Corrective Actions When Control Measures are Out of Control

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Corrective Actions

WATER SAFETY (RISK) MANAGEMENT STEPS

ROLES & RESPONSIBILITIES

WRITING THE SUMMARY

DESCRIBE THE BUILDING

IDENTIFY RISK

MITIGATE RISK

CORRECTIVE ACTIONS

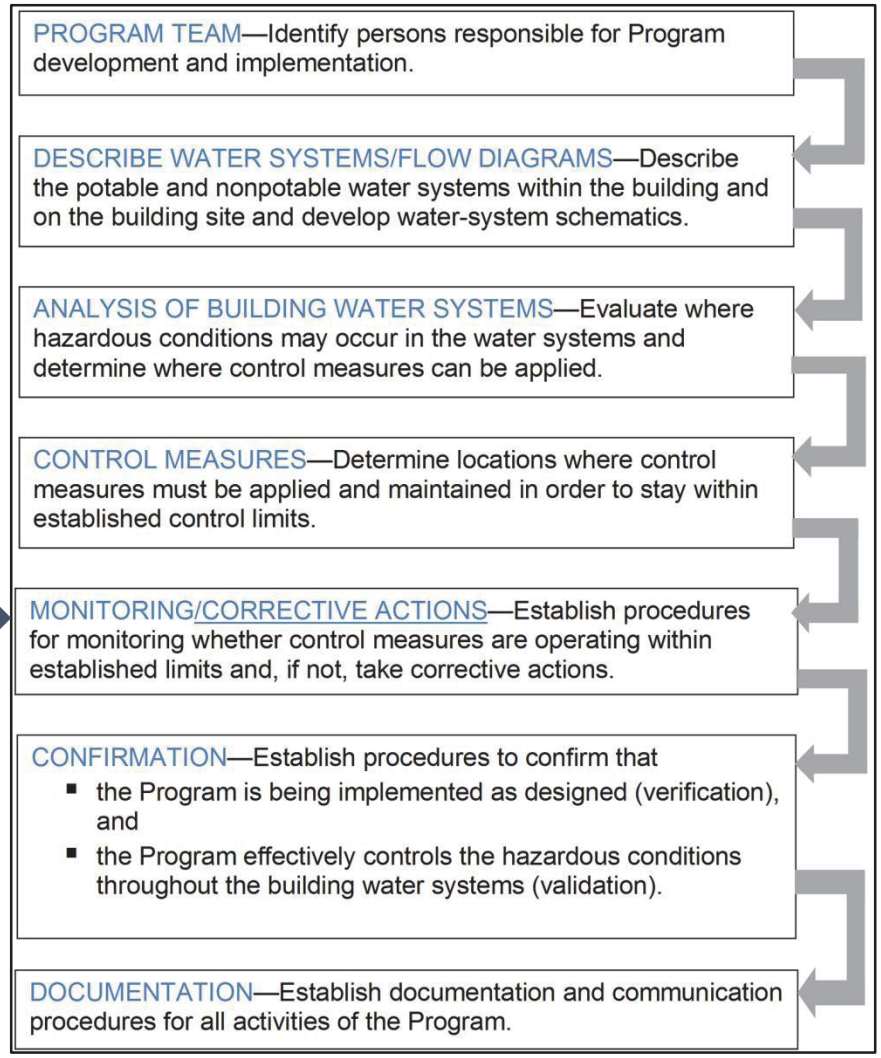
DOCUMENTATION

RESOURCES & TOOLS

WSM Plan – Corrective Actions …

ASHRAE 188 WMP Core Elements:

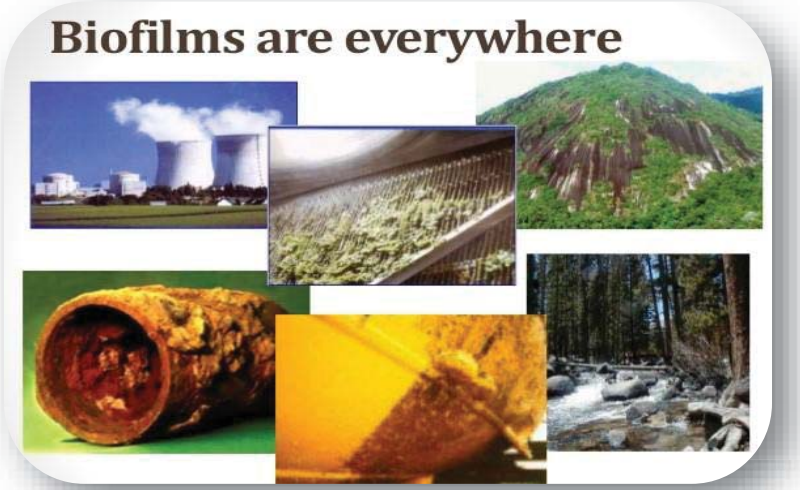
5. Monitor / Correct



WSM Plan – Corrective Actions …

Biofilm is the Problem

- Initiates deposit formation
- Promotes scaling
- MIC (microbial corrosion)
- Barrier to biocides
- Protects pathogens (*Lp*)
- Heat transfer resistance
- Flow resistance
- Particle plugging



WSM Plan – Corrective Actions …

CORRECTIVE ACTION EXAMPLES / per the CDC TOOLKIT

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

Example 1—Biofilm growth in the fountain

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

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

WSM Plan – Corrective Actions

Example 1: Corrective Actions / Biofilm growth in the fountain

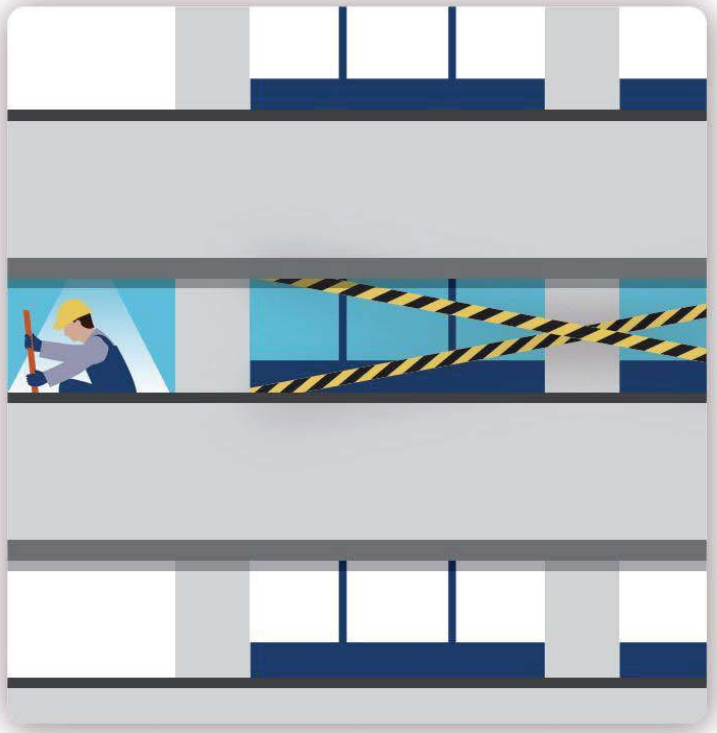
(CDC Toolkit)

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

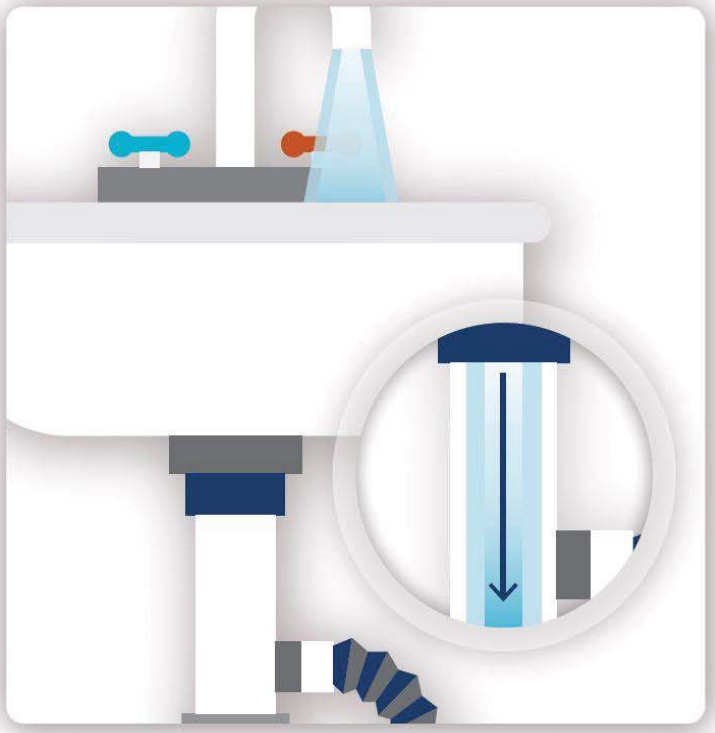
4. Michelle documents her observations and the performance of interim cleaning in her log book. She informs her supervisor.

WSM Plan – Corrective Actions

Example 2: Corrective Actions / Unoccupied Floor



(CDC Toolkit)



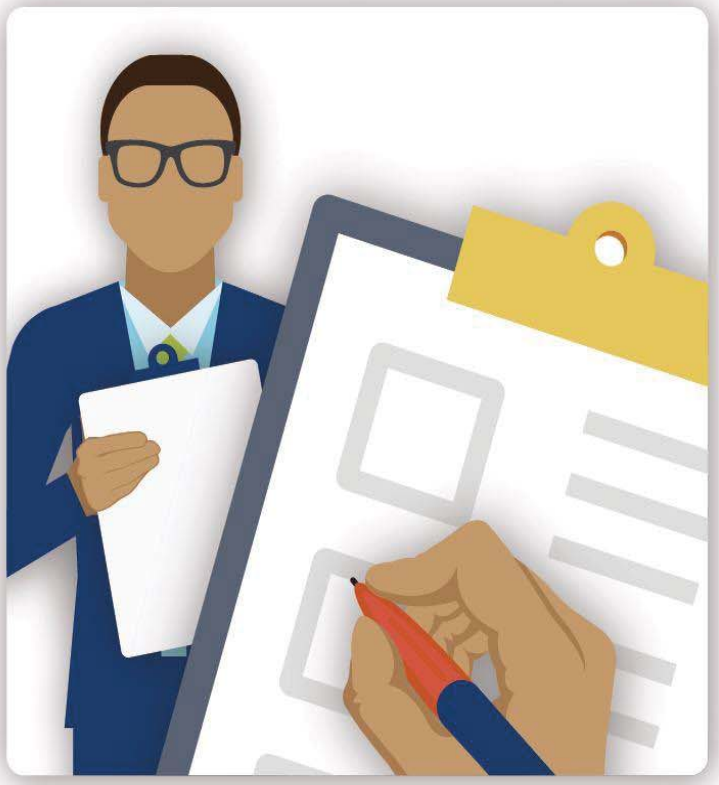
1. The eighth floor of the building is being renovated and is closed to the public. Jason Hernandez understands that this may cause a temporary hazardous condition because water usage will decrease, which means that stagnation is possible.

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

WSM Plan – Corrective Actions

Example 2: Corrective Actions / Unoccupied Floor

(CDC Toolkit)



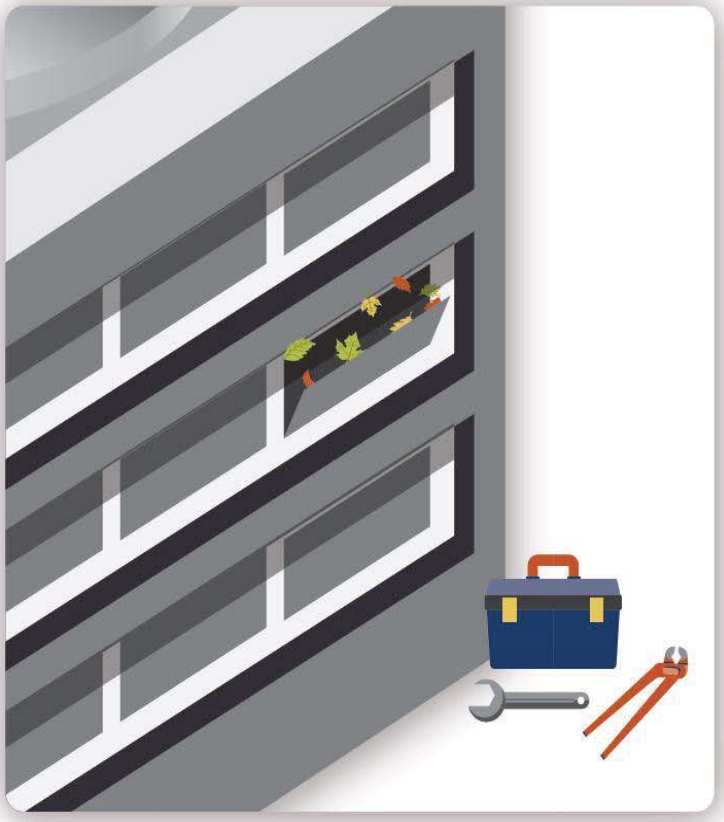
3. Jason also increases monitoring of temperature and chlorine levels on the eighth floor from weekly to daily for the duration of the renovation.

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

WSM Plan – Corrective Actions …

Example 3: Corrective Actions / Debris in the Cooling Tower

(CDC Toolkit)

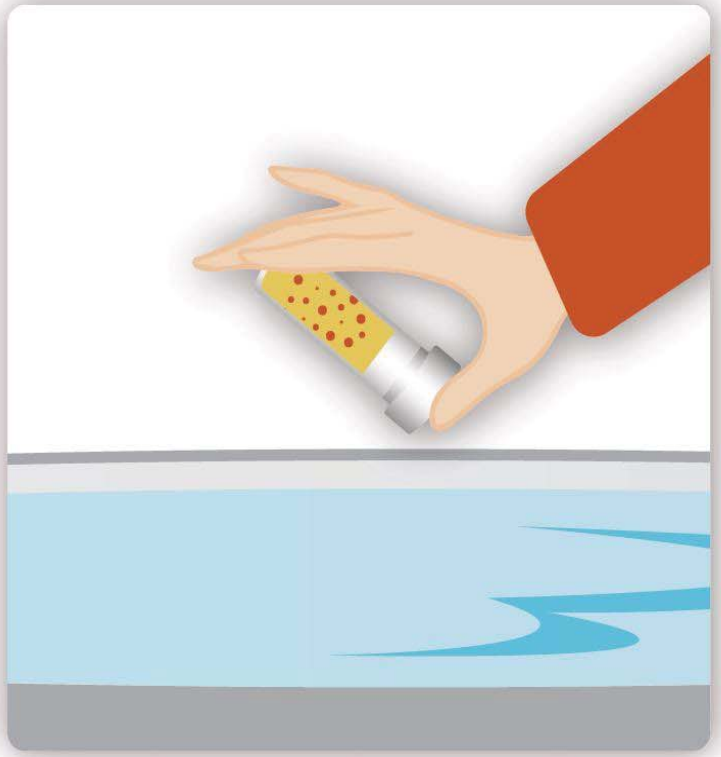


1. During weekly inspection of the cooling tower, Michelle discovers that leaf litter has accumulated in the reservoir.

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

WSM Plan – Corrective Actions …

Example 3: Corrective Actions / Debris in the Cooling Tower

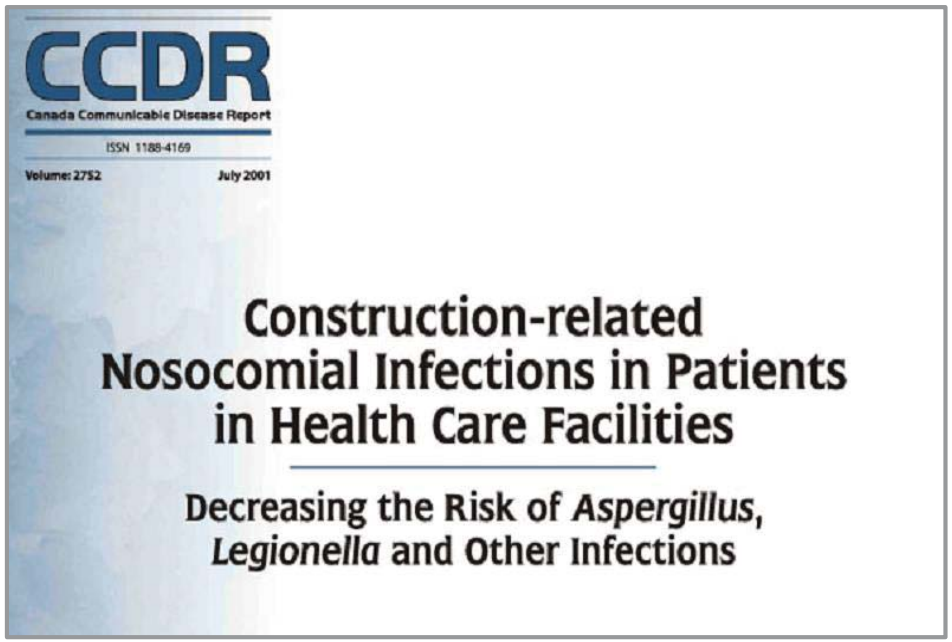


(CDC Toolkit)

3. After replacing the panel and skimming out the debris, Michelle checks the disinfectant levels and performs a heterotrophic plate count to find that the conditions are still within control limits.

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

WSM Plan – Corrective Actions …



A Long History of Legionellosis associated with Health Care Facility Construction

WSM Plan – Corrective Actions …

First Hospital Outbreak – 1965!

- St. Elizabeth Hospital, Washington, DC / 1965
- 81 cases and 14 deaths
- *Legionella pneumophila* serogroup 1 in the hospital water system
- Construction – airborne from sites of soil Excavation

An Outbreak in 1965 of Severe Respiratory Illness Caused by the Legionnaires' Disease Bacterium

S. B. Thacker, J. V. Bennett, T. F. Tsai, D. W. Fraser, J. E. McDade, C. C. Shepard, K. H. Williams, Jr., W. H. Stuart, H. B. Dull, and T. C. Eickhoff

From the Bureaus of Epidemiology and Laboratories, Center for Disease Control, Atlanta, Georgia

WSM Plan – Corrective Actions

Hospital Construction – a major problem

- New $135M 12-story patient tower
- Media coverage & legal proceedings
- $61k for outbreak management

Dayton Daily News

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Updated: 11:24 p.m. Thursday, July 21, 2011 | Posted: 11:23 p.m. Thursday, July 21, 2011

Legionnaires' outbreak linked to water

The hot water system sickened 11 patients at Miami Valley Hospital.

By Ben Sutherly

Staff Writer

DAYTON — Insufficient heating of the hot-water system in Miami Valley Hospital's new 12-story addition was the primary reason for the largest outbreak of Legionnaires' disease in Ohio since 2004, according to the hospital.

The outbreak of Legionnaires' disease at the hospital in February and March highlights an unintended result of plumbing codes that could put vulnerable populations like hospital patients at

WSM Plan – Corrective Actions …

Learn from the **Experience** (Mistakes) of Others

WSM Plan – Corrective Actions …

Learn from the Experience/Mistakes of Others

- **Outbreaks after New Construction or Renovations**
- **Outbreaks after installation of Low Flow/Electronic Sensor Faucets**
- **Outbreaks after long dormant periods (Months) before occupancy**
- **Commissioning process ineffective for *Legionella* removal**

WSM Plan – Corrective Actions …

Final Thoughts: Construction and Legionella

- Legionnaires' disease and *Legionella* contamination can occur in new buildings during construction & in existing structures during renovation of old buildings
- Risk can be managed:
  - Assessment and Water Safety Management Plans
  - Think (*Legionella*) **differently** about the routine commissioning process
  - Test for *Legionella* before & after construction

WSM Plan – Corrective Actions
Contingency response plan

Investigating Cases of Legionnaires' Disease

Legionnaires' disease is caused by multiple factors. When a case or cases are identified at a facility this doesn't mean that the building water system is the source of exposure. Investigation of the water system and patient is required to determine the link.

If a suspected case of Legionnaires' disease is reported at your facility refer to ASHRAE Standard 188 and other public health guidance documents. Suggested steps to be taken in response to identified cases may also include:

1. Collect information on the suspected case: patient's name, date of diagnosis, dates when patient was at your facility for 21 days prior to the date of diagnosis, locations frequented by patient while at the facility (rooms, floors, restrooms, kitchenettes, etc.)

2. Follow instructions provided by the health department when contacted.

3. Collect water samples for Legionella testing:
- Collect a minimum of 10 samples from distal hot water outlets.
- Take both water and swab samples from fixtures frequented by the diagnosed individual.
- Collect immediate and flushed sample from the hot water heaters serving the patient area.

4. Send samples to Special Pathogens Laboratory (SPL). SPL is an independent CDC-ELITE certified laboratory that uses culture-based method for Legionella isolation and enumeration as described in the International Standards Organization (ISO) Standards 11731-1:1998 and 11731-2:2004. SPL can identify Legionella species and serogroups, and will store isolates.

5. If Legionella is detected follow corrective actions established in the water safety plan and consult with Special Pathogens Laboratory to determine the appropriate remediation approach, based on the following information:
- Occupants' characteristics regarding risk, especially immunocompromised (i.e. healthcare facilities, especially those providing overnight stays, house populations with a higher risk than commercial buildings).
- The type of Legionella species and serogroup detected from water samples. *Legionella pneumophila* serogroup 1 is the most pathogenic causing more the 90% of all cases.
- Extent of colonization of Legionella. When greater than 30% of representative samples from the water system are positive studies show this increases the risk for cases. Increase clinical surveillance and consider secondary disinfection.

WSM Plan – Corrective Actions …

State Health Officials hold the keys to *Legionella* prevention …

- **Regulations** are ultimately needed for facilities to implement WSM plans, state officials hold the keys to preventing Legionnaires' disease – as states are the entities most likely to regulate.
- The CDC has influence but does not issue regulations.
- The EPA focuses on water distribution up to the street tap, not on systems within buildings.
- Water treatment professionals, engineers, and consultants can continue talking about better methods and procedures – **but the information won't prevent disease unless it changes the way building water systems are designed, operated, and maintained** – which, will invariably depend on **regulations** to do so.

WSM Plan – Corrective Actions …

Regulations based on a Standard could be established quickly …

- CMS simply issued a memorandum that hospitals and nursing homes must implement a WMP that reduces the risk of LD
- The entire memorandum was less than 3.5 pages, the directive itself consisted of only three sentences!
- With just the stroke of a pen, CMS did more to increase the prevention of disease in hospitals and nursing homes than had been accomplished with decades of guidelines, warnings, standards, articles, speeches, conferences, seminars & webinars!

CMS could not have established the requirement so simply or quickly without a standard (ASHRAE 188) to reference as a guide for WMP/WSM Plans.

WSM Plan – Corrective Actions …

ASHRAE Standard 188 is the best standard on which to base *Legionella* regulations – why?

- **It is ready,** here and now, and been in place for 3+ years – waiting for a "better" standard will cost health and life
- It is a **continuous maintenance standard** – there is a formal process for accepting and considering comments and making changes to improve the standard
- 188 outlines the **essential elements** and **framework** for a WMP/WSM – states can monitor documentation for specific procedures and performance criteria they want

WSM Plan – Corrective Actions …

Summary:

- *Legionella* is a common bacteria found in the environment and in man-built water systems
- Disease causation is ***not*** simple – involves many factors:
  - favorable conditions for LB growth, means of (aerosols) transmission and exposure route to susceptible persons
- Cooling water and potable water systems *all* important
- ***There is a 'standard of care' (not 'best practice') that has gained significant recognition and is required by certain AHJs, including CMS, for Legionellosis Risk Management in Building Water Systems – ASHRAE Standard 188.***