Slides Adapted from:

- ANSI/ASHRAE Standard 188-2015
  “An Overview for the Water Treatment Professional”
  Presented by: Bill Pearson from Southeastern Laboratories, Inc.
  September 11, 2015
  www.selaboratories.com
- ANSI/ASHRAE Standard 188-2015
  “Responsibilities, Liabilities & Opportunities”
  Presented by: Matt Freije from HC Resource Information, Inc.
  August 18, 2015
  www.hcinfo.com
- ASHRAE Standard 188 (LB)
  “Overview for the Water Treatment Professional”
  Presented by: Bill Pearson & Matt Freije
  September 9-12, 2015 at the Omni Hotel & Music Center, Nashville, TN
Introduction to Legionella & Legionnaire’s Disease
American Legion Convention, PA
July 1976:

Final Case Count = 221 cases
Deaths = 34
Summer of 2015 – The Perfect Storm:

- June 26, 2015
- ANSI/ASHRAE Standard 188-2015 is Published!
Legionella Outbreak – New York, NY:

- August 11, 2015
- 128+ cases reported
- 12 deaths
San Quentin State Prison - California

- August 31, 2015
- 6 Diagnosed Cases
- 95 under surveillance

SACRAMENTO, Calif. – At least six San Quentin State Prison inmates were ill with Legionnaires’ disease and dozens more under observation Sunday, prompting a weekend halt to visitors, no hot meals and limited drinking water supplies at California’s oldest prison.

At least 51 inmates are under observation for respiratory illness at the prison’s medical unit, said Dana Simas, a spokeswoman with the California Department of Corrections and Rehabilitation.
Illinois Veterans Home – Quincy, IL

- 54 Reported cases
- 13 deaths
Three Elgin, IL Schools Closed

• September 23, 2015

Three schools in Illinois' U-46 school district, which covers 11 communities in Cook, DuPage and Kane counties, shut down Wednesday after test results showed "higher than normal levels of Legionella bacteria," the district said.
Microbiological Background

- Legionella, is a gram negative, aerobic, waterborne pathogen that causes Legionnaires' disease - a serious but preventable form of pneumonia, as well as Pontiac Fever, a flu-like illness.
- The Legionella family encompasses more than 50 bacterial species, 20 of which are known to be associated with human infection. (90% of cases are from *L. pneumophila*, serogroup 1)
- Legionella is estimated to be present in up to 70% of all building water systems.
How Does One Get Legionnaire’s Disease?

- Aerosolized water droplets containing Legionella bacteria are inhaled.
- Contaminated respiratory therapy equipment.
- Aspiration of contaminated water.
Morbidity and Mortality

- According to Tom Watson, chair of the committee that wrote that Standard 188-2015
  - 8,000 to 10,000 cases of Legionnaires Disease are reported annually in the United States
  - More than 10% of those cases are fatal
  - This disease poses a real public health threat!!
How Will Legionnaires’ Disease be Controlled in the US?

- President Obama Mandates a New Prevention Plan ...and makes it part of the economic stimulus package?
- Everyone Voluntarily Begins to Test and Treat Water Systems to Control Legionella?
- **New Directives and Standards are Enacted that Require Hospitals and Building Owners to Address Legionella in Building Water Systems**
Questions?
New ANSI/ASHRAE Standard 188-2015
In 2015 a New ANSI/ASHRAE Legionella Standard – Ready or Not
American Society of Heating, Refrigerating and Air Conditioning

ASHRAE, founded in 1894, is a building technology society with more than 54,000 members worldwide. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow’s built environment today. ASHRAE was formed as the American Society of Heating, Refrigerating and Air-Conditioning Engineers by the merger in 1959 of American Society of Heating and Air-Conditioning Engineers (ASHAE) founded in 1894 and The American Society of Refrigerating Engineers (ASRE) founded in 1904.
Where to get ANSI/ASHRAE Standard 188–2015?

- Standard 188 can be purchased from ASHRAE at:
  http://www.techstreet.com/ashrae/products/1897561

- Standard 188 can be read for free from ASHRAE website under the preview ASHRAE Standards (bottom left of page) at:
  www.ashrae.org/standards
ASHRAE’s 3 Types of Voluntary Consensus Standards

ASHRAE develops three types of voluntary consensus standards accredited by the American National Standards Institute (ANSI):

1) Method of Measurement or Test
2) Standard Design
3) Standard Practice

- 188 is a ‘Standard Practice’ with Design considerations.
- 188 is written in code-ready language – thus, is readily adoptable to be written into codes or related regulations or legislation!
ASHRAE Standards – Special Note

SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus Standard developed under the auspices of ASHRAE. Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this Standard as an ANS, as “substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution.” Compliance with this Standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Senior Manager of Standards of ASHRAE should be contacted for
a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

‘Compliance with this Standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.’

*Overview for the Water Treatment Professional, Bill Pearson & Matt Freije, September 9-12, 2015 at the Omni Hotel & Music Center, Nashville, TN*
ASHRAE Legionella Standard Adopted in New York Following Outbreak

August 17, 2015
Contact: Jodi Scott
ASHRAE Public Relations
678-539-1140 / jscott@ashrae.org

ATLANTA – With 12 confirmed dead and more than 120 cases of infection due to legionellosis, New York City Council on Thursday adopted legislation that requires adherence to part of ASHRAE’s newly published Legionella standard.

The legislation addresses registration and inspection of cooling towers. It requires owners to create and file a plan to maintain equipment to comply with Sections 5, 6 and 7.2 of the ANSI/ASHRAE Standard 188-2015 / Legionellosis: Risk Management for Building Water Systems.

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American Society of Heating, Refrigeration & Air Conditioning Engineers

ASHRAE

... dedicated over 10 years to writing the 188 Legionella Standard!

*Overview for the Water Treatment Professional, Bill Pearson & Matt Freije, September 9-12, 2015 at the Omni Hotel & Music Center, Nashville, TN
**ASHRAE Legionella Standard Adopted in New York Following Outbreak**

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<tbody>
<tr>
<td>SPC-188 began meeting</td>
<td>released (+ PR/2)</td>
<td>released (+ PR/4)</td>
<td>Approved by ASHRAE board</td>
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<tr>
<td>released (+ PR/1)</td>
<td>released (+ PR/3)</td>
<td>released (+ PR/5)</td>
<td>Finalized Standard 188-2015</td>
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*Feb 2005: 1st meeting was GPC-12 (guideline), later as SPC-188
PR = Public Reviews (required by the ANSI/ASHRAE process)*

*ANSI/ASHRAE Standard 188-2015: Responsibilities Liability and Opportunity, Matt Freije, August 18, 2015*
Standard 188 ‘Evolved’ From ASHRAE Guideline 12

*Overview for the Water Treatment Professional, Bill Pearson & Matt Freije, September 9-12, 2015 at the Omni Hotel & Music Center, Nashville, TN*
Compliance with Standard 188

In a Nutshell: Compliance with Standard 188 will require facility owners (managers) to:

1. Establish a Team with assigned responsibilities & accountabilities

2. Have, Practice, & Audit a Water Management Plan for legionellosis risk management of their building water systems
188 provides a framework, but the Team must develop control measures, as applicable for . . .

- New Construction
- Siting
- Startup and Shutdown
- Inspections
- Maintenance
- Cleaning and Disinfection
- Monitoring (e.g., temperatures; disinfectant levels)
- Water Treatment
- Responding to Legionnaires' disease

188 Person Committee

There were 32 voting members, 7 Professional Organizations and many other active professional contributors to the Standard 188 committee.
Voting Member Professional Organizations on Standard 188 Committee Include

1)* CDC: Centres for Disease Control & Prevention
2)* AWT: Association of Water Technologies
3) ASHE: American Society for Healthcare Engineering
4) APIC: Association for Professionals in Infection Control and Epidemiology
5) ASPE: American Society of Plumbing Engineers
6) IAPMO: International Association of Plumbing and Mechanical Officials
7) NSF International

* Represented when committee first formed (2005)
# Sections 4-8 of Standard 188

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<td>2. Scope</td>
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<td>3. Definitions</td>
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<td>5. Building Survey</td>
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<td>7. Requirements for Building Water Systems</td>
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<td>8. Requirements for Designing Building Water Systems</td>
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<td>9. References</td>
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<td>Normative Annex A: Health Care Facilities</td>
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<td>Informative Annex B: Bibliography</td>
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<td>Informative Annex C: Guidance if Legionella Testing is Utilized</td>
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What is the Purpose of ASHRAE Standard 188-2015?

- **Purpose:** Establish minimum *Legionellosis* risk management requirements for *building water systems*.

- **Scope:**
  1) ... for design, construction, commissioning, operation, maintenance, repair, replacement, and expansion of new and existing buildings and their associated water systems.
  2) ... applies to human-occupied commercial, institutional, multiunit residential, and industrial buildings. Does not include single-family residential buildings.
  3) ... for use by owners and managers of human-occupied buildings, excluding single-family residential buildings. Also intended for those involved in the design, construction, installation, commissioning, operation, maintenance, and service of *centralized building water systems* and components.
Section 4: Compliance

<table>
<thead>
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<th>Building Designer Requirements</th>
<th>Building Owner Requirements</th>
<th>Health Care Facility Requirements</th>
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<tbody>
<tr>
<td>4.1</td>
<td>(compliant survey per Sec.5; comply w/Sec.8)</td>
<td>(compliant survey per Sec.5; comply w/Sec.6 &amp; 7)</td>
<td>Don’t comply – Section 4.2, 6 and 7. Comply - Sec. 4.2, 6 &amp; 7 OR with Annex A)</td>
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</tbody>
</table>

188 compliance requires Section 5 surveys be repeated (at least) annually, with results documented & available for review at any time.
Section 4: Compliance

4.3 Health Care Facility Requirements – Cont’d.

Compliance with Section 4.3.2

• Facility is accredited by a regional, national or international accrediting agency or by the authority having jurisdiction (AHJ) over the health care facility Infection Prevention and Control activities

• The health care facility IC program has an infection preventionist that is certified in infection prevention control (CIC) or has an epidemiologist with a minimum of a masters degree of equivalent
5.1 Determine whether it has one or more:

(a)… cooling towers or evaporative condensers that provide cooling and/or refrigeration for the HVAC&R system or other systems;

(b)… whirlpools or spas either in the building or on site;

(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.
ANSI/ASHRAE 188-2015: Water Management Program (WMP)

Implement for …

• Cooling Towers
• Whirlpool Spas
• Ornamental Fountains
• Misters, Air Washers, Atomizers, Humidifiers
• Other Devices that release water droplets
• And for Potable plumbing systems if…

*Overview for the Water Treatment Professional, Bill Pearson & Matt Freije, September 9-12, 2015 at the Omni Hotel & Music Center, Nashville, TN
Section 5: Building Survey

5.2 Determine whether it is characterized by one or more of the following risk factors that relate to legionellosis:

(a) multiple housing units with one or more centralized hot water systems;

(b) more than 10 stories high (including levels below grade);

(c) health care facility where patient stays exceed 24 hours;

(d-e) an area housing or treating occupants with certain medical conditions or risk factors: burns, chemotherapy, solid organ or bone marrow transplantation, immunocompromised, at-risk, with renal disease, diabetes, or chronic lung disease;

(f) identified as housing for occupants over the age of 65.
Implement a WMP for Plumbing Systems if a Building has ANY ONE of the Following:

- Multiple housing units with a centralized hot water system/s
- More than ten stories
- Housing designated for people over age 65
- Patients staying > 24 hours
- An area housing or treating people with certain medical risk factors...

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Implement a WMP for plumbing systems if a Building has an Area for Housing or Treating People

- For burns, cancer-chemo, solid organ or bone marrow transplant
- That are immunocompromised or otherwise more susceptible than the general population because of age, health, drug treatment, medication, smoking, or other issues
- That have renal disease, diabetes, or chronic lung disease

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Section 6: General Requirements

6.1 Principles of a Water Management Program
   6.1.1-6.1.7: outline of risk management principles

WMP → 6.2 Program Development
   6.2.1-6.2.9: detail management program development
Elements of a Water Management Program (WMP)

<table>
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<th>Element</th>
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<tbody>
<tr>
<td>PROGRAM TEAM  — Identify persons responsible for Program development and implementation.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>ANALYSIS OF BUILDING WATER SYSTEMS — Evaluate where hazardous conditions may occur in the water systems and determine where control measures can be applied.</td>
</tr>
<tr>
<td>CONTROL MEASURES — Determine locations where control measures must be applied and maintained in order to stay within established control limits.</td>
</tr>
<tr>
<td>MONITORING/CORRECTIVE ACTIONS — Establish procedures for monitoring whether control measures are operating within established limits and, if not, take corrective actions.</td>
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</tbody>
</table>
| 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. |
For Each Control Point ESTABLISHED

1. Control Limits
   for each control point
   where LB control is
   applied

2. Monitoring Method
   for each control point
   where LB control is
   applied

3. Monitoring Frequency
   for each control point
   where LB control is
   applied

4. Corrective Actions
   to be undertaken when
   control measurement is
   Out of Limits

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Verification & Validation

Water Management Plan: VERIFICATION ➔
The process and evidence used to support that compliance with the Plan is being done – i.e. record-keeping of control monitoring, process procedures and other evaluations. It ensures that the Water Management Plan is being correctly followed in practice:

... "Are you Doing what you Planned to Do?"

Water Management Plan: VALIDATION ➔
The process and evidence used to support that the hazard control elements of the plan are effective. Testing for the control of the hazard or assessment of technical, scientific, medical and other data that can be used to show that control measures for the hazard are effective – i.e. no Legionella, no legionellosis;

... "Are you Doing the Right Thing – Does it Work?"

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Section 7: Requirements for Building Water Systems

7.1 Potable Water Systems
7.2 Cooling Towers & Evaporative Condensers
7.3 Whirlpool Spas
7.4 Ornamental Fountains & Other Water Features
7.5 Aerosol-Producing Misters, Atomizers, Air Washers and Humidifiers

Section 7 is clearly the more extensive & detailed part of the standard – detailing the various potable and nonpotable waters system requirements
Section 8: Requirements for Designing Building Water Systems

8.1 General
8.2 Final Installation Documents
8.3 Balancing
8.4 Commissioning

Section 8 deals with Legionellosis hazard considerations and documentation required when designing for new construction, renovations, refurbishment, replacement, or repurposing of a facility.
ASHRAE Standard 188: Designers Must Provide Documents, Drawings & Instructions for:

- Monitoring and Control
- Code Compliance
- Operation and Maintenance
- Control System Operation
- Calibration
- Installation and Start-up
- Commissioning (including Flushing and Disinfection)
- Filling and Draining
- Equipment Sizes
- Piping Layout
- System Materials
- Pipe Sizes
- Design Flow Rates
- Design Temperatures
- Impact of Heat Loss or Gain

*ANSI/ASHRAE Standard 188-2015: Responsibilities Liability and Opportunity, Matt Freije, August 18, 2015*
ASHRAE Standard 188: Designers Must Note Locations of:

- Equipment
- Access (or note inadequate access)
- Filling and Draining
- Flushing
- Sampling
- Temperature monitoring
- Treatment
- No flow & Low Flow areas
- Outside Air Intakes
- Possible Cross Connections

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ASHRAE Standard 188: Prior to Occupancy

• Balance the Water Systems
• Disinfect and flush no more than 3 weeks before any part of the building is occupied for its intended purpose

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ASHRAE Standard 188: Normative Annex A – Health Care Facilities

- A1 – Definitions
- A2 – Designated Team
  - Senior Leadership, Facilities, Infection Control
- A3 – Water System Flow Diagram
- A4 – Risk Management Plan
  - Hazard analysis, control locations, limits, monitoring procedures and corrective actions, verification, validation.
- A5 – Existing Buildings, New Construction and Renovations
- A6 – Building Water System Procedures
  - Start-Up/Shutdown, Maintenance, Water Treatment

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Questions?
WMP Good Practices
**Process vs. Practice**

**Risk Management Process**
(to comply w/ASHRAE 188)

1. Water system survey for (LB) hazard analysis and process flow diagrams
2. Determine control points and control strategy where the hazard (LB) can be controlled in the system
3. Establish control limits for each control point
4. Establish monitoring protocol and frequency for hazard control
5. Establish corrective actions for out of control monitoring results
6. Establish record-keeping & program documentation procedures
7. Establish verification & validation procedures

**GOOD**

**Water Treatment Practices**

1. Facility Survey of water treatment systems (w/process flow diagrams)
2. Recommend a chemical treatment program with feed, monitoring & control procedures for each point
3. Establish recommended control limits for each control point
4. Establish monitoring/testing protocol and frequency for the WTP
5. Establish corrective actions for out of control monitoring results
6. Establish record-keeping & program documentation procedures
7. Establish verification & validation procedures

*ANSI/ASHRAE Standard 188-2015: Responsibilities Liability and Opportunity, Matt Freije, August 18, 2015*
Water Management Plans . . . Simply Put

Don’t Make a Mountain Out of a Molehill!

Water Management Plans should be thorough – but **KISS** (keeping it simple) should be more than adequate to complete the task!
Opportunities & Liabilities
Facility Owners & Operators

• Did you have a comprehensive WMP for Legionella control?
• Did you fully implement the control measures?
• How well did you validate it?
• Did you make appropriate adjustments based on test results?

Validation is the Key to Success!

Culture Test is Gold Standard

Culture Results Tell You:
- Species & serogroup is present
- Informs diagnostic options (Urine antigen for L. pneumophila serogroup 1 only)
- Verifies efficacy of disinfection efforts
- Samples should be sent to an Elite certified lab
How can Watertech Help?

Provide complete water treatment solutions for Legionella control in cooling towers, air washers, evaporative condensers and potable water.

Help with ASHRAE Standard 188 Compliance
Watertech of America, Inc. is here as a resource to assist your facility in obtaining and implementing all parts of the WMP. We have partnered with HC Info, a leading Legionella Consulting group, to assist customers in development of a WMP.

*Watertech of America, Inc. offers the following:*
- Membership on your Program Team
- Full Development of Water Management Program
- Monitoring
- Corrective Actions
- Legionella Testing
- Online Documentation and Recordkeeping
More Information – Contact Us

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