:
Identify zones and includes all treatment equipment, pumps, valves, tanks, etc.			
List all outlets/fixtures such as taps, fountains, showers, etc.			
Be sure to include any connected food units such as ice or coffee.			
Flushing & Cleaning Your System		(Check/NA)	Comments:
Start where the water enters the building and work from closest to farthest; closest zone to farthest zone, closest outlet to farthest outlet.			
Flushing requirements vary but run the water until the water maintains a constant cold temperature and the disinfectant (like chlorine) is detected.			
This should be a rigorous flush, you want to open taps fully (remove the aerator filter or shower head) but be aware this could cause greater spray and aerosols.			
Staff should wear appropriate PPE such as gloves, mask (N95 is recommended), and eye cover while flushing.			
Flush your cold water system first then your hot water system.			
Hot water tanks should be kept above 140°F (60°C) to ensure a temperature over 122°F (50°C) throughout the system. Be sure to flush the tank fully to replace all water. You may consider draining the tank but be cautious as this could stir up sedimentation or cause syphoning concerns.			
Then flush the hot water system from closest to farthest from the tank.			
If possible, clean, disinfect and rinse all outlets, screens etc.			
Shock chlorination may only need to be considered if you have a large system with remote branches, storage tanks, or you still detect issues after flushing, if you serve vulnerable populations or have a history of pathogen problems.			
Such system shocking should be conducted by a water treatment professional.			
Testing		(Check/NA)	Comments:
For smaller buildings, after flushing, you should be able to feel a consistent cold temperature and even detect disinfectant (such as chlorine by smell).			
For larger buildings and any building serving vulnerable populations, professional testing is highly recommended.			
Testing for disinfectant residual - simple equipment and/or testing services are available from local water treatment companies, plumbers and pool professionals.			
Testing for microbial pathogens – for complex systems, buildings serving vulnerable populations or any with a history of contaminations (like Legionella) – these issues are often related to water in HVAC systems.			

Reference: [Canadian Waste and Wastewater Association](#)

Get the latest information, guidance and resources on Coronavirus (COVID-19) to help you protect what matters most at hubinternational.com/coronavirus.

For additional support, please reach out to your local HUB office.