Welcome to the Oct 2018

WHEA Lunch & Learn

A Legionella control program is required by CMS. Control of Legionella is important from patient safety, compliance and liability perspectives because 10% of the persons who contract Legionella disease usually die. We will review the program requirements as outlined by CMS, ASHRAE, CDC, and the Joint Commission. You will see examples of each step of what is required for your Water Management Plan and assist you to generate your program or to evaluate the one you already have.

Infection Control

Legionella Compliance

Lauzon
Life Safety
Consulting

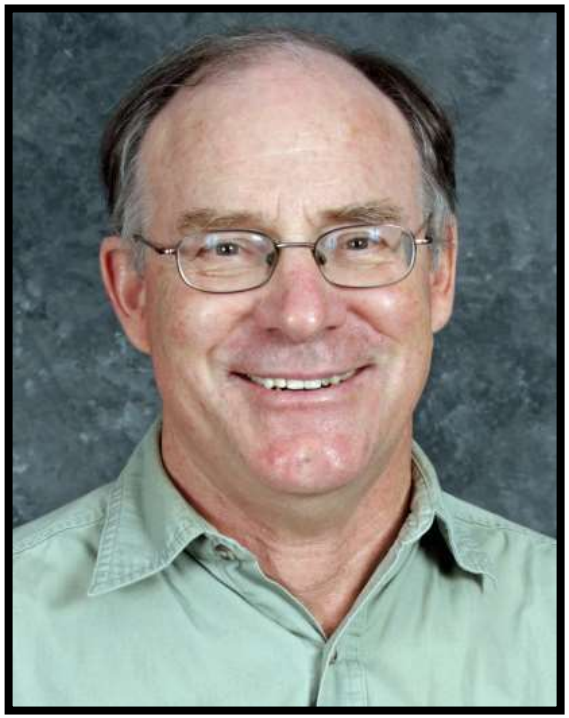
WHEA hasn't done a webinar on **Legionella Compliance** since CMS generated its new rule

Now's the time

(Hospitals & Nursing Homes must comply)

Presenter

Bill Lauzon



Healthcare Survey Protection

Your Protective Shield in the Code War

1973-2006 - “Facility Engineer”

2006-2011 – AHJ with DHS/DQA

2011-2018 - Consultant

AGENDA

1. **What is Legionella?**
2. CMS & TJC Standards
3. CDC & ASHRAE Standards
4. Program Details
   - Risk Assessment
   - Water Mgmt Program
   - Verify
   - Documentation

Enter Your Questions in the Chat Box at any time

5. Controls
6. Sys Requirements Details

Bonus Reference Material

Mystery Disease Claims 2 More, Putting Toll at 25

By LAWRENCE K. ALTMAN

Special to The New York Times

HARRISBURG, Pa., Aug. 6— The death toll in the outbreak of the mysterious respiratory disease in Pennsylvania rose by two to 25 as medical detectives accelerated efforts today to seek a chemical or poison as the possible cause.

At the same time, the official number of nonfatal cases was cut from 161 to 112 as Federal and Pennsylvania epidemiologists revised their definition of a case by limiting the scope of the symptoms.

Dr. Leonard Bachman, the Pennsylvania Secretary of Heath, defined a case as one having the presence of either a temperature of 102 degrees and a cough, or any fever and X-ray evidence of pneumonia in any person who had had any physical association with the state American Legion convention in Philadelphia July 21 to 24.

Such a redefinition is sometimes made in an ongoing investigation in which the cause of an outbreak is elusive. The previous total included patients with more general and nonspecific flu-like symptoms.

The latest fatalities were Earl Cox, 63 years old, of Washington County, and Elva Hamilton, 73, of Allegheny County, the fourth woman among the 25. Both died yesterday.

Dr. Backman explained the new count at a news conference. With 112 cases, including 25 deaths, the death rate is about 1 in 4.5 among those people known to have become ill. The death toll could rise further because some patients are in critical condition in hospitals throughout the state.

While environmental experts combed hotels in Philadelphia where the legionnaires ate and slept to find a possible toxicologic cause, health officials stressed that they would still

Continued on Page 9, Column 2

"Discovered" 1976 - Philadelphia

Death at an American Legion Convention

Mystery Disease Claims 2 More, Putting Toll at 25

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The Bellevue-Stratford Hotel closed 4 months after the outbreak

“Discovered”
1976 - Philadelphia

Death at an American Legion Convention

The “New” Pneumonia Disease was named **“Legionnaires’ Disease”**

WHAT IS LEGIONELLA?

Legionella is:

- A Waterborne Bacteria; Lives in Fresh Water
- A Common Bacteria
- Most likely present in small numbers in many building water systems

Legionella is:

- There are 58 species of Legionella bacteria
- About half are linked to disease
- Most virulent is Legionella pneumophila serogroup 1

WHAT IS LEGIONELLA?

Legionella is:

- Bacteria can grow in large numbers in man-made sources where there are favorable conditions

- Dangerous when infected water droplets are formed and are **INHALED** into the lungs

Legionella Bacteria in Water (This is Common)

Environmental Conditions to Promote Growth of Bacteria

Means of Transmission (usually via an “aerosol”)

Susceptible* Person

Colonized water inhaled or aspirated into the lungs

Bacteria Growth in Lungs Possible Contract **Legionellosis**

CHAIN of INFECTION TRANSMISSION

8-18k cases per year in US

*__Susceptible persons__ include, but not limited to, over age 50, very young, dialysis patients, smokers, persons with weakened immunsystem

LEGIONNAIRES DISEASE

Legionellosis comes in 2 forms:

Legionnaire's Disease (LD)

Pneumonia

(cough, muscle aches, high fever, headache, short breath)

Pontiac Fever

Influenza-like illness

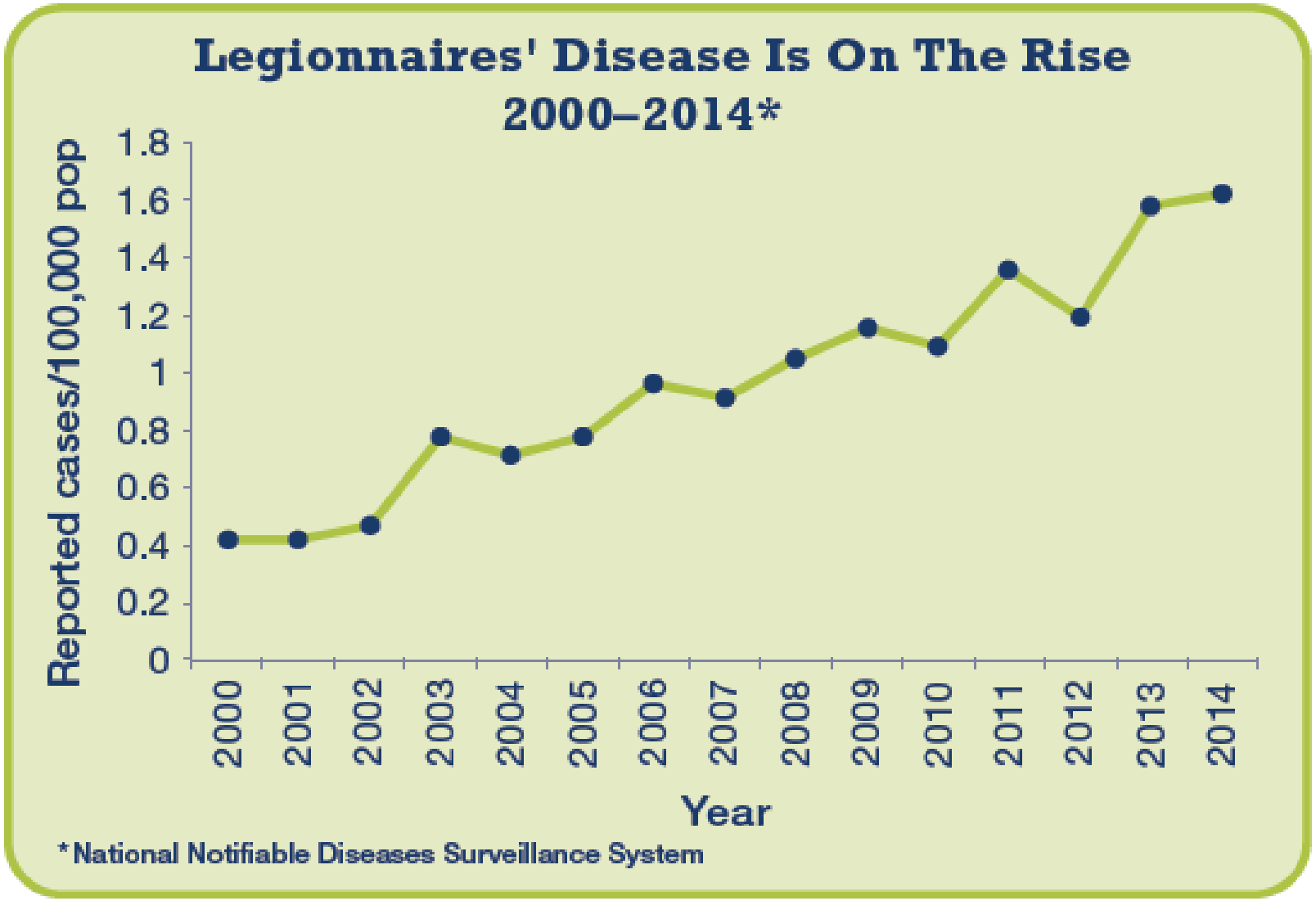
Those with healthy immune systems could develop this more mild influenza-like disease, or exhibit no symptoms at all

Investigate with chest x-ray, sample of urine & sputum to see if lung infection contain Legionella

Treated with antibiotics

5-15% **DIE** who get Legionnaires' Disease

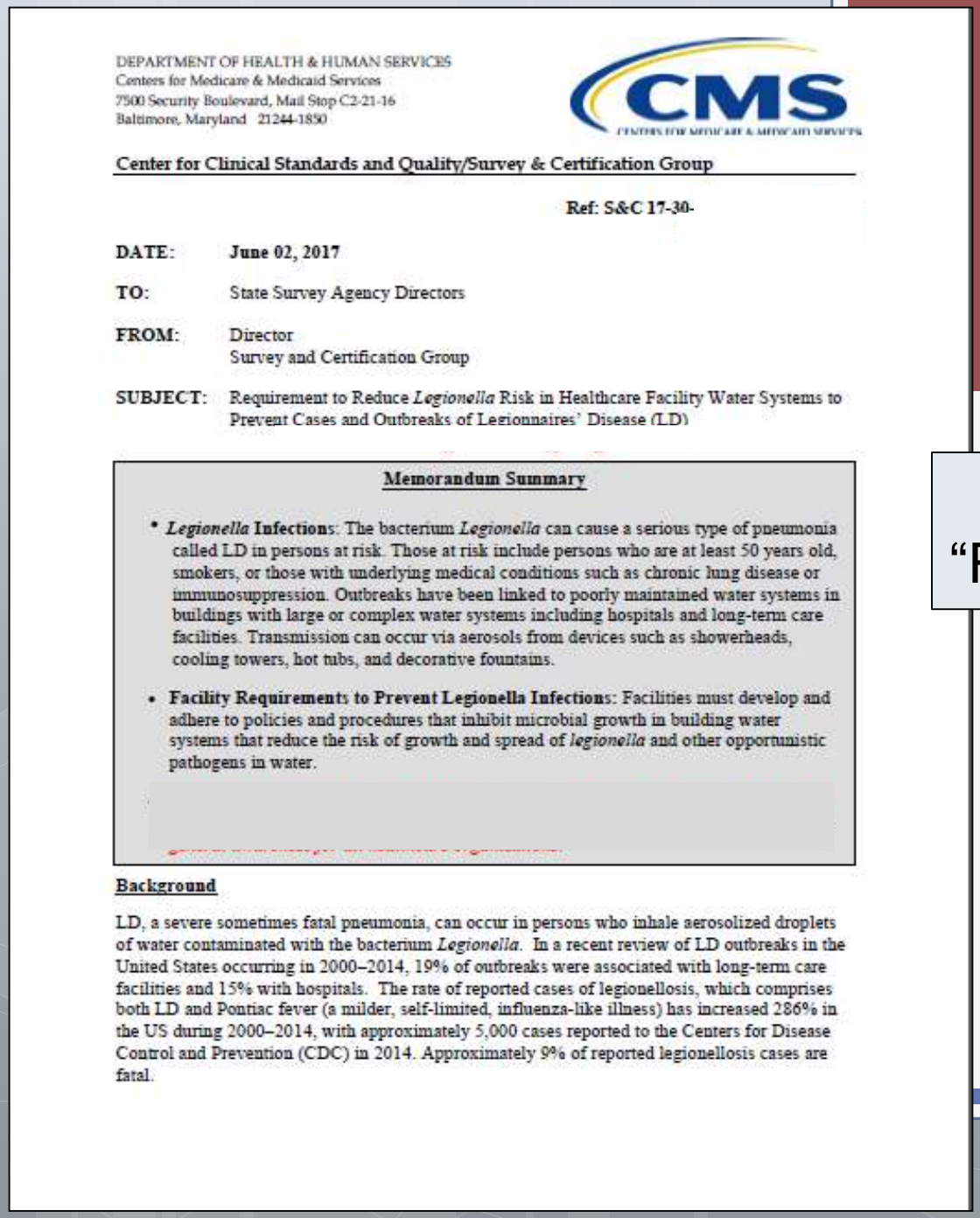
As with cases related to mold, many insurance carriers DO NOT cover costs associated with Legionnaires' disease outbreaks



In the United States, reported cases of Legionnaires' disease have increased by nearly four times since 2000. More illness occurs in the summer and early fall but can happen any time of year.

AGENDA

1. What is Legionella?
2. **CMS & TJC Standard**
3. CDC & ASHRAE Standards
4. Program Details
   - Risk Assessment
   - Water Mgmt Program
   - Verify
   - Documentation
5. Controls
6. Requirements Details



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/Survey & Certification Group

Ref: S&C 17-30-

DATE: **June 02, 2017**

TO: State Survey Agency Directors

FROM: Director
Survey and Certification Group

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

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.

Background

LD, a severe sometimes fatal pneumonia, can occur in persons who inhale aerosolized droplets of water contaminated with the bacterium *Legionella*. In a recent review of LD outbreaks in the United States occurring in 2000–2014, 19% of outbreaks were associated with long-term care facilities and 15% with hospitals. 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 US 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.

CMS S&C Letter 17-30 Legionella

June 2, 2017

Requirements & "Recommendations"

NOT a LSC issue; Facilities are cited under health care tags

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

Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C 17-30-*Hospitals/CAHs/NHs*
REVISED 06.09.2017

DATE: **June 02, 2017**

TO: State Survey Agency Directors

FROM: Director
Survey and 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 Provider Types Affected******

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.
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Background

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CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

CMS forgot to say who the letter applied to

- Long Term (42CFR §483)
- Hospitals (42CFR §482)
- Critical Access Hosp (42CFR §485)

General Awareness to all HC organizations

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

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

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- *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.*

Background

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CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

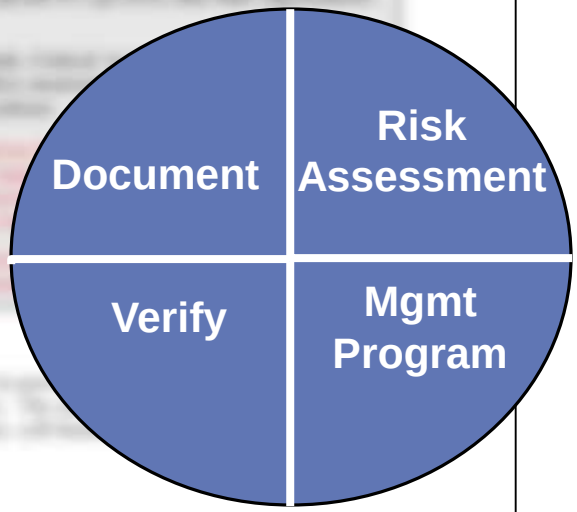
People were confused by CMS' wording

Clarifications of Previous Expectations

CMS S&C Letter 17-30 Legionella

At a minimum each facility must

1. Conduct a facility risk assessment
2. Develop a water management program
3. Verify Program is working
4. Document results



It's a Logical Sequence:

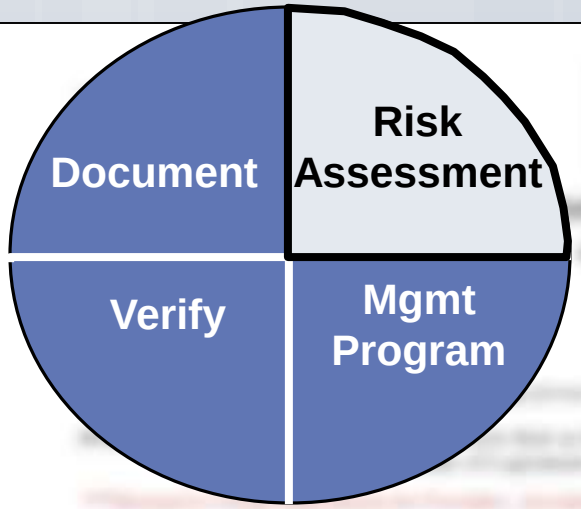
CMS S&C Letter 17-30 Legionella

4. Write it Up !

1. Check it out !

3. Verify that it's Working !

2. Make a Game Plan !

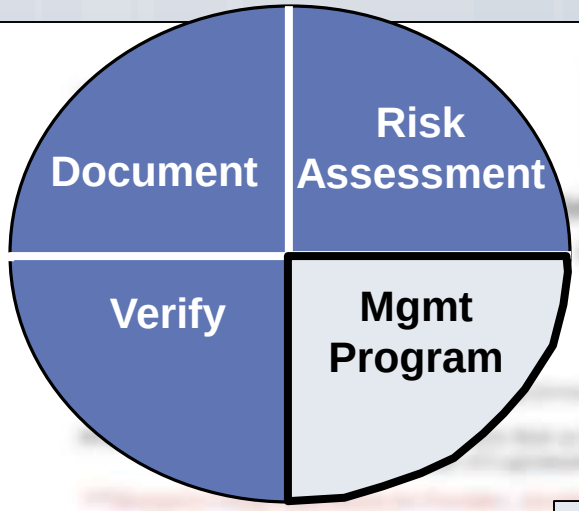


CMS S&C Letter 17-30 Legionella

1. Risk Assessment must evaluate typical problem areas:

- Hot water storage tanks
- Cold water storage tanks
- Water heaters
- Water hammer arrestors
- Pipes, valves, fittings
- Expansion Tanks
- Water filters
- Manual faucets
- Electronic faucets
- Aerators
- Faucet flow restrictors
- Shower heads & hoses

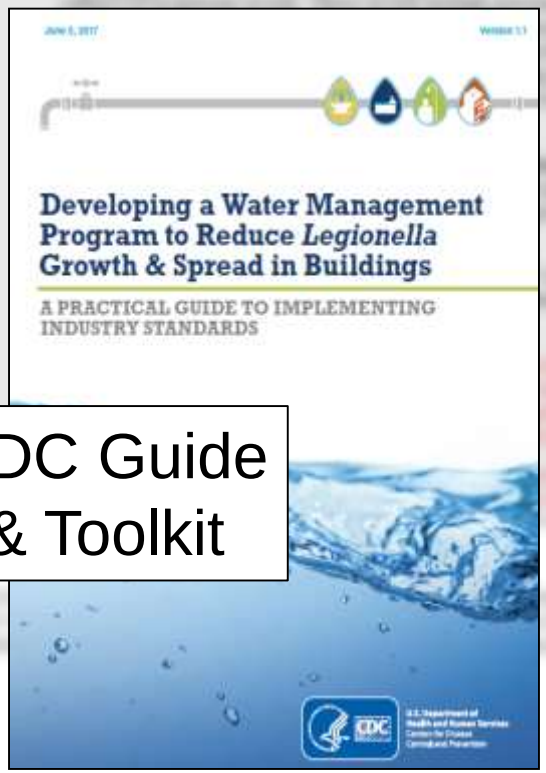
- Misters & atomizer
- Air washers
- Nonsteam aerosol humidifiers
- Eyewash stations
- Ice machines
- Hot tubs
- Saunas
- Decorative fountains
- Cooling towers
- Medical devices, such as CPAP, hydrotherapy, bronchs,
- Heater-cooler units



CMS S&C Letter 17-30 Legionella

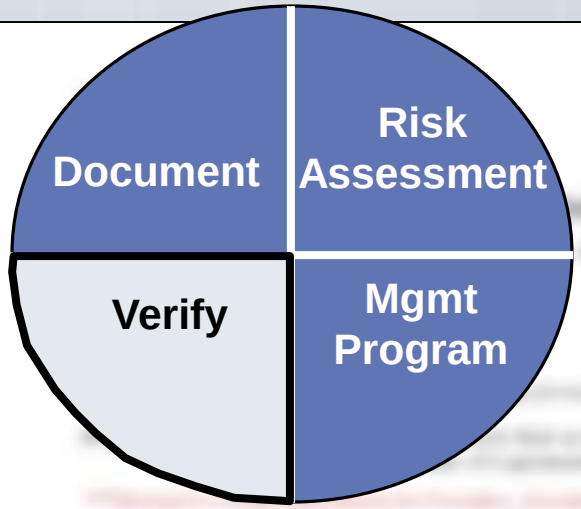
2. Water Management Program aimed to reduce the risk of growth and spread of Legionella and other aquatic pathogens

Must consider following an Industry Standard:



CDC Guide & Toolkit

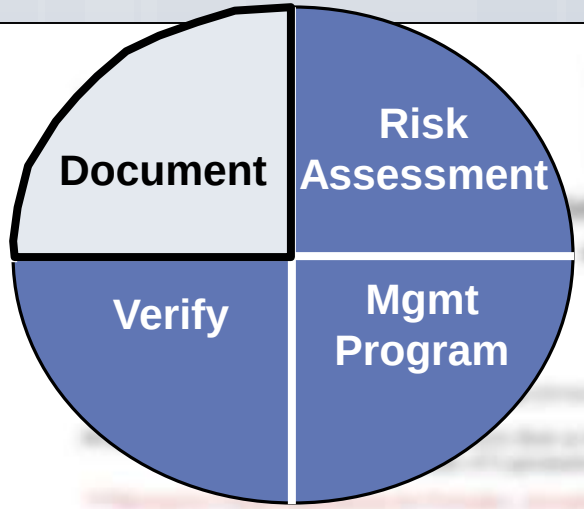
ASHRAE 188



CMS S&C Letter 17-30 Legionella

3. Have Appropriate Verification Protocols

It HAS to WORK !



CMS S&C Letter 17-30 Legionella

4. Document Results

*"CMS **does not** specify any particular report process. It is up to the facility."*

DEPARTMENT OF HEALTH & HUMAN SERVICES
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Baltimore, Maryland 21244-1850

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

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- **Facility Requirements to Preven fections:** Facilities must develop and adhere to policies and procedures obial growth in building water systems that reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in water.
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1

Background

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CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

Let's quickly see what's in the CMS Memo in more detail

There's always a "Summary" in a shaded box on page 1

CMS Letter 17-30

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.

1.SUMMARY - A

Explains:

- Danger of Legionella
- Who is at risk
- Outbreaks Linked to Poor Maintenance
- Transmission Cycle

CMS Letter 17-30

- **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.
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1.SUMMARY - B

- Requires Policies & Procedures to:
  - Inhibit Microbial Growth
  - Inhibit Spread of Legionella
- Applies to Hospitals, CAHs, Nursing Homes

CMS Letter 17-30

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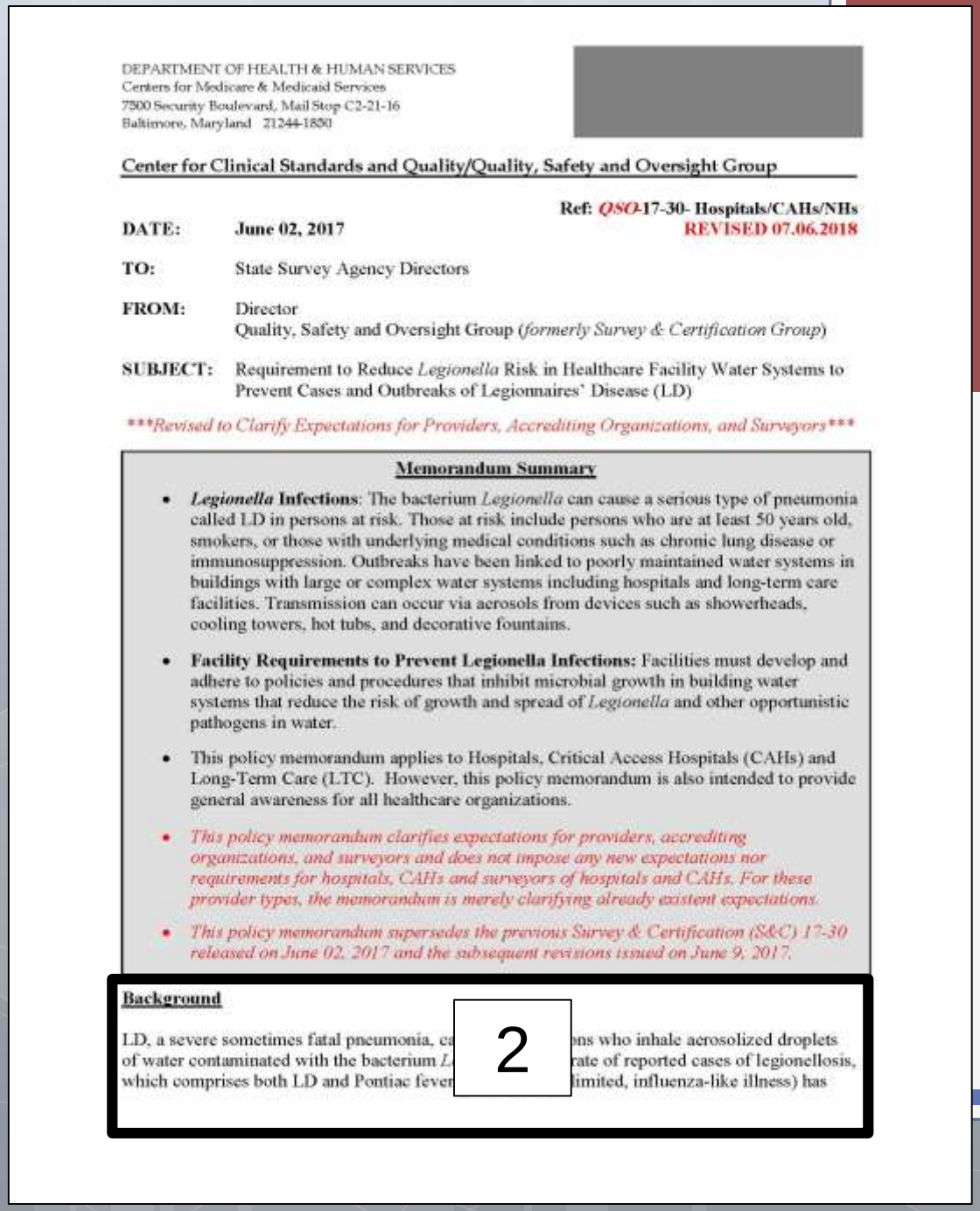
1.SUMMARY - C

- Clarifies that NO New Expectations are Imposed
- Supersedes Previous Letters



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2

CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

Next,
Added Info:

BACKGROUND

Background

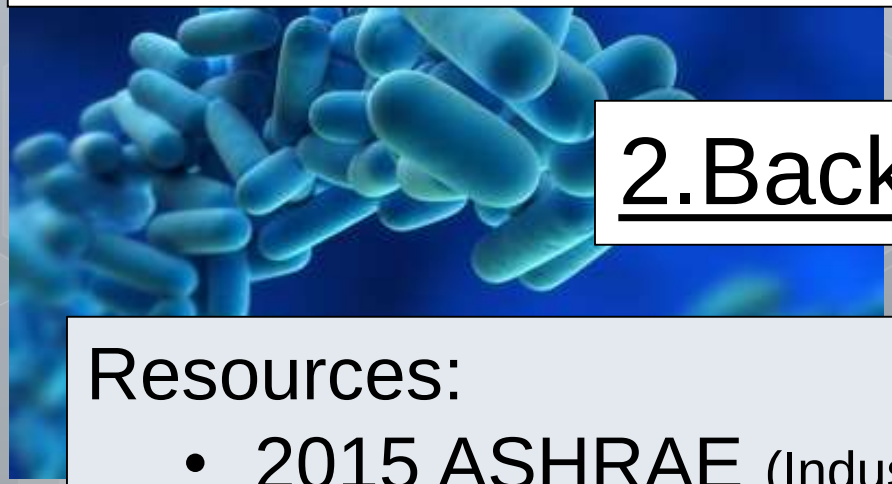
LD, a severe sometimes fatal pneumonia, can occur in persons who inhale aerosolized droplets of water contaminated with the bacterium *Legionella*. The rate of reported cases of legionellosis, which comprises both LD and Pontiac fever (a milder, self-limited, influenza-like illness) has increased 286% 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.

2.Background-A

- A person “catches” Legionella Disease by inhaling contaminated water droplets
- There is Legionella Disease & Pontiac Fever
- Cases have increased greatly in the US

Background

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.



2.Background-B

Resources:

- 2015 ASHRAE (Industry Standard for Water Management)
- 2016 CDC -Toolkit to Implement the Standard

Background

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.

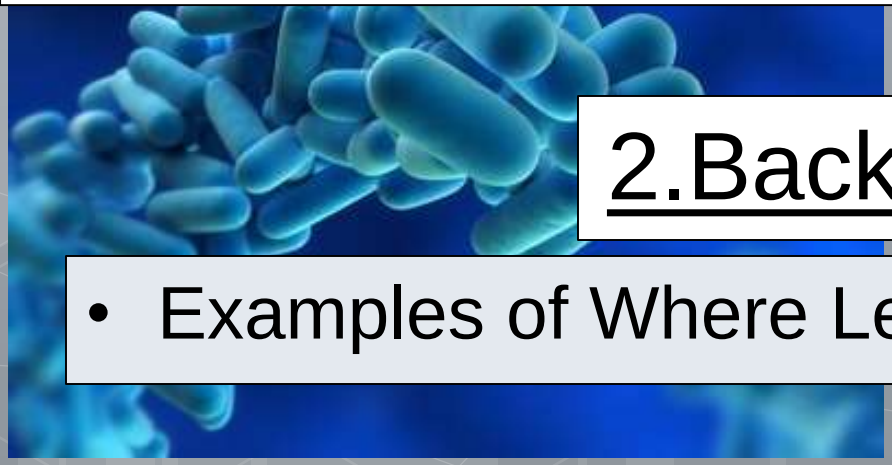
2.Background-C

- Data of 2000-2014 Outbreaks
- Outbreaks Linked to Complex Water Systems
- Outbreaks Require Aerosol Generation
- Person-to-Person Transmission Very Rare

Background

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
- Faucet flow restrictors
- Showerheads and hoses
- Centrally-installed misters, atomizers, air washers, and hun
- Nonsteam aerosol-generating humidifiers
- Eyewash stations
- Ice machines
- Hot tubs/saunas
- Decorative fountains
- Cooling towers



2.Background-D

- Examples of Where Legionella Typically Grows

- 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 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 a e diseases."

42 CFR §483.80 for skilled nursing facil facilities:
"The facility must establish and maintai evention 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."

3

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 S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

Now the Legalize:

REGULATORY AUTHORITY

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."

3.Regulations

- Code of Federal Regulation (CFR) requirements

- 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)

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4

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CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

Lastly:

EXPECTATIONS

36

Expectations for Healthcare Facilities

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4.Expectations - A

Must Have A Water Management Plan

- Conduct a Facility Risk Assessment of Where Legionella Could Grow

CMS Letter 17-30

Expectations for Healthcare Facilities

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

4.Expectations - B

Must Have a Water Management Plan

- Consider ASHRAE Standard & CDC Toolkit

38

CMS Letter 17-30

Expectations for Healthcare Facilities

- 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.

4.Expectations - C

Must Have a Water Management Plan

- Specify Testing Protocols & Controls
- Follow Other Legal Regulations

*"CMS **does not** require water cultures for Legionella. Testing protocols are at the discretion of the provider."*

CMS Letter 17-30

Expectations for Healthcare Facilities

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.

4.Expectations - D

Must Have a Water Management Plan

- Compliance with CMS Conditions of Participation or Be Cited

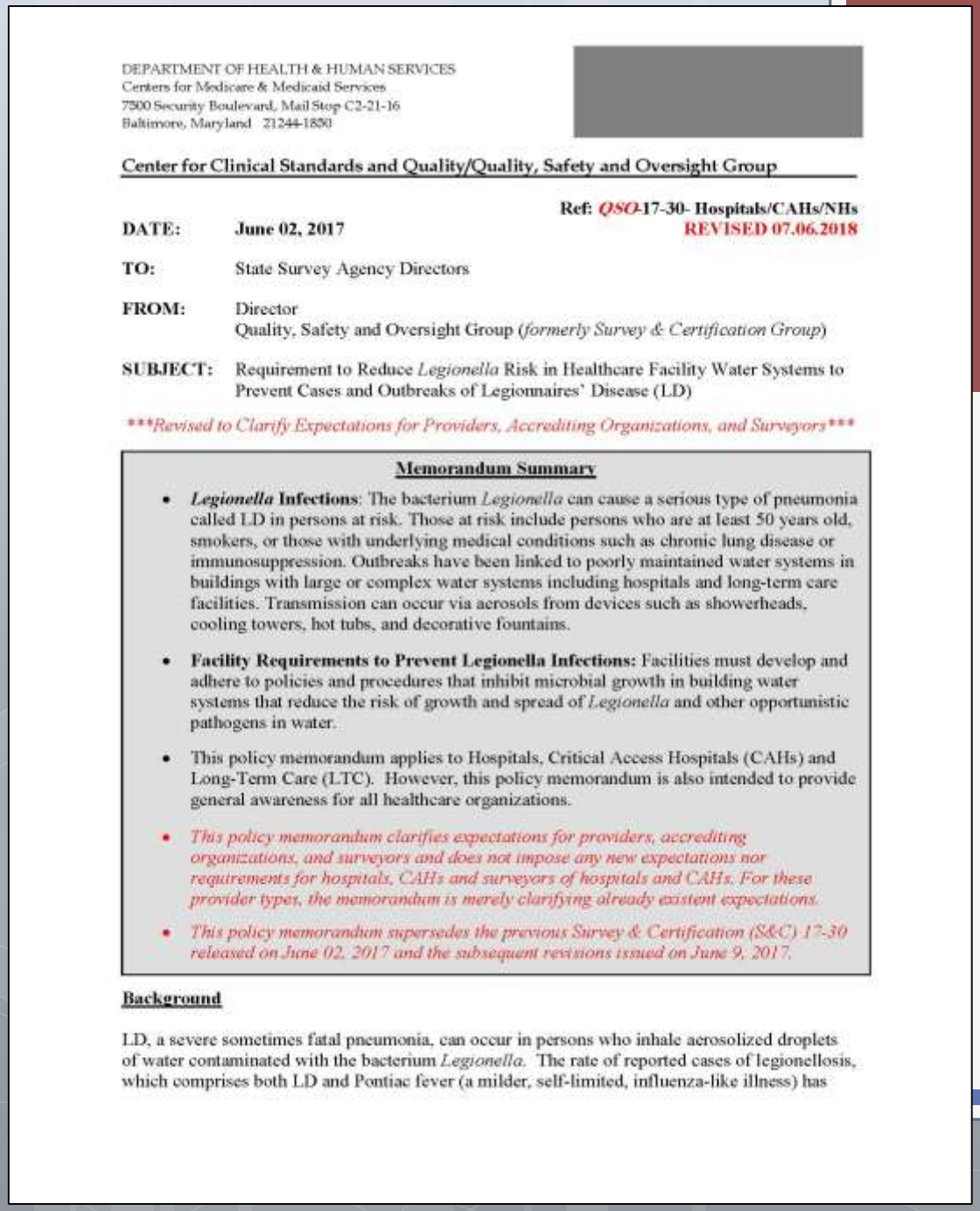
Expectations for Surveyors and Accrediting Organizations

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.

5.Expectations for Surveyors

Surveyors Should:

- Review the Water Management Plan in LTC
- Not Cite Actual Risk Assessment or Testing
- CMS Will Provide More Surveyor Guidance in the Future



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

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.*

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

CMS S&C Letter 17-30 Legionella

June 2, 2017

Revised June 6, 2017

Revised July 6, 2018

Requirements are Effective

Aug 6, 2018

DQA have not been given more directions (yet)

42

The Joint Commission

TJC Legionella Requirements are based on the Standard that mandates a **Utility Plan**

	AHC	BHC	CAH	HAP	LAB	NCC	OBS	OME
Standard EC.01.01.01								
The [organization] plans activities [**AHC, CAH, HAP:** to] [**BHC, LAB, NCC:** that] minimize risks in the environment of care. **Note:** *One or more persons can be assigned to manage risks associated with the management plans described in this standard.*	X	X	X	X	X	X		
Elements of Performance for EC.01.01.01								
8. The [organization] has a written plan for managing the following: Utility systems. Ⓓ	X	X	X	X	X			

"A management plan describes how the organization will establish and maintain a utility systems management program to … *reduce the potential for organizational-acquired illness;*"…

Joint Commission

TJC Website → Links to CDC

The Joint Commission

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Search Go

Accreditation | Certification | Standards | Measurement | Topics | About Us | Daily Update

Home > Topics > Infection Prevention and Control > HAI External - Legionnaires Disease

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Saturday 6:52 CST, September 22, 2018

Infection Prevention and HAI Portal External Resources - Legionnaires Disease

Links to external sites are offered for your convenience. The Joint Commission bears no responsibility for the content on these external sites, nor do the links constitute its endorsement or approval of such content.

Legionnaires Disease

CDC: Information on Legionnaires Disease for clinicians and organizations

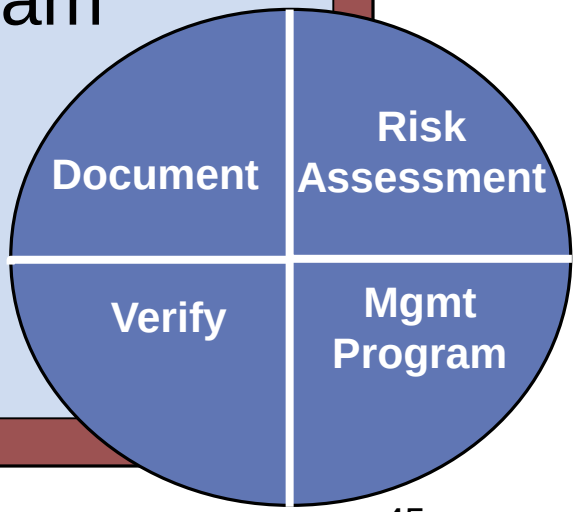
Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings - Toolkit

CDC: Water Management Programs for Healthcare Facilities

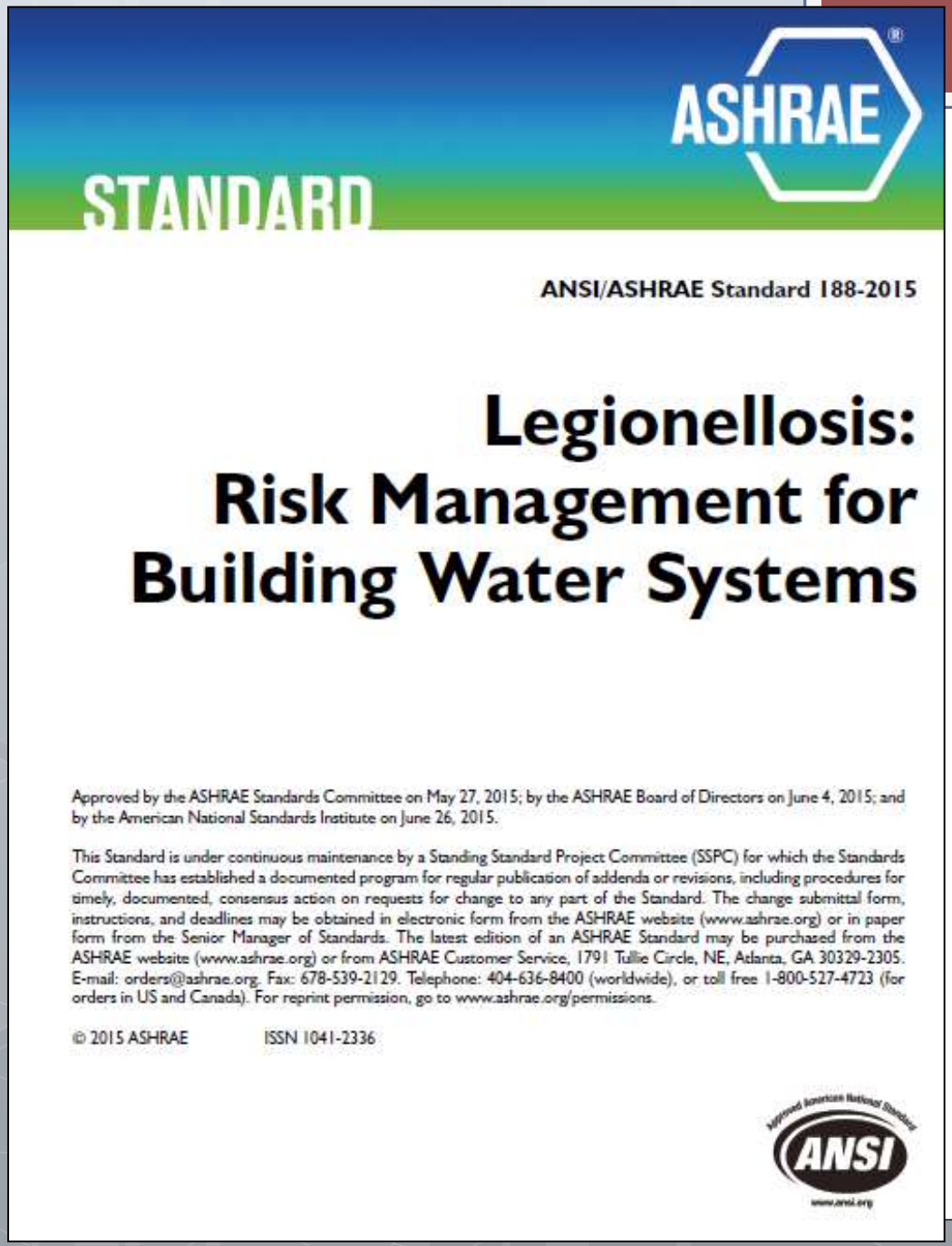
The Joint Commission → CDC Centers for Disease Control and Prevention

AGENDA

1. What is Legionella?
2. CMS & TJC Standards
3. **ASHRAE & CDC Standards**
4. Program Details
   - Risk Assessment
   - Water Mgmt Program
   - Verify
   - Documentation
5. Controls
6. Requirements Details



ASHRAE 188


STANDARD

ANSI/ASHRAE Standard 188-2015

Legionellosis: Risk Management for Building Water Systems

Approved by the ASHRAE Standards Committee on May 27, 2015; by the ASHRAE Board of Directors on June 4, 2015; and by the American National Standards Institute on June 26, 2015.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

 ISSN 1041-2336

ASHRAE 188
2015 version

The most respected & authorative standard

What does ASHRAE 188 address?

- Minimum components of a water management program (WMP)
- Types of buildings & devices that need a WMP
- Devices that need to be controlled to prevent growth & spread of Legionella
- Who should be on a WMP team
- When & how often a WMP should be reassessed & updated

ASHRAE 188

CONTENTS

ANSI/ASHRAE Standard 188-2015
Legionellosis: Risk Management for Building Water Systems

ASHRAE 188

4.2 Building Owner Requirements

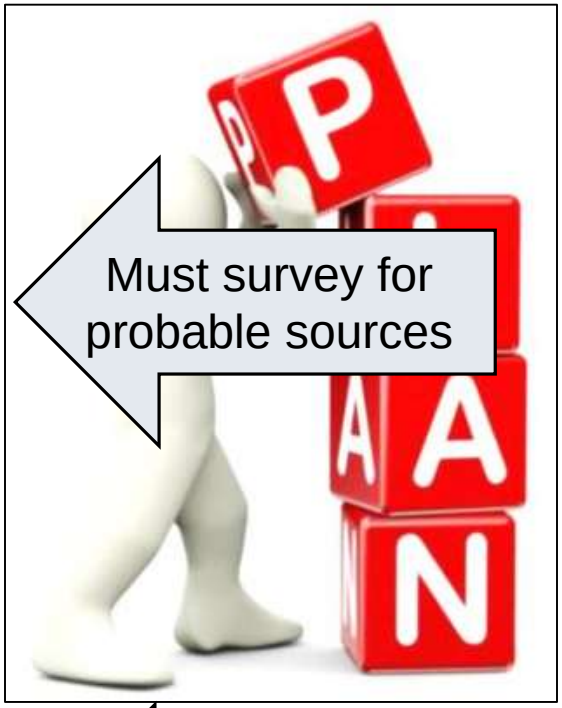
4.2.1 The building owner shall survey each existing building, new building, and any renovation, addition, or modification to an existing building and its water systems as described in Section 5. The survey and conformance with the compliance requirements of Section 4 must occur prior to occupancy of a new building and before construction begins on renovations, additions, or modifications to existing buildings. If the building and associated property has

a. any of the *building water systems* listed in Section 5.1, then all of those *building water systems* shall comply with the requirements of Section 6 and all applicable requirements of Section 7 of this standard.

b. any of the factors listed in Section 5.2, then all potable *building water systems* and all *building water systems* listed in Section 5.1 shall comply with the requirements of Sections 6 and all applicable requirements of Section 7 of this standard.

4.2.2 The building owner shall require the designer of any new building, and any renovation, addition, or modification to an existing building, to follow the requirements of Section 4.1 for the provided design.

4.2.3 The building owner shall conduct and document the compliance determination in Section 4 of this standard at least once per year and any time renovations, additions, or modifications are made to the building.



Must survey for probable sources

Include in constr projects

Annual compliance review

ASHRAE 188

Does your building have these things?

5. BUILDING SURVEY

5.1 The building shall be surveyed to determine whether it has one or more

a. open- and closed-circuit cooling towers or evaporative condensers that provide cooling and/or refrigeration for the *HVAC&R* system or other systems or devices in the building;

b. whirlpools or spas, either in the building or on the site; or

c. ornamental fountains, misters, atomizers, air washes, humidifiers, or other *nonpotable* water systems or devices that release water aerosols in the building or on the site.

Survey includes certain devices

ASHRAE 188

5. BUILDING SURVEY

5.2 The building shall be surveyed to determine whether it is characterized by one or more of the following factors that relate to *legionellosis*:

a. It includes *multiple housing units* with one or more centralized potable water-heater systems.
b. It is more than 10 stories high (including any levels that [illegible]).
c. It is a health care facility where patient stays exceed 24 hours.
d. It is a building containing one or more areas for the purpose of housing or treating occupants receiving treatment for burns, chemotherapy for cancer, or solid organ transplantation or bone marrow transplantation.
e. It is a building containing one or more areas for the purpose of housing or treating occupants that are *immunocompromised*, *at-risk*, are taking drugs that weaken the immune system, have renal disease, have diabetes, or have chronic lung disease.
f. It is a building identified by the owner or *designee* as being for the purpose of housing occupants over the age of 65 years.

Healthcare MUST be surveyed

ASHRAE 188

Contents of WMP

6. GENERAL REQUIREMENTS

6.1 Principles of a *Water Management Program*. A *Program* utilizing the risk management principles in the following subsections shall be used to reduce the risk of *legionellosis* associated with *building water systems*.

6.1.1 *Analysis of Building Water Systems*. tematic analysis of *hazardous conditions* *water systems*.

6.1.2 *Control Locations*. Determine the system where *control measures* are required.

6.1.3 *Control Limits*. For each *control meas* *trol location* established in Section 6.1.2, dete including but not limited to a maximum va value, or a range of values within which a cher parameter must be monitored and maintai reduce *hazardous conditions* to an acceptable

6.1.4 *Monitoring*. Establish a system for parameters associated with the *control limit* Section 6.1.3.

6.1.5 *Corrective Actions*. Establish the *co* to be taken when *monitoring* indicates that th eters are outside of the established *control lim*

6.1.6 Confirm *Program* Implementation cedures to confirm that all of the *Program* ele implemented as designed.

6.1.7 Documentation and Recordkeeping umentation concerning all procedures, and r appropriate to these principles and their appli

Summary of 7 Requirements

PROGRAM TEAM—Identify persons responsible for Program development and implementation.

DESCRIBE WATER SYSTEMS/FLOW DIAGRAMS—Describe the potable and nonpotable water systems within the building and on the building site and develop water-system schematics.

ANALYSIS OF BUILDING WATER SYSTEMS—Evaluate where hazardous conditions may occur in the water systems and determine where control measures can be applied.

CONTROL MEASURES—Determine locations where control measures must be applied and maintained in order to stay within established control limits.

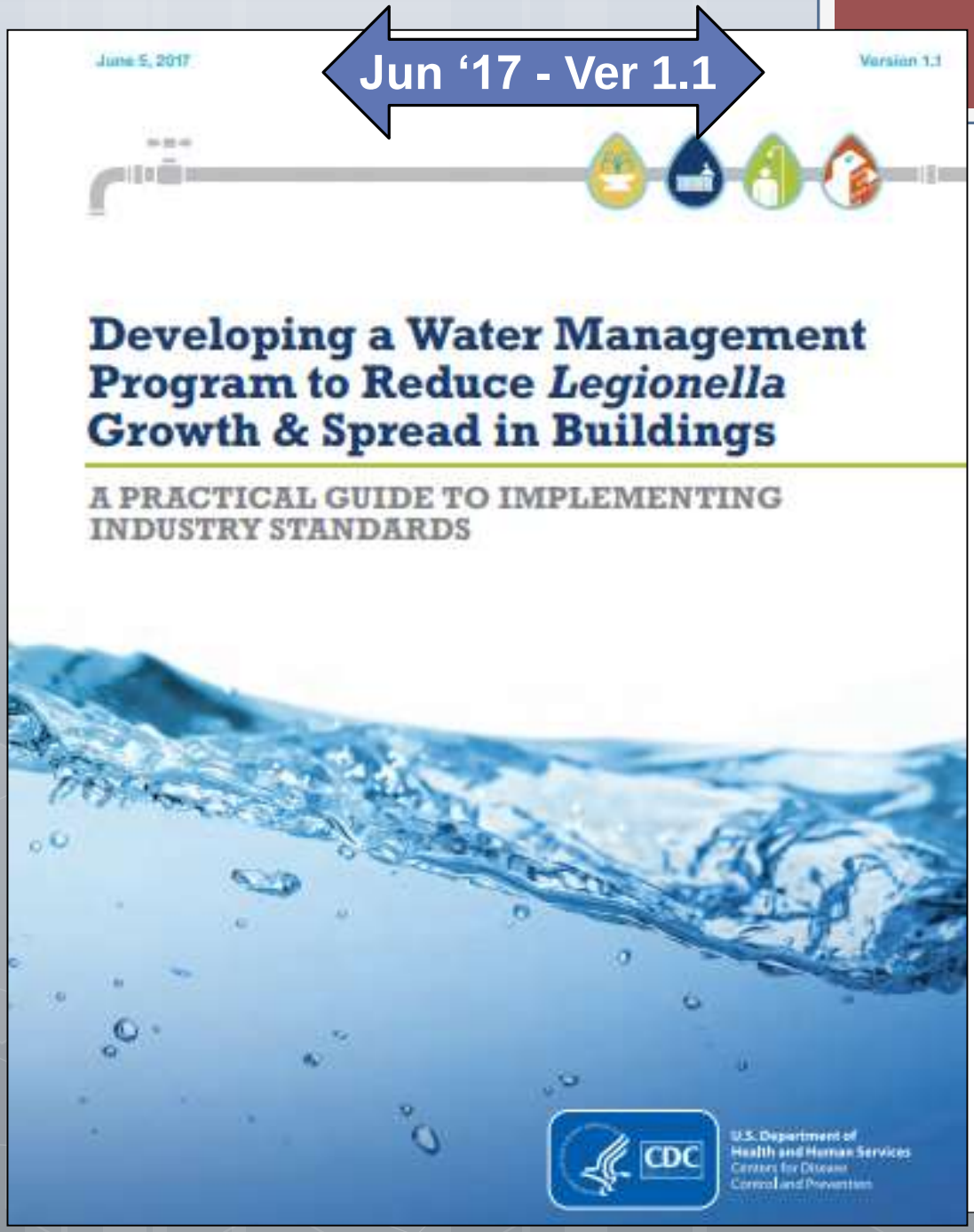
MONITORING/CORRECTIVE ACTIONS—Establish procedures for monitoring whether control measures are operating within established limits and, if not, take corrective actions.

CONFIRMATION—Establish procedures to confirm that

- the Program is being implemented as designed (verification), and
- the Program effectively controls the hazardous conditions throughout the building water systems (validation).

DOCUMENTATION—Establish documentation and communication procedures for all activities of the Program.

CDC Toolkit



Jun '17 - Ver 1.1

Center for Disease Control (CDC) **"TOOLKIT"**

Available On-Line

Version 1.1
June 2017

CDC Toolkit

Search in your browser:
"CDC Legionella"

CDC
Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

A-Z Index
Search

Diseases & Conditions | Healthy Living | Travelers' Health | Emergency Preparedness | More

Search Results

220 results returned for *Legionella ToolKit*

Legionnaires Disease and Pontiac Fever | Legionella | CDC
https://www.cdc.gov/legionella/
Home page of Legionella web site.

Developing a Water Management Program | Legionella | CDC
https://www.cdc.gov/legionella/wmp/toolkit/
A practical toolkit on developing a Legionella water management program.

Buildings at Risk for Legionella | Legionella | CDC
https://www.cdc.gov/legionella/wmp/toolkit/wmp-risk.html
A tool to help assess if a building needs a Legionella water management program.

Click

CDC Toolkit

Click on the "Toolkit Picture"

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

SEARCH

CDC A-Z INDEX

Legionella (Legionnaires' Disease and Pontiac Fever)

Legionnaires' (LEE-juh-nares) disease is a serious type of pneumonia (lung infection) caused by *Legionella* (LEE-juh-nell-a) bacteria. *Legionella* can also cause a milder illness called Pontiac fever. People can get sick when they breathe in mist or accidently swallow water into the lungs containing *Legionella*. Most people exposed to *Legionella* do not get sick. However, people 50 years or older, current or former smokers, and people with a weakened immune system or chronic disease are at increased risk.

Click

ABOUT THE DISEASE
Causes, how it spreads, people at increased risk, signs and symptoms, treatm
complications...

FAST FACTS
Facts about *Legionella* and the illnesses it can cause...

Toolkit to Develop a *Legionella* Water Management Program

Get practical guidance on how to implement industry standards for effective water management programs. Learn how to identify areas or devices in buildings where *Legionella* might grow or spread to people.

CDC Toolkit

Notice all the Available Information

Legionella (Legionnaires' Disease and Pontiac Fever)

- *Legionella* Home
- About the Disease
- Fast Facts
- For Clinicians +
- For Health Departments +
- For Laboratories
- Prevention with Water Management Programs –
  - Overview of Water Management Programs
  - **Water Management Program Toolkit** –
    - Identify Buildings at Increased Risk
  - Monitoring Your Building Water
  - Special Considerations for Healthcare Facilities +
  - Considerations for Public Hot Tub Operators
  - Considerations When

CDC > Legionella Home > Prevention with Water Management Programs

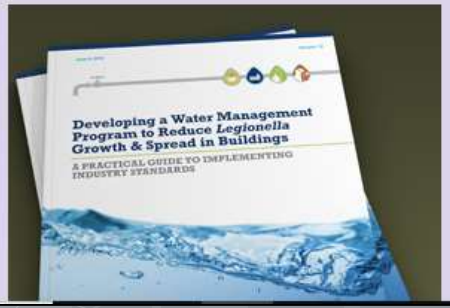
Toolkit: Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings

A Practical Guide to Implementing Industry Standards

Many buildings need a water management program to reduce the risk for *Legionella* growing and spreading within their water system and devices. This toolkit is designed to help people understand which buildings and devices need a *Legionella* water management program to reduce the risk for Legionnaires' disease, what makes a good program, and how to develop it.

Use the toolkit's quick yes/no worksheet to find out if your building or certain devices in your building need a water management program.

Download the Toolkit



Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards13.2 [13.3 MB, 36 pages] – June 5, 2017

CDC Toolkit

You DON'T Need this "Yes/No Worksheet"

Legionella (Legionnaires' Disease and Pontiac Fever)

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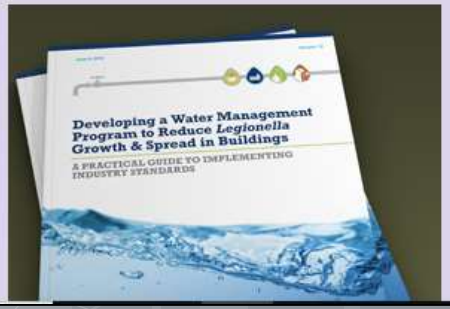
CDC > Legionella Home > Prevention with Water Management Programs

Toolkit: Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings

It is for non-healthcare facilities to determine if it needs a WMP. CMS says healthcare MUST have a Water Management Plan



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CDC Toolkit

Click on the Wording”

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CDC > Legionella Home > Prevention with Water Management Programs

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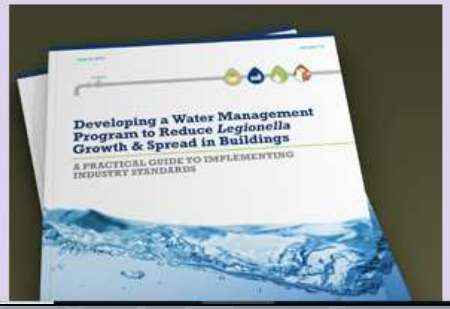

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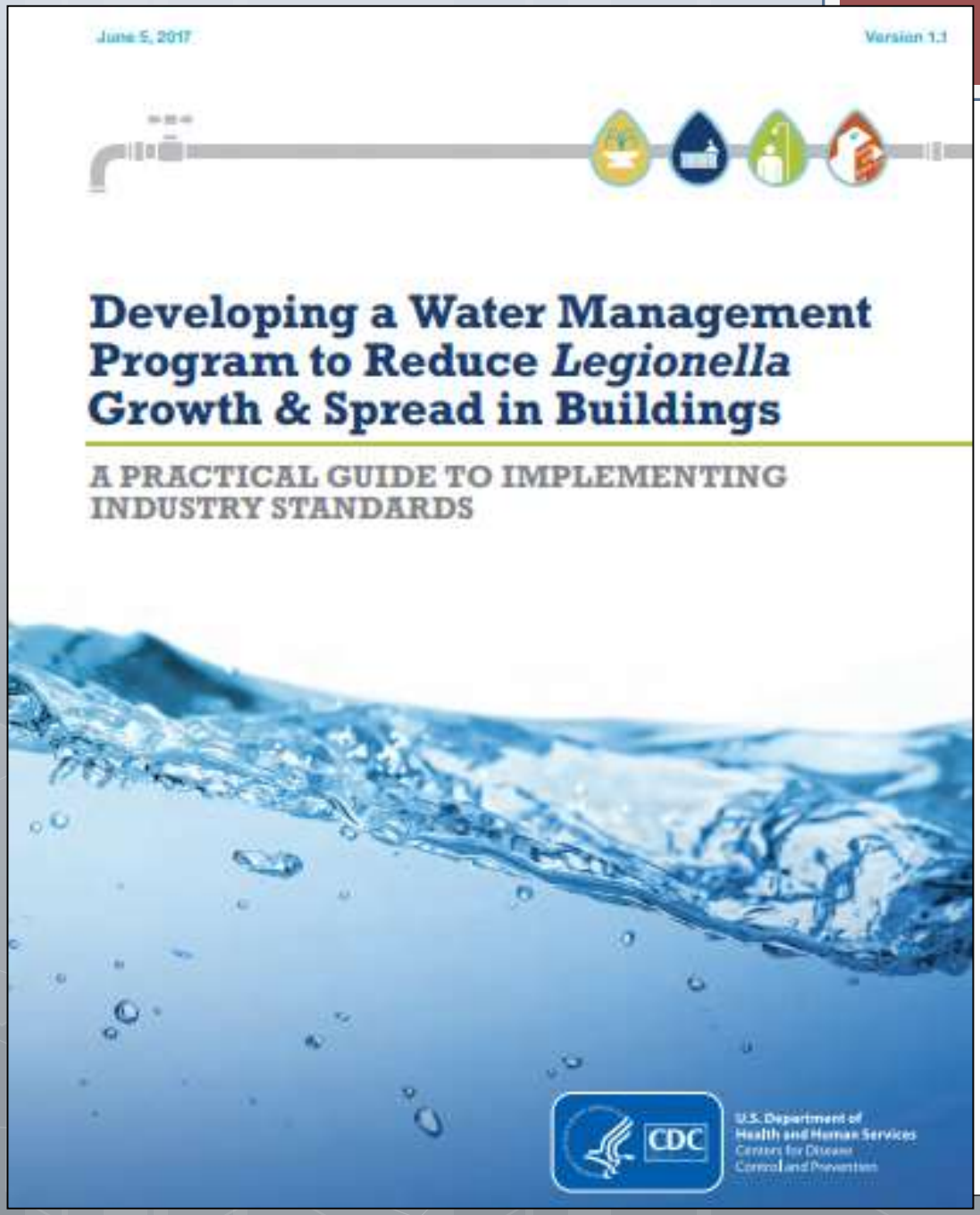

Let's Look at what the Toolkit Suggests

CDC Toolkit Steps for a WMP

1. Establish a WMP Team

2. Describe water sys with text & flow diagrams

3. ID areas where Legionella can grow & spread

4. Develop Control Measures & Control Limits to minimize bacteria growth

5. Develop Interventions if Control Limits are not met

6. Evaluate WMP is running as designed

7. Document & Communicate activities

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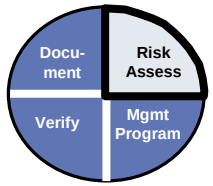
It's a repeat of the ASHRAE & CMS "Suggestions"

CDC Toolkit

CDC Toolkit Steps for a WMP

CMS

1. Establish a WMP Team



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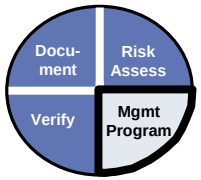
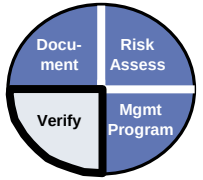
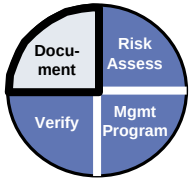


5. Develop Interventions if Control Limits are not met



6. Evaluate WMP is running as designed



7. Document & Communicate activities

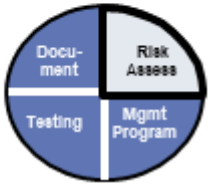
CDC Toolkit

ASHRAE

CDC Toolkit Steps for a WMP

1. Establish a WMP Team
2. Describe water sys with text & flow diagrams
3. ID areas where Legionella can grow & spread
4. Develop Control Measures & Control Limits to minimize bacteria growth
5. Develop Interventions if Control Limits are not met
6. Evaluate WMP is running as designed
7. Document & Communicate activities

CMS



AGENDA

1. What is Legionella?
2. CMS & TJC Standards
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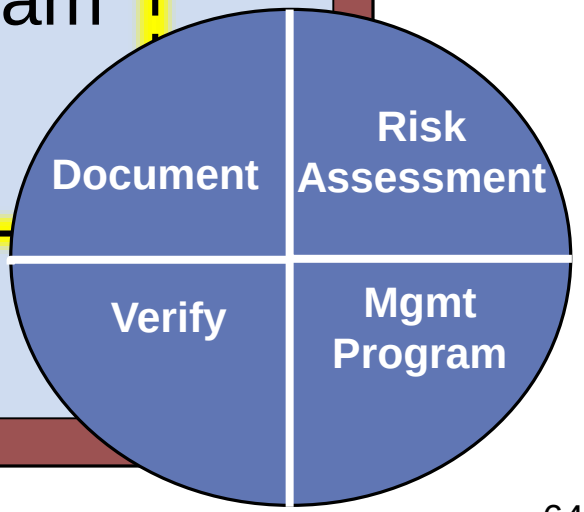
   - Verify
   - Documentation
5. Controls
6. Requirements Details

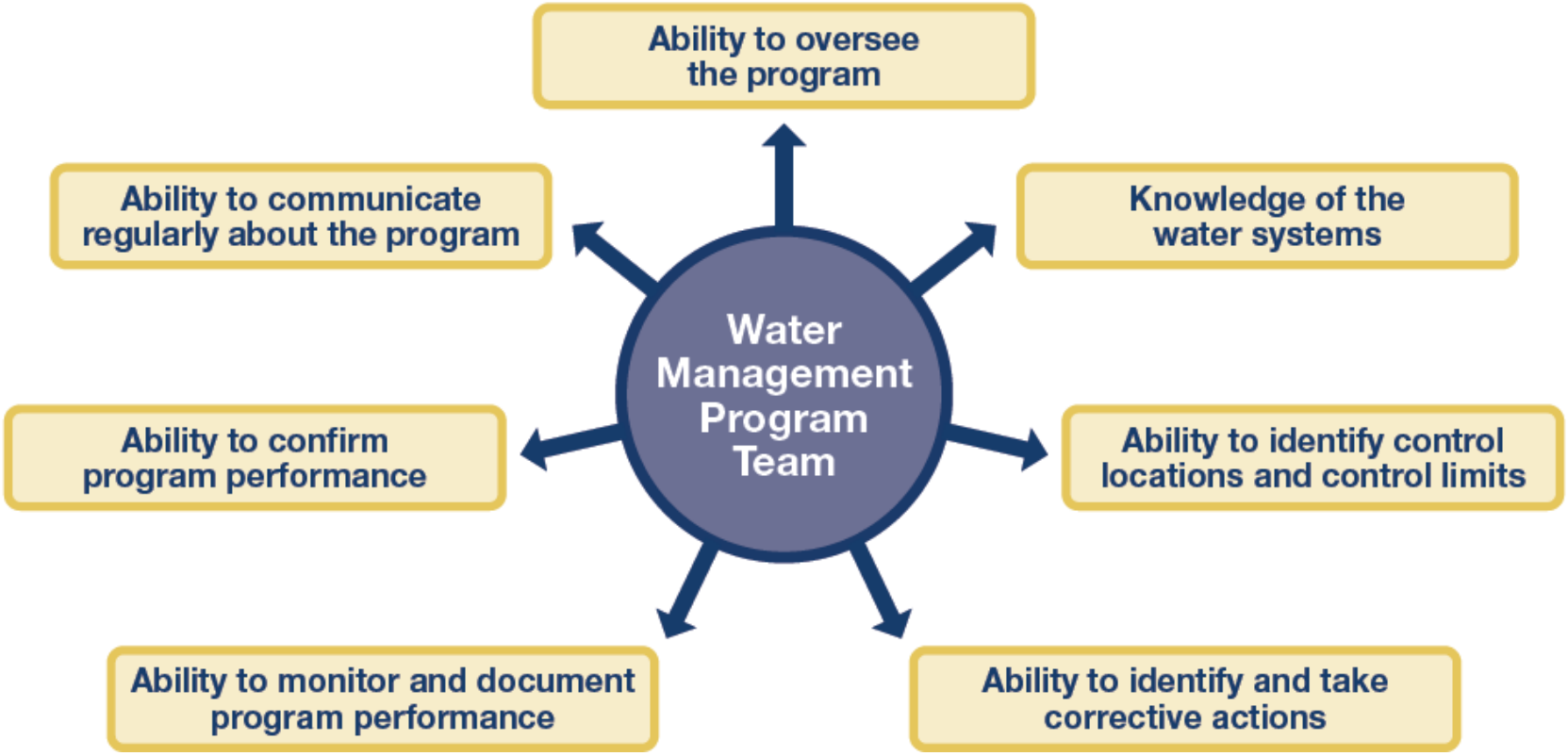


1

Establish a WMP Team

CDC Toolkit

Collect a team from the facility (outside if needed) to develop & implement the WMP .
Below are the recommended skills



Establish a WMP Team

Persons who may have the skills that are needed for the TEAM

Possible Members:

- Building Owner
- Facility Manager
- Maintenance Staff
- Safety Officer
- Infection Prevention
- Risk Mgmt Staff
- Quality Mgmt Staff
- Equip Suppliers
- Accreditation Mgt
- Chemical Suppliers
- Consultants
- Contractors
- Industrial Hygienists
- Environmental Specialists
- Local Health Officials

Recommended Skills

- Able to Oversee the Program
- Knowledge of Your Water Sys
- Ability to ID Control Locations & Limits
- Ability to ID & Take Corrective Actions
- Ability to Monitory & Doc Performance
- Ability to Confirm Program Performance
- Ability to Communicate

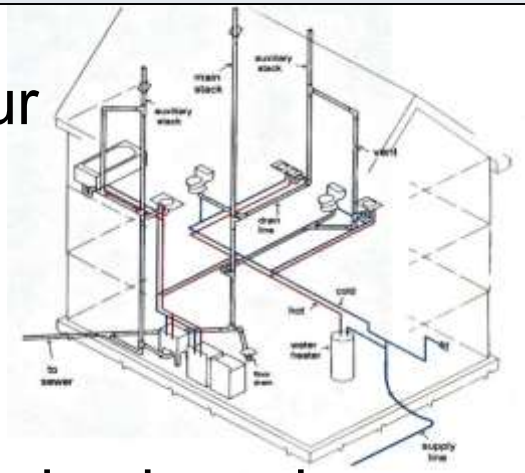
2

Describe water sys with text & flow diagrams

Risk Assessment

Write a simple **DESCRIPTION** of each water system in the building and the devices that typically generate Legionella or aspirate water particles.

- Use an “as-built” diagram of your plumbing sys (if available)



- Make sure your description includes how the water system feeds the hot water system, patient care and clinical support areas, and other areas that are listed on the next slide

Risk Assessment

2. Describe water sys with text & flow diagrams

Typical System Components	PLUMBING SYSTEMS			HVAC SYSTEMS			OTHER SYSTEMS	
	Domestic Plumbing Fixtures	Domestic Cold Water Distr Sys	Domestic Hot Water Distr Sys	Air Conditioning Cooling Towers	Hydronic Heating Sys	Humification Sys	Fountains	Lawn Sprinkler Sys
Pipes, valves, and fittings	x	x	x	x	x	x	x	x
Hot and cold water storage tanks	x	x	x	x	x	x	x	x
Disinfection/Control Device	x	x	x	x	x	x	x	x
Water filters	x	x		x		x	x	x
Spray nozzles Misters, atomizers, air washers				x		x	x	x
Open water tank				x			x	
Water heaters			x		x			
Water-hammer arrestors	x	x	x					
Expansion tanks			x		x			
Electronic and manual faucets	x							
Aerators	x							
Faucet flow restrictors	x							
Showerheads and hoses	x							
Eyewash stations	x							
Ice machines	x							
Hot tubs/saunas	x							
Medical devices (such as CPAP machines,	x							

Include in your Description all systems & devices you have that may generate Legionella or aspirate water particles

2. Describe water sys with text & flow diagrams

Example Water Description:

"Water enters the basement of the facility via a 6" main from the municipal water line at Maple Street. The city treats the water with chlorine, with a residual of 0.5 mg/L. There is a 4" branch that passes through a back-flow preventer (BFP) and feeds the fire sprinkler system. The rest of the water passes through a water meter and is distributed in the domestic cold water system."

Cold water is distributed directly to a lighted decorative fountain in the lobby, the air conditioning cooling tower on the roof, a hot tub and pool on the first floor, ice machines on the 2nd-6th floors, and showers/faucets in all patient rooms. All plumbing piping is 2' copper. There are BFPs where the cold water feeds the cooling tower, hot tub, and pool.

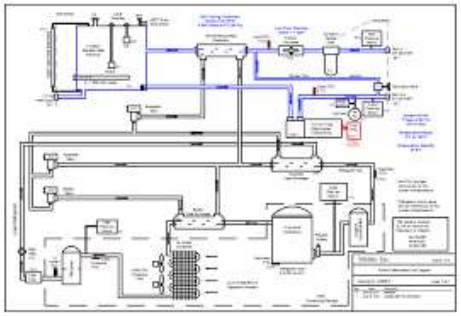
Example Description: (continued):

"A 3" cold water branch feeds a gas-fired 120 gal hot water heater in the basement that generates water at 150ºF. Hot water is stored in an adjacent pressurized 200 gal tank. It is distributed to the basement through 4th floor with a non-recirculating line. Hot water to the 5th through 8th floors has a recirculating line that returns unused water back to the basement storage tank. When water in the tank falls below 140ºF it is pumped through the water heater for re-heating."

"Thermostatic mixing valves tempers the water at all fixtures that are used by patients to 110ºF. Hot, cold, and tempered waste water is discarded through the sanitary sewer line."

2. Describe water sys with text & flow diagrams

Also draw a **WATER FLOW DIAGRAM** that visually shows the movement of water to each of the potential Legionella sources

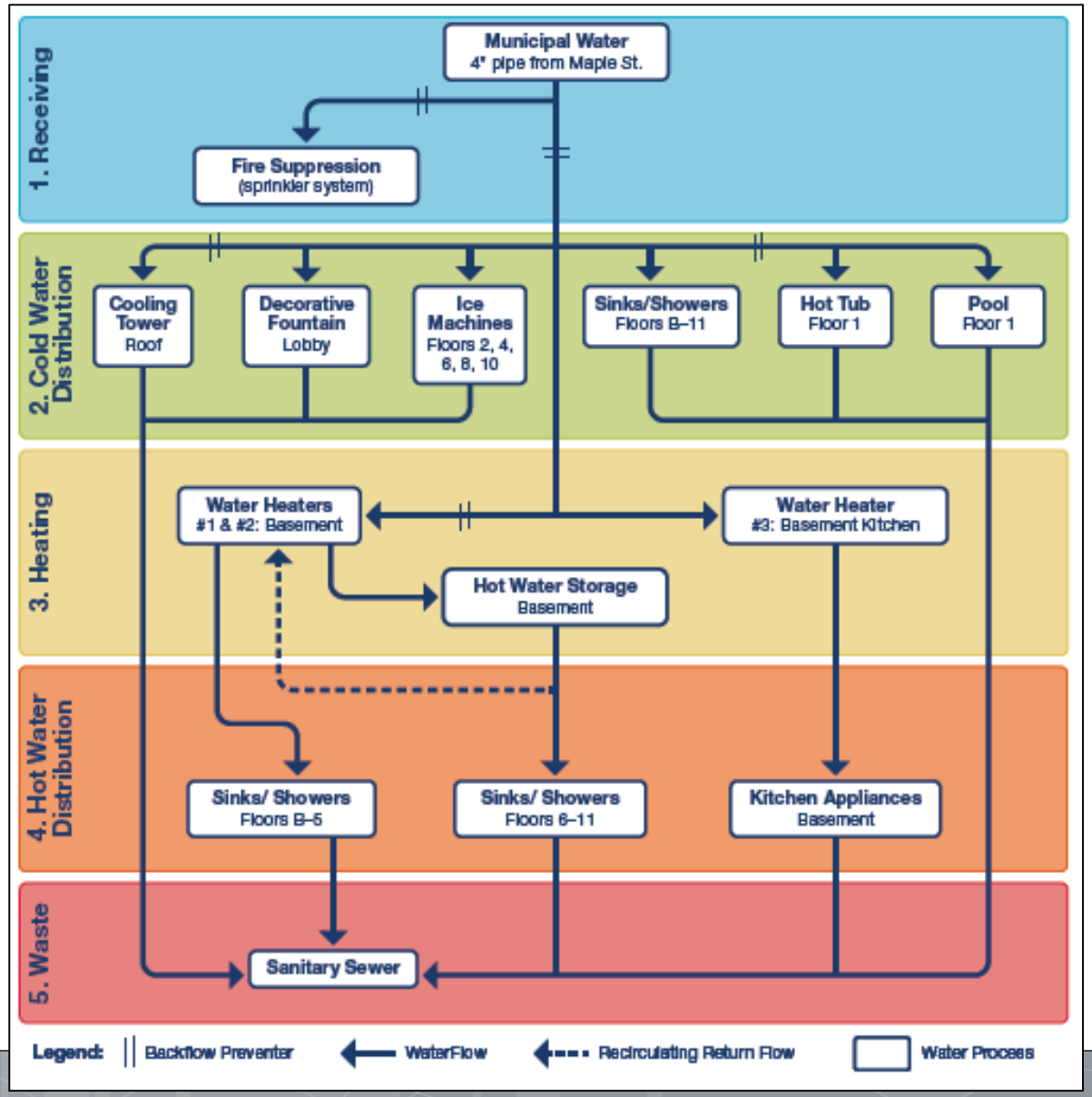


Include in Flow Diagram

- All water sources
- All water treatment sys, disinfection & filtration devices
- All water processing steps, including conditioning, storing, heating, cooling, recirculating & distributing
- All devices that may contribute to growth of Legionella or aspirate water particles
- Services to patient rooms, ICUs

- All Cooling Towers
- Open Water Features
- Spas & Whirlpools
- Pools
- Ice Machines
- Humidifiers
- Dietary
- Central Supply
- Respiratory
- Hydrotherapy
- Dialysis; Oncology; Transplant Units

2. Describe water sys with text & flow diagrams



Example Flow Diagram

It does NOT need to be detailed

Keys:

- Include all potential Legionella generators
- Understood by the team

3

ID areas where Legionella can grow & spread

Mark Flow Diagram with the location of possible Legionella **SOURCES**

EXAMPLE "DANGER" SIGNALS
(Any non-sterile Water, especially "sprays")

- Temperature Permissive
- Stagnation
- Biofilm
- Disinfectant Shortage
- Conditions for Bacteria Spread
- External Hazards (such as constr, main break, etc)

See list on next slide

Use any ID marking method that makes sense to the team

3. ID areas where Legionella can grow & spread

FACTORS ON LEGIONELLA GROWTH & SPREAD

Even if the water entering the building is high quality, it may contain *Legionella*, and under favorable conditions can greatly expand. The problem begins when Legionella bacteria find a foothold in a warm environment and begin to multiply.

Construction Vibration dislodges biofilm & frees Legionella to enter your building

Water Main Breaks & Pressure Changes dislodges biofilm & frees Legionella to enter your building; Can also introduce dirt & other materials into the water and use up disinfectant

Water Quality changes can increase sediment, increase turbidity

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3. ID areas where Legionella can grow & spread

FACTORS ON LEGIONELLA GROWTH & SPREAD

Water Temperature fluctuations can provide conditions for bacteria growth (77-108ºF ideal, but can grow outside this range); caused by many situations, including

- low water heater setting,
- heat loss in long pipe runs,
- uninsulated hot & cold water pipes,
- mixing hot & cold water,
- water stagnation & dead legs,
- heat transfer when cold and hot water pipes are too close together
- In hot weather, cold water in pipes can heat

Inadequate Disinfectant: *Legionella* disinfectants are dependent on the proper concentration for its temperature, proper pH within its effective range (6.5-8.5), retention time, and water quality characteristics. Processes such as heating, storing, and filtering can degrade the quality of the water and use up the disinfectant the water entered with, allowing the few *Legionella* that entered to grow into a large number if not controlled.

Risk Assessment

3. ID areas where Legionella can grow & spread

FACTORS ON LEGIONELLA GROWTH & SPREAD

Biofilm: The highest concentration of bacteria will be found in biofilms. Microbial growth is frequently detected as biofilms in plumbing fixtures and HVAC. Aerosolization and aspiration of water from hot water systems that contain Legionella is thought to be the major mode of transmission of the bacteria.

Biofilm is the slippery material found on wet surfaces and is where legionella typically grow best. Biofilm grows well on materials that are more porous such as plastic, stone and concrete. Nonporous materials such as copper, brass and stainless steel are less conducive to biofilm growth and much easier to keep clean. Biofilm can be cleaned easily from smooth surfaces but other surfaces such as uneven rocks or non-accessible surfaces such as plastic tubing are very difficult to clean.

Biofilm protects Legionella bacteria from heat & disinfectant; provides food; shelters from germs; grows on a surface that is constantly moist and can last for decades; caused by reduced water temps

3. ID areas where Legionella can grow & spread

FACTORS ON LEGIONELLA GROWTH & SPREAD

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 at low census. Stagnation can also occur when fixtures go unused, like a rarely used shower.

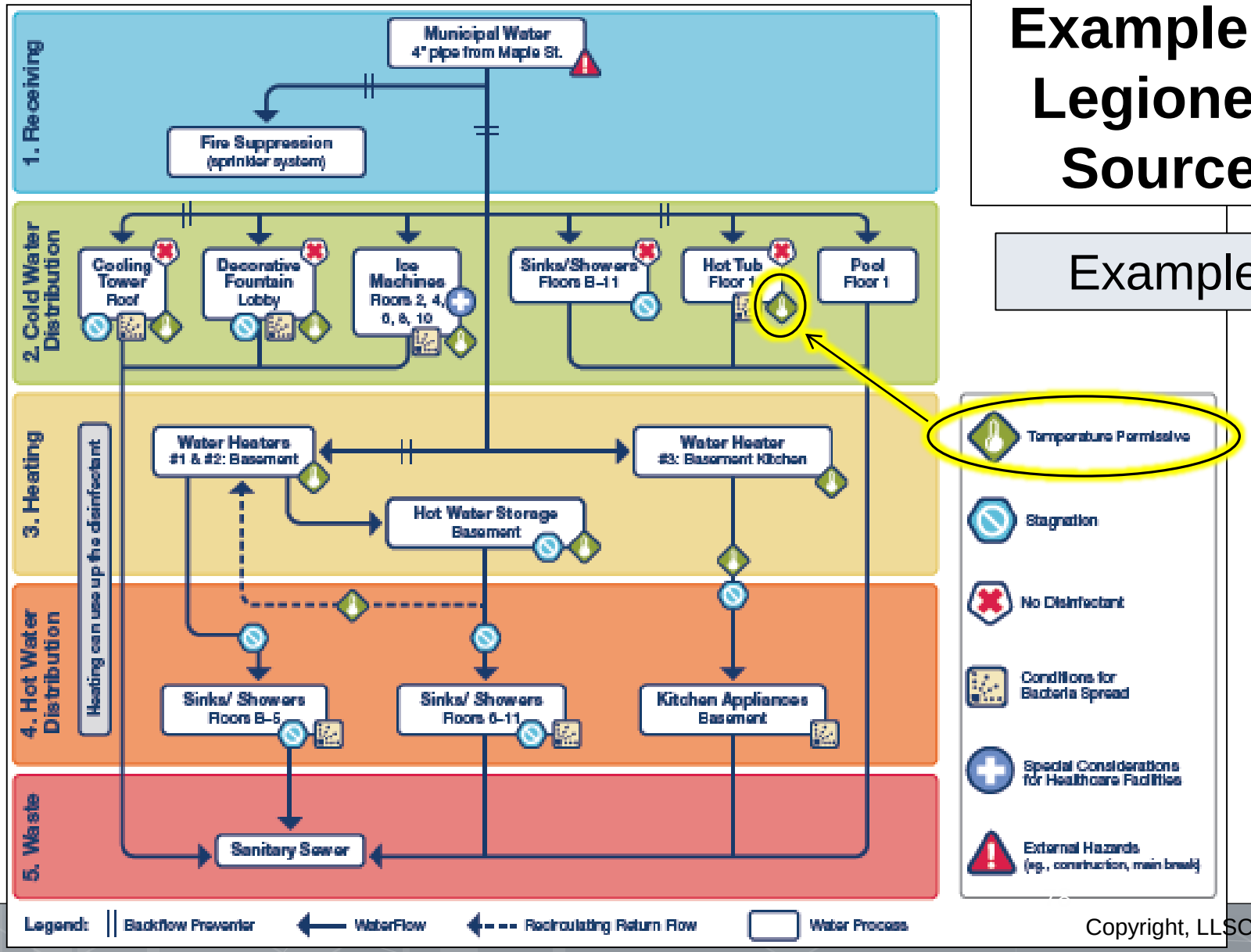
Scale & Sediment can use up disinfectants & provides a protected home for bacteria & germs

Risk Assessment

3. ID areas where Legionella can grow & spread

Example: ID Legionella Sources

Example



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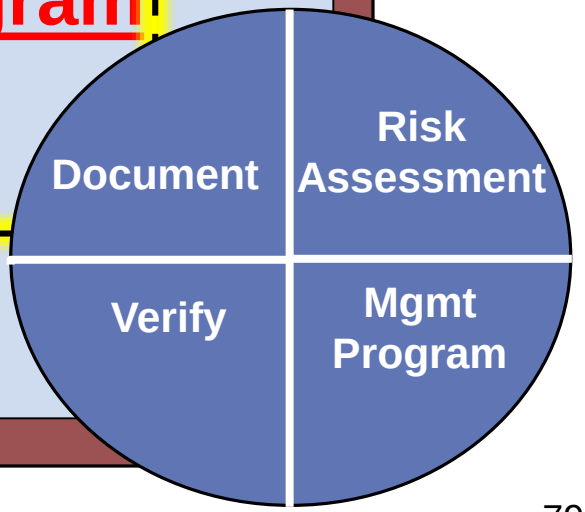


4

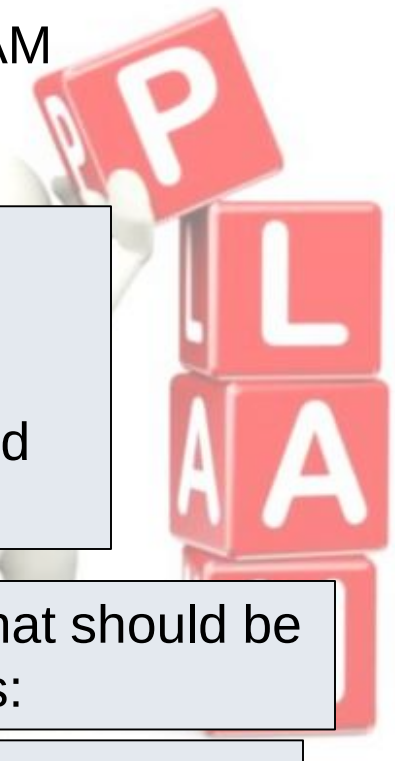
Develop Control Measures, Control Limits, & Monitoring to minimize bacteria growth

Water Mgmt Program

The ***Water Management Plan*** should include:

a. Name, title, and contact information of the TEAM
b. W*ater system FLOW DIAGRAMS*
c. Identify LOCATIONS of probable Legionella

d. Identification of ***CONTROL MEASURES***
   1. identification of the *control measures*,
   2. determination of the *control limits*,
   3. development of *monitoring* procedures, and
   4. determination of *corrective actions*;



GO TO These Slides to view Specific Elements that should be contained in WMP for certain locations:

Potable Water Sys	Cooling Towers	Whirlpools & Spas	Fountains	Aerosol Generators
Go to Slides #120-29	Go to Slides #130-36	Go to Slides #137-43	Go to Slides #144-62	Go to Slides #163-67

Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

Water Mgmt Program

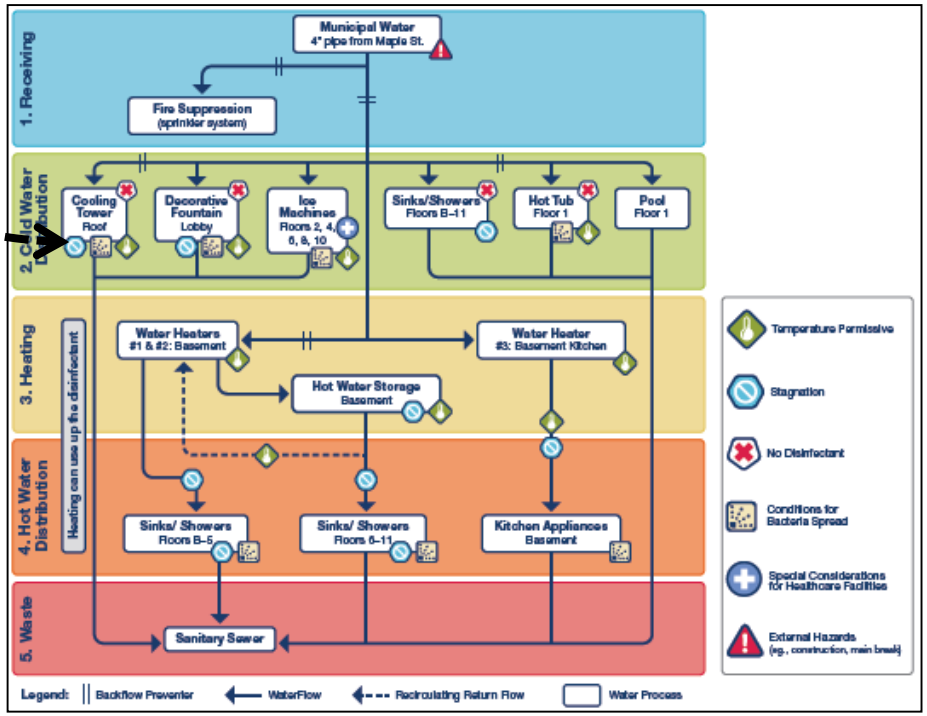
The ***Water Management Plan*** should include:

e. Who is RESPONSIBLE for each action step
f. NOTIFICATIONS if limit is exceeded
g. ACTIONS if *legionellosis* is discovered
h. EVALUATION of program effectiveness

Water Mgmt Program

Develop Control Measures, Control Limits, & Monitoring method to minimize bacteria growth

A **Control Measure** must be developed and implemented for each individual location on your flow diagram you identified as a potential Legionella source.



Develop Control Measures, Control Limits, & Monitoring method to minimize bacteria growth

A A **Control Measure** must be developed and implemented for each individual location on your flow diagram you identified as a potential Legionella source.

B Develop a **Monitor** for each Control Measure that will "meter" that Legionella is under control

C For each Monitor define a **Control Limit,** which will trigger a corrective action

Water Mgmt Program

Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

Spreadsheet available for Free on LLSC Website

CONTROL LOCATIONS, MEASURES, MONITORS & CONTROL LIMITS

Loc ID	Water System	Sub-system	Potential Hazard	Severity Risk	Basis of Risk	Control Measure	Monitor	Control Limit
	Chilled Water	Cooling Tower	Aerosol	High	Cooling water aerosol has been shown to be a leading cause growth & transmission	a. Control makeup water hardness b. Control pH, scale, corrosion & microbial fouli c. Perform re ntenance d. Maintain d inators	Daily testing of water eatment levels	Refer to cooling tower maintenance manual for control mits of each c treatme

Where in your systems is Legionella most likely to grow?

A What will you do to prevent a problem?

B How will you keep track of your measures ?

C How will you tell if something is wrong?

Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

Water Mgmt Program

A **ASHRAE 188 – Control *Measures***

Establish methods to control Legionella growth and distribution in locations of potential sources.

Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

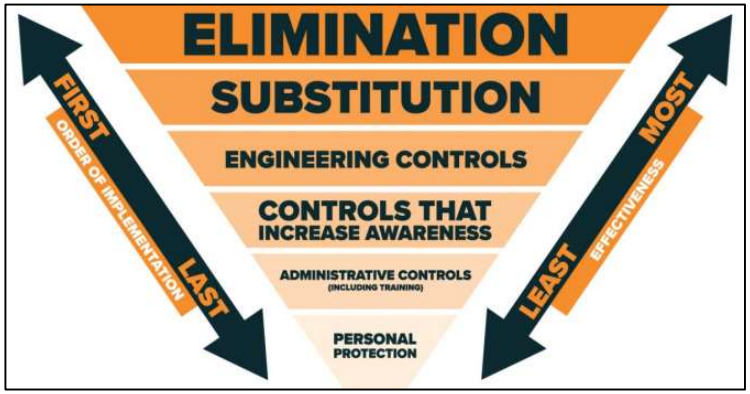
Water Mgmt Program

A ASHRAE 188 – Control *Measures*

Control measures may include:

- Water heaters maintained at the appropriate temperature
- Decorative fountains kept free of debris & visible biofilm
- Water quality throughout piping system checked for residual chlorine level
- Chemical treatment in cooling towers & hot tubes monitored
- Preplanning physical design and equipment siting
- Monitor high-risk patients for pneumonia

See slides 108-117



Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

Water Mgmt Program

B ASHRAE 188 - 6.1.4 *Monitoring*

Establish a system for **monitoring** the measures

- Measure temperatures
- Inspect for debris & visible biofilm
- Measure residual chlorine level
- Measure chemical levels
- Review design
- Monitor high-risk patients

Building water systems are dynamic, so expect that monitoring results will vary

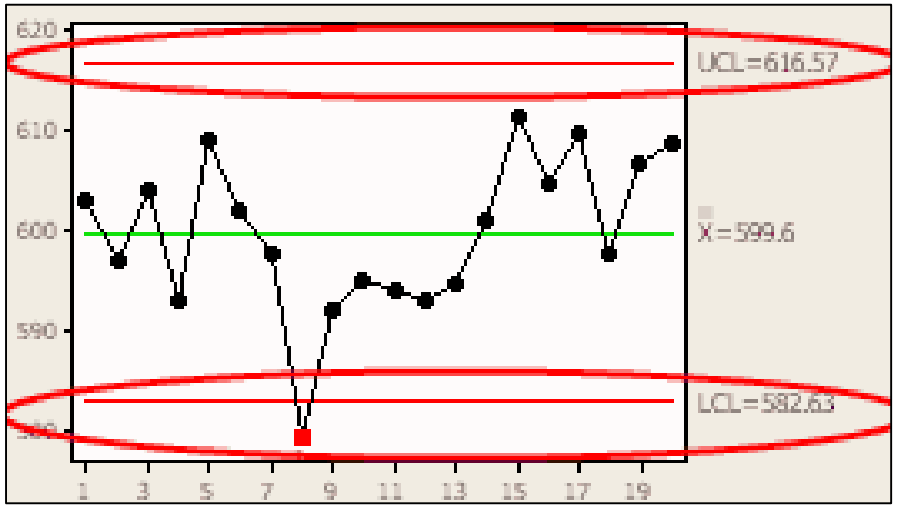
Develop Control Measures, Monitors & Control Limits to minimize bacteria growth

C ASHRAE 188 - 6.1.3 *Control Limits*

For each *Monitor that is measured*:

Define upper & lower limits of chemical or physical parameters to reduce *hazardous conditions* to an acceptable level.

- Maximum value
- Minimum value
- Range of values



5 Develop Interventions if Control Limits are not met

D ASHRAE 188 - 6.1.5 *Corrective Actions*

Establish ***corrective actions*** to take if *monitoring* shows the *control* parameters are outside of the control limits

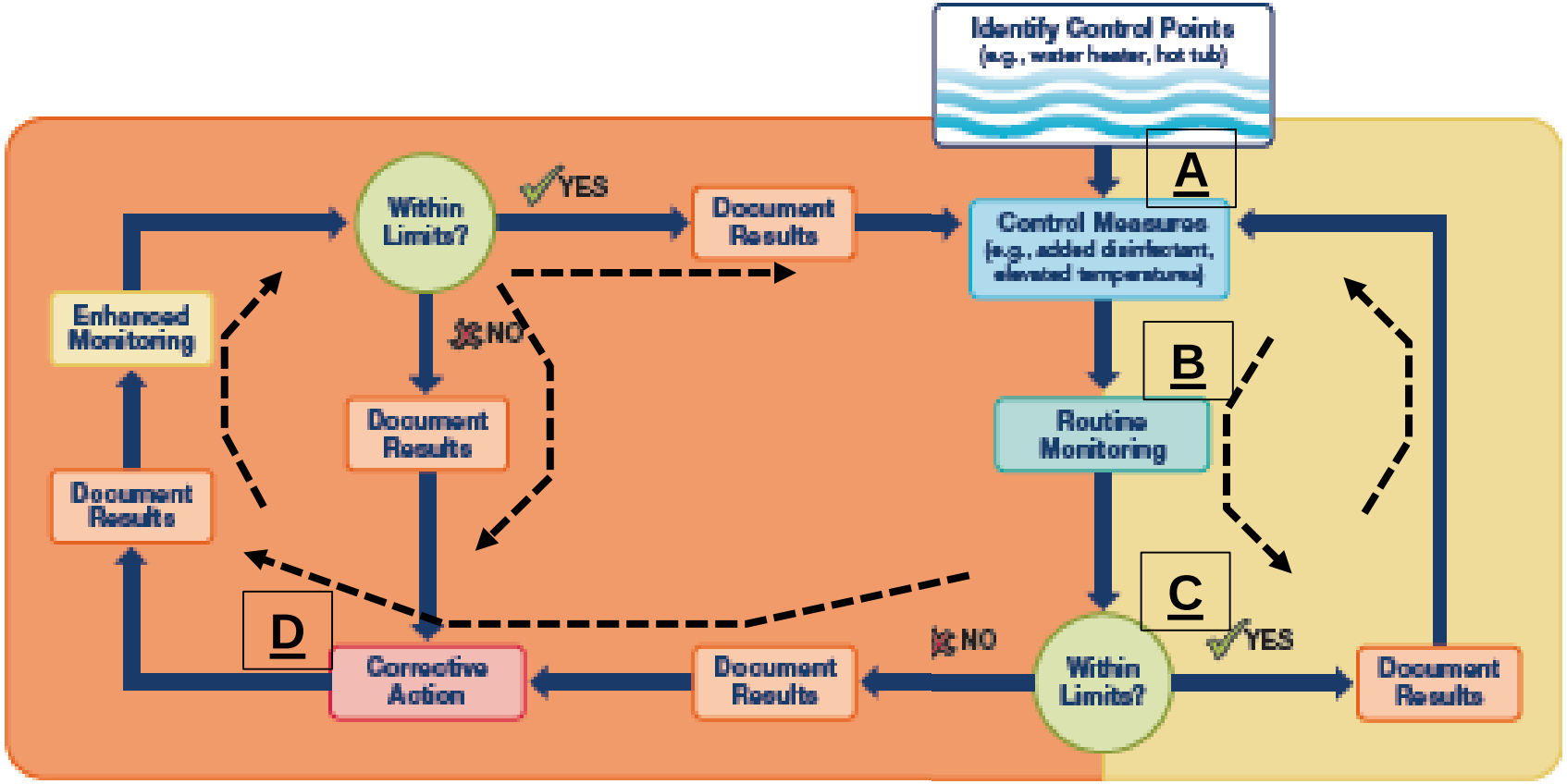
- Identify the person responsible for taking the *corrective action*
- Identify the required response time for taking the *corrective action*
- Identify all persons to be notified

Interventions

Develop Interventions if Control Limits are not met

Process if control monitors are **Outside of Limits**

Routine process of monitoring



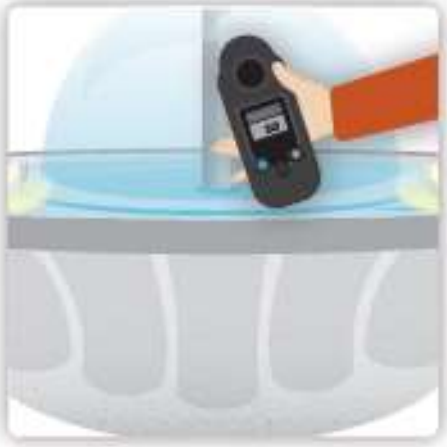
Corrective Action Example

for BIOFILM at a Decorative Fountain

Interventions

1. Note Slimy Growth on Walls

2. Shut Off & Drain; Scrub Wall



3. Refill; Check Disinfectant Levels

4. Document & Report Actions

Corrective Action Example

for Debris in COOLING TOWER

Interventions

1. Discover Leaves in Tank

2. Find Dislodged Panel

3. Replace Panel; Skim Debris; Check disinfectant

4. Document & Report Actions; Check for a week

Corrective Action Example

Water Main BREAK

Interventions

1. Get Report of Foul Water & Brown Tint; Check with City & Learns of Nearby Break; Send Notice to Users to Limit Water Use for Next 4 Hours

2. Flush Multiple Sinks at Entry & Where Reported Foul

3. Change Weekly Chlorine Monitoring to Daily Until Normal for a Week

4. Document & Report Actions

Full Investigations

Triggers for a full investigation:

1. Any patient is diagnosed with Legionnaires' Disease when patient spent the entire 10 days prior to onset in the facility
2. ≥ 2 cases of possible healthcare-associated Legionnaire' Disease (within 6 months) when patient spent the entire 10 days prior to onset in the facility
3. Patient with severe healthcare-associated pneumonia (especially in ICU, etc)
4. Positive environmental tests for Legionella
5. Changes in water quality that may lead to Legionella growth (such as low chlorine levels)

Full Investigations

Elements of a full investigation:

- Review medical & microbiology records
- Actively identify all new & recent patients with healthcare associated pneumonia & testing for Legionella, using both culture of lower respiratory secretions and urinary antigen test (the preferred diagnostic protocol)
- Work with local & state health department staff
- Develop a line list of cases
- Evaluate potential environmental exposures
- Perform an environmental assessment
- Perform environmental sampling
- Subtyping & comparing clinical & environmental isolates
- Decontaminating environmental sources
- Review & possibly revising the water management program

Full Investigations

If samples are positive for Legionella bacteria, remedial action must be taken

Culture Testing

Environmental Legionella Culturing

is **NOT** code mandatory

But should be considered by the team if:

- Monitoring is frequently outside of control limits,
- Prior history of Legionnaires' disease, or
- Provide service to patients at increased risk

Culture Testing

GUIDANCE IF LEGIONELLA TESTING IS UTILIZED

Sample Locations. It is not enough to just test cooling towers. It is quite likely that some level of Legionella bacteria exists in the hot water system, so samples should be taken from the water system and water outlets regularly. However, depending on the size of the facility, this could be very labor-intensive and costly.

Sample Method. The mode of sampling is important. Swabbing has been shown to be more effective than water sampling. Additionally, swab samples are easier to transport than straight water samples, and take less time to process. However, it is recommended to do both.

Culture Testing

GUIDANCE IF LEGIONELLA TESTING IS UTILIZED (continue

Frequency. Evidence shows that there is a correlation between the frequency of sampling and the reduction in cases of Legionnaires'. However, the frequency of sampling and the number of areas sampled can vary greatly depending on a facility's size and the organization's ability to commit time and money to the monitoring process. Some guidelines suggest quarterly to at least annual testing.

Outsourcing. Some facilities find engaging a third party for environmental monitoring and remediation to be the most effective way to prevent Legionellosis. Samples should be analyzed by a qualified laboratory.

Culture Testing

GUIDANCE IF LEGIONELLA TESTING IS UTILIZED

Quality of Lab. When *testing* of environmental water samples is utilized, it should be by a laboratory with demonstrated proficiency in the subject method, such as may be evidenced by certification by a national, regional, or local government agency or by an accredited nongovernmental organization (NGO). Laboratories performing microbiological culture *testing* of environmental water samples should be accredited by a regional, national, or international accrediting body according to a nationally or internationally recognized standard, for example ISO/IEC 17025:2005. *Legionella* culture *testing* must be included as well as the laboratory's scope of accreditation. As part of the laboratory accreditation, laboratories should have demonstrated proficiency in the detection of *Legionella* culture in accordance with Centers for Disease Control and Prevention (CDC) Environnemental *Legionella* Isolation Techniques Evaluation (ELITE) Program, or an equivalent, nationally accredited proficiency test provider

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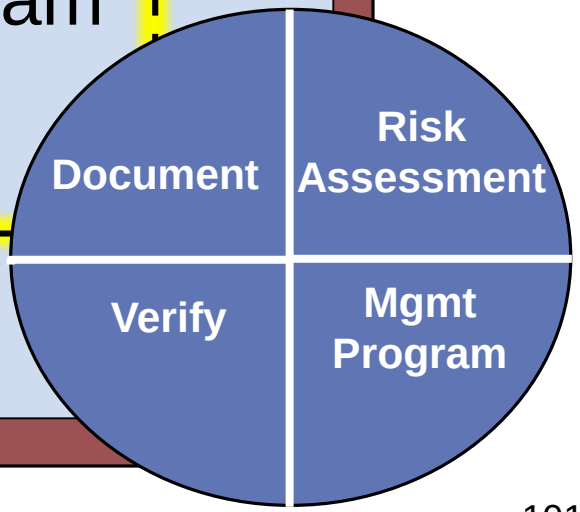

6

Evaluate WMP is running as designed

Verification

Verification:

If you said you would test the hot tub daily for chlorine and record & communicate the results, HAVE YOU BEEN DOING THAT?

- People should NOT verify the program activity for which they are responsible
- Typically, Infection Prevention staff are used to perform the independent review of actions they are NOT responsible for

Evaluate WMP is running as designed

Verification

ASHRAE 188 – Program Review

Review & revise program (a) at least once per year, and (b) when any of the following events occur:

- Measures are persistently outside control limits
- Major maintenance or water service change occurs
- New construction
- Equipment changes (e.g., new pump)
- Changes in treatment products (e.g., disinfectants)
- Changes in water usage (e.g., high/low occupancy)
- Changes in the municipal water supply
- Case of disease that may be associated with a sys
- Changes in applicable laws, regulations, or stds

Evaluate WMP is running as designed

Verification

ASHRAE 188 – Program Review

If an event triggers you to review and update your Water Management Program, you should:

- Update the process flow diagram, associated control measures, control limits, and corrective actions
- Update the written description of your building water systems
- Train those responsible for implementing and monitoring the updated program

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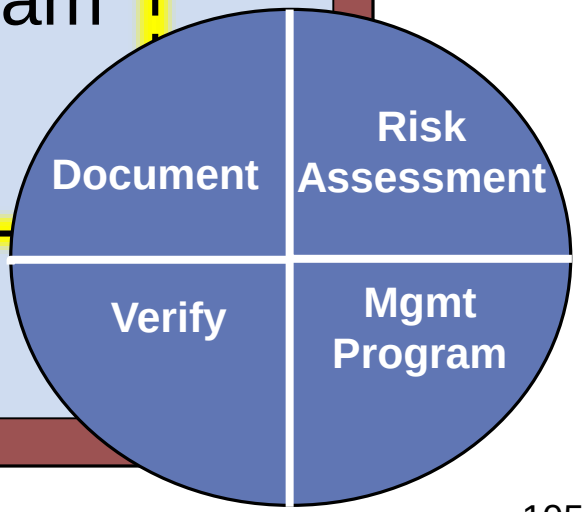

7

Document & Communicate activities

Documentation

DOCUMENT:

- All the items required to be in the Water Management **Plan** (see slides 80-81)
- **Coordination** among subgroups covering different portions of the *building water system* and associated equipment
- A master index of the location of all **Data** collection documents shall be maintained
- **Verifications** steps to show the program is being followed as written & program is effective

COMMUNICATION

Do not put your plan on the shelf and walk away

- Notify building occupants that there is a plan to keep building water systems safe
- Communicate test results on a regular basis
- Train persons who are responsible for implementing & monitoring the program

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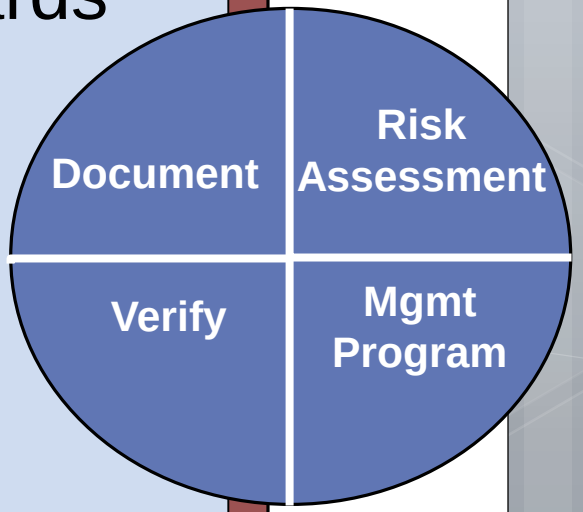
Resources for

5. Controls

6. Requirements Details



Control Measures

There are a number of recognized methods of preventing Legionella colonization in building water systems: These methods have different considerations and varying degrees of efficacy.

OSHA recognized methods:

- Metal ions (copper, silver)
- Ozonization
- Ultraviolet Radiation

Other methods of eradication:

- Hyperchlorination
- Chlorine dioxide
- Super heated flushes
- Microfiltration,
- Thermal disinfection
- Instantaneous steam heating

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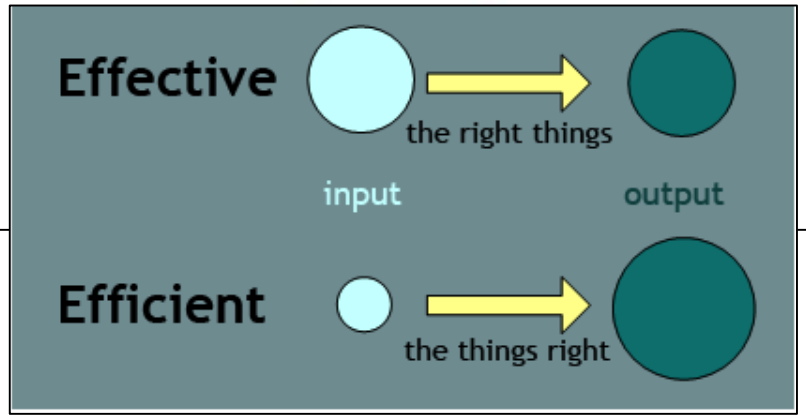
Control Measures

- Effective
  - Proactive monitoring of the water systems
  - Continuous residual biocide in cooling towers (oxidizer + nonoxidizer)
  - If high level colonization (high % positivity) of warm water system – apply disinfection
  - Maintain good records and document all findings/corrective actions/maintenance
- Ineffective
  - Hot water temperature at 140° F at the tank
  - Dead leg removal in absence of systemic disinfection
  - Removal of aerators
  - Chemical treatment of showerheads in the absence of systemic disinfection

Watertech of America, Inc.



Control Measures

Amount of remediation depends on the levels of bacteria present and where the sample was taken. Cooling towers and evaporative condensers present a comparatively lower risk than potable water systems.

- Levels above 9 CFU/ml found in potable water systems require cleaning and/or biocide treatment and present a moderately high level of concern
- Levels above 99 CFU/ml found in cooling towers or evaporative condensers require cleaning and/or biocide treatment and present a moderately high level of concern

THERMAL DISINFECTION

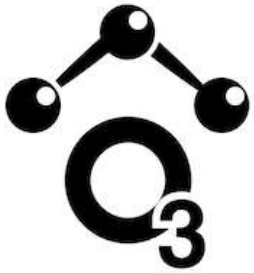
Thermal disinfection is commonly used to control Legionella

- The temperature of the hot water system is raised above 158 degrees Fahrenheit (At 158 degrees Fahrenheit it takes 10 minutes to kill Legionella in water)
- Also, water outlets, such as faucets and showerheads, are flushed for 30 minutes (at 140 degrees Fahrenheit it takes 25 minutes to kill Legionella)
- There is a potential safety concern with scalding by using this method. State laws reduce discharge temperature to 110-115ºF; dictates requires careful monitoring of faucets & showers
- This is a temporary solution, which requires many personnel to monitor the water outlets, tank water temperatures and flushing times.
- Recolonization of Legionella bacteria will happen within months, requiring frequent repetition of this process.

ULTRA-VIOLET LIGHT

UV light is effective at its point of contact for bacteria that passes the light at 254 nm with light dosages of 2,500 – 7,000 mW-s/cm^2

- The quartz sleeve that hold the lamps are subject to scaling & other malfunctions
- Declining lamp intensity over time can permit Legionella development

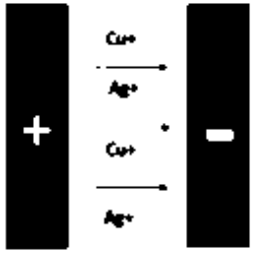


OZONE

Ozone the aqueous oxidant generated by electrically exciting oxygen to the atomic level of ozone

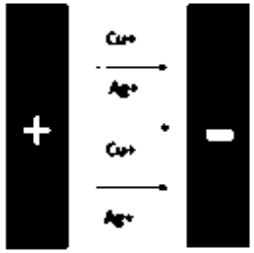
Ozone is the strongest oxidizing agent among commonly used disinfectants. It oxidizes organic matter in the water and kills bacteria, viruses, algae, and similar microorganisms

- 95% of European municipal potable water systems use ozone; some for over 100 years
- Recontamination is possible if system stops functioning since there is no residual protection



COPPER-SILVER IONIZATION

This method generates low levels of copper-silver ions into water systems. The positively charged metal ions bond with the negatively charged sites on the bacteria cell wall. Ionization disrupts the permeability of the Legionella cell membrane, denatures proteins and causes cell death. Metal ions are not biologically selective, not corrosive, not pH sensitive.



COPPER-SILVER IONIZATION

- Long lasting residual protection
- Proven effective in tests by NASA
- Low maintenance; minimal technical training to operate the system; extremely reliable with microprocessor controls
- Copper-silver ionization is less expensive than hyperchlorination
- Metal ions are not biologically selective, not corrosive,
- Not pH sensitive, but efficacy is reduced by elevated pH
- Optimum levels are easily measured
- Human ingestion of heavy metals over time is a slight concern; however, exposure would be limited because copper and silver ions are only added to the hot water system Required levels of metals are well below recommended EPA drinking water standards

HYPER-CHLORINIZATION

Hyperchlorination by a chlorinator maintains a set chlorine level of the system, most effectively at 3 to 5 mg/L, but no less than 2 mg/L.

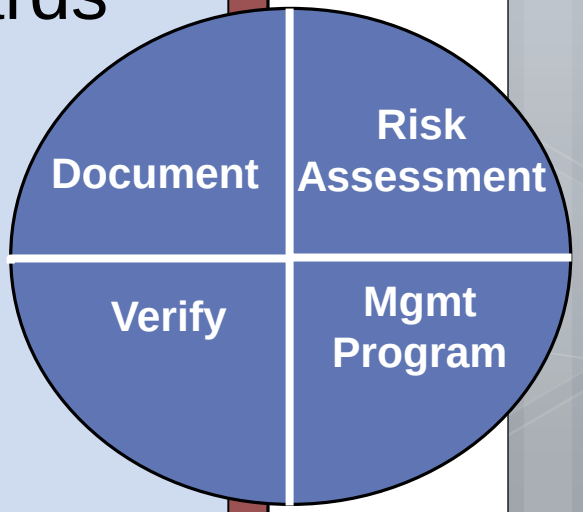
- Legionella is chlorine-resistant up to 3 parts per million. However, after five or six years, this high concentration of chlorine will lead to corrosion of the pipes, causing pinhole leaks.
- Poses a health risk, as chlorine above 4 mg/L increases the levels of trihalomethanes, which are potentially carcinogenic
- The pH should be maintained between 7.0 and 8.0

AGENDA

1. What is Legionella?
2. CMS & TJC Standard
3. CDC & ASHRAE Standards
4. Program Details
   - Risk Assessment
   - Water Mgmt Program
   - Verify
   - Documentation

Resources for

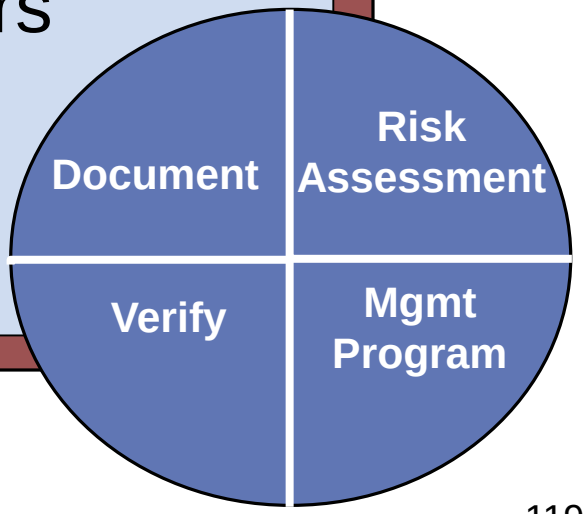
5. Controls
6. **Requirement Details**



AGENDA

6. Requirement Details
   - A. **Potable Water Supplies**
   - B. Cooling Towers
   - C. Whirlpools & Spas
   - D. Fountains
   - E. Aerosol Generators

- New Design/ Construction



Typical Elements in Water Management Programs

- Inventory
- Design
- Start-Up
- Shut-Down
- Monitoring & Testing
- Maintenance
- Water Treatment
- Contingency Plan

Example Components

Informative Note:
Recommendations and guidance on the design, maintenance, and operation of *building water systems* are provided in ASHRAE Guideline 12, *Minimizing the Risk of Legionellosis Associated with Building Water Systems*.

Potable Water Sys	Cooling Towers	Whirlpools & Spas	Fountains	Aerosol Generators
Go to Slide #121	Go to Slide #130	Go to Slide #138	Go to Slide #145	Go to Slide #164

Example Components

Potable Water System

1. <u>Systems start-up and shutdown:</u>

The *Water Mgmt Program* documents shall include procedures for

- Flushing and disinfection before using any new system;
- Shutdown, including any draining, purging, cleaning treatment, and control settings;
- Any unplanned loss of operating energy, loss of water treatment chemicals, or component repair or replacement;
- Restarting safely from a drained shutdown condition and from an undrained (stagnant) shutdown condition;
- Monitoring and treatment following water supply interruptions or breaks in water supply piping; and
- Reestablishing required temperatures throughout the hot water distribution system.

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Example Components

Potable Water
Water Mgmt Program

Documents must show, when designing for new construction, renovations, refurbishment, replacement, or repurposing of a facility (a) A system overview and intended mode of system operation; (b) documentation and design compliance to address *hazardous conditions* for each of the following:

- Schematic diagrams of water systems
- *Monitoring* and control diagrams of water systems
- Local, regional, and national code compliance
- Locations of: makeup, flush, sampling, temp. monitoring & drain
- Locations of outdoor air intakes
- Building water equipment
- Commissioning & operating instructions and procedures
- Maintenance schedules, frequencies, and procedures
- No-flow and low-flow portions of the *building water systems*
- Impact of heat loss from hot water or heat gain by cold water in piping and water system components
- Possible cross connections of potable & *nonpotable* water
- Inadequate access to expansion tanks, hammer arrestors, storage tanks, heaters, and other components containing water

Example Components

Potable Water
Water Mgmt Program

Balancing. All water systems shall be balanced, and a balance report for all water systems shall be provided to building owner

2. Commissioning. Detailed instructions for commissioning of all *building water systems* shall be provided by the designer in the plans and specifications. Commissioning shall include:
(a). Confirmation that *water system* meets design performance parameters; and (b) Procedures for flushing and *disinfection*
1. Procedures shall meet AWWA C651 2 or AWWA C652 3 or comply with all applicable national, regional, and local regulations.
2. *Disinfection* and flushing shall be completed within three weeks prior to whole or partial *beneficial occupancy*.

- If *beneficial occupancy* of any part of the building is delayed more than two weeks but less than four weeks after *disinfection*, flushing of all fixtures shall again be completed.
- If *beneficial occupancy* of any part of the building is delayed four weeks or more after *disinfection*, the need for *disinfection* and/or flushing for unoccupied areas shall be determined by a *risk* assessment conducted by the water *Program Team.*

Example Components

Potable Water
Water Mgmt Program

3. System Maintenance: The Water Mgmt Program documents shall include procedures for

- Inspection and the inspection schedule for water containing vessels and system components;
- Flushing or mixing of stagnant or low-flow areas;
- Maintenance and monitoring procedures based on equipment manufacturers' recommendations for cleaning, disinfection, replacement of system components, and other treatments the Designated Team decides are necessary for

(a) Hot & cold water storage tanks;
(b) ice machines;
(c) water-hammer arrestors;
(d) expansion tanks;
(e) water filters;
(f) shower heads and hoses;
(g) electronic faucets;
(h) aerators;
(i) faucet flow restrictors;
(j) nonsteam aerosol-generating & humidifiers,
(k) water heaters;
(l) infrequently used equipment, including eyewash stations and showers;
(m) other equipment identified by the *Designated Team*;
(n) maintaining and storing instructions and forms for inspection notes and a correction action log; and
(o) maintaining and sorting component and equipment operating manuals.

Example Components

4. Water treatment. The *Water Mgmt Program plan* documents shall include:

- M*onitoring* method and schedule for temperature measurement in the hot water and cold water systems;
- M*onitoring* method and schedule for measuring the chemical *disinfectant residual* or physical parameters in the hot water and cold water system;
- Procedures to address water supply interruptions or breaks in water supply piping;
- Procedures and schedule for maintaining water treatment system *disinfectants*; and
- Water treatment products, the procedures for their application, and confirmation that the products comply with applicable regulations.

Example Components

5. Contingency Response Plan: For both hot water and cold water systems, the *Program* documents shall include

- Procedures to be followed if there are known or suspected cases of *legionellosis* associated with the use of *potable* water from the *building water systems;*
- Directives issued by national, regional, and local health department authorities;
- If the *Program Team* determines testing for *Legionella* shall be performed, the procedures shall include criteria for when and where the tests shall be performed;
- Procedures for emergency *disinfection*; and
- Procedures for other actions identified as necessary by the *Program Team* to prevent exposure to contaminated water.

Example Components

6. Dead legs: It is now becoming apparent that heating, ventilating and air-conditioning (HVAC) and domestic plumbing “dead legs” (domestic water and condenser water piping in preparation of future expansion) have some significant trade-offs in terms of the cost-savings they’re intended to provide versus the potential risk they represent.

As an illustration of the potential risk, the U.S. Centers for Disease Control and Prevention (CDC) currently reports that between 8,000 and 18,000 cases of Legionella are reported in hospitals annually, although they estimate the actual cases to be far greater in number because many cases are not properly diagnosed or reported. To reduce liability given the potential for Legionella outbreaks, designers should include a careful review of the piping design relative to piping size (hence, fluid velocities), intended cooling tower operation, and dead legs associated with future installation.

Example Components

6. Dead legs: (continued)

Prior to breaking ground on a new building, as institutions or corporations plan for expansion or a development firm invests in a new facility, they consider the schematic design for the necessary utilities, including the building's HVAC, electrical, and plumbing systems. These systems are often laid out in such a way that is intended to ease future expansion. The planned or renovated space may, for example, only require three chiller units in order to accommodate the building's HVAC system, but a fourth may some day prove necessary. To accommodate future needs, extra condenser water piping may be installed and capped off, so that the additional chiller and/or cooling tower equipment may later be easily incorporated. Unfortunately, these so-called "dead legs" in the piping systems can create significant problems down the road for the building owner and occupants, because the water in these areas does not tend to circulate, and warm, stagnating water creates a particularly encouraging environment for many kinds of bacteria, including Legionella.

AGENDA

6. Requirements Details

A. Potable Water Supplies

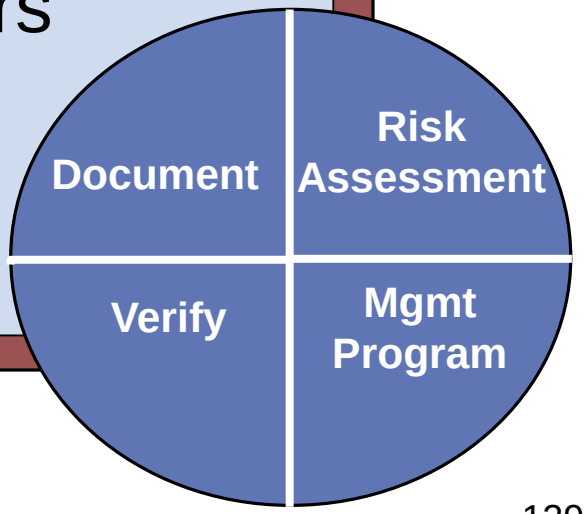
B. Cooling Towers

C. Whirlpools & Spas

D. Fountains

E. Aerosol Generators

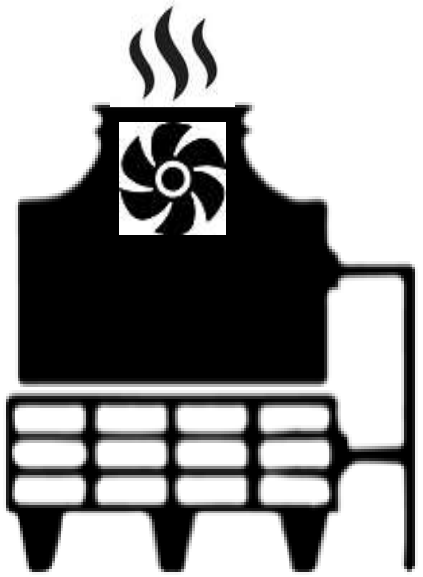
- New Design/ Construction



Example Components

Cooling Tower Water Mgmt Program

Cooling Water System



1. <u>Equipment Siting.</u> Prior to the beginning of Construction of new or replacement open-circuit cooling towers, closed circuit cooling towers, or evaporative condensers, drawings shall be reviewed and the following items shall be addressed:

- a. Potential contamination from building systems or facility processes to be drawn into the equipment
- b. Potential for equipment to discharge into occupied spaces, trafficable areas, pedestrian thoroughfares, outdoor air intakes, and building openings
- c. Potential for equipment siting that inhibits access to the equipment for the required maintenance and inspection consistent with the manufacturer's instructions and guidelines

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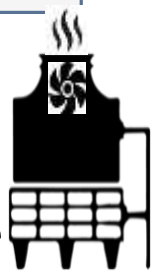
Example Components

Cooling Tower Water Mgmt Program

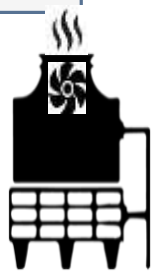


2 New-System Start-Up. The *Program* document shall include procedures for cleaning steps that are part of commissioning of the cooling system. The *Program* document shall also include procedures for management and *control* means of ensuring that ongoing water treatment is initiated immediately once the system is charged with water.

3 System Maintenance. The *Program* documents shall include

- A schedule for inspection of general system cleanliness, of drift eliminator condition and fill material condition, and of water distribution system operation;
- Requirements and schedule for basin or remote sump cleaning and purging of stagnant or low-flow zones; and
- Documentation requirements.

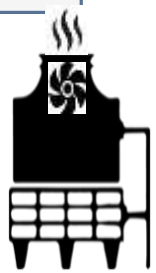
Example Components



4. Water Treatment. The *Program* documents shall include the water treatment requirements to *control* microbiological activity, scale, and corrosion and shall also

- Specify all equipment and chemicals used for the purpose of treating the open recirculating loop;
- Include the minimum required schedule for inspection, maintenance and *monitoring*, and a *corrective actions* plan; and
- Identify the minimum requirements for documenting system water treatment.

Example Components

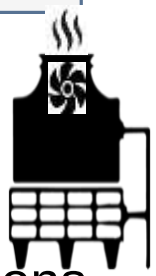


5. Shutdown and Start-Up. The *Program* documents shall include start-up and shutdown requirements to manage *hazardous conditions* associated with operation of fans during untreated water conditions and procedures for

a. shutdown that includes all chemical pretreatment steps, pump cycling protocols, and procedures for system drainage for shutdown periods longer than the duration specified by the *Program Team*;

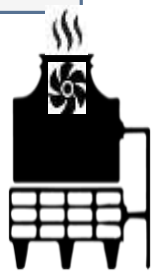
b. start-up from a drained system; and

c. start-up from an undrained (stagnant) system that exceeds the number of idle days specified by the *Program Team.*

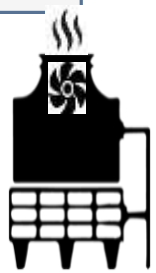


6. *Disinfection* of Cooling Towers & Evap. Condensers. The *Program* documents shall include procedures and identify the responsible person for initiating the process for

- Remedial *disinfection* while in operation, including the conditions that require its application, and
- Emergency *disinfection*, including the conditions that require its application.



7. Location of Cooling Tower Makeup Valve. The *Program* documents shall include requirements for the location of cooling tower makeup valves and for maintaining compliance with all applicable local, regional, and national codes and regulations for air gaps and backflow preventers and for the height of the discharge outlets and makeup valve over the rim of the overflow in the cooling tower or evaporative condenser cold water basins. If no such codes and regulations exist for the location, then the *Program* shall include requirements for maintaining compliance with ASME/ANSI A112.1.2 1 for air gaps and for maintaining compliance with codes and regulations applicable to other locations, selected by the owner or *designee*, for backflow preventers and for the height of the discharge outlets and makeup valve over the rim of the outflow in the cooling tower or evaporative condenser cold water basins.



8. Contingency Response Plan. The *Program* documents shall include

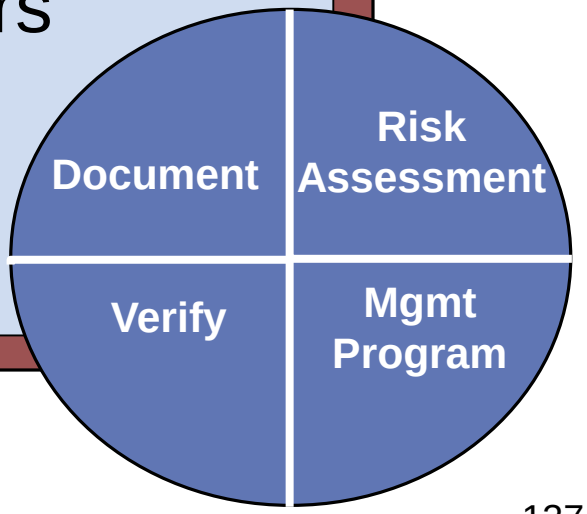
- Procedures to be followed if there are known or suspected cases of *legionellosis* associated with the use of cooling towers and evaporative condensers;
- Directions issued by national, regional, and local health department authorities;
- If the *Program Team* determines testing for *Legionella* or other pathogens shall be performed, procedures shall include criteria for when and where the tests shall be performed, proper sampling procedures, and the interpretation of test results;
- Procedures for emergency *disinfection*;
- Procedures for other actions identified by the *Program Team* to prevent exposure to contaminated water.

AGENDA

6. Requirements Details

A. Potable Water Supplies
B. Cooling Towers
C. Whirlpools & Spas
D. Fountains
E. Aerosol Generators

- New Design/ Construction



Whirlpools & Spas

1. Bather-Related Requirements. The *Program* documents shall include the

- Allowable bather load for each whirlpool spa,
- Procedures for posting and enforcing the allowable bather load for each whirlpool spa, and
- Procedures for posting a notice to bathers of the increased health *risk* related to use of whirlpool spas by individuals who are *at-risk* or *immunocompromised* who have chronic lung disease.

2. Filter Operation and Maintenance. The *Program* documents shall include procedures for filtration of whirlpool spa water.

3. Cartridge (Canister) Filters. The *Program* documents shall include procedures and schedules for inspection and replacement of cartridge-type filters, pressure gages, valves, and related equipment.

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Example Components

4. Granular Filters. The *Program* documents shall include procedures and schedules for backwashing, inspection, and replacement of granular-type filters, pressure gages, valves, and related equipment.

5. Water Quality, *Disinfection*, and *Monitoring*. The *Program* documents shall include procedures for

- Scheduled changing of whirlpool spa water;
- Maintaining the pH of the water within the range specified by local, regional, and national codes and regulations;
- Maintaining *disinfectant* levels, the products to be applied, and requirements to follow *disinfectant* label directions;
- Shock *disinfection* of the whirlpool spa at the end of each day by achieving the *disinfectant residual* and minimum circulation time recommended by the *disinfectant* manufacturer;
- Maintenance of the *disinfection* system in accordance with the manufacturer's instructions;

5. Water Quality, *Disinfection*, and *Monitoring*. (continued)

- Measurement schedule and logbook of all residual *disinfectant* measurements;
- Recording *corrective actions* in logbooks; and
- Recording operations in logbooks maintained for the periods specified in local, regional, and national codes and regulations and for at least 12 months and retained for at least an additional 12 months.

6. Microbiology. The *Program* documents shall include procedures for the microbiological standards required by local, regional, and national health departments that are to be achieved by public whirlpool spas.

7. Microbiological Testing. The *Program* documents shall include procedures for

- Monthly or more frequent *testing* of spa water for indicator organisms and pathogens identified by the *Program* microbiological standards;
- Maintaining the total heterotrophic aerobic bacteria colony count at or below the maximum level specified by local, regional, and national codes and regulations or 200 CFU/mL if no codes or regulations apply;
- Maintaining the levels of indicator organisms at or below the standard threshold;
- When and where tests shall be performed, proper sampling procedures, and the interpretation of test results should the *Program Team* determine that *testing* for *Legionella* or other pathogens is required;
- Responding to unsatisfactory test results, including *disinfection* record review and repetition of microbiological tests.

8. When Contamination Is Discovered. The *Program* documents shall include procedures to be followed if there is evidence of feces, vomiting, or other gross contamination and shall include procedures for immediately taking the spa out of use for spa cleaning, for d*isinfection* of the entire spa system & restoring the spa to service.

9. Contingency Response Plan. The *Program* documents shall include

- Procedures to be followed if there are known or suspected cases of *legionellosis* associated with the use of whirlpool spas;
- Directions issued by national, regional, and local health department authorities;
- If the *Program Team* determines testing for *Legionella* shall be performed, procedures shall include criteria for when and where the tests shall be performed, proper sampling procedures, and the interpretation of test results;
- Procedures for emergency *disinfection*; and
- Procedures for other actions identified by the T*eam*

Example Components

10. <u>Operating Manuals</u>. The *Program* documents shall include procedures for regularly updating all operating manuals for filters, pumps, and *disinfection* equipment and for maintaining them at a secure location accessible to maintenance personnel.

<u>11. Risk Management Plan.</u> Pools and spas shall be operated and maintained in accordance with original equipment manufacturer (OEM) requirements.

AGENDA

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A. Potable Water Supplies
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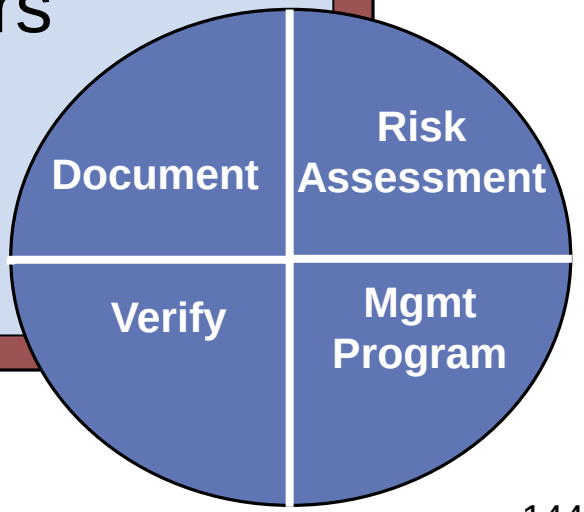

Example Components

WIS DHS Guidelines **Issued After Investigation of a Legionnaire Outbreak at a WI Hospital**

It seems reasonable to advise healthcare facilities that have similar sheet\waterfall-type fountains, or any other decorative fountains in patient care areas, to take precautionary measures. The safest option would be to shut down the fountains, drain the water from the fountain's plumbing, thoroughly clean & disinfect the fountain & keep it out of operation until more definitive guidelines are available. Intermediate measures short of shutdown include:

- Periodic (e.g., weekly) shutdown, cleaning, and disinfection of the fountain and its plumbing. This should include scrubbing to remove biofilm which can harbor and protect *Legionellae* from biocides. Mineral scale should also be removed. The use of halogen agents (chlorine or bromine) for disinfection should be considered, although odor and corrosive effects may be a concern. We suggest checking with the fountain's manufacturer to ensure disinfection procedures do not void the product's warranty. Depending on the biocide used, the pH of water may need to be monitored.

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Example Components

WIS DHS Guidelines **Issued After Investigation of a Legionnaire Outbreak at a WI Hospital (continued)**

- At post-cleaning startup, use filtered or distilled water to refill. Biofilm should be scrubbed away prior to refilling to avoid contamination of the newly added water
- Eliminate heat sources that could raise water temperatures (e.g., fireplaces or decorative lighting)
- Eliminate all stagnant water (e.g., drain all plumbing and hoses during routine maintenance, locate drains at the lowest point in any reservoir, and eliminate items like sponges or mats that cannot be disinfected)
- If the fountain has been out of use for several days or more, ensure thorough drainage of all water followed by a biocide treatment prior to startup. (*Legionellae* can proliferate to high numbers in stagnant water)
- Perform enhanced periodic bacteriologic monitoring of the fountain water to assess levels of *Legionella*. More frequent testing (possibly quarterly) should be performed initially, and if consistently low *Legionella* level are found, testing frequency can be reduced.

Decorative Fountains

2010 Facility Guidelines Institute:

Requires any open water feature to be equipped to safely manage water quality to protect occupants from infection or irritating aerosols.

2014 Facility Guidelines Institute:

Open, indoor water features are prohibited in new hospitals (NOT adopted in Wis; NOT mandatory)

Example Components

Decorative Fountain Water Mgmt Program

Water features can be a polarizing issue in health care. Are indoor water features in hospitals stagnant pools of disease or flowing streams of healing?

Supporters of water features tout possible benefits such as increased patient satisfaction, lower patient blood pressure, and less patient stress. They point out that patients (and, often times, donors) enjoy water features and want them in hospitals. And water features can be used to mask sounds, potentially increasing patient satisfaction levels.

Types of Ornamental Features

Sea Bubbler
The sea bubbler feature typically has the water totally enclosed. If the water is enclosed it will create little, if any, aerosol.

Cascade
A cascading fountain pumps water to the top of the feature then allows the water to cascade down to the sump over typically smooth surfaces that create very little aerosol. By design, the smooth peaceful flow of the water results in little aerosol generated.

Water Wall
A Water Wall feature operates like a Cascade fountain pumping the water to the top of the unit and allowing it to flow down over a smooth surface to the sump. Because of the fine sheeting of water created over a large surface area, there is the additional possibility of creating a small amount of aerosol.

Spray
The Spray fountain pumps water through a nozzle forcing a spray of water into the air. Water droplets fall by gravity back to the sump. This design will create a significantly larger amount of aerosol than any of the previously discussed units. A pulsing fountain is a type of Spray fountain that pulses water into the air. Pulsing fountains can create significantly more aerosol than a standard spray type fountain. Fine mists and high sprays will create more aerosol than coarse and low sprays. However, outbreaks have been associated with coarse, low sprays.

Mist
These ornamental features operate in the same fashion as table top humidifiers. The main difference between this unit and humidifiers is that humidifiers have a fan to circulate the mist into the room so that it quickly evaporates. These units allow the mist to stay around the unit for effect. The units by design create a very high amount of aerosol in proportion to their total volume.

Example Components

For legionella to grow in an ornamental feature, the bacteria must be present in the supply water or aerosolized legionella must enter the feature from another source. If the ornamental feature is indoors and makeup is distilled or sterile water, the potential for legionella growth is reduced significantly. If the system used a water source that may have contained legionella, switching to sterile water will not eradicate legionella already in the system.

Temperature: Legionella require a certain temperature to multiply. Legionella will reproduce at temperatures between 68ºF and 122ºF and will grow rapidly between temperatures of 85ºF and 110ºF. Legionella can multiply to deadly levels at temperatures as low as 68ºF. As water evaporates, it releases heat and cools the remaining water in the feature. The amount of cooling is impacted by the relative humidity and amount of aerosolization. For features in air conditioned buildings with an average air temperature of 70oF and a low to moderate relative humidity the feature water temperature will typically be 65ºF or lower. The temperature of outdoor features is impacted by daily weather conditions.

Example Components

Decorative Fountain Water Mgmt Program

Source of Nutrients: Legionellae are parasitic bacteria that grow best in the presence of higher life forms including amoebae, protozoa and algae. Any water that is at all cloudy or dirty can be considered to have an extremely high concentration of bacteria and also higher life forms like amoebae as well. Even clear water that is not properly maintained can readily grow legionella. The location and size of the feature can also be a factor in the source of nutrients. Large features can have debris dropped in them by passersby. Features in food areas have a potential of food or even oils entering the unit. Filtration is an effective method to control solids including minerals and nutrients in the water. Filtration will not filter out legionella bacteria but by keeping the feature clean, filtration will minimize items that are needed for legionella habitat.

Example Components

Make Up Water. To keep features free of scale, water pretreatment by softeners, reverse osmosis, or pH control through acid feed is recommended. Also, scale control chemicals can be used by themselves or in conjunction with a pretreatment program. For small features adding makeup by hand, distilled water is recommended. Distilled water is not the same as spring water. Spring water will contain minerals including calcium that add a spring like flavor to the water, while distilled water is pure H2O with no minerals at all.

Flowing Water. Another factor having a significant impact on biofilm growth is water flow. Flowing water will tend to minimize biofilm growth whereas stagnant water can facilitate quick biofilm growth. Fountains should be run a minimum of 6 hours a day to minimize biofilm growth; this will also minimize potential for mosquito larvae in outdoor fountains.

Example Components

Design. Ornamental feature design has a **major** impact on the amount of aerosol generated. Below is a summary of design factors and their impact on legionella growth.

- Flow Type - Ornamental features that spray or mist water will create much more aerosol than features which cascade water. Totally enclosed or mostly enclosed features such as a sea bubbler type will generate little if any aerosol. Ornamental feature flow types are reviewed on the next page.
- Surface Area - The amount of exposed surface area will impact the potential for biofilm growth, heat exposure and dirt accumulation. A fountain with a lot of surface area, such as many rocks, has a greater potential for biofilm growth and is more difficult to keep clean.
- Submerged Components - Biofilm and legionella will grow well in plastic tubing and places where dirt can accumulate. Units with no hidden or difficult to inspect and maintain components are easier to keep clean.

Design (continued)

- Lighting - Submerged lighting has a **major impact** on the risk of Legionnaires' disease associated with ornamental features. All documented cases of Legionnaires' disease outbreaks related to ornamental features in the US had submerged lighting. LED and fiber optic light produces less heat than incandescent or halogen light sources.
- Drainage - The ability to drain a fountain from the lowest point in the system, below pumps and tubing, easily and quickly has an impact on maintenance of the unit.

Example Components

Fountain Size: A small indoor feature may generate little aerosol which may only travel a few yards. A large exterior fountain can generate large volumes of aerosol that travels several city blocks. However, smaller indoor units not maintained properly can present a high risk. One outbreak, which resulted in death and illness, was caused by a feature that contained less than 20 gallons of water.

Location: Fountain location, to a smaller degree than other factors, impacts aerosol transmission. A fountain located in the corner of the room away from all air flow will have a much lower risk of transmitting an aerosol than one located in the air circulation path. The same holds for exterior ornamental features. An exterior fountain located on the side of the building protected from winds or in a location with little or no winds will have a much lower possibility of transmitting aerosols than one in an exposed or windy area.

Example Components

Decorative Fountain Water Mgmt Program

1. Equipment Siting. Prior to beginning construction of an ornamental fountain or other water feature, drawings shall be reviewed and the following items shall be addressed:

- Potential organic contamination from adjacent sources
- Inadequate drains and stagnant areas
- Inadequate access to pumps, filters, tanks & treatment equip.
- External heat sources and inadequate airflow that increase the temperature and thereby increase the *risk* of exposure

2. Operation. The *Program* documents shall include a description of the procedures for

- Draining, cleaning all components, disinfecting, and refilling if the water feature is not in operation for periods that exceed the number of idle days specified by the *Program Team*;
- Confirming submerged lights will not operate unless the circulating pump is running; and
- Confirming circulating pumps are running.

Example Components

Decorative Fountain Water Mgmt Program

3. Maintenance. The *Program* documents shall include procedures for regular cleaning; for cleaning the visible buildup of dirt, organic matter, or other debris; and for maintaining pumps and filters as recommended by the manufacturer.

4. Water Treatment. The *Program* documents shall include procedures for

- Weekly cleaning, *disinfection* of equipment and components, and replacement of water in systems with total water volume <5 gal (20 L) or for the periodic use of a *disinfectant*, the products to be applied, and a requirement to follow *disinfectant* manufacturer's directions;
- Periodic use of a *disinfectant*, the products to be applied, and a requirement to follow *disinfectant* manufacturer's directions for systems □5 gal (20 L); and
- Maintaining water temperature within the *control limits* in the *Program*.

5. Contingency Response Plan. The *Program* documents shall include

- Procedures to be followed if there are known or suspected *legionellosis* health problems associated with the use of decorative fountains and other water features in building systems;
- Directions issued by national, regional, and local health department authorities;
- Procedures that include criteria for when and where tests shall be performed if the *Program Team* determines that *testing* for *Legionella* shall be performed;
- Procedures for emergency *disinfection*; and
- Procedures for other actions identified by the *Program Team* to prevent exposure to contaminated water.

Example Components

Decorative Fountain Water Mgmt Program

Chart 1 - Indoor Ornamental Water Features

	Large (> 200 gal) & All hospital fountains	Medium (less than 100 gallons)	Small (less than 5 gallons)
Filtration	Filtration	Drain & clean monthly	Drain & clean weekly
Bacteria Control	Automatic control & feed of biocide. Maintain at least 0.5 ppm free chlorine (or equivalent) continuously	Manual or automatic biocide feed to maintain at least 0.5 ppm free chlorine (or equivalent) 6 hours a day.	Manual dosing once a day of liquid chlorine to develop 3 – 5 ppm free chlorine (or equivalent) for 1 hour.
Algae Control	Feed chlorine or algaecide as required to insure no algae or slime		
Slime Control	Spray slimy areas with a weak bleach solution and rinse		
Semi-Annual	Open & inspect filter	Open & inspect filter	
Annual	Drain, clean & inspect	Drain, clean & inspect	

Example Components

Decorative Fountain Water Mgmt Program

Chart 2 - Outdoor Features

	Large (> 200 gal) & All hospital fountains	Medium (less than 200 gallons)	Small (less than 25 gallons)
Filtration	Filtration	Filtration	Drain water monthly.
Bacteria Control	Automatic control & feed of biocide. Maintain at least 0.5 ppm free chlorine (or equivalent) continuously	Manual or automatic biocide feed to maintain at least 0.5 ppm free chlorine (or equivalent) 6 hours a day.	Manual dosing once a day of liquid chlorine to develop 3 – 5 ppm free chlorine (or equivalent) for 1 hour.
Algae Control	Feed chlorine or algaecide as required to insure no algae or slime		
Slime Control	Spray slimy areas with a weak bleach solution and rinse		
Algae Control	Feed as required to insure no algae	Feed as required to insure no algae	Feed as required to insure no algae
Slime Control	Algaecide and biocide should control slime	Spray slimy areas with a weak bleach solution and rinse	Spray slimy areas with a weak bleach solution and rinse
Semi-Annual	Open & inspect filter	Open & inspect filter	
Annual	Drain, clean & inspect	Drain, clean & inspect	

The above protocols are for units with medium to low risk factors.

* Consider the indoor unit at a significantly higher risk if:
  - Water temperature exceeds 70°F. Temperature should be measured at the hottest area in the system and at the time of day when the water temperature is hottest.
  - The unit is located, in a walkway to or near a hospital, extended care facility or

Example Components

Decorative Fountain Water Mgmt Program

Maintenance Log

Keep a Maintenance log for all ornamental features.

Daily Logs

Free chlorine or free bromine residual

- Collect water samples where chlorine level will be lowest such as a low flow area or a high temperature area and away from any source that may give higher chlorine such as near the chemical feed location or city water makeup.
- For small, manually dosed ornamental fountains, the reading should be taken one hour after dosing to insure the desired level of chlorine is maintained in the feature at least one hour a day.

Temperature

- Water temperature should be logged once a day when the chlorine sample is collected. As with chlorine, the water temperature should be obtained in the area of the fountain with the highest temperature.
- For features where the water temperature is constant, as with most indoor units, a change in water temperature may be an indicator of an equipment problem.
- For smaller indoor features with constant temperature weekly temperature logs are sufficient.

pH and alkalinity

- pH impacts the ability of chlorine and bromine to kill bacteria. pH should be kept at less than 8.5 for chlorine and less than 9.0 for bromine systems.
- For copper systems, pH should be maintained at less than 7.6 or as recommended by the manufacturer and less than 100 ppm total alkalinity. Above 7.6 (see manufacturers instructions) copper can precipitate from solution causing staining of the feature.

Visual Inspection

- Log daily visual inspection.

Example Components

Decorative Fountain Water Mgmt Program

Weekly Logs

- If copper is used as a disinfectant, weekly testing and, in some cases, testing every two weeks may be sufficient.
- If using polyquat feed according to manufacturers recommendations and log additions.
- Log weekly cleaning of surface for debris, algae and scum

Monthly, Quarterly and Annual

Log all recommended manufacturer maintenance items including:

- Filter inspections
- Filter changes
- Filter media changes (minimum of once / year)
- Pump cleaning (typically every 3 to 4 months)
- Water changes – when water is changed all slime and dirt should be cleaned with a weak disinfectant. The sump as well as pump and piping or tubing should be rinsed with a disinfectant solution as well.

Example Components

Decorative Fountain Water Mgmt Program

Risk Management Plan (for a small, moderate to low risk, indoor feature)
In the log book enter the date, action taken and initials of the person completing the task.

Daily Treatment

- Add chlorine daily at the end of the each day to develop at least 3 ppm free chlorine (or add polyquat as recommended weekly and 0.5 pm chlorine daily).
- Test chlorine levels three times a week one hour after chlorine is added. Add chlorine if level is below 3 ppm (or below 0.5 ppm if used with polyquat).

Weekly Cleaning

- Drain feature and clean with dilute chlorine solution (or 50% vinegar solution).
- Remove pump filter and clean.
- Circulate dilute chlorine, hydrogen peroxide or vinegar solution for 30 minutes
- Rinse and refill with distilled water (or use tap water and appropriate treatment).

Quarterly Inspection

- Check components including pump for proper operation.

Additional Actions

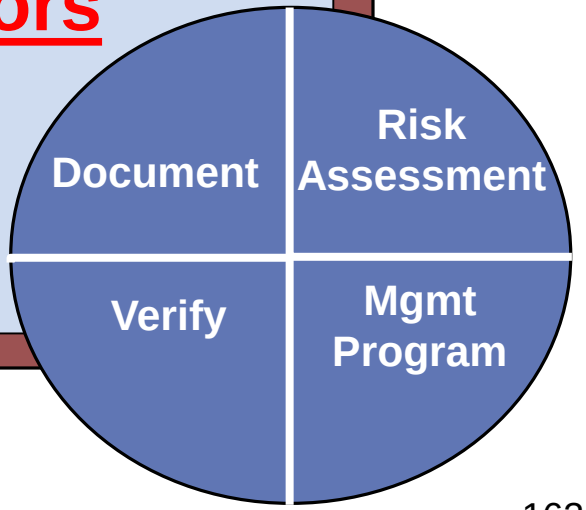
- If unit is to be down for 3 or more days, drain unit completely and let it sit dry. When ready to operate refill and add normal treatment.
- If unit water is allowed to sit stagnant for 3 or more days, unit should be drained completely and disinfected with 5 ppm chlorine circulated for 30 minutes then rinsed and refilled prior to operation.
- If water is cloudy or smelly perform disinfection step above.

AGENDA

6. Requirements Details

A. Potable Water Supplies
B. Cooling Towers
C. Whirlpools & Spas
D. Fountains
E. Aerosol Generators

- New Design/ Construction



Aerosol Generators

1. Equipment Siting. Prior to beginning construction for installation of new or replacement aerosol-generating misters,
atomizers, air washers, or humidifiers, drawings shall be reviewed and the following items addressed:

- Potential contamination from sources that can be drawn into the system
- Inadequate access to pumps, filters, and treatment equipment for maintenance and inspection
- External heat sources and inadequate airflow that increase the temperature and thereby the *risk* of exposure to *Legionella*

2. New-System Start-Up. The *Program* documents shall have procedures for cleaning that is required when commissioning misters, atomizers, air washers, and humidifiers.

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Example Components

Aerosol Generator Water Mgmt Program

3. System Maintenance. The *Program* documents shall include procedures for

- A maintenance schedule and instructions for maintaining air-washer mist eliminators, evaporative cooler/humidifier media, spray nozzles, water distribution system operation, and other equipment and components identified by the *Program Team*;
- A maintenance schedule and instructions for cleaning basins and remote sumps and for cleaning and purging stagnant and low-flow zones; and
- Maintenance procedure documentation, inspection notes, and *corrective actions*.

4. Water Treatment. The *Program* shall have procedures for

- All equipment and chemicals used for the purpose of treating the open recirculating loop,
- An inspection and maintenance schedule for the water treatment equipment, and
- Schedule for all *monitoring* required by the water treatment program.

5. System Shutdown and Start-Up. The *Program* shall have:

- System shutdown, including any required chemical pretreatment or pump cycling, and procedures for shutdown periods that exceed the number of idle days specified by the *Program Team*;
- System start-up from a drained condition; and
- System start-up from an undrained (stagnant) condition that exceeds the number of idle days specified by the *Team.*

6. *Disinfection*. The *Program* documents shall have procedures for remedial on-line *disinfection* and the conditions requiring its application and for emergency *disinfection* and the conditions requiring its application.

7. Contingency Response Plan. The *Program* documents shall include

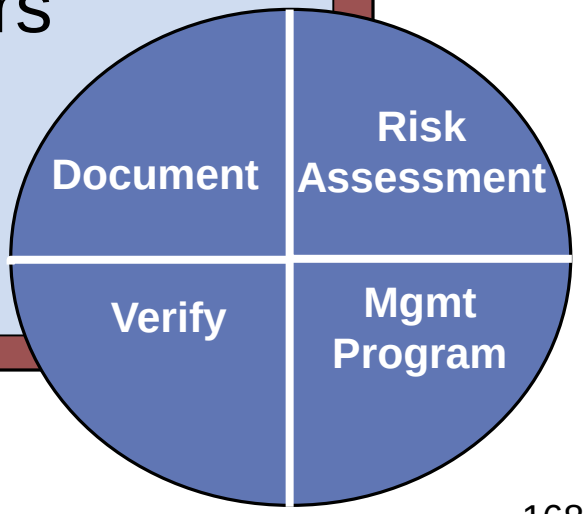
- Procedures to be followed if there are known or suspected cases of *legionellosis* associated with the use of aerosol generating misters, atomizers, air washers, and humidifiers;
- Directions issued by national, regional, and local health department authorities;
- Procedures that include criteria for when and where the tests shall be performed if the *Program Team* determines that *testing* for *Legionella* shall be performed; d. procedures for emergency *disinfection*; and
- Procedures for other actions identified by the *Program Team* to prevent exposure to contaminated water.

AGENDA

6. Requirements Details

A. Potable Water Supplies
B. Cooling Towers
C. Whirlpools & Spas
D. Fountains
E. Aerosol Generators

- **New Design/ Construction**



Example Components

New Building
Water Mgmt Program

NEW CONSTRUCTION & RENOVATIONS

For new construction and renovations, the *Designated Team* shall review the scope of work and determine the *risk* associated with the project, and the senior organizational leadership or their *designee* shall require the building designer and builder to:

- To work cooperatively with the *Designated Team* to conduct an evaluation and estimate of the likelihood of *legionellosis* for the project;
- Based on the results of this evaluation and estimate, the *Designated Team* shall modify the *Water Mgmt Program plan* as necessary for the project (1) during the early planning, (2) during each phase of design and construction, and (3) during commissioning;
- To provide timely documented reports to the *Designated Team* confirming compliance with the *legionellosis risk management plan*; and
- To provide a commissioning plan.

Example Components

Existing Building Water Mgmt Program

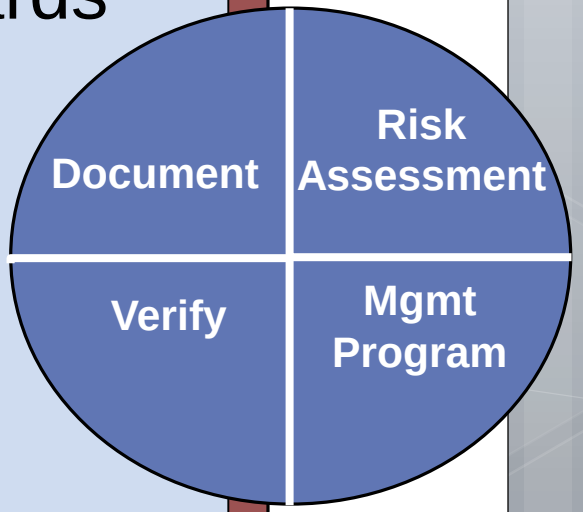
EXISTING BUILDINGS

The *Team* shall review the *Water Management plan & modify* as necessary, as follows

1. The *Designated Team* shall conduct an annual evaluation and estimate of the likelihood of *legionellosis* for each existing building
2. Whenever a building or portion of a building is changed such that one or more water system is affected;
3. Whenever major maintenance to a *building water system* is performed, including replacing tanks, pumps, heat exchangers, and distribution piping; and
4. Whenever there is a *water service disruption* from the supplier to the building.

AGENDA

1. What is Legionella?
2. CMS & TJC Standard
3. CDC & ASHRAE Standards
4. Program Details
   - Risk Assessment
   - Water Mgmt Program
   - Verify
   - Documentation



5. Controls
6. Requirements Details
7. **Resources**

Bonus→

Resources

Just Google "Legionella" for a wealth of Information

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

CDC's ELITE Program
Centers for Disease Control and Prevention
wwwn.cdc.gov/ELITE/Public/EliteHome.aspx

Planning Guides & Toolkits

Emergency Water Supply Planning Guide for Hospitals and Healthcare Facilities
Centers for Disease Control and Prevention, American Water Works Association
Published 2012
www.cdc.gov/healthywater/pdf/emergency/emergency-water-supply-planning-guide.pdf

Drinking Water Advisory Communication Toolbox
US Department of Health & Human Services, Centers for Disease Control and Prevention, Environmental Protection Agency, American Water Works Association
Published 2013
www.cdc.gov/healthywater/pdf/emergency/drinking-water-advisory-communication-toolbox.pdf

Investigation Tools for Clusters and Outbreaks of Legionnaires' Disease
Centers for Disease Control and Prevention
www.cdc.gov/legionella/outbreak-toolkit

Healthcare Resources

Sehulster LM, Chinn RYW, Arduino MJ, Carpenter J, Donlan R, Ashford D, et al. **Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC).** *MMWR.* 2003;52 (RR-10): 1–42.
www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm

Tablan OC, Anderson LJ, Besser R, Bridges MD, Hajjeh R. **Guidelines for preventing health-care-associated pneumonia, 2003: Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee.** *MMWR.* 2004;53(RR-3):1–36.
www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm

Prevention of Healthcare-associated *Legionella* Disease and Scald Injury from Potable Water Distribution Systems
Veterans Health Administration
Published 2014
http://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=3033

Legionnaires' Disease Information

Legionnaires' Disease Website
Centers for Disease Control and Prevention
www.cdc.gov/legionella

AGENDA

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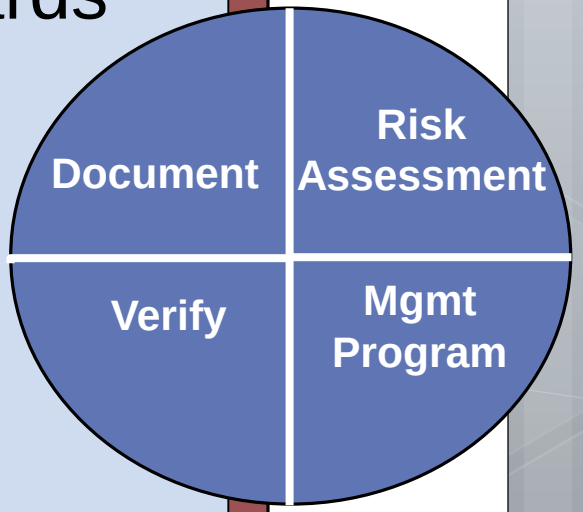

5. Controls
6. Requirements Detail
7. Resources

Oct 2018

WHEA Lunch & Learn

Lauzon Life Safety Consulting

Healthcare Survey Protection

Your Protective Shield in the Code War

Infection Control

Legionella Compliance