WISCONSIN DEPARTMENT of HEALTH SERVICES

Wisconsin HAI Long-Term Care Education Series

November 17, 2022

Today's Agenda

- Water Management Programs
  - **Bruce Meiners,** Legionella Industrial Hygienist, Bureau of Communicable Diseases, Division of Public Health

November LTC Education Series Discussion

November 17, 2022 “LTC Water Management Program Introduction”

Bruce Meiners
https://www.dhs.wisconsin.gov/disease/legionellosis.htm/#hcp

Legionella Industrial Hygienist | Communicable Diseases Epidemiology Section

Bureau of Communicable Diseases | Division of Public Health

Does Your Facility Have a Water Management Program (WMP) ?

Potable water

Cooling towers

Hot tubs

Decorative fountains

What are you going to do if?

- You have a positive legionella case or other water borne disease?
- You have a construction project planned?
  - Any construction can impact your water distribution system.
- You need some emergency construction/repair?
- Watermain Break?
- Boil water notice?
- Water is shut off to the building for fire protection maintenance?
  - Depressurize the water distribution system! Repressurize the water distribution system!
- Street construction that vibrates your building?
- Water being used for dust control.
- Water age/low census/ flushing program?
- Health care appliances?
- Identifying other hazards! **A future class.**

What is a WMP?

- **Water management program:** the risk management plan for the prevention and control of legionellosis associated with building water systems, including documentation of the plan's implementation and operation.
- **Program documents:** procedures, work instructions, specifications, and records for all activities of the Program, established or collected by the Program Team and residing in one or more locations and formats.

What is the purpose and goals of water management program?

- Risk management of the facilities domestic cold and hot water systems.
- Risk management for other types of sources of water that can be aerosolized.
  - Hot tubs
  - Healthcare Appliances
  - Decorative Fountains
  - Ice Machines
  - Others! (Yes, think about it.)
- **To eliminate water as a contributing factor of illness in your facility.**

Who needs WMPs?

- **Legionellosis risk management for building water systems.**
  - **Examples, including but not limited to:**
    - Hospitals
    - SNF
    - CBRF & Hospice
    - Healthcare facilities where there are people of compromised immune systems
    - Hotels/Lodging/Time Share
    - Dorms
    - Schools
    - Other public buildings

What type of facilities are required to have a WMP?

Centers for Medicare & Medicaid Services

SC17-30.Legionella_Risks in Healthcare.Revised 6-09-17 (cms.gov)

QSO17-30-18 (cms.gov)

Home - Centers for Medicare & Medicaid Services | CMS

Regulations & Guidance | CMS

https://www.dhs.wisconsin.gov/disease/legionellosis.htm/#hcp

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

Center for Clinical Standards and Quality/Quality, Safety and Oversight Group

Ref: *QSO*-17-30- Hospitals/CAHs/NHs
REVISED 07.06.2018

DATE: **June 02, 2017**

TO: State Survey Agency Directors

FROM: Director
Quality, Safety and Oversight Group (*formerly Survey & Certification Group*)

SUBJECT: Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)

****Revised to Clarify Expectations for Providers, Accrediting Organizations, and Surveyors****

Memorandum Summary

- ***Legionella* Infections**: The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.
- **Facility Requirements to Prevent Legionella Infections:** Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in water.
- This policy memorandum applies to Hospitals, Critical Access Hospitals (CAHs) and Long-Term Care (LTC). However, this policy memorandum is also intended to provide general awareness for all healthcare organizations.
- *This policy memorandum clarifies expectations for providers, accrediting organizations, and surveyors and does not impose any new expectations nor requirements for hospitals, CAHs and surveyors of hospitals and CAHs. For these provider types, the memorandum is merely clarifying already existent expectations.*
- *This policy memorandum supersedes the previous Survey & Certification (S&C) 17-30 released on June 02, 2017 and the subsequent revisions issued on June 9, 2017.*

CMS Memo (continued)

Background

LD, a severe sometimes fatal pneumonia, can occur in persons who inhale aerosolized droplets of water contaminated with the bacterium *Legionella*. The rate of reported cases of legionellosis, which comprises both LD and Pontiac fever (a milder, self-limited, influenza-like illness) has increased 286% in the United States (U.S.) during 2000–2014, with approximately 5,000 cases reported to the Centers for Disease Control and Prevention (CDC) in 2014. Approximately 9% of reported legionellosis cases are fatal.

An industry standard[1] calling for the development and implementation of water management programs in large or complex building water systems to reduce the risk of legionellosis was published in 2015 by American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). In 2016, the CDC and its partners developed a toolkit to facilitate implementation of the ASHRAE Standard[2]. Environmental, clinical, and epidemiologic considerations for healthcare facilities are described in this toolkit and may include control measures such as physical controls, temperature management, disinfectant levels, visual inspections, and environmental testing for pathogens.

In a recent review of LD outbreaks occurring from 2000–2014 in the U.S., 19% were associated with long-term care facilities and 15% with hospitals. There have been multiple recent LD outbreaks in hospitals and long-term care facilities as reported by the CDC, state and local health departments, or investigated by State Survey Agencies (SA). Below is information about these outbreaks for provider informational purposes.

Outbreaks generally are linked to environmental reservoirs in large or complex water systems, including those found in healthcare facilities such as hospitals and long-term care facilities. Transmission from these water systems to humans requires aerosol generation, as can occur from showerheads, cooling towers, hot tubs, and decorative fountains. *Legionella* is less commonly spread by aspiration of drinking water or ice. Only one case of possible person-to-person transmission has been reported.

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CMS Memo (continued)

In manmade water systems, *Legionella* can grow and spread to susceptible hosts, such as persons who are at least 50 years old, smokers, and those with underlying medical conditions such as chronic lung disease or immunosuppression. *Legionella* can grow in parts of building water systems that are continually wet, and certain devices can spread contaminated water droplets via aerosolization. Examples of these system components and devices include:

- Hot and cold water storage tanks
- Water heaters
- Water-hammer arrestors
- Pipes, valves, and fittings
- Expansion tanks
- Water filters
- Electronic and manual faucets
- Aerators

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[1] ASHRAE Standard 188-2015: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

[2] "Legionella (Legionnaires' Disease and Pontiac Fever)," Centers for Disease Control and Prevention, September 14, 2017. www.cdc.gov/legionella/maintenance/wmp-toolkit.html.

CMS Memo (continued)

- Faucet flow restrictors
- Showerheads and hoses
- Centrally-installed misters, atomizers, air washers, and humidifiers
- Nonsteam aerosol-generating humidifiers
- Eyewash stations
- Ice machines
- Hot tubs/saunas
- Decorative fountains
- Cooling towers
- Medical devices (such as CPAP machines, hydrotherapy equipment, bronchoscopes, heater-cooler units)

CMS Memo (continued)

CMS Regulatory Authorities
Pertinent regulations include, but are not limited to, the following:

42 CFR §482.42 for hospitals:
"The hospital must provide a sanitary environment to avoid sources and transmission of infections and communicable diseases. There must be an active program for the prevention, control, and investigation of infections and communicable diseases."

42 CFR §483.80 for skilled nursing facilities and nursing facilities:
"The facility must establish and maintain an infection prevention and control program designed to provide a safe, sanitary, and comfortable environment and to help prevent the development and transmission of communicable diseases and infections."

42 CFR §485.635(a)(3)(vi) for critical access hospitals (CAHs):
CAH policies must include: "A system for identifying, reporting, investigating and controlling infections and communicable diseases of patients and personnel."

CMS Memo (continued)

Expectations for Healthcare Facilities

CMS expects Medicare and Medicare/Medicaid certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in building water systems.

Facilities must have water management plans and documentation that, at a minimum, ensure each facility:

- Conducts a facility risk assessment to identify where *Legionella* and other opportunistic waterborne pathogens (e.g. *Pseudomonas*, *Acinetobacter*, *Burkholderia*, *Stenotrophomonas*, nontuberculous mycobacteria, and fungi) could grow and spread in the facility water system.

- Develops and implements a water management program that considers the ASHRAE industry standard and the CDC toolkit.

CMS Memo (continued)

- Specifies testing protocols and acceptable ranges for control measures, and document the results of testing and corrective actions taken when control limits are not maintained.
- *Maintains compliance with other applicable Federal, State and local requirements.*

Note: CMS does not require water cultures for Legionella or other opportunistic water borne pathogens. Testing protocols are at the discretion of the provider.

Healthcare facilities are expected to comply with CMS requirements and conditions of participation to protect the health and safety of its patients. Those facilities unable to demonstrate measures to minimize the risk of LD are at risk of citation for non-compliance.

CMS Memo (continued)

Expectations for Surveyors and Accrediting Organizations

LTC surveyors will expect that a water management plan (which includes a facility risk assessment and testing protocols) is available for review but will not cite the facility based on the specific risk assessment or testing protocols in use. Further LTC surveyor guidance and process will be communicated in an upcoming survey process computer software update. Until that occurs, please use this paragraph as guiding instructions.

Contact: For questions or concerns regarding this policy memorandum, please contact *the following for each facility type:*

Hospitals: HospitalSCG@cms.hhs.gov.

Critical Access Hospitals: CAHSCG@cms.hhs.gov.

Long-Term Care: NHSurveyDevelopment@cms.hhs.gov.

Effective Date: Immediately. This policy should be communicated with all survey and certification staff, their managers and the State/Regional Office training coordinators within 30 days of this memorandum.

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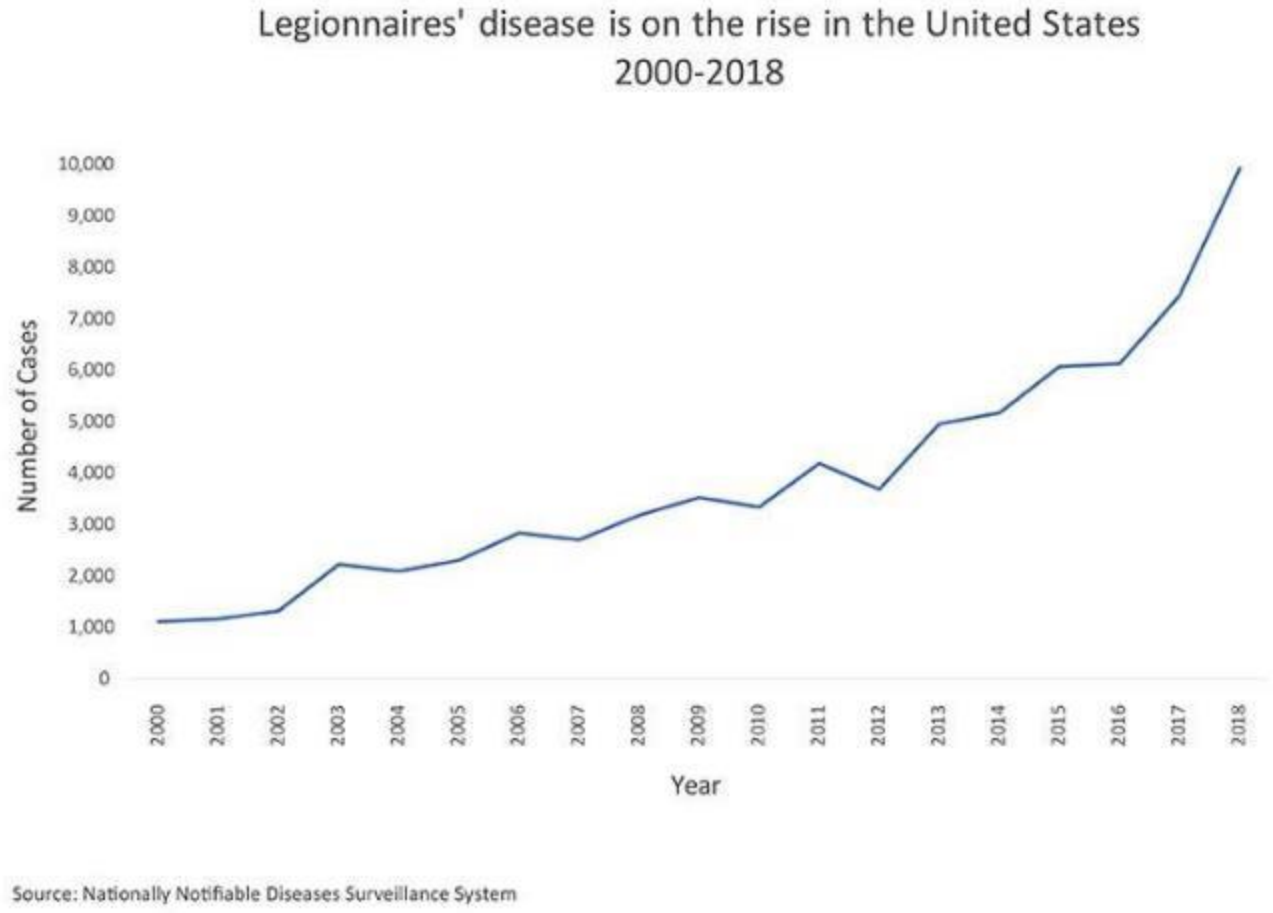
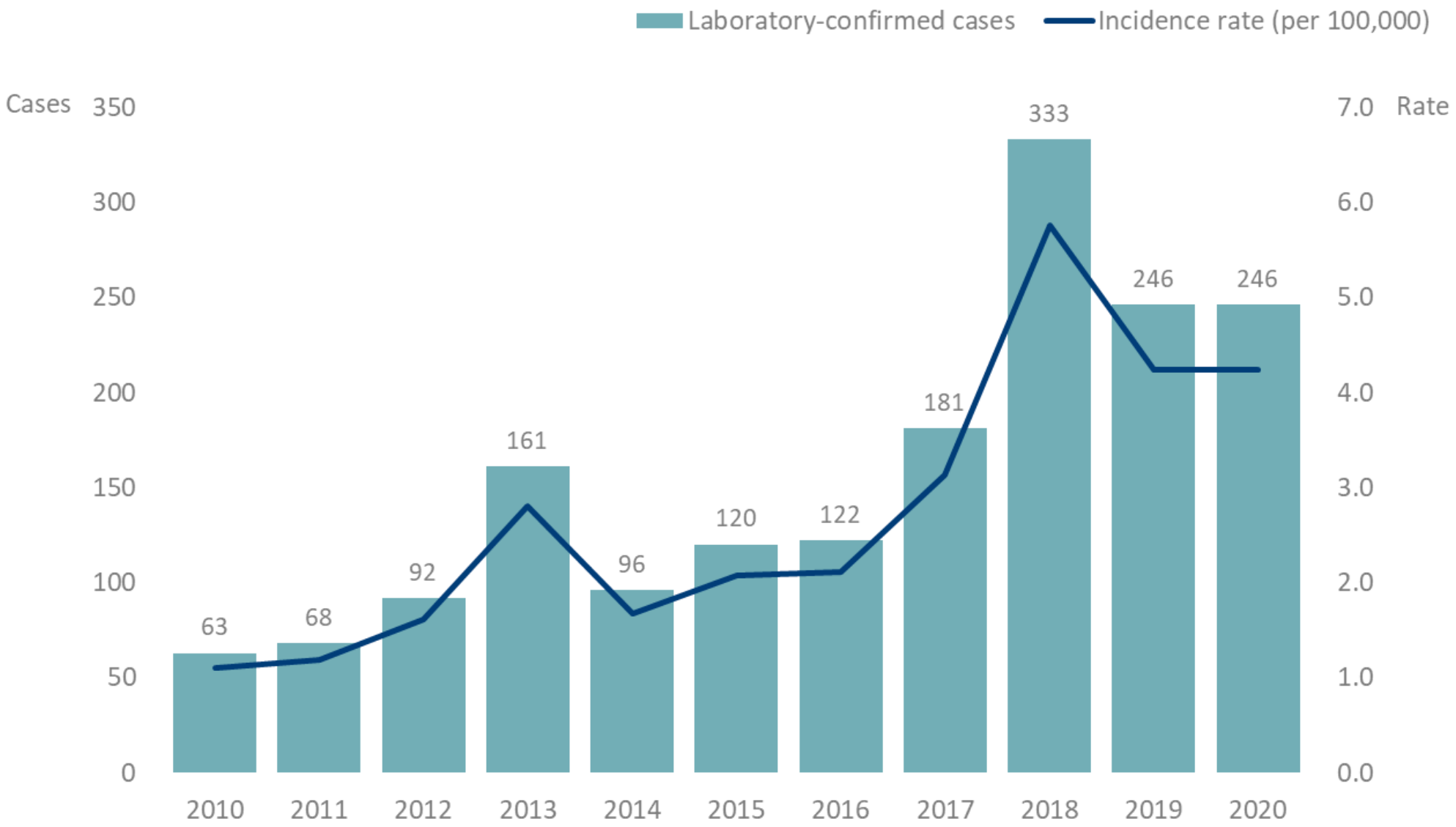
Why are WMPs important?



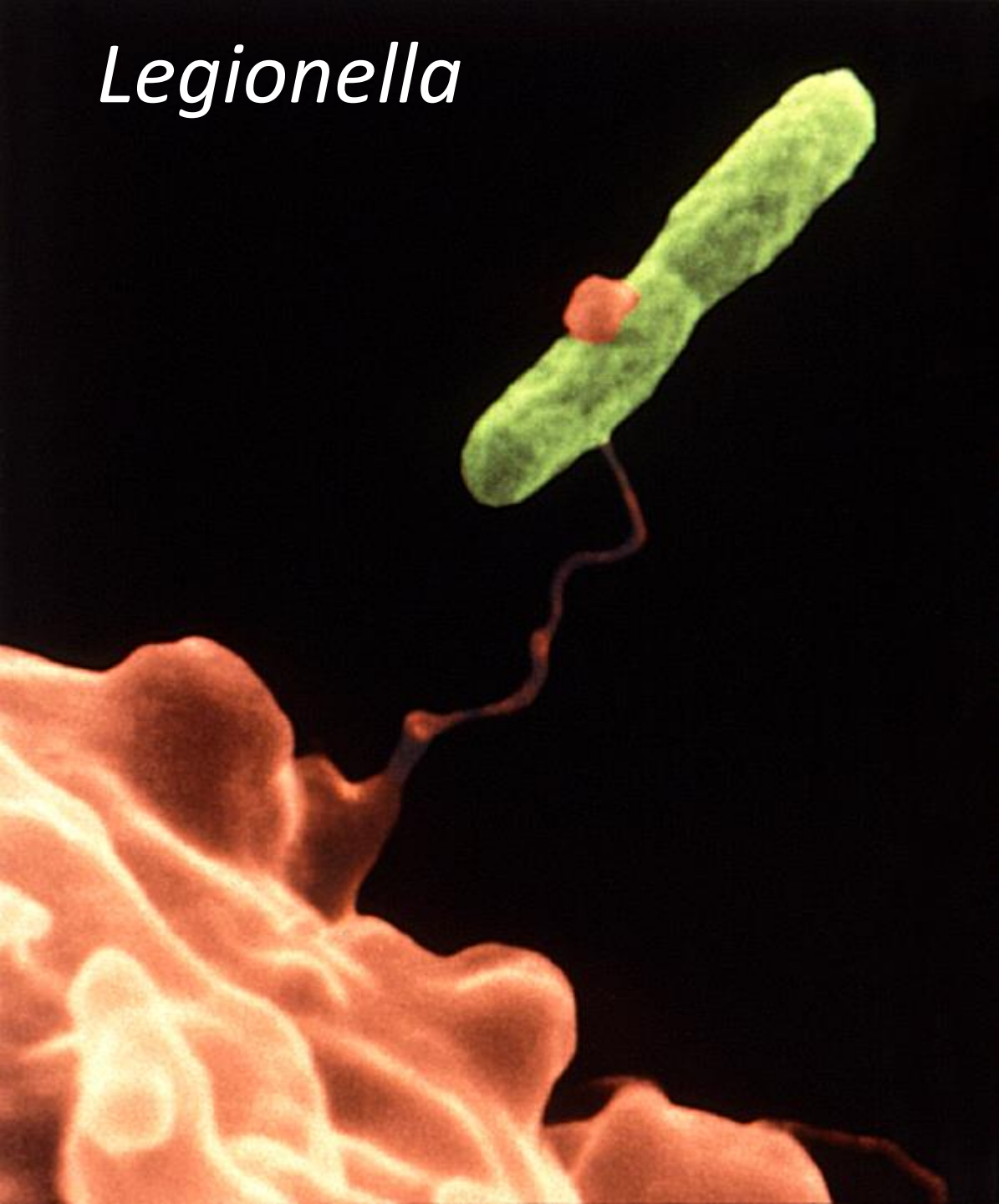
https://www.cdc.gov/legionella/about/history.html

Wisconsin Trend

Laboratory-confirmed cases, Wisconsin Electronic Disease Surveillance System



Legionella



60+ species and 70+ serotypes are recognized.

1/3 of these species are associated with disease

Legionella pneumophila serogroup 1 is most commonly associated with disease.

Legionellosis

Legionnaires' disease

Severe type of pneumonia

Pontiac fever

Mild febrile illness

Extrapulmonary legionellosis

Infection at sites outside the lungs

Clinical Features

	Legionnaires' disease	Pontiac fever
Signs and symptoms	Pneumonia	No pneumonia
	Cough, fever, muscle aches, shortness of breath, chest pain, headache, confusion, diarrhea	Mild, self-limiting illness with fever and muscle aches

Clinical Features

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Incubation period	2–10 days (up to 2 weeks)	24–72 hours

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Hospitalization	Common	Uncommon

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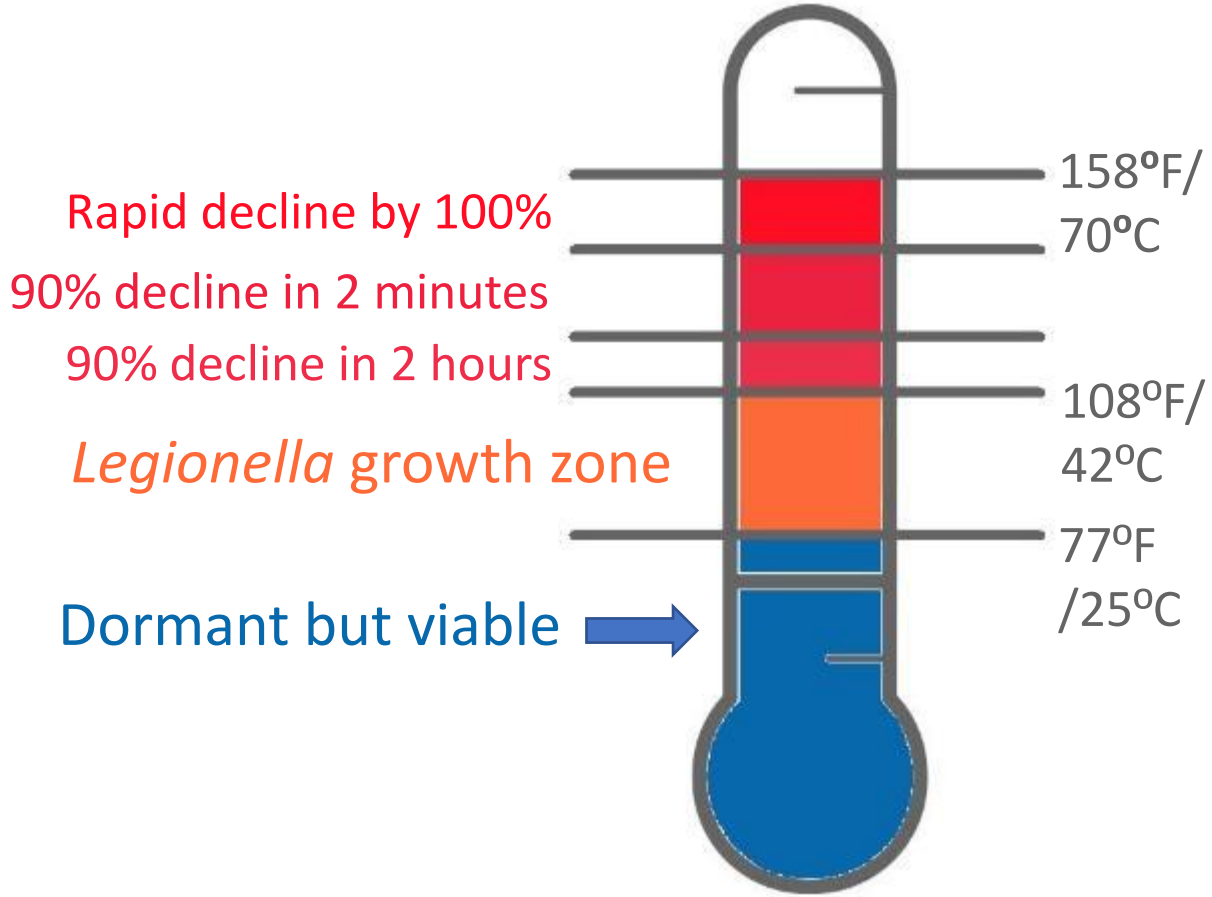
Attack rate	< 5%	about 90%
Treatment	Antibiotics	Supportive care
Hospitalization	Common	Uncommon
Case-fatality rate	**10%** (>25% for healthcare-associated infections)	**Extremely low**

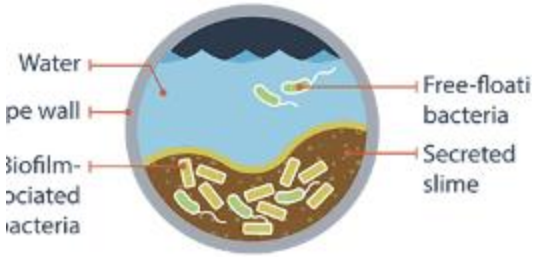
General Rules for Legionella Prevention in Potable Water

- Keep the hot water hot
- Keep the cold water cold
- Keep the water moving
  - Prevent water age

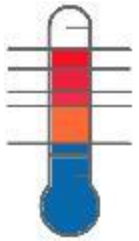


Ideal Conditions for Growth and Transmission

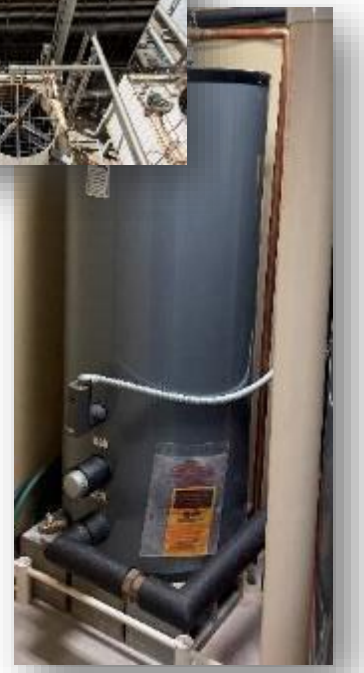
Aerosolization



Biofilm and sediments

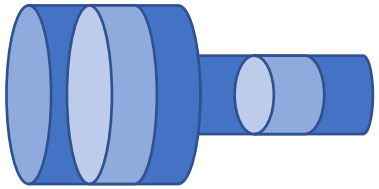


Ideal growth temperatures



Stagnant water

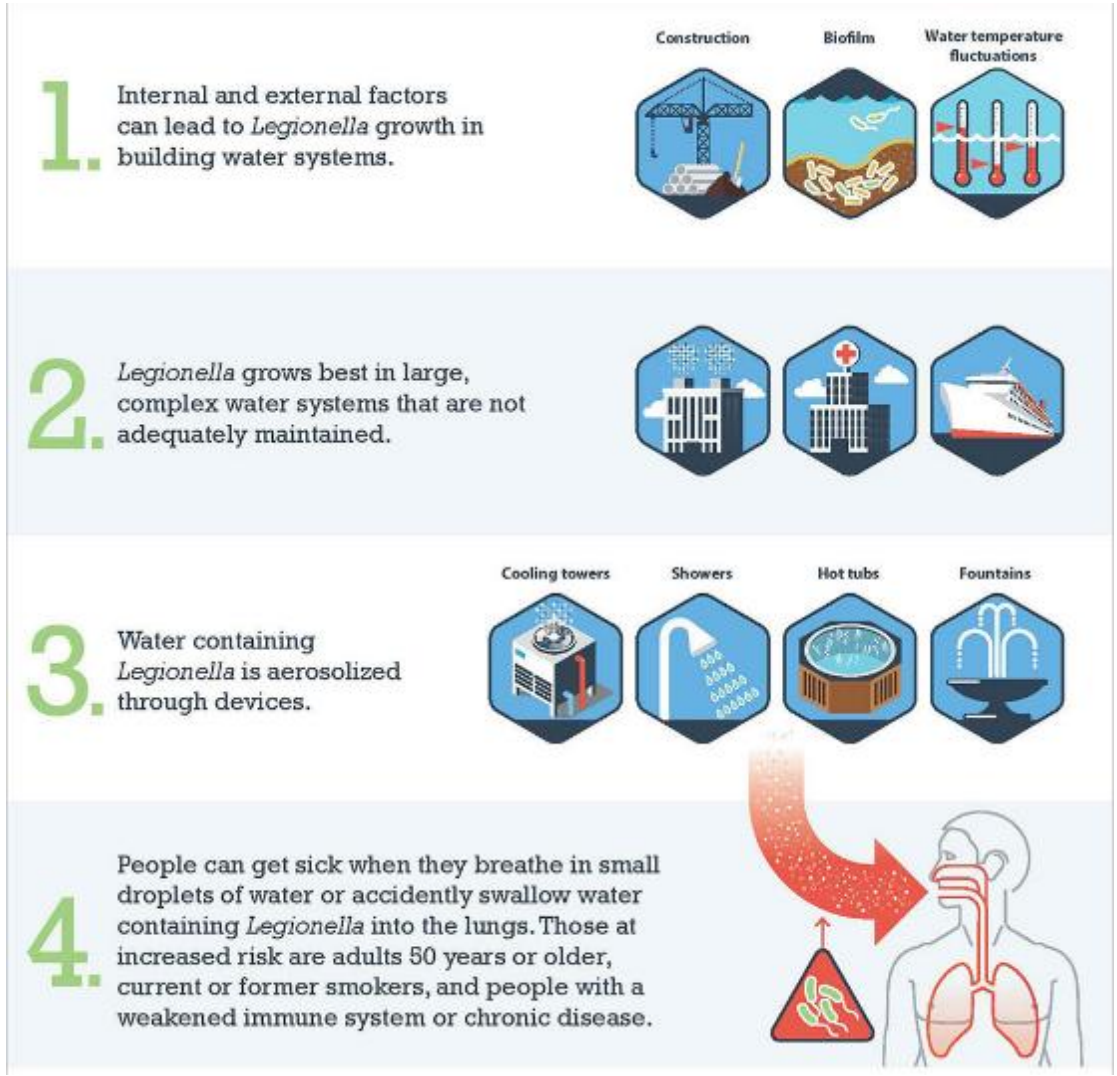
Cross connections/Deadlegs



High surface area to volume ratios

Low or absent residuals

How *Legionella* Affects Building Water Systems and People



https://www.cdc.gov/legionella/infographics/legionella-affects-water-systems.html

CSTE WMP Example

- Council of State and Territorial Epidemiologists (**CSTE**) Template Example: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Facility and Water Management Team

Summary of Actions:

- Nominate water program management team members
- Those who might be a part of your water management team could include building manager/administrator, maintenance or engineering, infection preventionist, clinician with expertise in infectious disease, risk management/safety officers, state or local public health, certified industrial hygienists, environmental health specialist, and microbiology expert.
- Identify a team leader or team hierarchy
- Record why team members have been selected to participate in Legionella risk management.
- Clearly articulate the responsibilities of each member of the water management team.
- All information about the Water Management Team should be noted in Table 2.

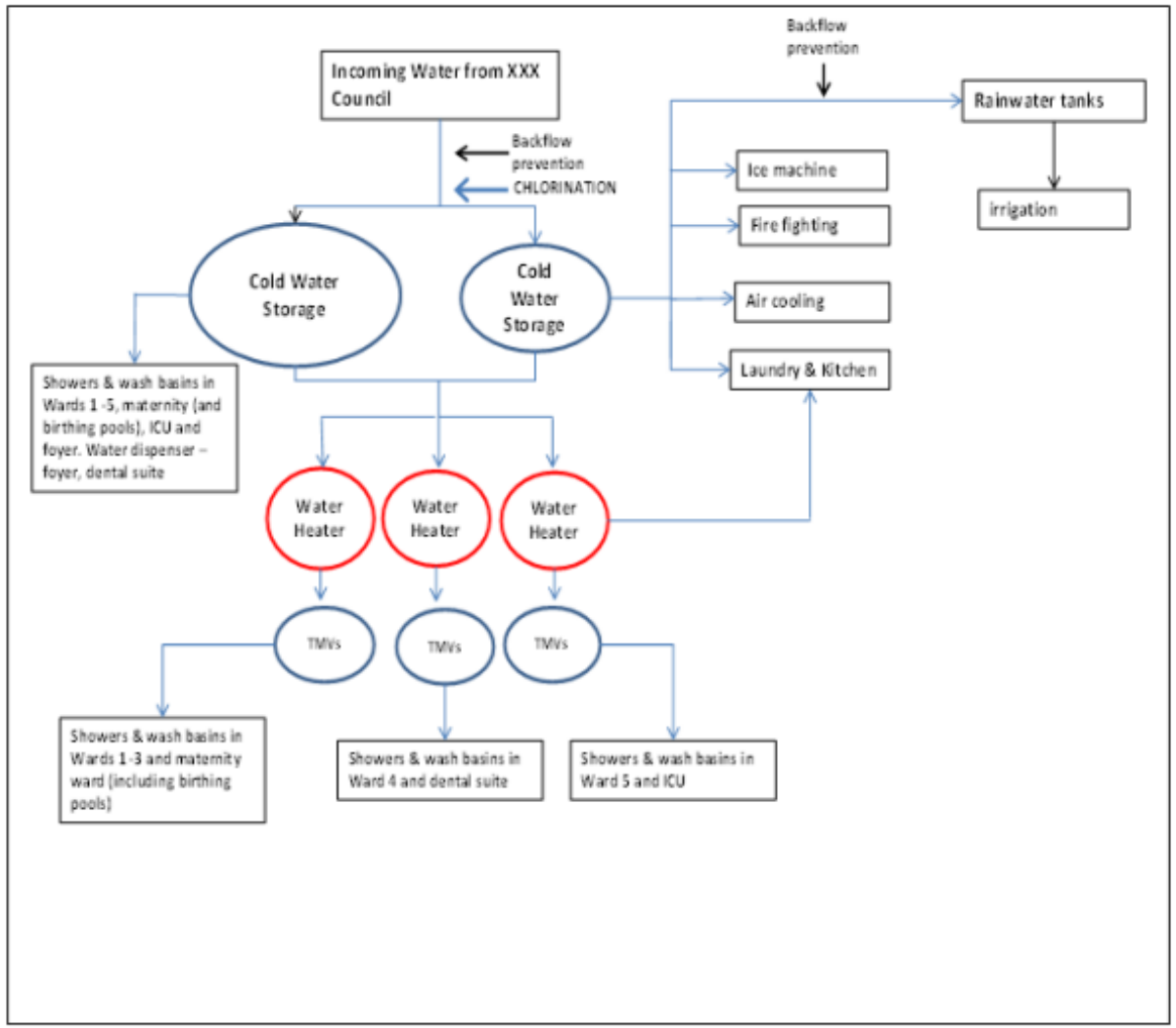
Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 2. Water Management Team Example

Name	Organization	Position	*Legionella* Risk Management Responsibilities	Phone Number	Email Address

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

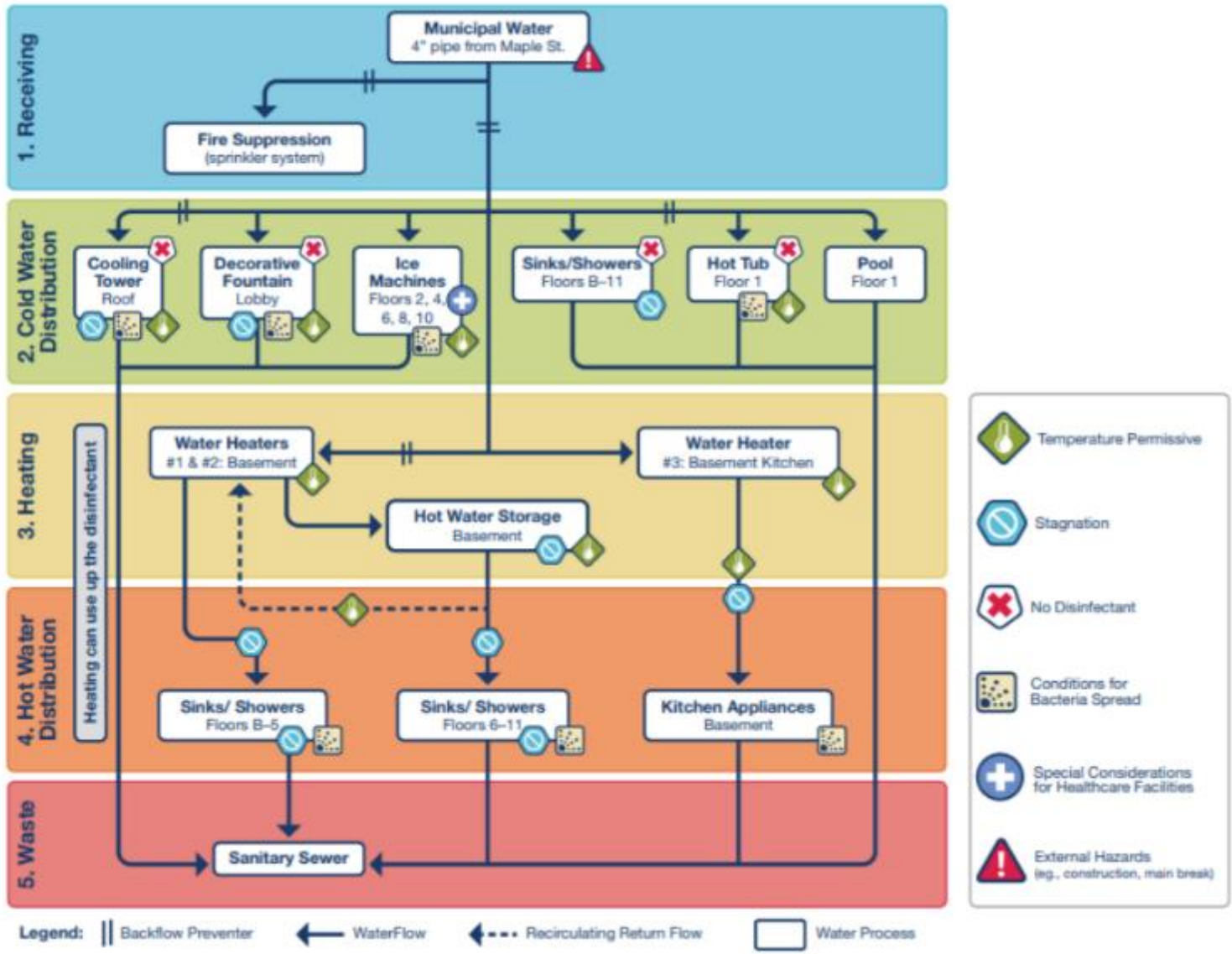
Figure 4. Example of a schematic drawing of a facility water delivery system



State Approved Plumbing Plans from the original construction of the building? These are a valuable asset.

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Figure 6. Example of a schematic drawing of a building water system



Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 23: Potable Water System Monitoring Log

Date	Location/Source	Time	pH	Temp (F)	Cl (mg/L)	Flushing (Y/N)	Staff Initials	*Legionella* result

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Is your municipal water system's water supply disinfected?

- **Does the disinfectant from the municipal survive the water heater and the hot water distribution system?**
- DNR link: https://dnr.wisconsin.gov/topic/DrinkingWater/disinfection.html

Year-Round Continuous Disinfection?	PWS_ID	PWS_NAME
YES	73701485	ABBOTSFORD WATERWORKS
YES	70101075	ADAMS WATERWORKS
YES	46004354	ADELL WATERWORKS
YES	12300717	ALBANY WATERWORKS
YES	47116113	ALGOMA TN SANITARY DIST 1
YES	43102807	ALGOMA WATERWORKS
YES	26701048	ALLENTON SANITARY DISTRICT
YES	40504552	ALLOUEZ WATERWORKS
YES	62702981	ALMA CENTER WATERWORKS
YES	60601926	ALMA WATERWORKS
YES	60301241	ALMENA WATERWORKS
YES	61802807	ALTOONA WATERWORKS
NO	64903421	AMANI VILLAGE SANITARY DIST
YES	64903289	AMERY WATERWORKS
YES	75000948	AMHERST WATERWORKS
YES	73400866	ANTIGO WATERWORKS
YES	44503338	APPLETON WATERWORKS
YES	66203192	ARCADIA WATERWORKS
YES	12500730	ARENA WATERWORKS
YES	13300683	ARGYLE WATERWORKS
YES	11100936	ARLINGTON WATERWORKS
YES	80203739	ASHLAND WATER UTILITY
YES	40504563	ASHWAUBENON WATERWORKS
YES	73701496	ATHENS WATERWORKS
YES	61802312	AUGUSTA WATERWORKS
YES	12500741	AVOCA WATERWORKS
YES	12200848	BAGLEY WATERWORKS
NO	65601195	BALDWIN WATERWORKS
NO	64903300	BALSAM LAKE WATERWORKS
YES	63202337	BANGOR WATERWORKS

Table 26: Example of Activity Log for Flushing Vacant/Unoccupied Rooms (add, edit, or delete as needed)

Date	Time	Staff Initials	Room Number	Floorplan Style	Hot Flush?	Cold Flush?	Toilet Flush?	Cleaned?

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 29: Healthcare Facility Characteristics Example

Component	Response	Locations
Type of healthcare facility	Long-term care facility	
Total number of beds	75	
Number of intensive care unit beds (including surgery, coronary care, etc.)	10	first floor
Do you have a solid organ transplant program? (circle)	Yes (No)	
Do you have a bone marrow transplant program? (circle)	Yes (No)	
Can windows in patient rooms be opened? (circle)	(Yes) No	
If windows in patient rooms can be opened, are cooling towers visible from these windows? (circle)	Yes (No)	
Are patients exposed to portable humidifiers? (circle)	Yes (No)	
Do any patients use aerosol generating devices, such as CPAP, BiPAP, or nebulizers? (circle)	(Yes) No	portable devices- depends on patient care
Are there therapeutic whirlpools/spas on site? (circle)	Yes (No)	
Has your facility previously experienced Legionnaires' disease cases that were "possibly" or "probably" facility acquired? (circle)	Yes (No)	
If yes to a Legionnaires' disease case, enter the YEAR of the most recent case.		

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 33: Recreational Water Feature Descriptions Example

Water Feature Questions	Descriptor/Location			
	Pool	Hot Tub		
Indoor or Outdoor	Indoor	Indoor		
Max Bather Load	20	3		
Filter Type	Sand	Cartridge		
Date filter was last changed	05/2019	05/2019		
Date of last filter backwash	05/01/2019	05/01/2019		
Compensation tank present?				
Type of disinfectant used (include chemical name, formulation, and amount used)	Chlorine	Bromine		
Desired disinfectant range (ppm)	2 - 5	3 - 8		
Desired pH range	7.2 – 7.8	7.2 - 7.8		
Method used for adding disinfectant	Automatic feeders	Automatic feeders		
Method used for monitoring and maintaining disinfectant and pH levels	Manual readings 3x/day	Manual readings every 2 hours		
Date last drained and scrubbed	08/15/2018	04/25/2019		
Was there a recent disinfectant "shock" treatment?	No	Yes		
Operating as designed and in good repair? If no, describe issues.	Yes	Yes		
Operates continuously or intermittently	Continuous	Continuous		
Heat source				

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Decorative Water Displays

- Decorative water displays, such as decorative water fountains, can also serve as a source of *Legionella* capable of infecting people who are exposed to aerosolized spray.
- It is important to regularly maintain decorative water features to inhibit growth of algae and biofilm that may encourage bacterial growth.
- Use Tables 51 and 52 below to document routine maintenance protocols.

Table 51: Decorative Water Feature Maintenance Protocols

Aspect	Response
Wetted surfaces are free of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants	Yes No
Minimum acceptable halogen level (i.e. chlorine, bromine)	mg/L
Acceptable pH range	
Acceptable temperature range	
Frequency of cleaning and disinfection (i.e. daily, weekly)	
Type of disinfectant used in cleaning/disinfection	
Describe cleaning protocols	

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 52: Decorative Water Feature *Legionella* Testing

Will *Legionella* culture testing be performed? Yes No

If yes, complete the table below:

Component	Response
Responsible party for *Legionella* sample collection	Describe who is responsible for *Legionella* sample collection.
***Legionella* sample collection location(s)**	Describe where in the decorative water feature system the sample(s) will be taken from.
***Legionella* sampling protocol**	Describe how the *Legionella* sample(s) will be taken and managed. Identify lab. (see Appendix A)
Responsible party for corrective action(s)	Describe who is responsible for interpreting results/performing corrective action(s).
Corrective action(s) and timeline	Describe corrective action(s) and timeline, along with documentation procedure (See decorative water feature section in Appendix B).

Table 53: Decorative Water Feature Monitoring Log

Monitoring Person: _____

Week, Month, Year: _____

Day	Feature	Time	pH	Temp (F)	Halogen Residual (mg/L)	Cleaned (Y/N)	Staff Initials	Comments
1								
2								
3								
4								
5								
6								
7								

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Ice Machines/Makers are frequently missed and not thought about when it comes to a cleaning and maintenance.

Table 54: Ice Machine Description

Description	Response
Building/location	
Manufacturer	
Model	
Filter type (e.g. stainless steel, pleated, carbon)	
Filter's micron cut-off	
Is this machine also a water dispenser?	Yes No

Table 55: Ice Machine Maintenance Protocols

Protocol	Description
Who is responsible for maintaining ice machines?	
How often are ice machines cleaned? (e.g. daily, weekly, monthly)	
What are the cleaning protocols, including description of steps taken and chemicals used?	
How often are ice machines sanitized?	
What are the sanitization protocols, including description of steps taken and chemicals used?	

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 57A: Respiratory Therapy Use, Respiratory Aerosolized Care (nebulizer, inhaler)

Protocol	Response
What sterile solutions are used for nebulization?	
If multi-dose vials are used, describe manufacturer's instructions for handling, storing, and dispensing the medications.	
Are jet nebulizers used for only one resident?	
How are jet nebulizers cleaned, dried, and stored?	
How are mesh nebulizers that remain in the ventilator circuit cleaning, disinfected, and changed?	
Who is responsible for maintaining aerosolized care equipment?	

Table 57B: Respiratory Therapy Use, Oxygen

Protocol	Response
How is oxygen equipment cleaned, and sanitized?	
Who is responsible for cleaning and maintaining oxygen equipment?	

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 57C: Respiratory Therapy Use, Mechanical Ventilation or Tracheostomy

Protocol	Response
Describe protocols for ensuring condensate does not drain towards the resident.	
Are single-use open-system suction catheters used?	
Describe protocols for how sterile fluid is used to remove secretions from the suction catheter if the catheter is used for re-entry into the resident's lower respiratory tract	
How are machines or equipment maintained and cleaned?	
Who is responsible for cleaning and maintaining equipment?	

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Table 59: Example Sample Data Collection Sheet (add, edit, or delete as needed)

Sample ID	Date Collected	Collected by	Specimen Type (e.g., water, swab, filter)	Sample Description (e.g., room 253 shower)	Temp (F)	Time to Temp	Free Cl (ppm)	Total Cl (ppm)	pH
1	05/01/19	AB	Water	Hot tub water	103.5	------	3.5		7.5
2	05/01/19	AB	Swab	Room 1123 shower swab	118	12 s	0.3		7.2

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

CDC WMP Development Guide

- Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards: https://www.cdc.gov/legionella/downloads/toolkit.pdf

June 24, 2021

Version 1.1

Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Table of Contents

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Identifying Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of *Legionella* growth and spread.

If you answer YES to any of questions 1 through 4, you should have a water management program for *that building's* hot and cold water distribution system.

Healthcare Facilities

Yes ____ No ____ 1. 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?

Yes ____ No ____ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?

Yes ____ No ____ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?

Yes ____ No ____ 4. Does your building have more than 10 stories (including basement levels)?

Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for *that device*.

Yes ____ No ____ 5. Does your building have a cooling tower*?

Yes ____ No ____ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?

Yes ____ No ____ 7. Does your building have a decorative fountain?

Yes ____ No ____ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Factors external to buildings that can lead to *Legionella* growth

- **Construction:** Vibrations and changes in water pressure can dislodge biofilm and free *Legionella* into the water entering your building.
- **Water main breaks:** Changes in water pressure can dislodge biofilm and free *Legionella* into the water, while dirt and other materials can be introduced into the water and use up disinfectant.
- **Changes in municipal water quality:** Changes in water quality can increase sediment, lower disinfectant levels, increase turbidity, or cause pH to be outside recommended ranges. Changes in disinfectant type can impact how you should monitor your program.

Factors internal to buildings that can lead to *Legionella* growth

- **Biofilm:** Protects *Legionella* from heat and disinfectant; provides food and shelter to germs; grows on any surface that is constantly moist and can last for decades
- **Scale and sediment:** Uses up disinfectant and creates a protected home for *Legionella* and other germs
- **Water temperature fluctuations:** Provide conditions where *Legionella* grows best (77°F–113°F); *Legionella* can still grow outside this range
- **Water pressure changes:** Can cause biofilm to dislodge, colonizing downstream devices
- **pH:** Disinfectants are most effective within a narrow range (approximately 6.5 to 8.5)

  Many things can cause the hot water temperature to drop into the range where *Legionella* can grow, including low settings on water heaters, heat loss as water travels through long pipes away from the heat source, mixing cold and hot water within the plumbing system, heat transfer (when cold and hot water pipes are too close together), or heat loss due to water stagnation. In hot weather, cold water in pipes can heat up into this range.

- **Inadequate disinfectant:** Does not kill or inactivate *Legionella*.

  Even if the water entering your building is of high quality, it may contain *Legionella*. In some buildings, processes such as heating, storing, and filtering can degrade the quality of the water. These processes use up the disinfectant the water entered with, allowing the few *Legionella* that entered to grow into a large number if not controlled.

- **Water stagnation:** Encourages biofilm growth and reduces temperature and levels of disinfectant.

  Common issues that contribute to water stagnation include renovations that lead to 'dead legs' and reduced building occupancy, which can occur in hotels during off-peak seasons, for example. Stagnation can also occur when fixtures go unused, like a rarely used shower in a hospital room.

Where can *Legionella* grow and/or spread?

***Legionella* can grow in many parts of building water systems that are continually wet, and certain devices can then spread contaminated water droplets. Examples include:**

- Hot and cold water storage tanks
- Water heaters
- Water-hammer arrestors
- Expansion tanks
- Water filters
- Electronic and manual faucets*
- Aerators
- Faucet flow restrictors
- Showerheads* and hoses
- Pipes, valves, and fittings
- Centrally-installed misters*, atomizers*, air washers*, and humidifiers*
- Nonsteam aerosol-generating humidifiers*
- Infrequently used equipment, including eyewash stations*
- Ice machines*
- Hot tubs*
- Decorative fountains*
- Cooling towers*
- **Medical devices* (such as CPAP machines, hydrotherapy equipment, bronchoscopes)**

*These devices can spread *Legionella* through aerosols or aspiration

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Elements of a Water Management Program

Developing and maintaining a water management program is a multi-step, continuous process. The key steps, listed here, are explained in more detail throughout the toolkit with the associated step number appearing on the page where the specific step is discussed.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Establish a Water Management Program Team

1

Certain skills, described in the diagram below, are needed to develop and implement your water management program. These skills would typically be provided by a combination of people, some of whom may have multiple skills (examples shown below).

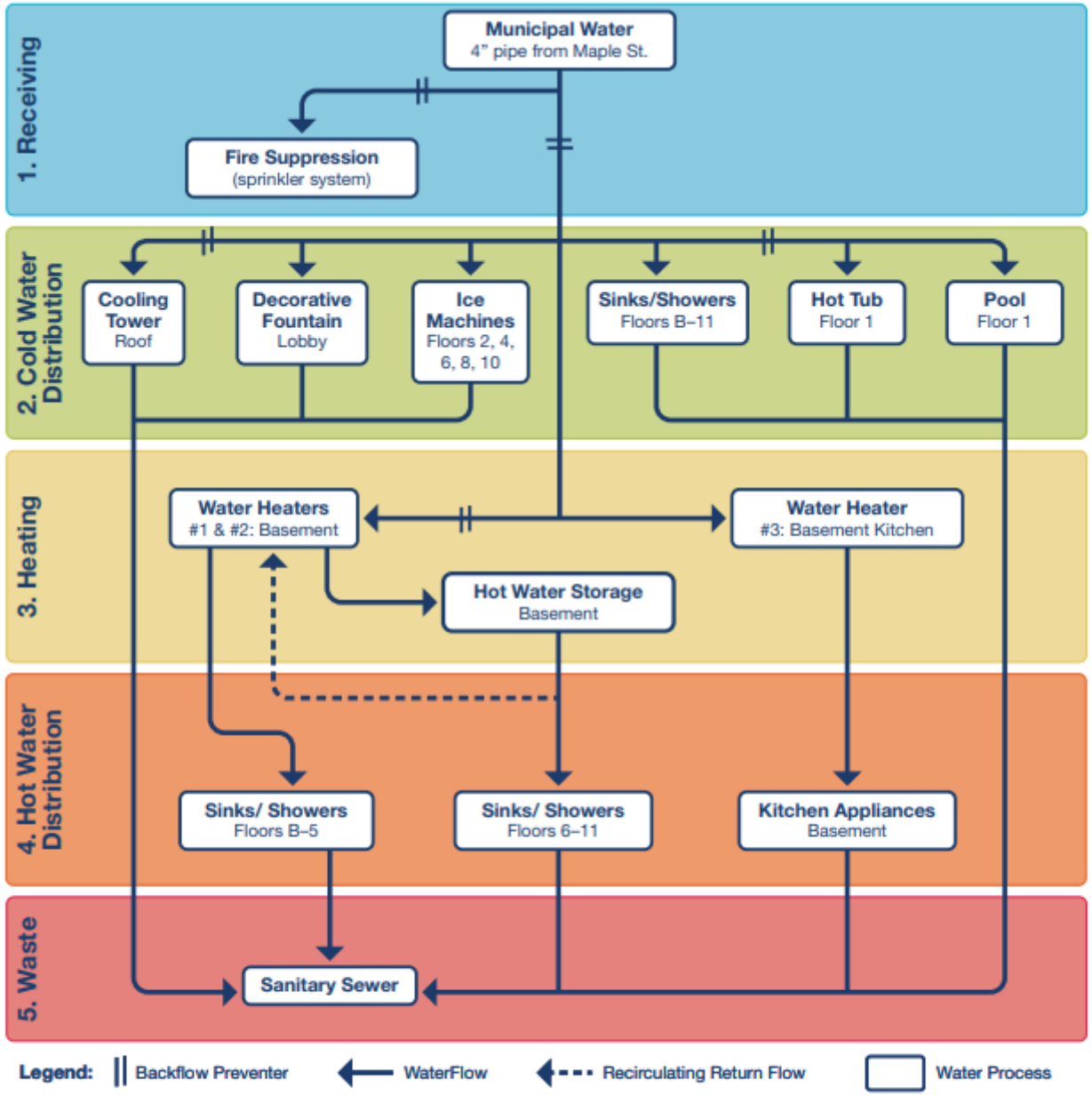
Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

2 Describe Your Building Water Systems Using Text

DEVELOPING A *LEGIONELLA* WATER MANAGEMENT PROGRAM

2 Describe Your Building Water Systems Using a Flow Diagram

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf



Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Reference: ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

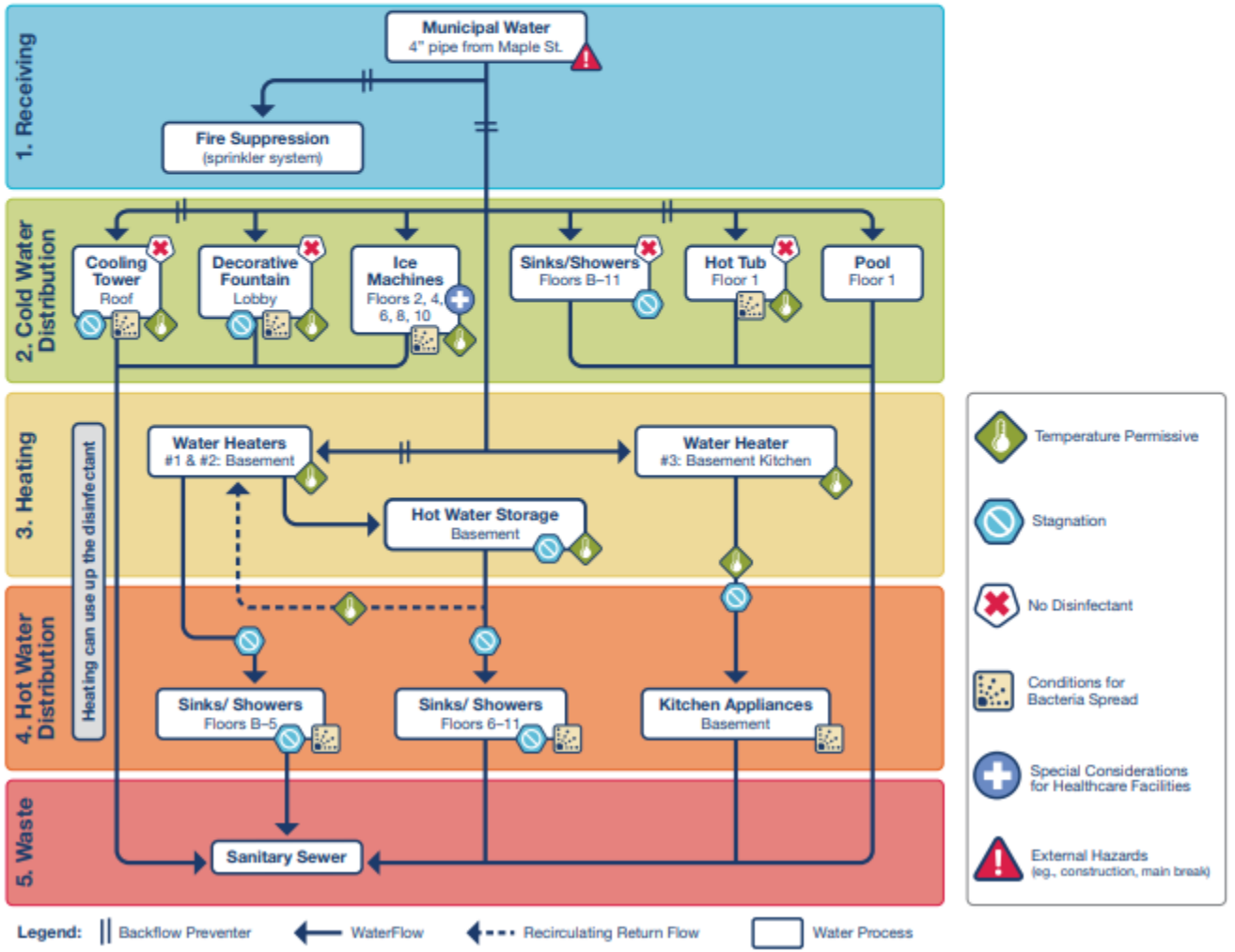
Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Identify Areas Where *Legionella* Could Grow & Spread

3

EXAMPLE: BUILDING A

Once you have developed your process flow diagram, identify where potentially hazardous conditions could occur in your building water systems. The below diagram points out locations and types of hazardous conditions you could expect in Building A. Each potentially hazardous condition should be addressed individually with a control point, measure, and limit.



Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Healthcare Facilities

Think about:

- Areas where medical procedures may expose patients to water droplets, such as hydrotherapy
- Areas where patients are more vulnerable to infection, such as bone marrow transplant units, oncology floors, or intensive care units

In Building A, the ice machine is included to illustrate that patients with problems swallowing may be at increased risk for *Legionella* spread by aspiration.

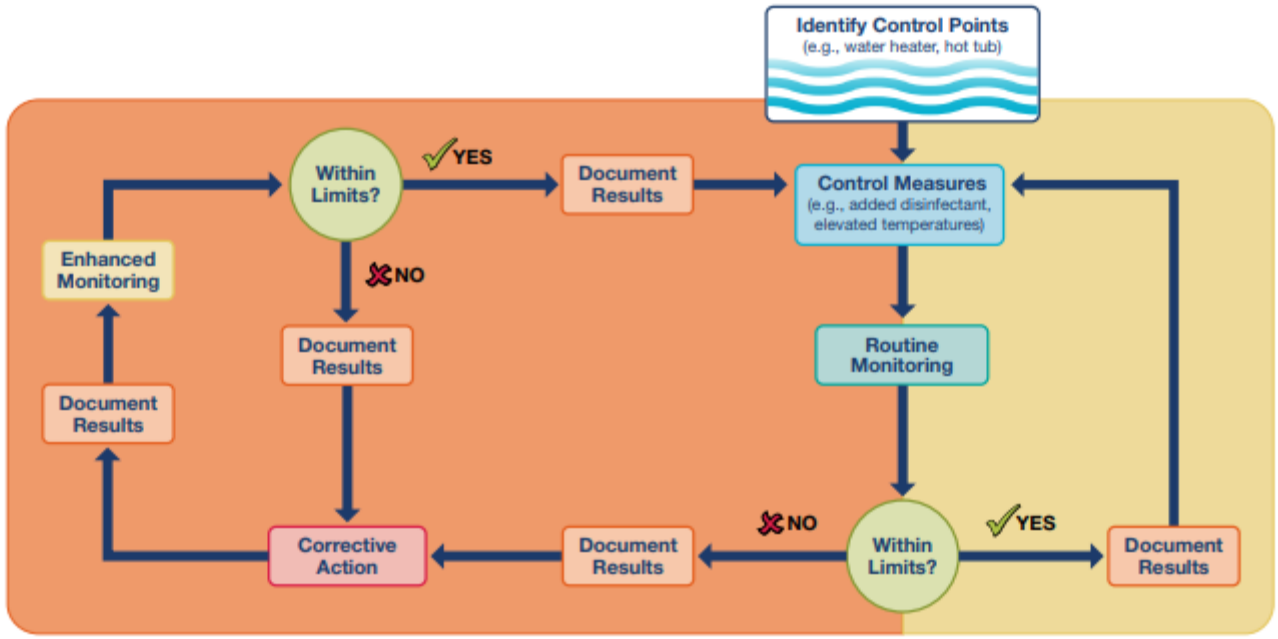
Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Reference: ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

3 Control Measures & Corrective Actions: The Basics

The diagram below shows the process of implementing and monitoring control measures. If you find that a control limit (i.e., temperature levels, disinfectant levels) is not being met, you need to take corrective actions to get conditions back to within an acceptable range. The right side, in yellow, illustrates the routine process of monitoring control measures to make sure they are within limits. The left side, in orange, shows the process of what to do if control measures are found to be outside of their limits.



Remember, any time there is a suspected case of Legionnaires' disease associated with your building you should:

- Contact your local and/or state health department or work with them if they contact you
- Notify anyone who could be affected by the growth and spread of *Legionella* in your building if the health department asks you to
- Decontaminate the building water systems if necessary (you may need to get additional help from outside experts)
- Review the water management program and revise it, if necessary

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Healthcare Facilities

In addition to the steps listed above that you would take in all buildings, if a case of healthcare-associated Legionnaires' disease is discovered in a healthcare facility:

- Make sure the person with expertise in infection prevention on your team is aware
- **Important:** Tell clinicians so they can test patients with healthcare-associated pneumonia for Legionnaires' disease with both culture of lower respiratory secretions and the *Legionella* urinary antigen test
- Report the case to your local and/or state health department; a full investigation may be needed

For more details on identifying and investigating Legionnaires' disease cases in healthcare facilities, see page 24.

Reference: ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Decide Where Control Measures Should Be Applied

4

Control measures and limits should be established for each control point. See the diagram on the next page for the types of monitoring that could occur in Building A. You will need to monitor to ensure your control measures are performing as designed. Control limits, in which a chemical or physical parameter must be maintained, should include a minimum and a maximum value.

Examples of chemical and physical control measures and limits to reduce the risk of *Legionella* growth:

- Water quality should be measured throughout the system to ensure that changes that may lead to *Legionella* growth (such as a drop in chlorine levels) are not occurring.
- Water heaters should be maintained at appropriate temperatures.
- Decorative fountains should be kept free of debris and visible biofilm.
- Disinfectant and other chemical levels in cooling towers and hot tubs should be continuously maintained and regularly monitored. Surfaces with any visible biofilm (i.e., slime) should be cleaned.

Healthcare Facilities

Clinicians should test patients with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission) for Legionnaires' disease. This is especially important among patients at increased risk for developing Legionnaires' disease (see Appendix B), among patients with severe pneumonia (particularly those requiring intensive care), or if any of the following are identified in your facility:

- Other patients with healthcare-associated Legionnaires' disease diagnosed in the past 12 months
- Positive environmental tests for *Legionella* in the past 2 months
- Current changes in water quality that may lead to *Legionella* growth (such as low chlorine levels)

The preferred diagnostic tests for Legionnaires' disease are culture of lower respiratory secretions on selective media and the *Legionella* urinary antigen test.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Additionally, certain commonly-encountered changes in building water system design or management might require increasing the extent and frequency of monitoring. It's a good idea to anticipate additional hazardous conditions that could be associated with scheduled or unanticipated changes in water quality, such as:

- System start up
- System shut down
- Regularly scheduled maintenance
- Renovations, construction, and installation of new equipment on your property
- Equipment failure
- Water main break or other service interruptions

Anti-scald Regulation

You should follow local and state anti-scald regulations. However, maximum temperatures allowed by your state may be too low to limit *Legionella* growth. Engineering controls that mix hot and cold water together at or near the point of use can reduce the risk of scalding while allowing water in pipes to remain hot enough to limit *Legionella* growth.

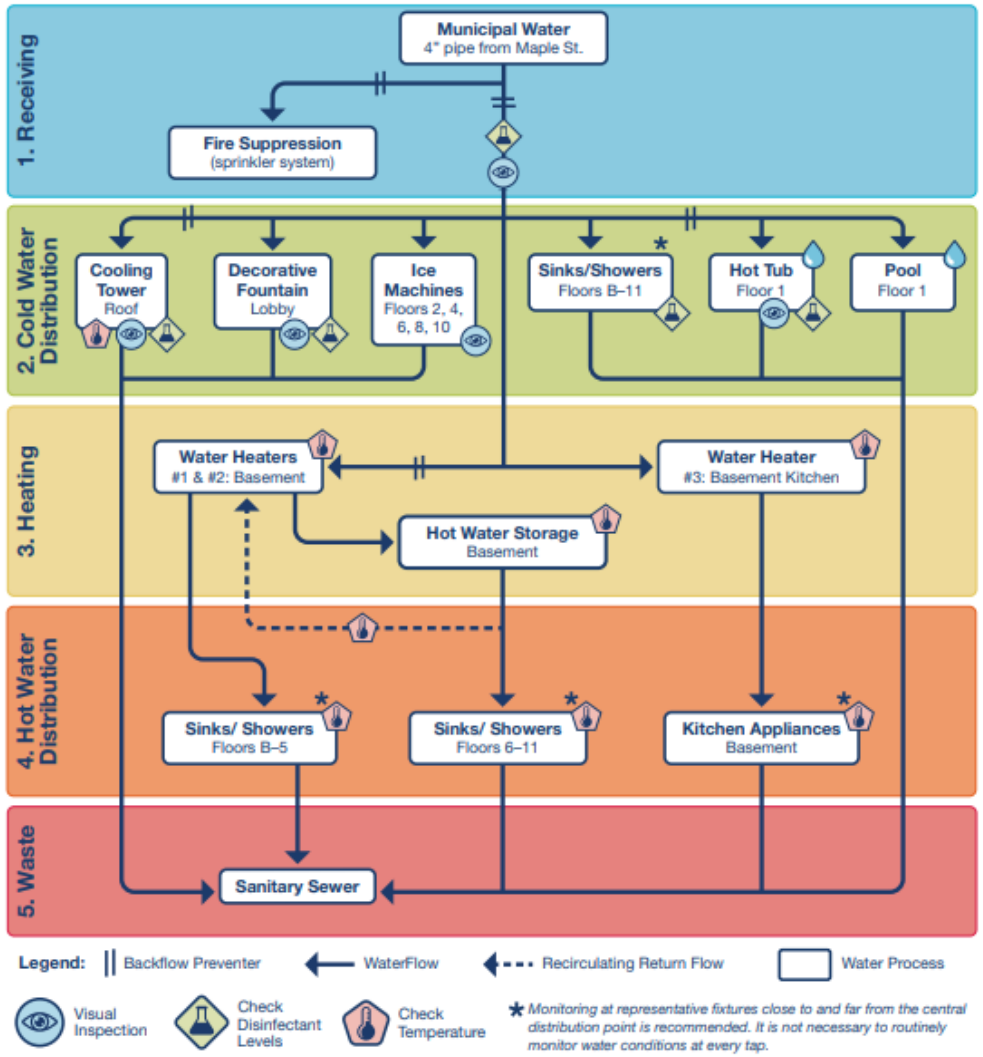
Reference: ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

4 Decide How to Monitor Your Control Measures

EXAMPLE: BUILDING A

The diagram below shows which types of monitoring could occur at different locations within Building A's water system to reduce the risk of growth and spread of *Legionella*.



Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Establish Ways to Intervene When Control Limits Are Not Met

5

CORRECTIVE ACTION EXAMPLES

Building water systems are dynamic. You should plan for your monitoring results to vary over time and be prepared to apply corrective actions. **Corrective actions** are taken in response to systems performing outside of control limits. The following are examples of corrective actions.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Example 1—Biofilm growth in the decorative fountain

1. During her weekly inspection of the fountain in the first floor lobby, Michelle Patterson notes that the fountain walls have accumulated a slimy growth.

2. As dictated by her water management program, Michelle immediately shuts off the fountain, drains it to the sanitary sewer, and scrubs it with a detergent recommended by the manufacturer.

3. She then follows the program's start up procedure to refill the fountain with water and checks the residual disinfectant levels to make sure that they are within control limits.

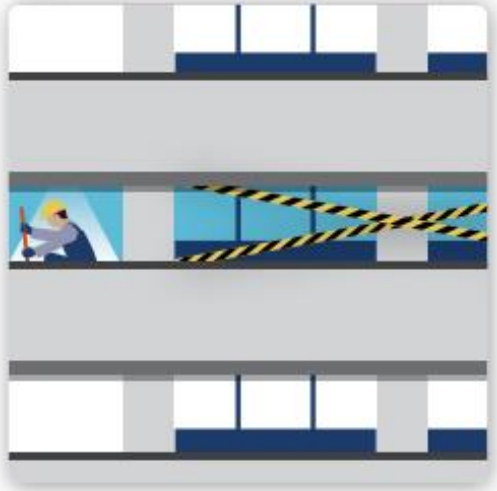
4. Michelle documents her observations and the performance of interim cleaning in her log book. She informs her supervisor.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

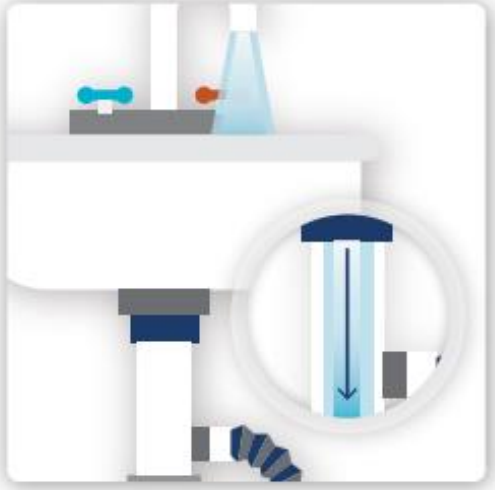
Reference: ASHRAE 188: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. www.ashrae.org

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Example 2—Unoccupied floor



1. The eighth floor of the building is being renovated and is closed to the public. Jason Hernandez understands that this may cause a temporary hazardous condition because water usage will decrease, which means that stagnation is possible.



2. After discussing the issue with his supervisor, Jason counteracts the potential for stagnation by daily flushing of the sinks and fixtures with hot and cold water in several rooms including those at the end of the hall, which are farthest from the vertical pipe serving that floor (riser).

3. Jason also increases the frequency of measuring temperature and chlorine levels on the eighth floor from weekly to daily for the duration of the renovation.

4. He documents the method and duration of flushing and records his daily temperature and chlorine readings in his log book. He reviews his documentation with his supervisor.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Example 3—Debris in the cooling tower

5

1. During weekly inspection of the cooling tower, Michelle discovers that leaf litter has accumulated in the reservoir.

2. Upon further investigation, she finds that a panel has become dislodged, allowing windblown debris to enter.

3. After replacing the panel and skimming out the debris, Michelle checks the disinfectant levels and performs a heterotrophic plate count as an indicator of water quality.

4. She documents her actions in her log book. She also makes a note to check the disinfectant levels daily for a week to make sure that the cooling tower remains within control limits. She reviews her actions and documentation with her supervisor.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

5 CONTINGENCY RESPONSE EXAMPLES

Even the most closely monitored systems will sometimes require adjustments, as shown in the following examples. You should be prepared to respond, even to unexpected problems, based on your knowledge of the building water systems and how *Legionella* grows and spreads. You may need to initiate a customized contingency response to gain control of a building water system. **Contingency responses** may involve several steps and often require follow up. A contingency response is always required when a case of Legionnaires' disease has been linked to a building and is also appropriate in other situations.

Example 1—Biofilm growth in the fountain

1. During the annual review of the water management program, supervisor Anson Cho notes that Michelle and Jason performed six interim cleanings of the lobby fountain due to excessive biofilm growth in the past year.

2. Upon further review of the logs, he discovers that the biofilm growth was observed near the inner wall where incandescent lighting illuminates the water.

3. Anson decides to replace the incandescent bulbs with LED bulbs to prevent the lights from heating the water to a temperature that allows biofilm to grow.

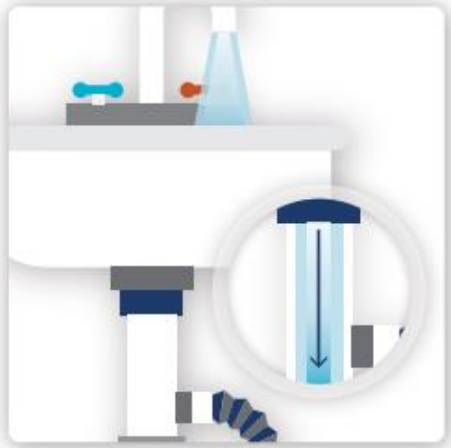
4. After three months of routine inspections show that this corrective action reduces biofilm growth and eliminates the need for interim cleaning, Anson amends the water management program to specify use of only LED bulbs in the fountain and he informs the owner.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Example 2—Water main break

1. Jason receives several complaints from building occupants of foul-tasting water. He also notes a brownish tint to the water entering the building during his daily visual inspection. Jason immediately contacts the water provider and discovers that there was a water main break nearby but that a boil water advisory was not issued. He sends a notice to building occupants about the main break and that they should limit water usage for the next 4 hours while facilities clear the line.



2. To improve building water quality, Jason flushes the water at multiple sinks and fixtures near the entry until the water runs clear and falls within established water quality parameter control limits. He also flushes fixtures in areas where he received taste and odor complaints and at pre-determined flushing locations per the water management program.

3. Jason increases the frequency of measuring chlorine levels at the taps from weekly to daily to ensure that adequate residual disinfectant is moving through the system.

4. Jason informs his supervisor, documents his actions, and records chlorine readings in his log book.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Example 3—Broken chlorinator in the hot tub

1. Michelle notes chlorine levels of zero within the hot tub during her daily inspection. On further inspection she notices that disinfectant in the automatic delivery system reservoir is full.

2. Michelle immediately closes the hot tub and calls the pool contractor.

3. The contractor arrives the next day to discover that the chlorinator pump has malfunctioned and replaces the unit.

4. Michelle documents the action and follows the water management program's protocol for start up, which includes cleaning the hot tub, shocking it with a high dose of disinfectant, and back-flushing the filter. Michelle also recommends that the supervisor amend the water management program to include a daily check of equipment operation and disinfectant levels in the reservoir, in addition to the daily visual inspection and chlorine measurements, so that such equipment failures may be detected more quickly in the future.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Make Sure the Program Is Running as Designed & Is Effective

6

Verification: Are we doing what we said we would do?

Your program team should establish procedures to confirm, both initially and on an ongoing basis, that the water management program is being implemented as designed. This step is called "verification." For example, if you said you would test the hot tub daily for chlorine and record and communicate those results, have you been doing that? If you found a problem, did you take the action included in your program?

People should not verify the program activity for which they are responsible. For example, if one person is responsible for maintaining the hot tub and another is responsible for the cooling tower, they could verify each other's work, not their own.

Validation: Is our program actually working?

Now that you have a water management program, you need to be sure that it is effective. Your program team should establish procedures to confirm, both initially and on an ongoing basis, that the water management program effectively controls the hazardous conditions throughout the building water systems. This step is called "validation."

Environmental testing for *Legionella* is useful to validate the effectiveness of control measures. The program team should determine if environmental testing for *Legionella* should be performed and, if so, how test results will be used to validate the program. Factors that might make testing for *Legionella* more important include:

- Having difficulty maintaining the building water systems within control limits
- Having a prior history of Legionnaires' disease associated with the building water systems
- **Being a healthcare facility that provides inpatient services to people who are at increased risk for Legionnaires' disease (see Appendix B)**

If the program team decides to test for *Legionella*, then the testing protocol should be specified and documented in advance. You should also be familiar with and adhere to local and state regulations and accreditation standards for this testing.

Healthcare Facilities

Water management program teams that include infection control staff may also choose to use their facility's routine surveillance for healthcare-associated Legionnaires' disease to validate their program. To look for healthcare-associated cases, histories for all patients with diagnosed Legionnaires' disease should be reviewed for possible healthcare exposures and certain patients with healthcare-associated pneumonia (see the *Healthcare Facilities* section on page 13) should be tested for Legionnaires' disease.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

7 Document & Communicate All the Activities of Your Water Management Program

Documentation

Now that you have done all of the work required to create your water management program, write it down. This information will be important to improve your program and if you or others want to review your records. Your written program should include at least the following:

- Program team, including names, titles, contact information, and roles on the team
- Building description, including location, age, uses, and occupants and visitors
- Water system description, including general summary, uses of water, aerosol-generating devices (e.g., hot tubs, decorative fountains, cooling towers), and process flow diagrams
- Control measures, including points in the system where critical limits can be monitored and where control can be applied
- Confirmatory procedures, including verification steps to show that the program is being followed as written and validation to show that the program is effective
- Document collection and transport methods and which lab will perform the testing if environmental testing is conducted

Communication

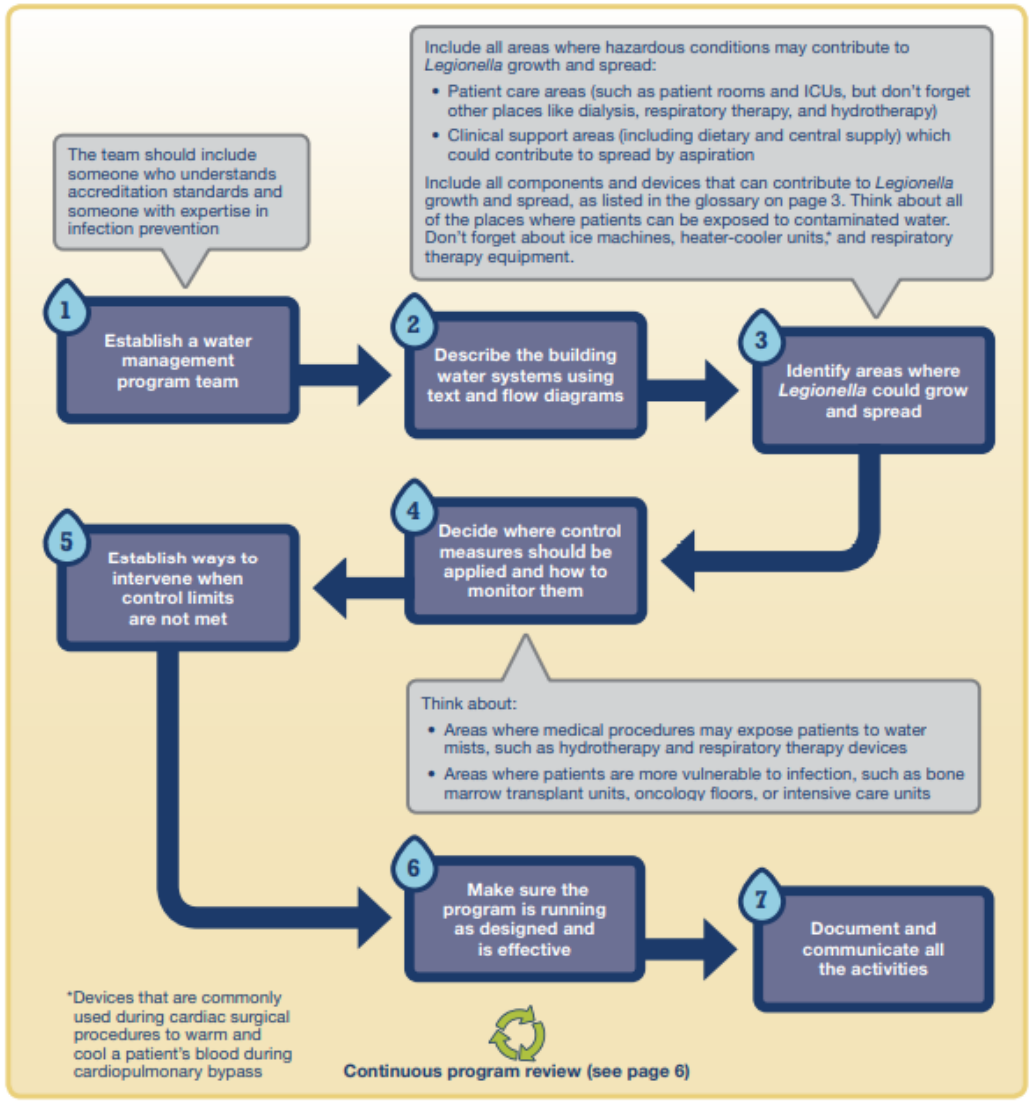
You have worked hard to develop your water management program and you have carefully documented all aspects of it. Resist the temptation to put it on a shelf and walk away. Consider notifying building occupants that you have a plan in place to keep the building water systems safe, just as you would for an elevator inspection. Be sure to communicate with your employees and colleagues about your program on a regular basis and train those responsible for implementing and monitoring the program. Use this communication as an opportunity to identify strategies for improving the management and efficiency of your water systems.

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Special Considerations for Healthcare Facilities

ELEMENTS OF A WATER MANAGEMENT PROGRAM

Developing and maintaining a water management program in healthcare facilities requires a few more considerations than the ones explained on page 6. All healthcare facilities should have a *Legionella* water management program.



Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Perform a full investigation for the source of *Legionella* when:

- ≥1 case of **definite** healthcare-associated Legionnaires' disease (a case in a patient who spent the entire 10 days prior to onset of illness in the facility) is identified at any time
- ≥2 cases of **possible** healthcare-associated Legionnaires' disease (cases in patients who spent part of the 10 days before symptoms began at the same facility) are identified within 12 months of each other (note that under certain circumstances, during a cooling tower outbreak for example, the interval may be shorter)

Key elements of a full public health investigation include:

- Working with healthcare facility leaders*
- Performing a retrospective review of cases in the health department surveillance database to identify earlier cases with possible exposures to the healthcare facility
- Developing a line list of possible and definite cases associated with the healthcare facility
- Working with infection control and clinical staff to actively identify all new and recent patients with healthcare-associated pneumonia and test them for *Legionella* using both culture of lower respiratory secretions on selective media and the *Legionella* urinary antigen test
- Obtaining postmortem specimens, when applicable
- Considering recommendations for restricting water in the facility or other immediate control measures
- Performing an environmental assessment to evaluate possible environmental exposures
- Performing environmental sampling, as indicated by the environmental assessment
- Decontaminating possible environmental source(s)
- Subtyping and comparing clinical and environmental isolates, if available
- Working with healthcare facility leaders to determine how long heightened disease surveillance and environmental sampling should continue to ensure the outbreak is over
- Working with healthcare facility leaders to review and possibly revise the water management program, if indicated

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

References & Resources

There are many references and resources that can help you develop and implement your *Legionella* water management program, some of which are listed below.

Standard

Standard 188—Legionellosis: Risk Management for Building Water Systems (ANSI Approved)
ASHRAE
Published 2015
www.techstreet.com/ashrae/products/1897561

Guidelines

Guideline 12—Minimizing the Risk of Legionellosis Associated with Building Water Systems
ASHRAE
Published 2000
www.techstreet.com/ashrae/products/232891
(currently under revision)

Legionellosis Guideline: Best Practices for Control of *Legionella*
Cooling Technology Institute
Published 2008
www.cti.org/downloads/WTP-148.pdf

Model Aquatic Health Code Guidance
Centers for Disease Control and Prevention
Published 2014
www.cdc.gov/mahc/index.html

Laboratory Resources

ELITE Program
Centers for Disease Control and Prevention and Wisconsin State Laboratory of Hygiene
wwwn.cdc.gov/ELITE/Public/EliteHome.aspx

Source: https://www.cdc.gov/legionella/downloads/toolkit.pdf

Helpful Industry Standards

- ASHRAE
  - Guideline 12-2020: Managing the Risk of Legionellosis Associated with Building Water Systems
  - ANSI/ASHRAE Standard 188-2021: Legionellosis: Risk Management for Building Water Systems
  - https://www.ashrae.org/technical-resources/standards-and-guidelines

ASHRAE Guideline 12-2020

- Information on the control of legionellosis in building water systems
- Assists with the implementation of ANSI/ASHRAE Standard 188
- Does not require previous training or certification for use

ANSI/ASHRAE 188-2021

- Assists with the development of a comprehensive program that involves the following steps:
  - Program Team
  - Water System Description
  - Evaluation of Hazards
  - Control Measures
  - Monitoring and Corrective Action Plan
  - Confirmation/Validation
  - Documentation

What are the requirements recommended by ASHRAE 188?

- Analysis of the building's different water systems.
- Identify where can control measures be implemented.
- Control limits, i.e.: chemical or physical parameters.
- Monitoring the parameters
- Corrective actions
- Validation of procedures
- Documentation

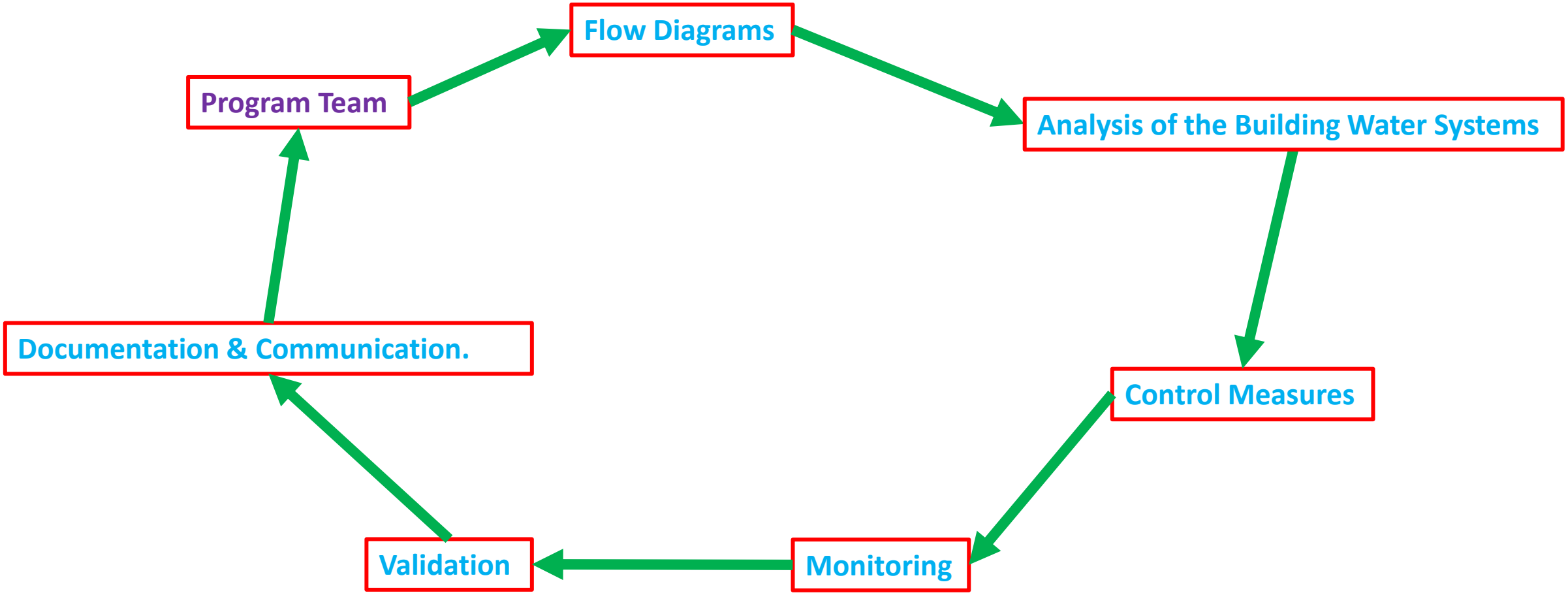
Program Development

- Create a team: building owner rep, suppliers, consultant, **employees**
- Process flow diagrams
- Analysis of the buildings water system
- Control measures:
  - Physical design
  - Equipment siting
  - Treatment methods processes
  - Procedures/actions to monitor or maintain the physical or chemical conditions established

Program Development

- Monitoring
- Corrective actions
  - Know what you are going to do before your monitoring indicates that you need corrective actions
- Program validation
- Document/record
- Communicate

Visual Summary



Healthcare Considerations

- **Designated Team Includes:**
  - Senior leadership who can make command decisions
  - A member of the facilities management staff
    - Needs to have a working knowledge of the water systems.
  - A member of the Infection Prevention and Control program.
  - Can have others, not limited to the above

Healthcare Considerations

- **The Designated Team is responsible for a Water System Flow Diagram.**
- Flow diagram may need to include:
  - All water supply sources
  - Water service entrances
  - All water treatment systems and control measures
  - All Water Processing Steps
  - All areas where hazardous conditions may contribute to legionella
  - All water points of use
  - Any other items identified by the team

Healthcare Considerations

Develop a Legionellosis water management plan

- Contact information and roles of team members
- Flow diagram
- Hazard analysis of flow diagram
- Identification of areas with higher probability of infection.
- Using flow diagram, estimate the likelihood of legionellosis.
- Prevention and control measures
- Document responsibilities for each part of plan

Healthcare Considerations

- Documentation of the legionellosis water management plan
- Disease prevention responses to elevated risks.
- Actions to be taken when the IC Dept identifies legionella.
- Verification that the risk management is being followed.

Building Water Procedures: Start up/Shutdown

Potable water systems start up and shutdown procedures

- Before commissioning: flushing and disinfection
- Shutdown: draining, purging
- Unplanned shutdowns
- Restarting drained or stagnant conditions
- Monitoring and treatment following water supply interruptions or watermain breaks
- Re-establishing required temperatures in the hot water distribution system

Building Water Procedures: Maintenance

- **System**
  - Inspection and inspection schedules
  - Flushing of low or no flow areas (water age)

- **Equipment**
  - All domestic water storage tanks
  - Ice machines
  - Water-hammer arrestors
  - Expansion tanks
  - Filters
  - Shower hoses and showerheads
  - Faucets (aerators, flow restrictors)
  - Humidifiers
  - Water heaters
  - Eye wash and emergency showers

Building Water Procedures: Water Treatment

- **Premise plumbing bacterial control/disinfection**
  - Monitoring temperature cold and hot water distribution.
  - Monitoring chemical residual.
  - Procedures for water supply/flow interruptions
  - Schedules and procedures to maintain water treatment system Chemicals
  - Water treatment products and equipment comply to standards. (NSF 60 & NSF 61)

Building Water Procedures: Cooling Towers

- System maintenance
- Water treatment (disinfectant & PH)
- Shutdown and start up
- Water make up
  - Protected against cross connection/backflow protection.

Building Water Procedures: Pools, Spas, Therapy Pools

- Maintained per manufacturer
- Maintained per applicable DATCP codes
- Installed per applicable DSPS Pool codes

Building Water Procedures: Decorative Fountains

- WMP should include:
  - Draining, cleaning, disinfection
  - Draining and refilling schedules.
  - Lighting only operates during the circulation of water
  - Confirmation of circulation pump works
  - Weekly cleaning and disinfection of components
  - Disinfection instructions in accordance with manufacturer recommendations.
  - Maintain water temperature within control limits

WMP Example: Water System

Component	Response
Type of water system used	Ex: public, facility-owned well, public-owned well
Name of water supplier	
Water supplier contact information	
Type of disinfection system	Ex: chlorine, monochloramine
Has water treatment changed in the last 6 months? If yes, explain.	Ex: No
Have there been any pressure drops, boil water advisories, or water disruptions in the past 6 months? If yes, explain.	Ex: No

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

WMP Example: Hazard Analysis

Potable Water Processing Step	Potential Hazard -Microbial -Chemical -Physical	Risk Characterization (Y/N)	Basis for Risk Characterization	Hazard Control Options (at this location)	Is control at this location essential (Y/N)?
Receiving	-Microbial -Chemical Municipal water supply	No, high quality/consistent water supply	Water Quality Report	-Screen -Filtration -Disinfection	No
Cold Water Distribution					
Heating	-Physical/temp permissive water heater could promote growth of *Legionella*	Yes. Current temp is too low to avoid *Legionella* growth and spread	Review of weekly water monitoring logs from visual water heater thermostat	Raise water heater temperature or replace water heater	Yes
Hot Water Distribution					
Wastewater					

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

WMP Example: Incident Response

Incident	Responses	Procedure name
e.g. isolated *Legionella* species detection	Water sampling or system evaluation	e.g. Undertaking a *Legionella* colonisation investigation
e.g. isolated *Legionella* species detection	Localised partial system decontamination	e.g. Assess and undertake appropriate local partial system decontamination
e.g. single confirmed Legionnaires' disease case linked to facility	Case activity investigation	e.g. Assess potential case exposures during incubation period

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

WMP Example: Control Measures

Potable Water System Monitoring Table

Activity Title	Description of Service	Frequency (e.g. daily, weekly, monthly, quarterly, annually)
System Flushing	flush sinks and showers for 5 minutes	weekly
Temperature Monitoring	test hot water maximum temperature in 5 sinks/showers per floor	weekly
Disinfectant Monitoring	test Cl level in 5 sinks/showers per floor	weekly
pH Monitoring	test pH level in 5 sinks/showers per floor	weekly
***Legionella* Testing**	test 10% of sinks/showers	annually

Potable Water System Monitoring Log

Date	Location/Source	Time	pH	Temp (F)	Cl (mg/L)	Flushing (Y/N)	Staff Initials	*Legionella* result

Source: https://portal.ct.gov/-/media/DPH/EEIP/CSTE-Water-Management-Program-Template_June2019.pdf

Legionella Consultants

- Many companies provide consultation and water management services
- The decision to utilize a Legionella consultant service is solely the decision of the facility
- Things to consider:
  - Level of experience
  - Laboratory expertise
  - Environmental assessment expertise
  - Remediation expertise
  - Water management expertise
  - Knowledge of codes, standards, and regulations
  - Potential conflicts of interest

Suggested Interview Questions

General Questions

- How long has the company been in business?
- Does the company have the capacity to travel for consulting services?
- Who is employed with the company? What are their educational and professional backgrounds? What expertise is available within the company (for example, laboratory isolation, chemical remediation, epidemiology, and engineering)?

Suggested Interview Questions

Laboratory Questions

- Do they have personnel and laboratory capacity to culture *Legionella* from water and other environmental samples? *Comment: Culture is the method that is recommended for Legionella detection in the environment.*
- Do they participate or have they participated in the Centers of Disease Control and Prevention (CDC) Environmental *Legionella* Isolation Techniques Evaluation (ELITE) Program for *Legionella* culturing and isolation (or other accreditation programs)?
- Are other laboratory methods (such as PCR) performed in their laboratory in addition to culture?
- How often is environmental testing for *Legionella* requested of their laboratory?

Suggested Interview Questions

Remediation Questions

- Is *Legionella* consultation and remediation the primary focus of the company?
- How many years has the company been providing *Legionella* specific services?
- How often is the company asked to provide remediation services related to *Legionella*?
- Without disclosing specific names or incidences, can the company describe situations where they were successful in eradicating *Legionella* from a man-made building water system?

Suggested Interview Questions

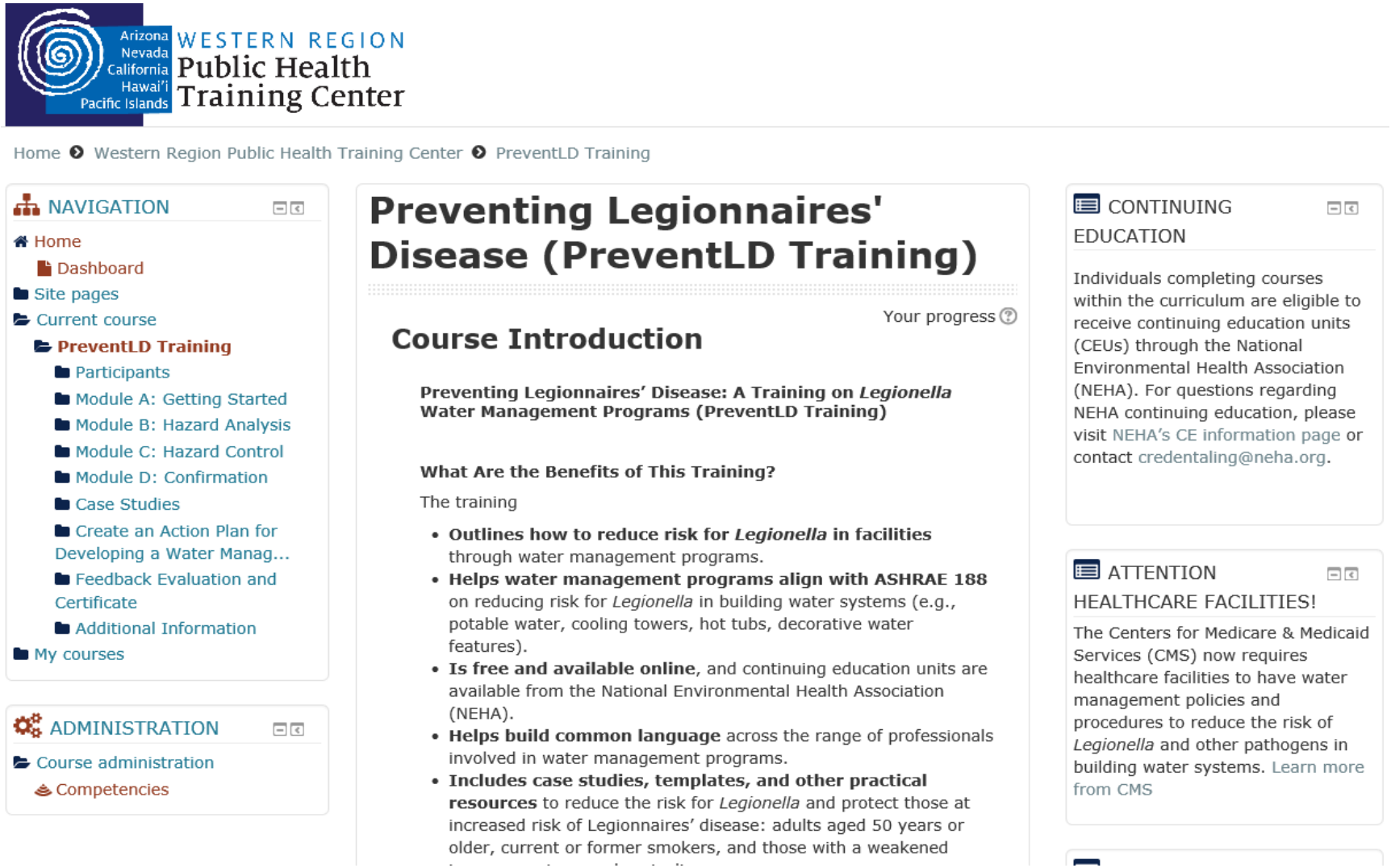
Remediation Questions

- Have they also had specific examples where *Legionella* control was difficult and unachievable?
- What types of remediation methods does the company recommend and utilize?
- Do they only endorse and recommend one method or are they willing to try multiple methods to address the problem? *Comment: The company should be willing to consider multiple options.*
- Can they provide you an example of previous *Legionella* remediation recommendations from their company addressing a *Legionella* colonization issue?
- Can they provide contact information for a current client as a potential reference?

WMP Resources

- Wisconsin Department of Health Services, Division of Public Health (DPH)
  - https://www.dhs.wisconsin.gov/disease/legionellosis.htm#hcp
- CSTE Legionnaires' Disease Surveillance Workgroup
  - https://www.cste.org/page/Legionnaires
  - Communication Toolkit: https://cdn.ymaws.com/www.cste.org/resource/resmgr/ld_risk_comm_toolkit/LDRC_Toolkit_Combined_Final_.pdf
- CDC
  - Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: https://www.cdc.gov/legionella/downloads/toolkit.pdf

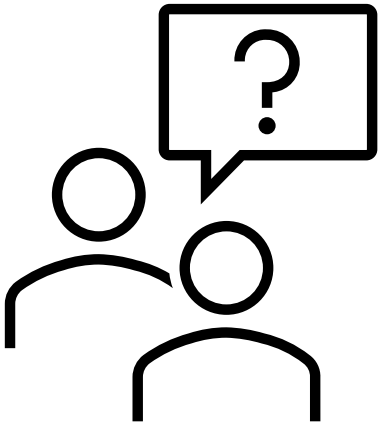
Preventing Legionnaires' Disease Webinar



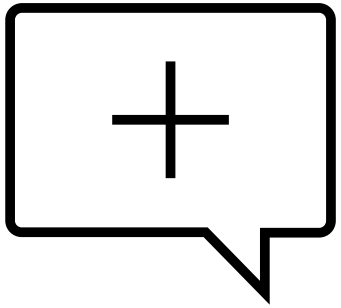
Enroll: https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html

Now it is your turn

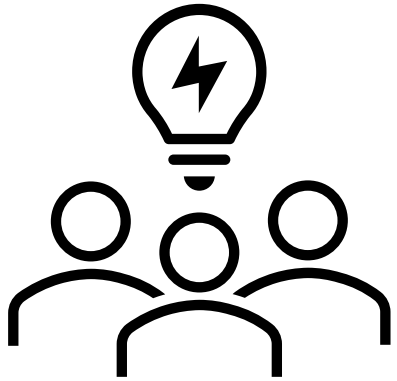
Questions



Comments



Ideas



Questions?

HAI Prevention Program

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608-267-7711

HAI Prevention Program Staff Contacts:

https://www.dhs.wisconsin.gov/hai/contacts.htm

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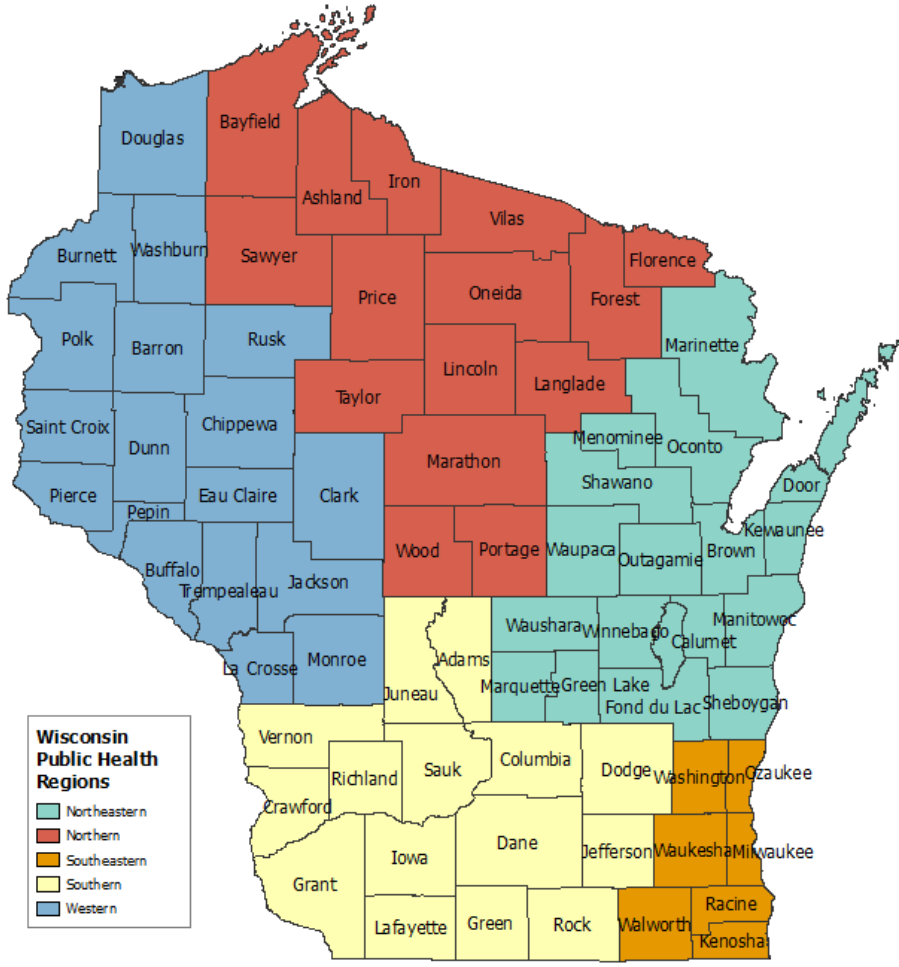

www.dhs.wisconsin.gov/hai/contacts.htm

https://www.dhs.wisconsin.gov/hai/ip-education.htm

Upcoming LTC Education Session

There will not be a December LTC Education Session.

The LTC Education Series will resume in January!