ASHRAE LEGIONELLA STANDARD 188

Application Should Be Evidence-based

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ASHRAE 188-2015

• Role of 188-2015 in the management of building water systems (cooling towers and potable water systems) in preventing Legionnaires’ disease

• Mind the Gap: What’s missing?
Evidence-based

• Recommendations should be validated through controlled studies

• Recommended approaches/actions should achieve the expected result: prevention of the disease through environmental/engineering controls
THE CHALLENGE OF LEGIONNAIRES’ DISEASE
• Legionellosis cases have increased substantially – over 200% in last 10 years
Summary: Legionnaires’ Disease

• 2 – 5% of all community-acquired pneumonia

• Most cases in people with health conditions that increase risk
  ▪ 25% in otherwise healthy people
  ▪ Early treatment with effective antibiotics reduces mortality
  ▪ Mortality as high as 30% for healthcare acquired cases
Historical Approaches to Prevention

• REACTIVE
  ▪ After cases occur
    • Combined epidemiologic and environmental investigation
    • Legionella source identified = decontaminate

• PROACTIVE
  ▪ Before cases, perform environmental surveillance
  ▪ Also perform clinical surveillance to identify cases
    • Legionella source identified = decontaminate
South Bronx Outbreak

- 130 cases, 12 deaths
- Declared over August 20, 2015
- Cooling tower identified as the source

"I'm happy to announce that the outbreak is over," Health Commissioner Mary Bassett told a Manhattan news conference.

The South Bronx outbreak of Legionnaires' disease that killed a dozen New Yorkers and sickened another 127 is officially history.
• First Legionella standard in the United States.

• Approved June 26, 2015
What Is ASHRAE Standard 188?

The purpose is to establish minimum Legionellosis risk management requirements for building water systems.
Water Safety and Management Plans

ASHRAE 188
## New Responsibilities

<table>
<thead>
<tr>
<th><strong>Building Owners &amp; Facility Managers</strong></th>
<th><strong>Water Management Team</strong></th>
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<tr>
<td>Responsible for implementing ASHRAE 188 requirements and safeguards to protect against <em>Legionella</em></td>
<td>Assist building owners with Program development and review, monitoring water systems and results interpretation</td>
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IMPLEMENTING THE STANDARD
Compliance

The building shall be surveyed to determine whether it has one or more of the listed water systems and/or the factors described that relate to risk for Legionellosis.
Does ASHRAE 188 apply to me?

• Section 5: Building Survey
  • Building owners must survey all existing buildings for the following:
    • Non-potable Systems
    • Building Characteristics
Water Systems Covered by 188

- Potable and non-potable water systems, in the building or on the site
  - Includes building water distribution systems (including centralized potable water heater systems)
  - Cooling towers, evaporative condensers
  - Whirlpools or spas
  - Ornamental fountains, misters, atomizers, air washes, humidifiers or other non-potable water systems or devices that release water aerosols in the building or on the site
Section 5.2: Building Characteristics

- Multiple housing units
- > 10 stories high (including below grade)
- Patient stays exceed 24 hours
- One or more areas for purpose of housing or treating occupants receiving treatment for burns, chemotherapy, organ transplantation or bone marrow transplantation
Section 5.2: Building Characteristics

• One or more areas for the purpose of housing or treating occupants that are immuno-compromised, at-risk, taking drugs that weaken immune system, have renal disease, have diabetes, or chronic lung disease

• Housing occupants over the age of 65.
Does the building have open and closed circuit cooling towers or evaporative condensers that provide cooling and/or refrigeration for HVAC&R system or other systems or devices in the building?
If Yes, Then…

A program shall be implemented to manage the risk of Legionellosis for those water systems
ASHRAE 188 Components

• Two paths for existing buildings
  ▪ Path A (Standard Body)
    • Applies to all facilities
  ▪ Path B (Normative Annex A)
    • Option for accredited healthcare facilities with certified infection control professionals

• Requirements for New Construction
  ▪ Applies to Path A & B
# Elements of Water Management Program

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ASHRAE 188: Mind the Gaps
A Few Gaps

• The standard requires reducing hazardous conditions to an “acceptable level” through monitoring and maintenance

**BUT** doesn’t define “acceptable level.”
The ASHRAE 188 Legionella Standard tells building owners what to do but not how to do it.

• This creates gaps when it comes to Legionella control—gaps that could make building owners vulnerable and open to liability claims for failing to prevent disease.
Elements of Water Management Program

**Confirmation** – Establish procedure to confirm Program is being implemented as designed (verification) and the Program effectively controls the hazardous conditions (validation).

- **Validation**
  - Evidence that confirms the effectiveness of the plan
  - How do you know *Legionella* is being controlled?
    - Establish validation measures
A Few Gaps

• Legionella testing isn’t required to validate that the risk management program is working.

• The Program Team shall include consideration in determining whether to test for Legionella:
  ▪ If control limits not maintained
  ▪ Facility provides in-patient services to at risk or immunocompromised populations
  ▪ There’s a history of Legionellosis
WMP Team
Determines Approach to Testing

• The Program Team shall determine the testing approach including:
  ▪ Sampling frequency
  ▪ Number of samples
  ▪ Locations and sampling methods
The Microbiology of Prevention
Not All *Legionella* Are Dangerous
Legionella Species Are Not Equal When it Comes to Causing Disease

- 58 named species to date

- Only half implicated in human disease, *Legionella pneumophila* serogroup 1 causes majority of cases

- Some species very common in the environment, but rarely cause illness, and almost exclusively in the immunocompromised
Sources of Exposure

WELL-DEFINED BUT UNDER APPRECIATED SOURCE
"Legionella as "the single most common etiologic [disease-causing] agent associated with outbreaks involving drinking water."
**Legionella in Water: 2015**

Centers for Disease Control and Prevention (CDC) reported:

- *Legionella* accounted for 66% of outbreaks among drinking water–associated outbreaks
- 431 cases of illness, 102 hospitalizations, and 14 deaths

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6431a2.htm?s_cid=mm6431a2_w
Sources

- Warm water distribution in:
  - Hospitals
  - Nursing homes
  - Rehabilitation centers
  - Office buildings
  - Apartment buildings
  - Hotels
  - Residential homes

- Other water systems:
  - Spas and hot tubs
  - Decorative fountains
  - Humidifiers
  - Cooling towers
Myth: *Legionella* Is Everywhere

- Published studies find:
  - 20–70% of buildings and
  - 30–50% of cooling towers colonized with *Legionella*

- *Legionella* **is not** ubiquitous (everywhere)!
ASHRAE 188 Compliance
Good News, Bad News

- Standard is not prescriptive –
  - **Good News:** You get to make lots of decisions
  - **Bad News:** You get to make lots of decisions
ASHRAE 188:
Your Decisions Fill The Gaps
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Knowledge

The Program Team shall have *knowledge* of the building water system design and water management as it relates to Legionellosis
KNOWLEDGE IS KNOWING A TOMATO IS A FRUIT. WISDOM IS NOT PUTTING IT IN A FRUIT SALAD.

-MILES KINGTON-
Test Your Knowledge: True or False?

- Legionella is ubiquitous (everywhere).
- If chlorine levels at or above 0.5 mg/L in the supply water, Legionella is controlled.
- Only old buildings have Legionella problems.
- If total bacteria are controlled, Legionella is controlled.
- Water and energy conservation approaches minimize Legionella risk.
Important Information To Avoid Outbreaks

• Outbreaks and New Construction
  ▪ With renovation, installation of low flow/electronic sensor faucets
  ▪ Commissioning process ineffective for Legionella removal
  ▪ Long dormant periods (months) before occupying

• CDC ELITE Labs
  ▪ All are not equal in Legionella testing proficiency

• Cooling Tower Biocides
  ▪ All are not effective against Legionella
I Have Legionella…
Now What?

DISINFECTION APPROACHES
Secondary Disinfection Methods

- Thermal shock treatment (heat & flush)
- Shock chlorination (>10 mg/L residual), may require water tanks to be 20-50 mg/L
- Continuous supplemental chlorination (2-4 mg/L)
- Copper-silver ionization (continuous)
- Chlorine Dioxide (ClO2)
- Monochloramine
- Point-of-use filtration
ASHRAE 188: Information on Secondary Disinfection Missing

- Generation technology
- Impact to water quality
- Impact to system components
- Manufacture's operating ranges
- Ability to maintain effective residual
- Evidence-based efficacy
- Permitting and operation requirements
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Monitoring

• Monitor for disinfectant and chemical parameters

• Validate that *Legionella* is controlled - monitor for the target (Legionella)
ASHRAE Compliance

• Compliance is just the first step to protect yourself and building occupants

• Compliance doesn’t guarantee Legionella control and cases can occur.
• Legionnaires’ disease is increasing
• Potable Water systems, especially in hospitals (and other buildings) with complex hot water systems, are the most important source of *Legionella* transmission.
• Proactive prevention = ASHRAE 188 Water Management Programs and Risk Assessments
• Environmental testing for *Legionella* is a key indicator for disease risk
Start Your ASHRAE 188 Water Safety Program

Establish a Plan to Respond Not React
Legionella Anxiety?
Medication
Legionella Chill Pills

• Treatment for *Legionella*-related anxiety.

• Take 2 tablets 1 hour before starting your ASHRAE 188 Water Management Program
THANK YOU

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