MAY 6 | 10:00 AM - 11:00 AM | BALLROOM IV

SURVEY READINESS: Water Management and Water Safety During Construction

Presented by:

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Regional Manager

SARA JOHNSON
Account Manager

phigenics®
Independent Water Management

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Phigenics' Bias Disclosure

Phigenics provides INDEPENDENT expert guidance for the development and implementation of water management programs to prevent building-associated injury and disease and to improve operational efficiency for facilities.

We provide real-time monitoring solutions, cloud-based data management, and environmental testing for all waterborne pathogens and analytical services for water chemistry.

Phigenics does not sell water treatment chemicals or disinfection products, nor do we have commercial affiliation or funding from suppliers or manufacturers of such products.

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Learning Objectives

- **Review** key considerations from the revised Elements of Performance (EP's)
- **Describe** how a Water Management Team can utilize ASHRAE, CMS, and CDC guidance to achieve alignment with the new Joint Commission requirements
- **Identify** areas of your water management program to strengthen in preparation for 2022 TJC surveys
- **Understand** the water related risks associated with construction activities and how to mitigate them

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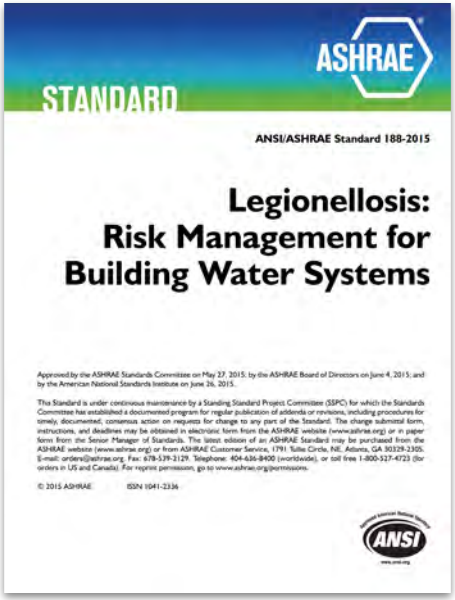
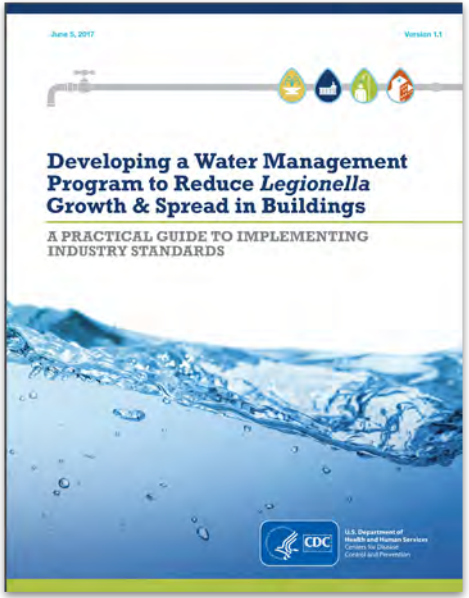
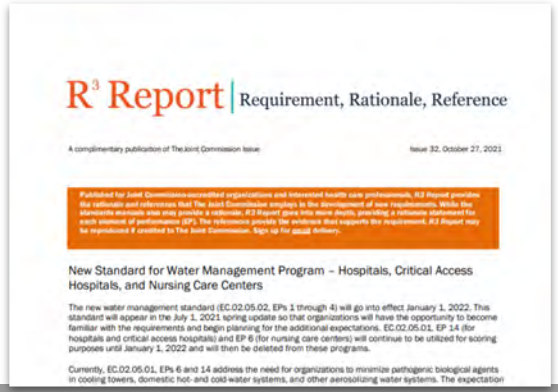
Industry Leading Guidances







Is Your Water Management Program Already Aligned with Joint Commission Requirements?

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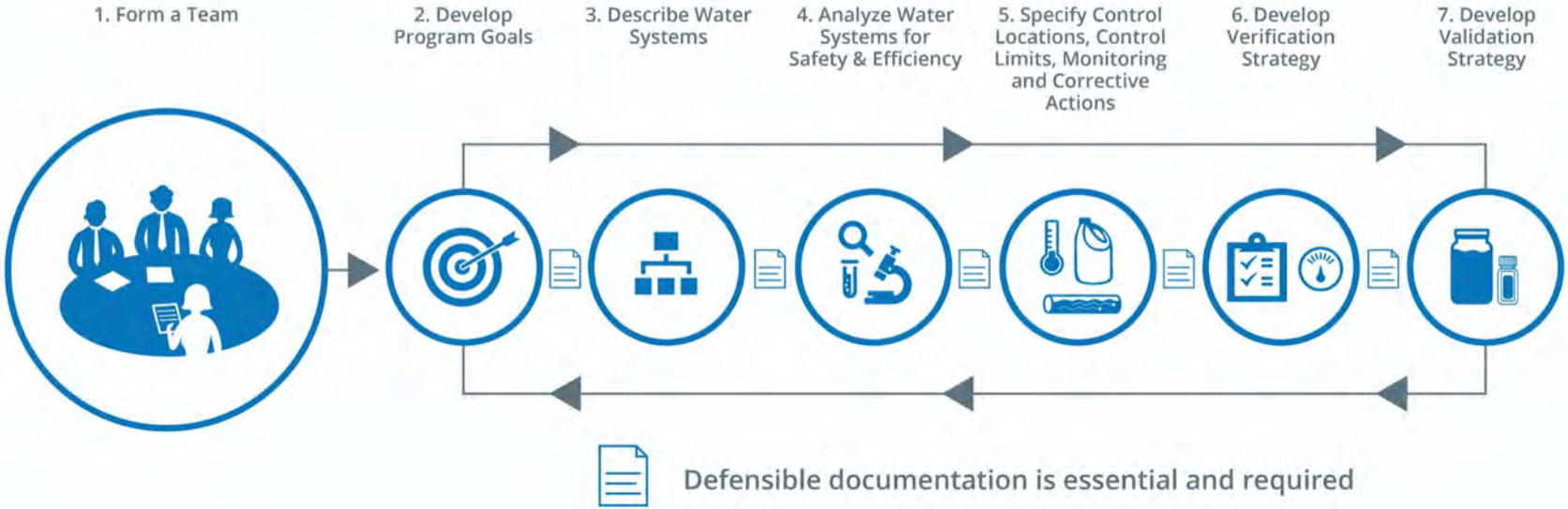
7 STEPS OF THE COMPREHENSIVE AND DEFENSIBLE WATER MANAGEMENT PROGRAM



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Prior to January 2022

TJC Manual Environment of Care (EC) Standard

- **EC.02.05.01:** The hospital manages risks associated with its utility systems.
- **EP 14:** The hospital minimizes pathogenic biological agents in cooling towers, domestic hot- and cold-water systems, and other aerosolizing water systems.

Previous Expectations for Healthcare Facilities:

1. Conduct risk assessment for potential areas of growth and spread

2. Implement a water management program that considers ASHRAE industry standard and CDC toolkit.
    - Must include control measures that addresses: physical controls, temperature, disinfection levels, visual inspection, and environmental testing

3. Specified testing protocols and acceptable ranges for control measures and documented results of resting and corrective actions taken when control limits are not maintained.

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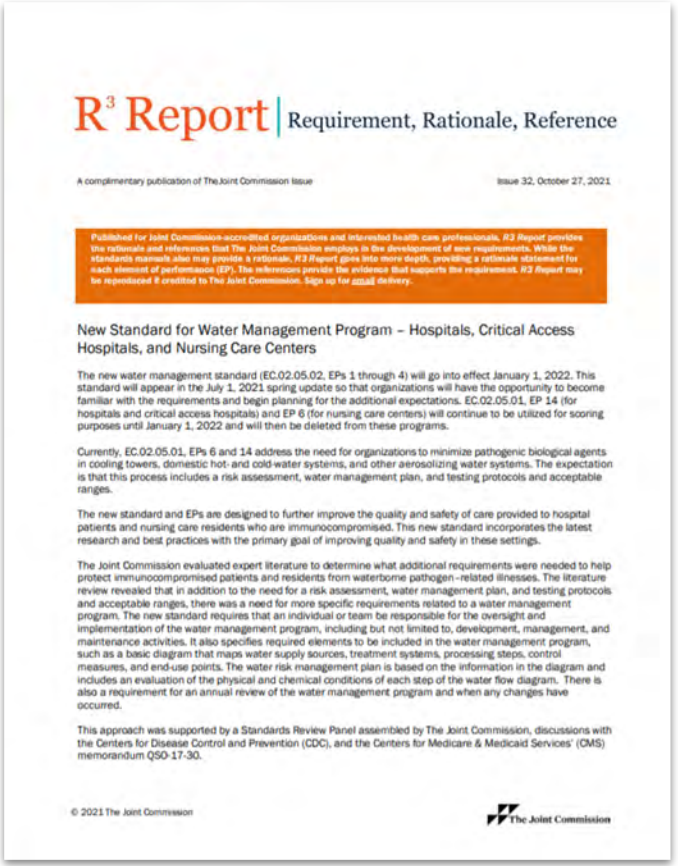
January 2022 and Beyond

- **Prepublication Requirements Communicated March 19, 2021**
- **EC.02.05.02:**
  - The hospital has a water management program that addresses *Legionella* and other waterborne pathogens.
  - Note: The water management program is in accordance with law and regulation.
  - Effective January 1st, 2022
  - Contains four (4) Element(s) of Performance (EP)
- **In addition to this EC, references will also be made to IC.01.03.01 and IC.01.05.01**



R³ Report | Requirement, Rationale, Reference

A complimentary publication of The Joint Commission Issue — Issue 32, October 27, 2021

Published for Joint Commission-accredited organizations and interested health care professionals, *R³ Report* provides the rationale and references that The Joint Commission employs in the development of new requirements. While the standards manuals also may provide a rationale, *R³ Report* goes into more depth, providing a rationale statement for each element of performance (EP). The references provide the evidence that supports the requirement. *R³ Report* may be reproduced if credited to The Joint Commission. Sign up for email delivery.

New Standard for Water Management Program – Hospitals, Critical Access Hospitals, and Nursing Care Centers

The new water management standard (EC.02.05.02, EPs 1 through 4) will go into effect January 1, 2022. This standard will appear in the July 1, 2021 spring update so that organizations will have the opportunity to become familiar with the requirements and begin planning for the additional expectations. EC.02.05.01, EP 14 (for hospitals and critical access hospitals) and EP 6 (for nursing care centers) will continue to be utilized for scoring purposes until January 1, 2022 and will then be deleted from these programs.

Currently, EC.02.05.01, EPs 6 and 14 address the need for organizations to minimize pathogenic biological agents in cooling towers, domestic hot- and cold-water systems, and other aerosolizing water systems. The expectation is that this process includes a risk assessment, water management plan, and testing protocols and acceptable ranges.

The new standard and EPs are designed to further improve the quality and safety of care provided to hospital patients and nursing care residents who are immunocompromised. This new standard incorporates the latest research and best practices with the primary goal of improving quality and safety in these settings.

The Joint Commission evaluated expert literature to determine what additional requirements were needed to help protect immunocompromised patients and residents from waterborne pathogen-related illnesses. The literature review revealed that in addition to the need for a risk assessment, water management plan, and testing protocols and acceptable ranges, there was a need for more specific requirements related to a water management program. The new standard requires that an individual or team be responsible for the oversight and implementation of the water management program, including but not limited to, development, management, and maintenance activities. It also specifies required elements to be included in the water management program, such as a basic diagram that maps water supply sources, treatment systems, processing steps, control measures, and end-use points. The water risk management plan is based on the information in the diagram and includes an evaluation of the physical and chemical conditions of each step of the water flow diagram. There is also a requirement for an annual review of the water management program and when any changes have occurred.

This approach was supported by a Standards Review Panel assembled by The Joint Commission, discussions with the Centers for Disease Control and Prevention (CDC), and the Centers for Medicare & Medicaid Services' (CMS) memorandum QSO-17-30.

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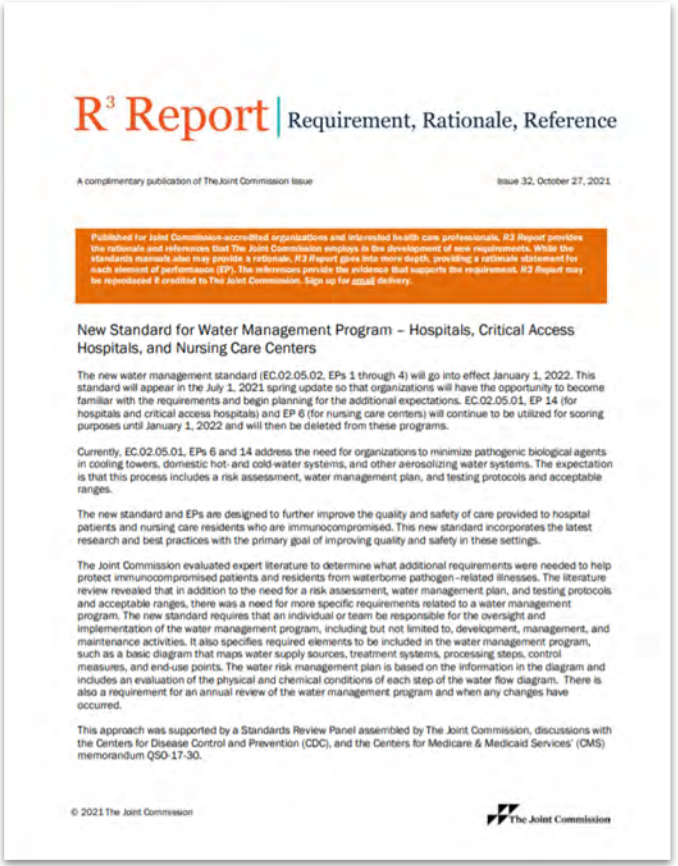
January 2022 and Beyond

- **EC.02.05.02 Elements of Performance:**
  - EP1 - Have a WMT responsible
  - EP2 - WMP Development
  - EP3 - WMP Management
  - EP4 - WMP Review and Updates



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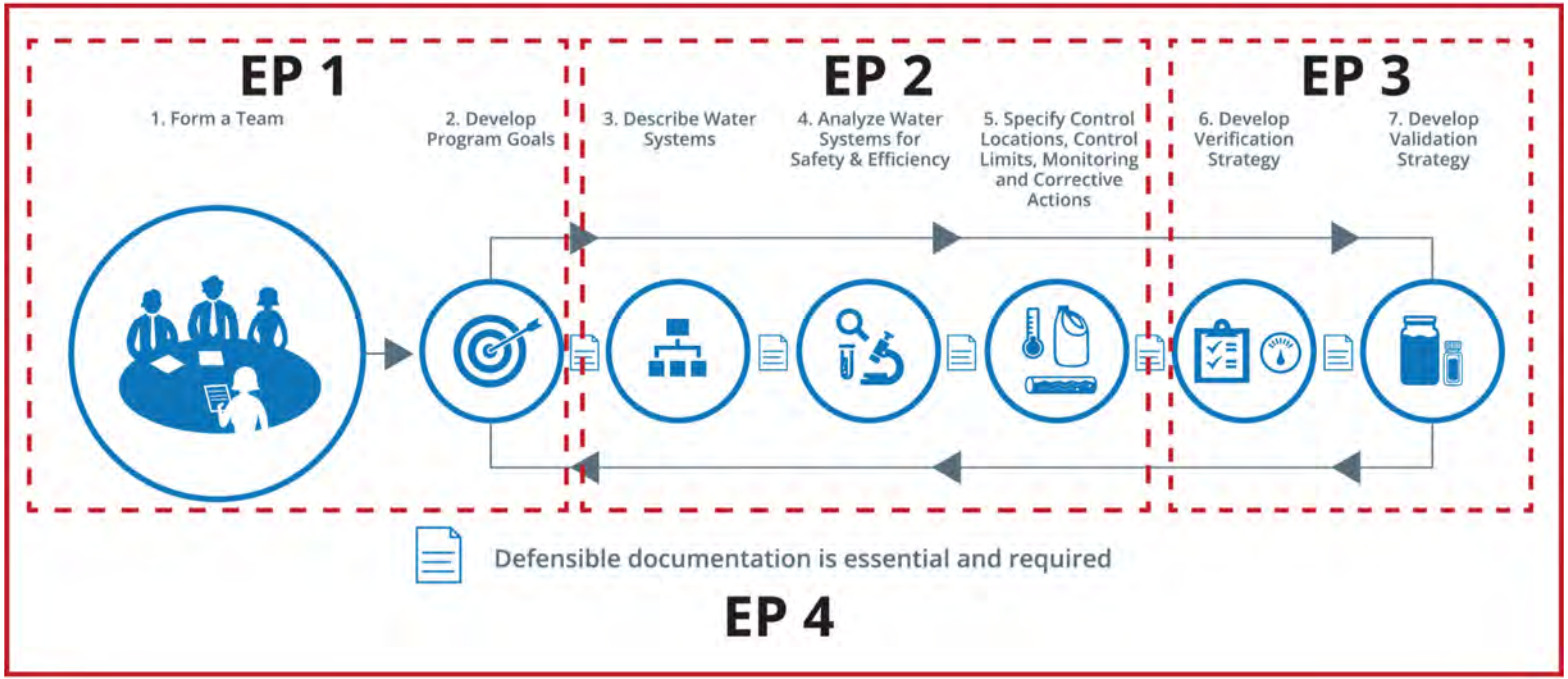
Alignment with Joint Commission Updated **Elements of Performance (EPs)**



Is Your Water Management Program Already Aligned with Joint Commission Requirements?

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January 2022 and Beyond EP 1

The water management program has an individual or team responsible for the oversight and implementation of the program, including but not limited to, development, management, and maintenance activities.

Name	Title	Functional Area	Team Role
Edwin Santos	Environmental Health & Safety Manager	Health & Safety	Voting Member
Erica Saylor	Environmental Services Director	Environmental Services	Voting Member
Frank Montgomery	VP Facilities Management	Facilities & Engineering	Responsible Party, Voting Member
Irene Peterson	Infection Preventionist	Infection Prevention & Control	Voting Member
Isaac Davis, MD, MPH	Epidemiologist	Infection Disease	Voting Member

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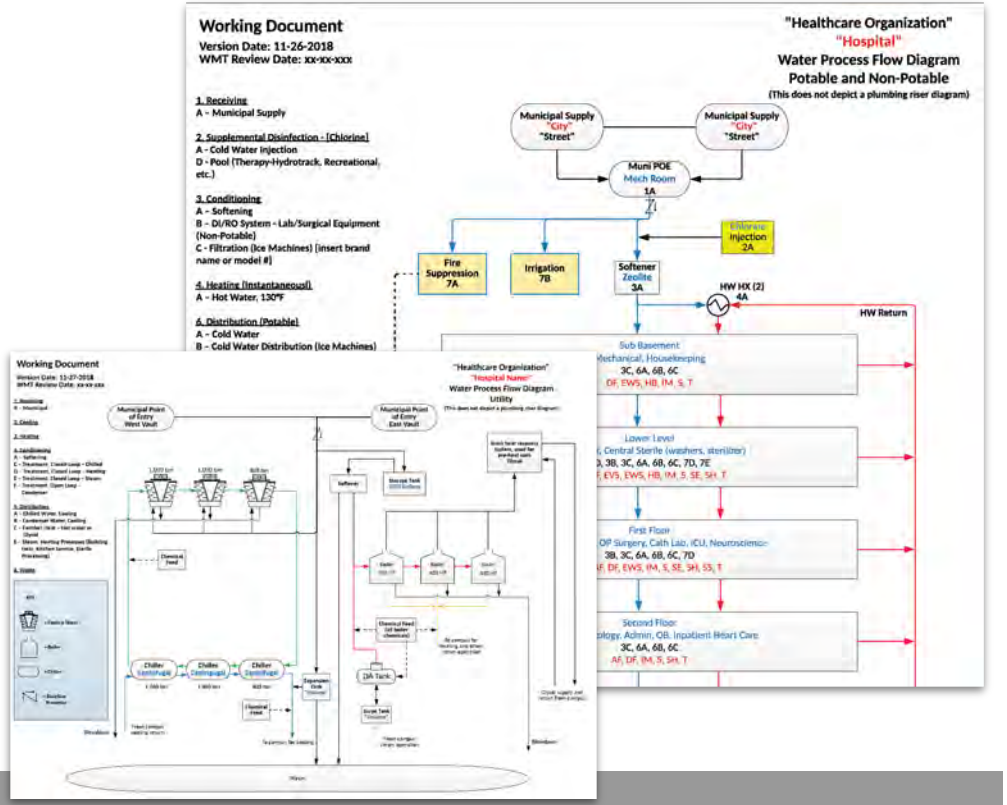
January 2022 and Beyond EP 2

The individual or team responsible for the water management program **develops** the following:

A basic diagram that maps all water supply sources, treatment systems, processing steps, control measures, and end-use points

- Note: An example would be a flow chart with symbols showing sinks, showers, water fountains, ice machines, and so forth.



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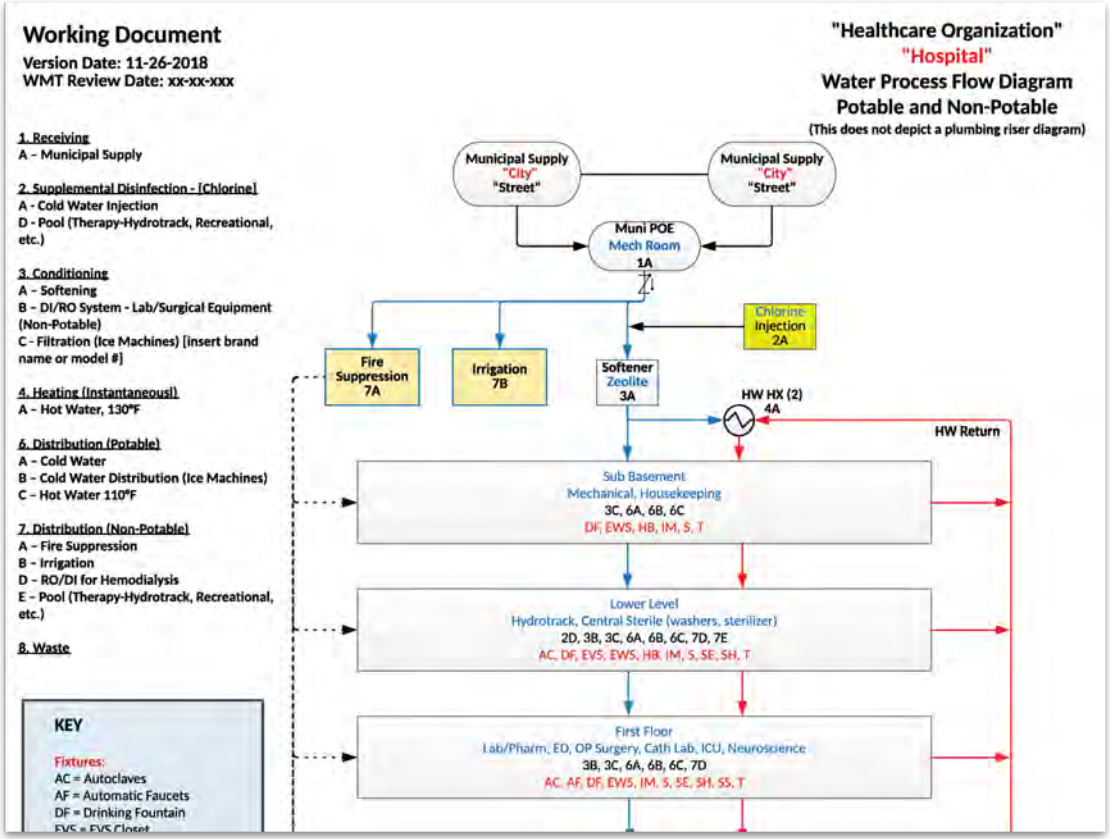

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January 2022 and Beyond EP 2 (cont.)

The individual or team responsible for the water management program develops the following:

- A water risk management plan based on the diagram that includes an evaluation of the biological, physical and chemical conditions of each step of the water flow diagram to identify any areas where potentially hazardous conditions may occur (these conditions can most likely occur in areas with slow or stagnant water)
    - Note: Refer to the Centers for Disease Control and Prevention's "Water Infection Control Risk Assessment (WICRA) for Healthcare Settings" tool as an example for conducting a water-related risk assessment.

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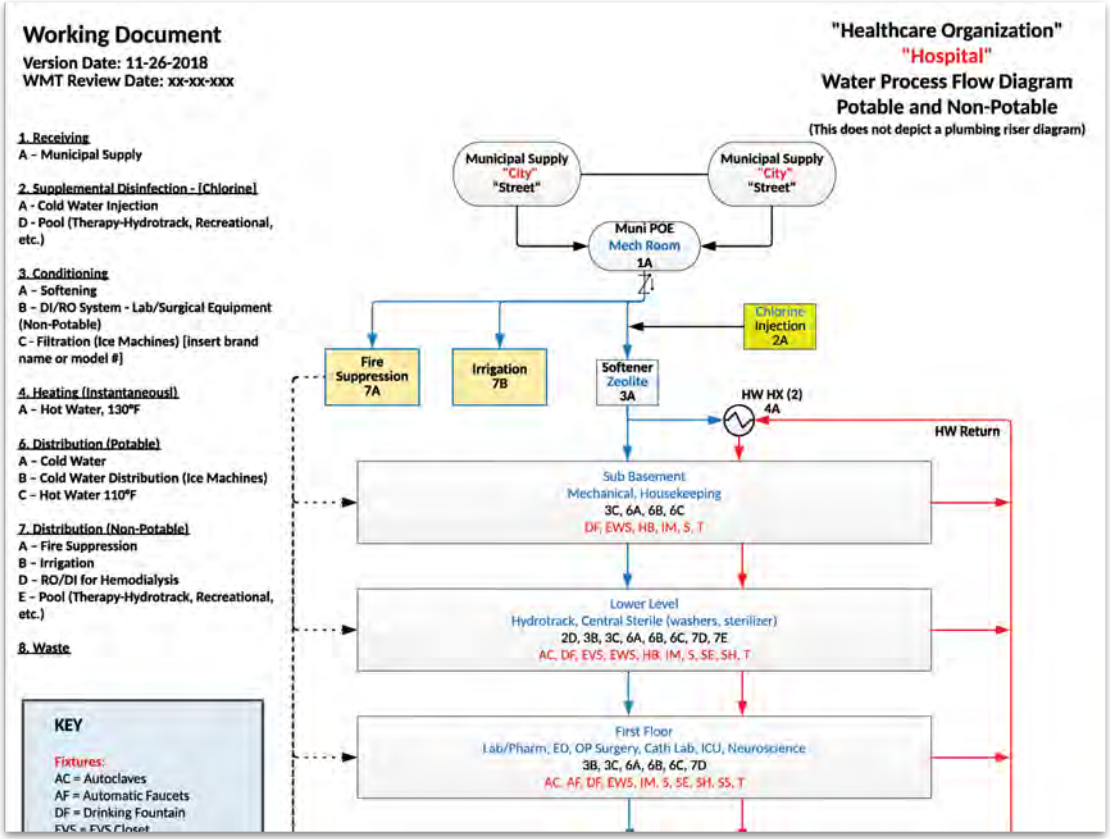

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January 2022 and Beyond EP 2 (cont.)

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January 2022 and Beyond EP 2 (cont.)

Processing Step: 6C. DISTRIBUTION (Potable) - Hot Water, 110°F EDIT DELETE

Potable Active

Risk Significant? Yes

Risk Basis: Hot water distribution has been associated with severe cases of disease from pathogens if temperatures are not closely monitored. Along with favorable temperatures for growth, there is high potential for disinfectant residuals to dissipate as a result of the heating process which directly reduces the biocide's ability to control the risk.

Dependent on residual disinfection present in the hot water distribution system, bacteria can propagate within the system. Hot water systems provide a temperature more conducive to bacteria growth and propagation. Water is also likely to be aerosolized at fixtures within the distribution system, increasing the likelihood of inhalation and exposure. Complex water distribution systems may contain dead legs or otherwise stagnant areas which may re-seed a system with biofilm over time.

Potential Hazards

B

Biological

Microbiological growth in the potable water distribution system which could be transmitted via sink faucets, shower heads, etc. Potential scaling of piping and/or fixtures can contibute to the prevalence of mcirobiological growth

Control Measure: Disinfectant

Control Description: Monitor free residual oxidant (FRO) concentration at the source

Do you need to apply and document control at this point? Yes

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January 2022 and Beyond EP 2 (cont.)

The individual or team responsible for the water management program develops the following:

- An evaluation of the patient populations served to identify patients who are immunocompromised

	Environmental Risk Categories - for waterborne pathogen growth and aerosolized water exposure		
Clinical Risk Categories - susceptibility to waterborne pathogen disease	**High**	**Medium**	**Low**
High	**Oncology, ICU, CVICU, Medical ICU, Solid Organ Transplant, Bone Marrow Transplant**		
Medium	**Observation Unit, Trauma, General Inpatient, Med Surg/Intermediate Care**		
Low			**Radiation, Pharmacy, Imaging and X-ray, Emergency Department, Cath Lab, Surgery, Lab, Endoscopy, Dialysis**

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January 2022 and Beyond EP 2 (cont.)

- A plan for addressing the use of water in areas of buildings where water may have been stagnant for a period. (for example, unoccupied or temporarily closed areas)
- Monitoring protocols and acceptable ranges for control measures
    - Note: Hospitals should consider incorporating basic practices for water monitoring within their water management programs that include monitoring of water temperature, residual disinfectant, and pH. Additionally, protocols should include specificity around the parameters measured, locations where measurements are made, and appropriate corrective actions taken when parameters are out of range.

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January 2022 and Beyond EP 2 (cont.)

Processing Step	Control Measure	Control Limits	Monitoring	Frequency	Corrective Actions	Records	Verification Procedure
Hot Water Distribution	Disinfectant	Free Residual Oxidant (FRO): 0.2 - 4.0 ppm as Cl_2 in hot water	Perform free chlorine test with EPA approved DPD method via colorimeter	Weekly, during planned flushing program	Perform flushing of identified outlet(s) or low flow areas and retest	Engineering Logs	Independent Water Management Company to verify logs quarterly

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January 2022 and Beyond EP 3

The individual or team responsible for the water management program **manages** the following:

- Documenting results of all monitoring activities
- Documenting corrective actions taken when control limits are not maintained
  - Note: See EC.04.01.01, EP 1 for the process of monitoring, reporting, and investigating utility system issues.
- Corrective actions and procedures to follow if a test result outside of acceptable limits is obtained, including when a probable or confirmed waterborne pathogen(s) indicates action is necessary

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January 2022 and Beyond EP 3 (cont.)

Processing Step	Control Measure	Control Limits	Monitoring	Frequency	Corrective Actions	Records	Verification Procedure
Hot Water Distribution	Disinfectant	Free Residual Oxidant (FRO): 0.2 - 4.0 ppm as Cl_2 in hot water	Perform free chlorine test with EPA approved DPD method via colorimeter	Weekly, during planned flushing program	Perform flushing of identified outlet(s) or low flow areas and retest	Engineering Logs	Independent Water Management Company to verify logs quarterly

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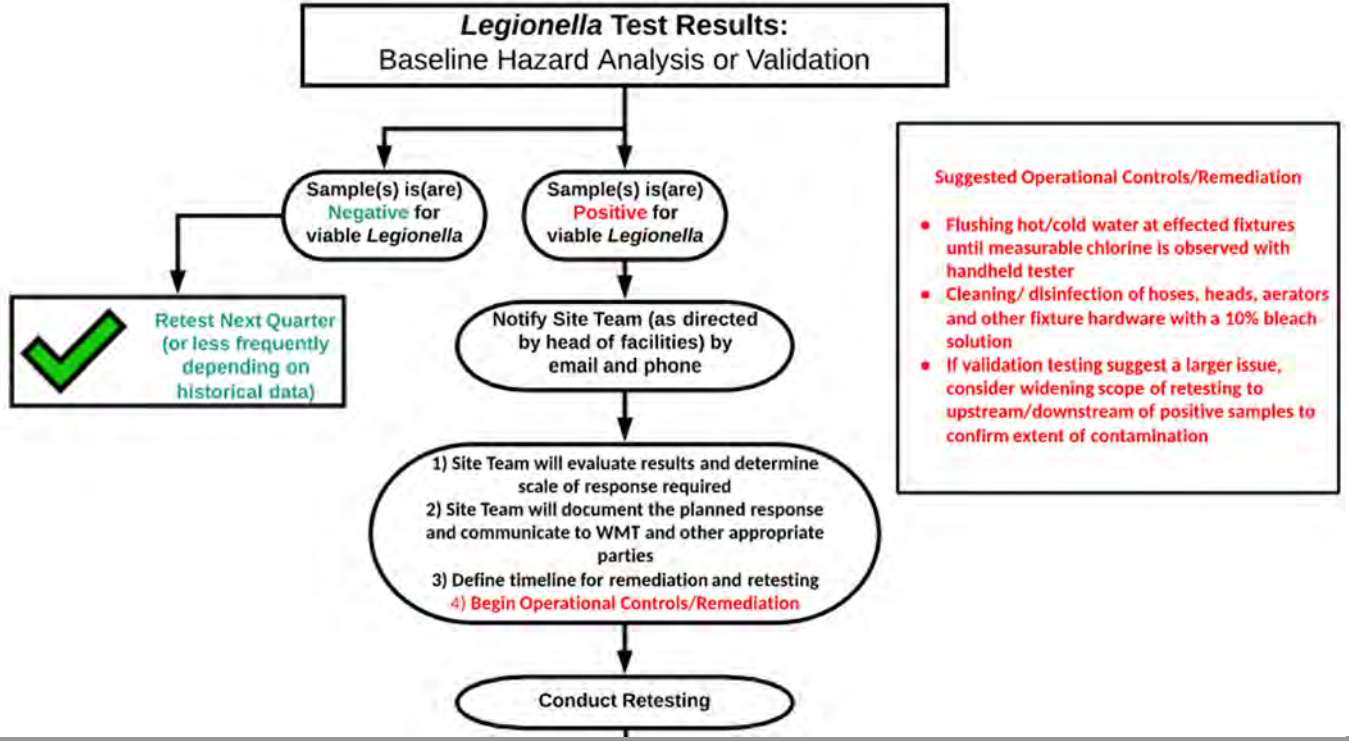
January 2022 and Beyond EP 3 (cont)



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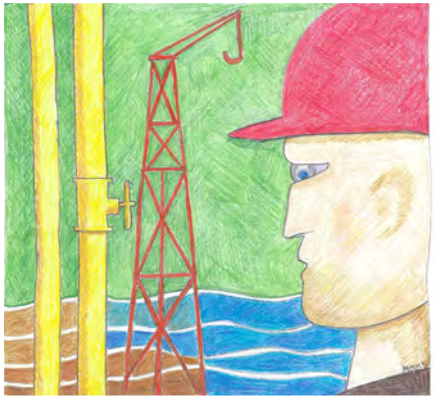
January 2022 and Beyond EP 4

The individual or team responsible for the water management program ***reviews the program annually*** and when the following occurs:

- Changes have been made to the water system that would add additional risk.
- New equipment or at-risk water system(s) has been added that could generate aerosols or be a potential source for *Legionella*. **This includes the commissioning of a new wing or building.**



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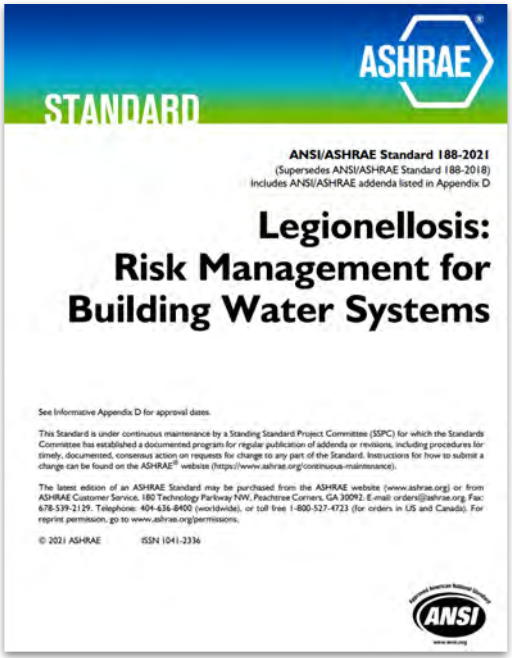
Specific Building Water Systems Covered



Section 7 identifies 5 building water systems covered under the standard:

7.1 Potable Water Systems

7.2 Cooling towers and evaporative condensers

7.3 Whirlpool spas

7.4 Ornamental fountains and other water features

7.5 Aerosol-generating misters, atomizers, air-washers and humidifiers

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Compliance with Construction Activities

Section 4.2 Building Owner Requirements

“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.”

Section 8.4 Commissioning

- Instructions for Commissioning shall be provided to the building owner.
- Procedures for disinfection follow AWWA Standard C651 & C652
- Procedures for disinfection and flushing
    - Complete within 3 weeks prior to whole or partial beneficial occupancy

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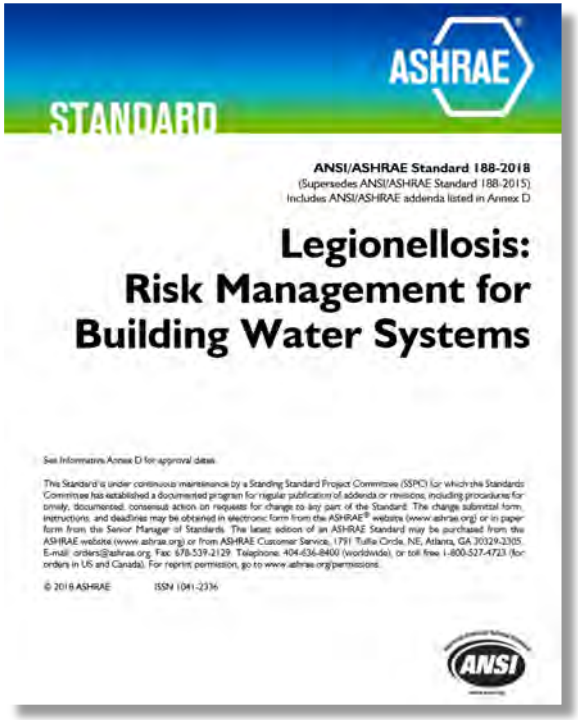
ASHRAE Standard 188 Compliance w/Construction Activities



Section 4.2 Building Owner Requirements

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**.

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ASHRAE Standard 188 Compliance w/Construction Activities

Section 8.0 Designing Building Water Systems

Section 8.4 Commissioning

- **Instructions for Commissioning shall be provided to the building owner.**
- **Procedures for disinfection follow AWWA Standard C651 & C652**
- **Procedures for disinfection and flushing**
  - Complete **within 3 weeks prior** to whole or partial beneficial occupancy
  - If beneficial occupancy delayed 2 weeks but not more than 4 weeks after disinfection, flushing of **all fixtures** shall again be completed
  - If beneficial occupancy of any part of the building is **delayed 4 weeks or more** after disinfection, the need for disinfection, flushing, or both disinfection and flushing of unoccupied areas shall be determined by the (Water Management) Program Team

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Water Safety During Construction Activities

The 7 Steps of a Comprehensive & Defensible Water Management Program

Integrating WMC / ICRA*

1) ICRA Audit
- Integrate construction professionals onto WMP team
- Review existing ICRA policy to include water safety

2) Develop Project- Specific ICRA Plan
- Demolition
- New Construction
- Renovation
- Addition
- Expansion

3) Describe Construction Project Limits
(Diagram & Written)

4) Analyze Water System Hazards of Construction Activities

5) Specify Control Locations, Control Limits, Monitoring and Corrective Actions

6) Develop Verification Strategy

7) Develop Validation Strategy

*WMC = Water Management for Construction / ICRA = Infection Control Risk Assessment

Is Your Water Management Program Already Aligned with Joint Commission Requirements?

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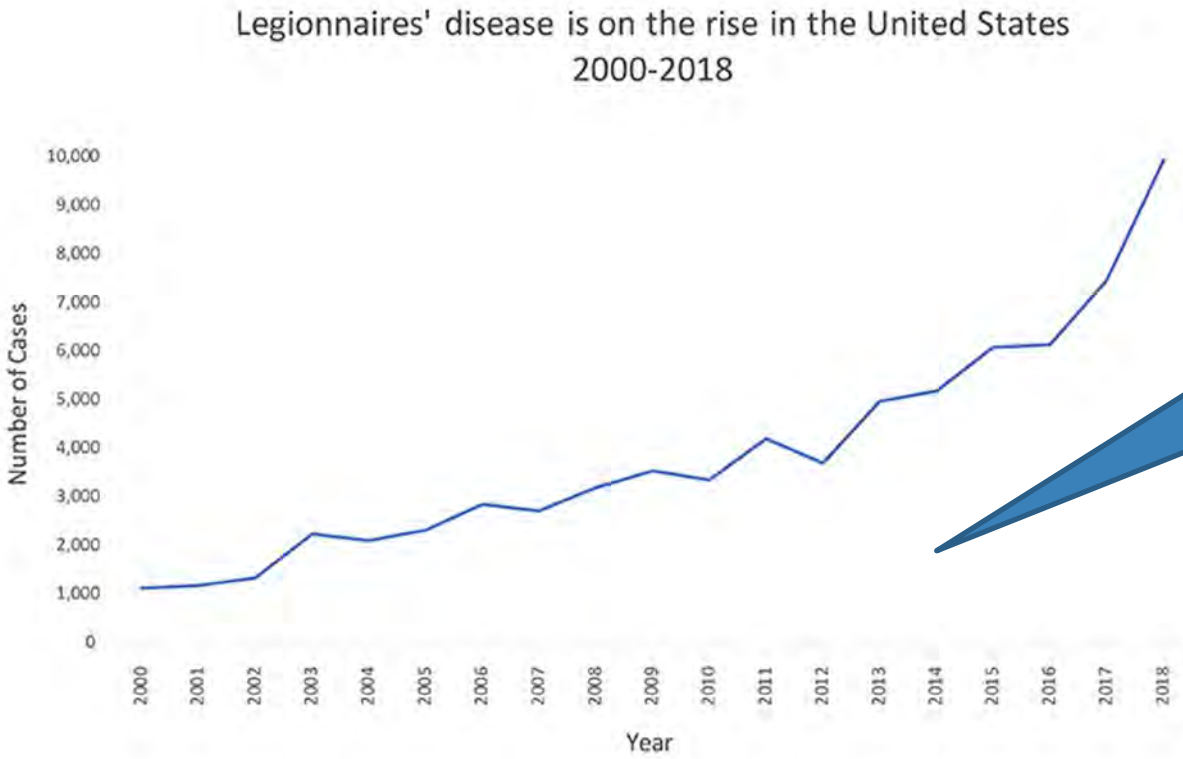

Source: Nationally Notifiable Diseases Surveillance System

How many disease cases are associated with construction activities?

Are other pathogens of interest associated with construction activities?

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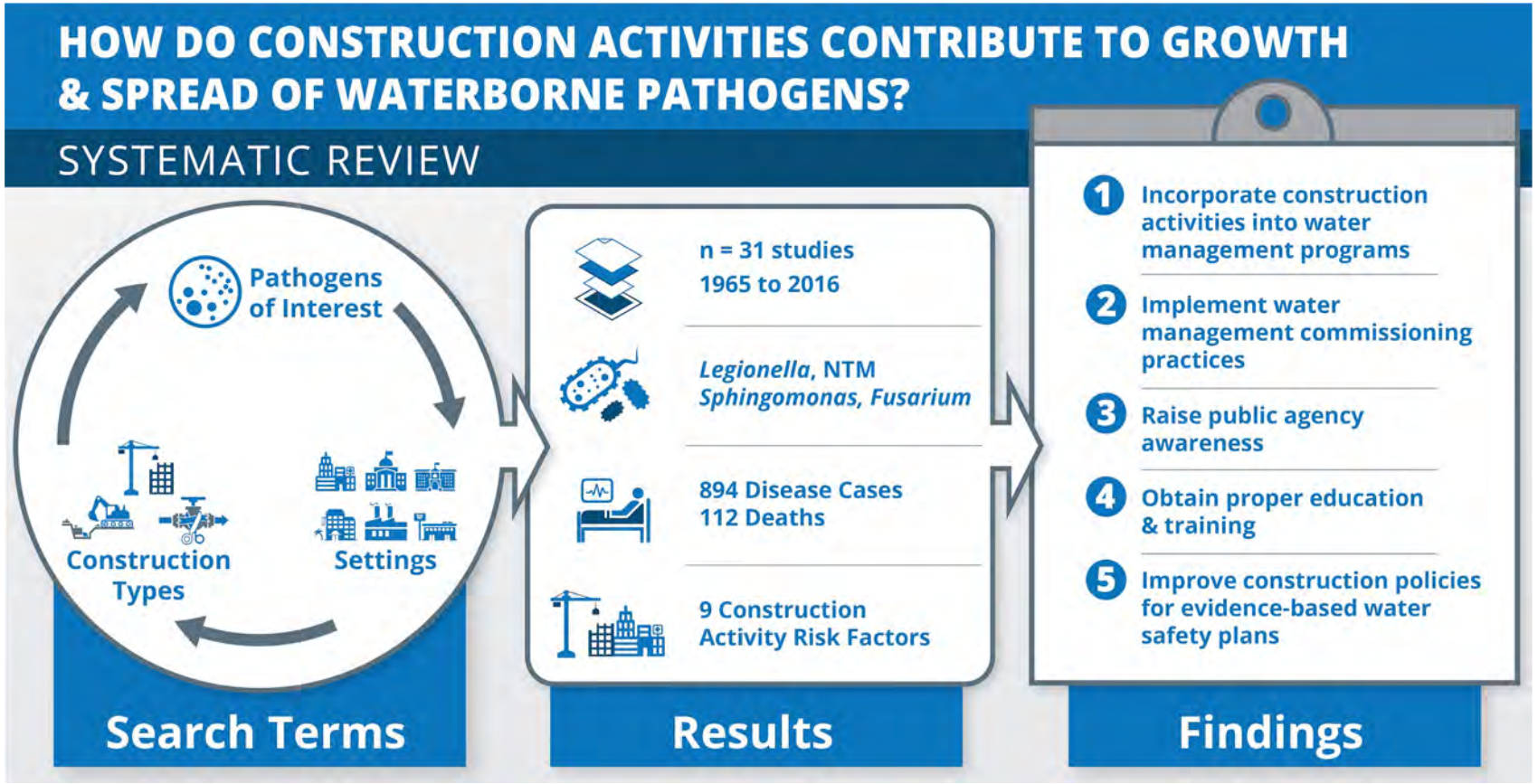

Scanlon, M.M.; Gordon, J.L.; McCoy, W.F.; Cain, M.F. Water Management for Construction: Evidence for Risk Characterization in Community and Healthcare Settings: A Systematic Review. *Int. J. Environ. Res. Public Health* **2020**, *17*, 2168.

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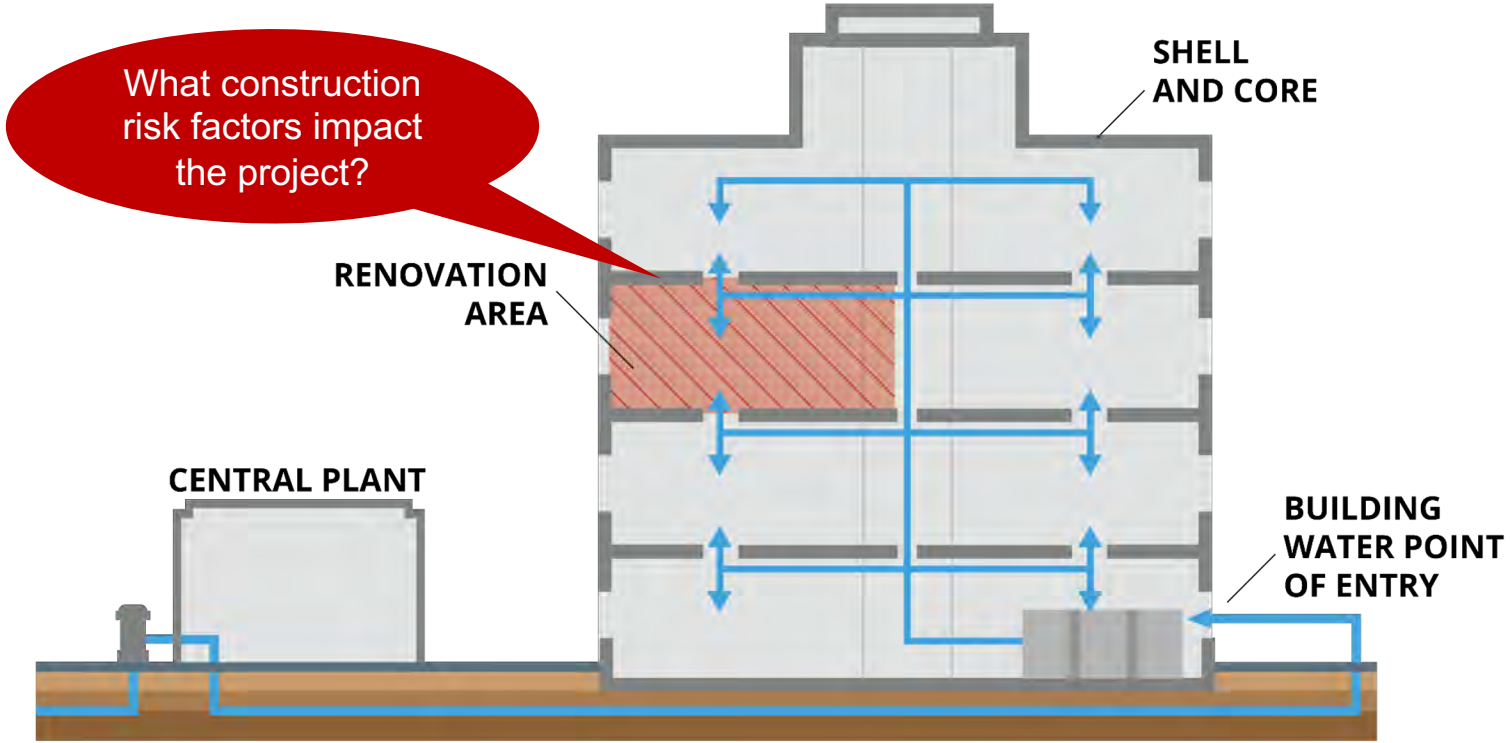
Water Management and Renovation



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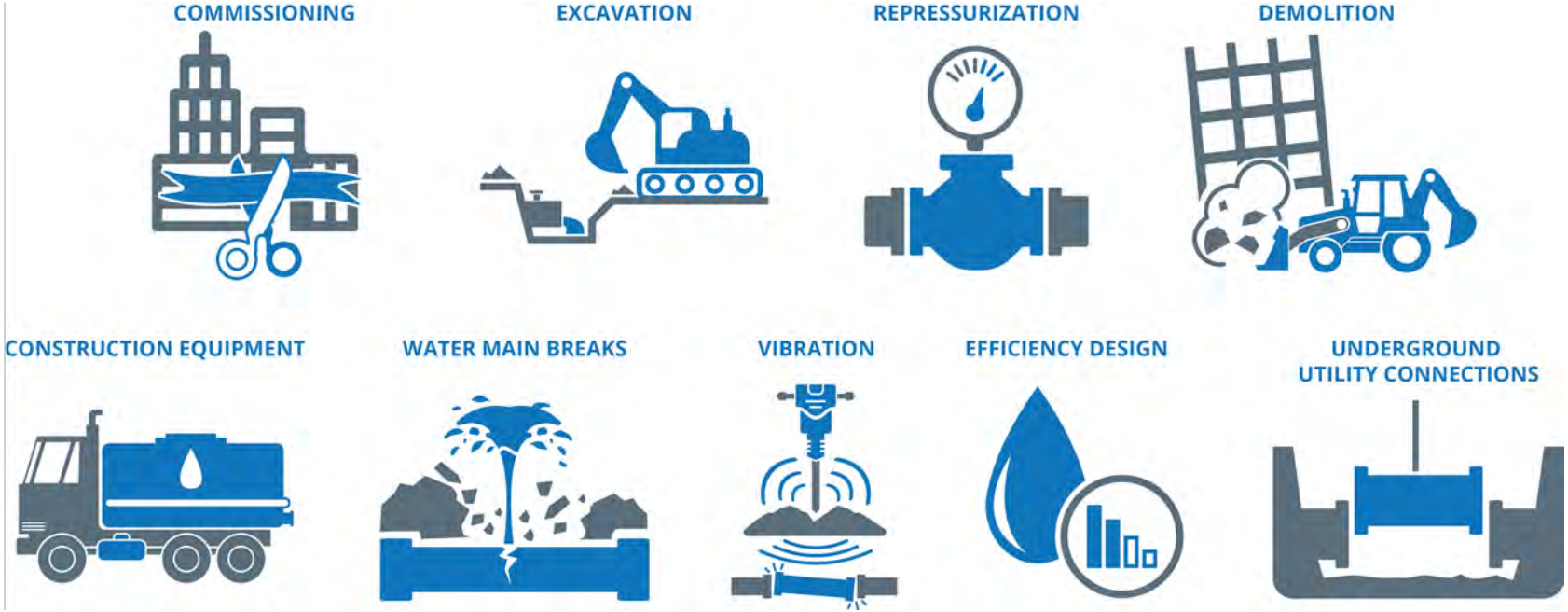
Known Construction Risk Factors



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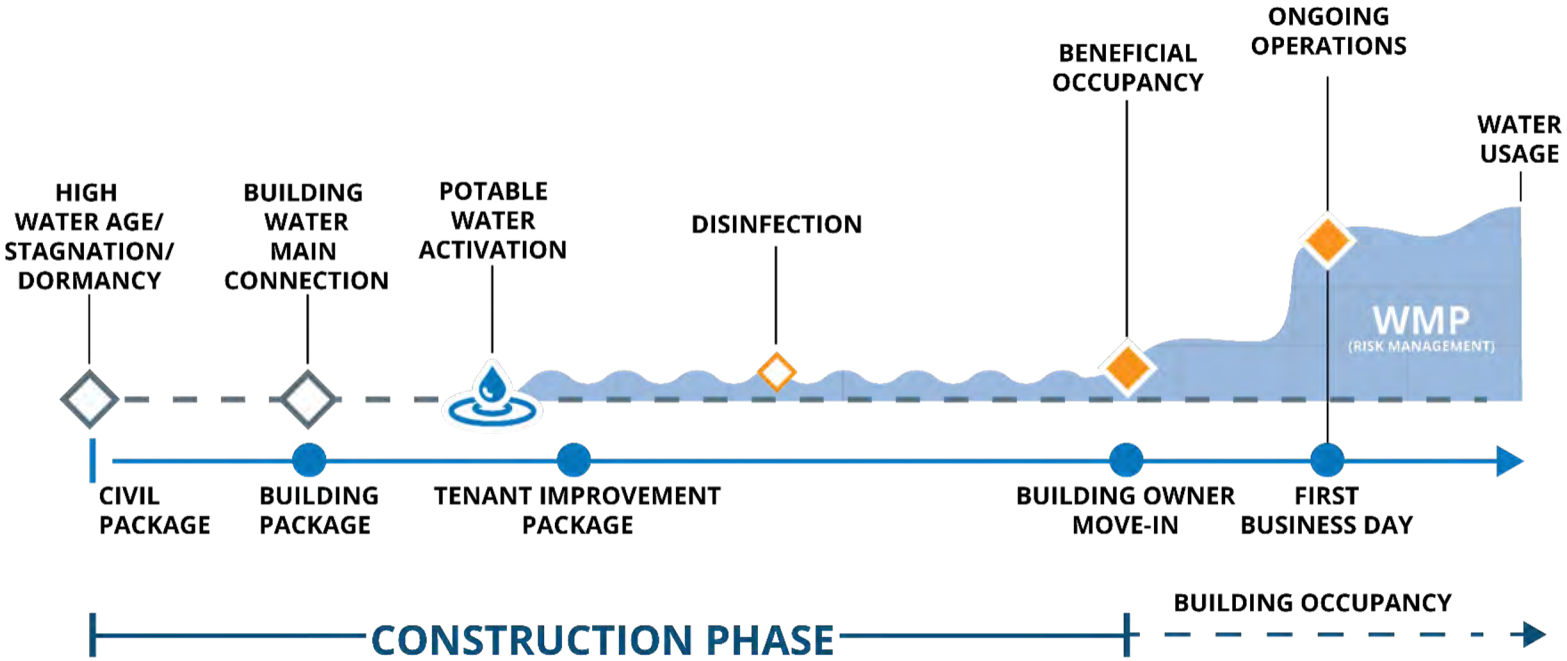
Historical Building Water Distribution System Project Schedule



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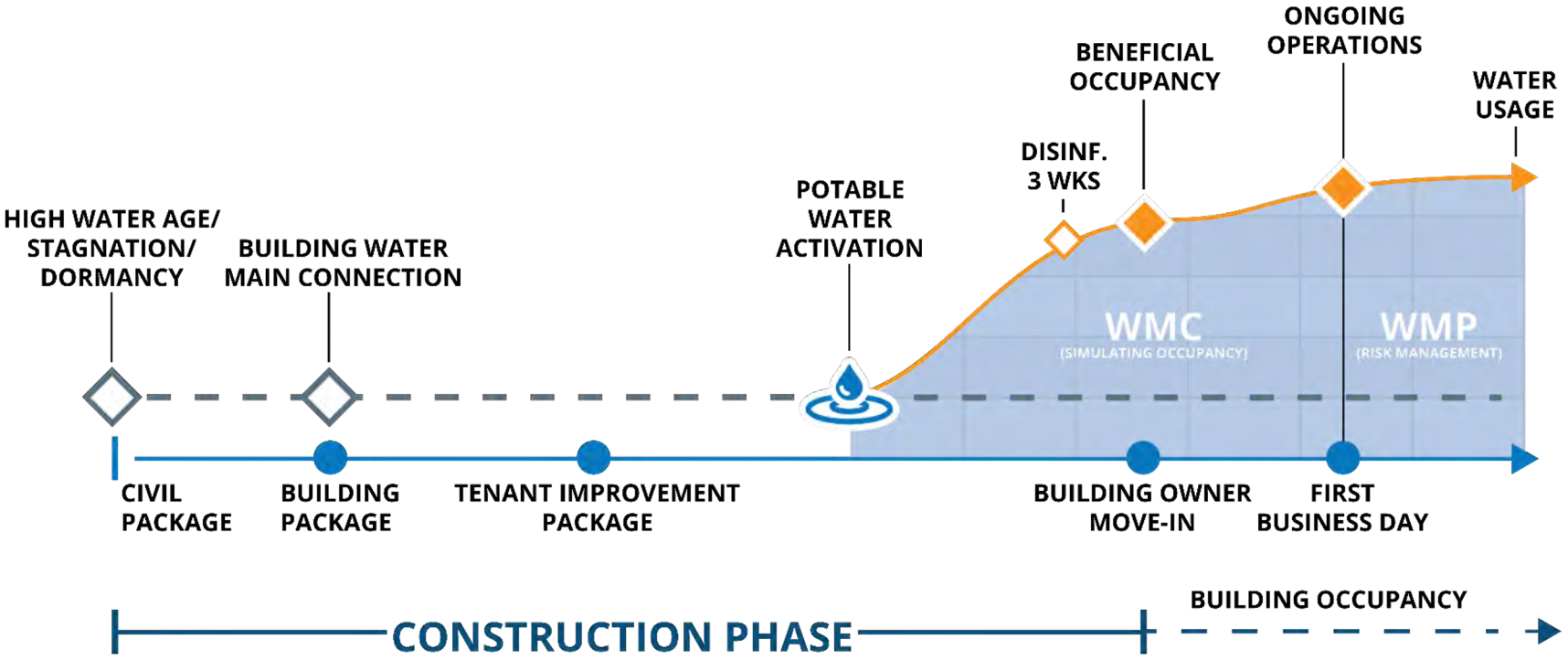
New Method Water Management Project Schedule



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Methods - Managing Water Stagnation

Contractor Field Methods

- Delay water activation
- Delay hot water activation
- Install temporary water lines
- Install automated flushing mechanisms
- Introduce temporary flushing methods
- Develop routine flushing protocols
- Combine auto and manual flushing

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Common Water Commissioning Mishaps

Retrospective Analysis

Key Preliminary Findings

- **Initial project schedule** - not addressing water commissioning
- **Lack of routine and adequate flushing protocols** - leading to high bacteria and waterborne pathogens
- **Temperature settings** – mixing valves, water heaters, pumps
- **Defective Equipment** – pumps, mixing valves
- **Substitutions** - on products without building owner approval
- **Lack of disinfectant residual** – pre-planning, during & post-construction
- **Premature installation** - of medical equipment with water reservoirs
- **Sediment invasion** - into the water system from off-site construction
- **Lack of WMP Standards & Awareness** – training & terminology understanding of water management terminology
- **Post-construction unoccupied building spaces**

Molly M. Scanlon, PhD, FAIA, FACHA
Phigenics, Director of Standards, Compliance & Research
Environmental Health Scientist & Licensed and Certified Healthcare Architect

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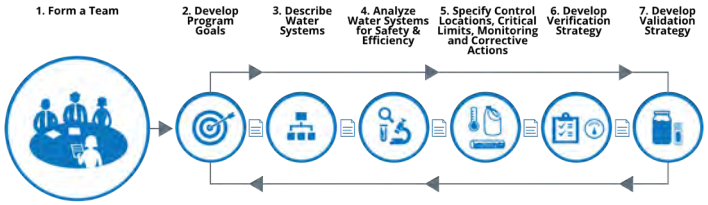
Overlaying WMP with WMC Tools

Water Management Program with Infection Control Risk Assessment

Complex or Large Projects with WMC Risk Management Process Typical > 30-day duration

7 STEPS OF THE SUSTAINABLE COMPREHENSIVE WATER MANAGEMENT PROGRAM



Defensible documentation is essential and required

Small to Medium Projects with Prescriptive Hazard Controls Typical ≤ 30-day duration

	Type A	Type B	Type C	Type D
Low Risk Group	I	II	II	III/IV
Medium Risk Group	I	II	III	IV
High Risk Group	I	II	III/IV	IV
Highest Risk Group	II	III/IV	III/IV	IV

Is Your Water Management Program Already Aligned with Joint Commission Requirements?

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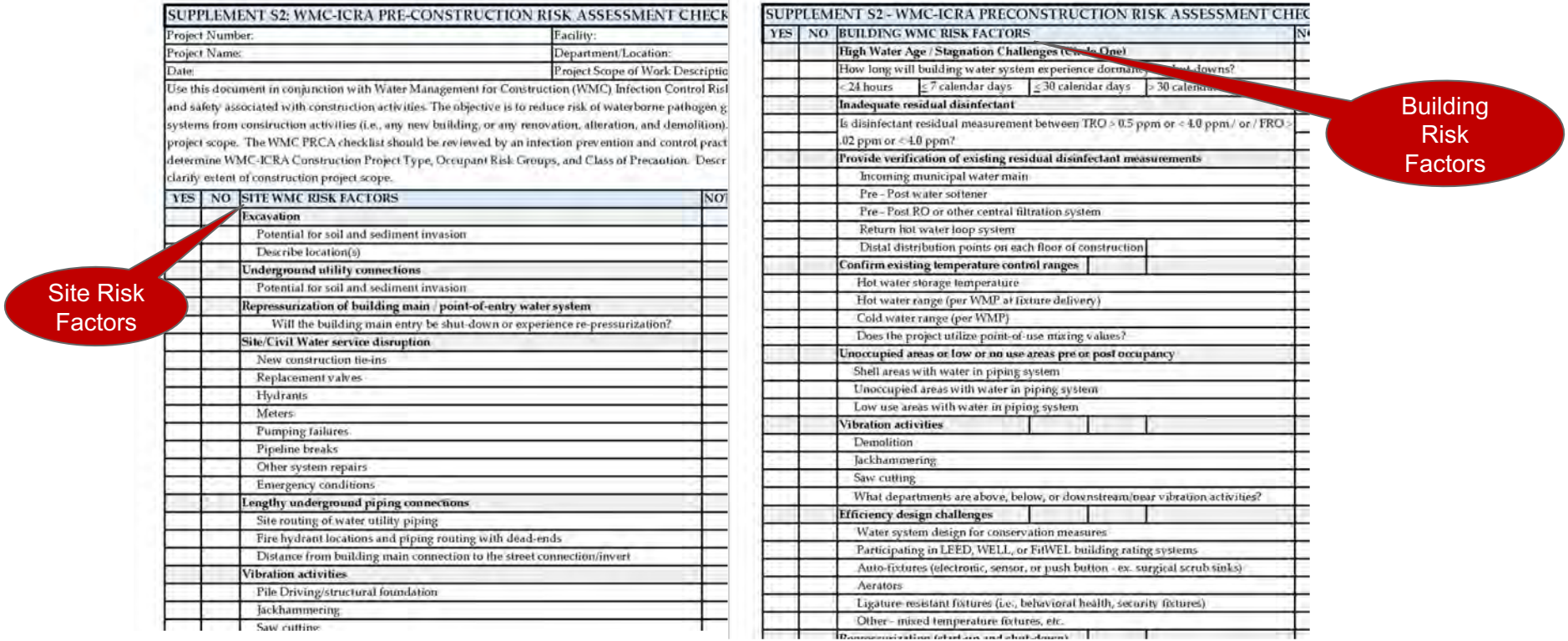
WMC-PCRA Tool Checklist



SUPPLEMENT S2: WMC-ICRA PRE-CONSTRUCTION RISK ASSESSMENT CHECK

Project Number:	Facility:
Project Name:	Department/Location:
Date:	Project Scope of Work Descriptio

Use this document in conjunction with Water Management for Construction (WMC) Infection Control Risk and safety associated with construction activities. The objective is to reduce risk of waterborne pathogen g systems from construction activities (i.e., any new building, or any renovation, alteration, and demolition). project scope. The WMC PRCA checklist should be reviewed by an infection prevention and control pract determine WMC-ICRA Construction Project Type, Occupant Risk Groups, and Class of Precaution. Descr clarify extent of construction project scope.

YES	NO	SITE WMC RISK FACTORS	NO
		Excavation	
		Potential for soil and sediment invasion	
		Describe location(s)	
		Underground utility connections	
		Potential for soil and sediment invasion	
		Repressurization of building main / point-of-entry water system	
		Will the building main entry be shut-down or experience re-pressurization?	
		Site/Civil Water service disruption	
		New construction tie-ins	
		Replacement valves	
		Hydrants	
		Meters	
		Pumping failures	
		Pipeline breaks	
		Other system repairs	
		Emergency conditions	
		Lengthy underground piping connections	
		Site routing of water utility piping	
		Fire hydrant locations and piping routing with dead-ends	
		Distance from building main connection to the street connection/invert	
		Vibration activities	
		Pile Driving/structural foundation	
		Jackhammering	
		Saw cutting	

Site Risk Factors

SUPPLEMENT S2 - WMC-ICRA PRECONSTRUCTION RISK ASSESSMENT CHEC

YES	NO	BUILDING WMC RISK FACTORS	N
		High Water Age / Stagnation Challenges (circle One)	
		How long will building water system experience dormancy / shut-downs?	
		<24 hours / ≤7 calendar days / ≤30 calendar days / >30 calendar	
		Inadequate residual disinfectant	
		Is disinfectant residual measurement between TRO > 0.5 ppm or < 4.0 ppm/ or / FRO > .02 ppm or <4.0 ppm?	
		Provide verification of existing residual disinfectant measurements	
		Incoming municipal water main	
		Pre - Post water softener	
		Pre - Post RO or other central filtration system	
		Return hot water loop system	
		Distal distribution points on each floor of construction	
		Confirm existing temperature control ranges	
		Hot water storage temperature	
		Hot water range (per WMP at fixture delivery)	
		Cold water range (per WMP)	
		Does the project utilize point-of-use mixing values?	
		Unoccupied areas or low or no use areas pre or post occupancy	
		Shell areas with water in piping system	
		Unoccupied areas with water in piping system	
		Low use areas with water in piping system	
		Vibration activities	
		Demolition	
		Jackhammering	
		Saw cutting	
		What departments are above, below, or downstream/near vibration activities?	
		Efficiency design challenges	
		Water system design for conservation measures	
		Participating in LEED, WELL, or FitWEL building rating systems	
		Auto-fixtures (electronic, sensor, or push button - ex. surgical scrub sinks)	
		Aerators	
		Ligature-resistant fixtures (i.e., behavioral health, security fixtures)	
		Other - mixed temperature fixtures, etc.	
		Repressurizations (start-up and shut-downs)	

Building Risk Factors

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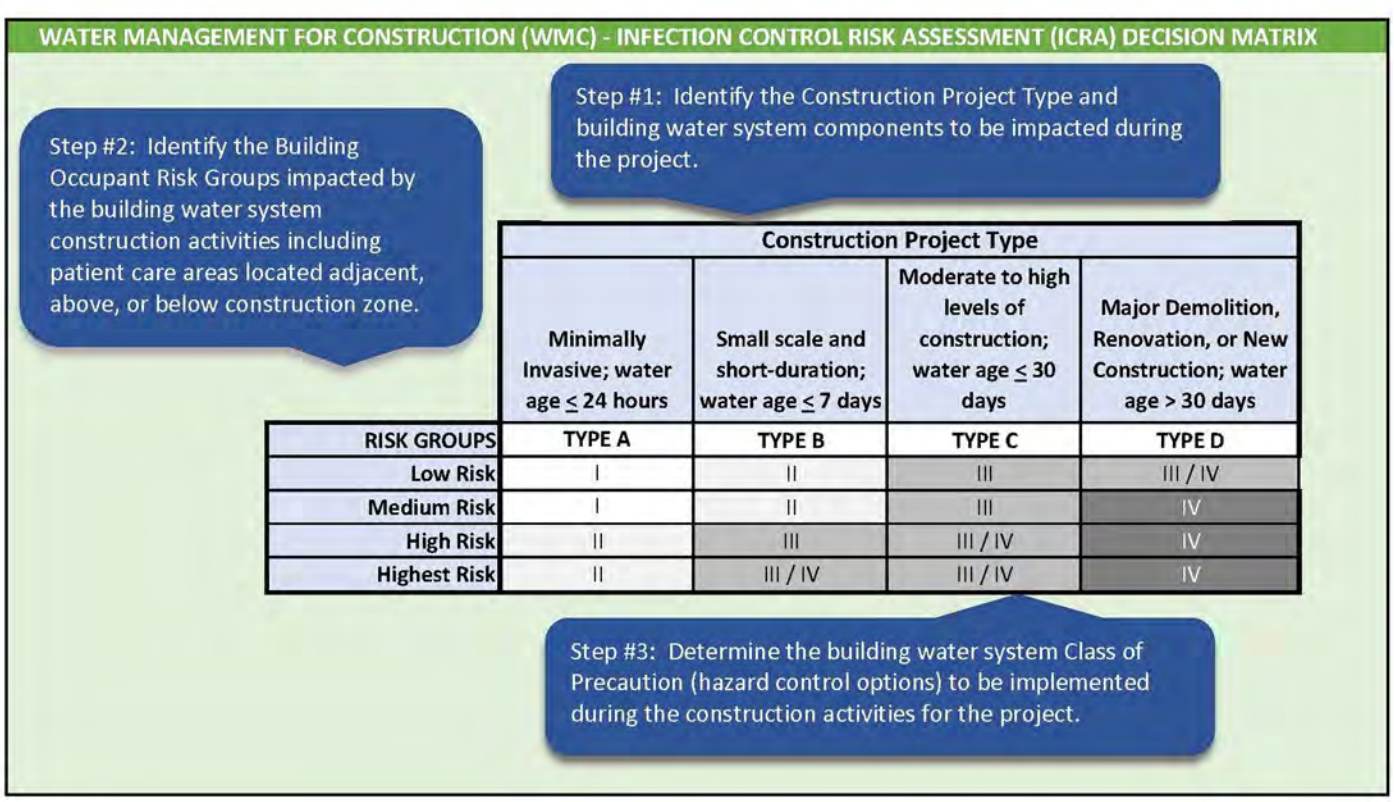
Tool: WMC-ICRA Method



	Construction Project Type			
	Minimally Invasive; water age ≤ 24 hours	Small scale and short-duration; water age ≤ 7 days	Moderate to high levels of construction; water age ≤ 30 days	Major Demolition, Renovation, or New Construction; water age > 30 days
RISK GROUPS	TYPE A	TYPE B	TYPE C	TYPE D
Low Risk	I	II	III	III / IV
Medium Risk	I	II	III	IV
High Risk	II	III	III / IV	IV
Highest Risk	II	III / IV	III / IV	IV

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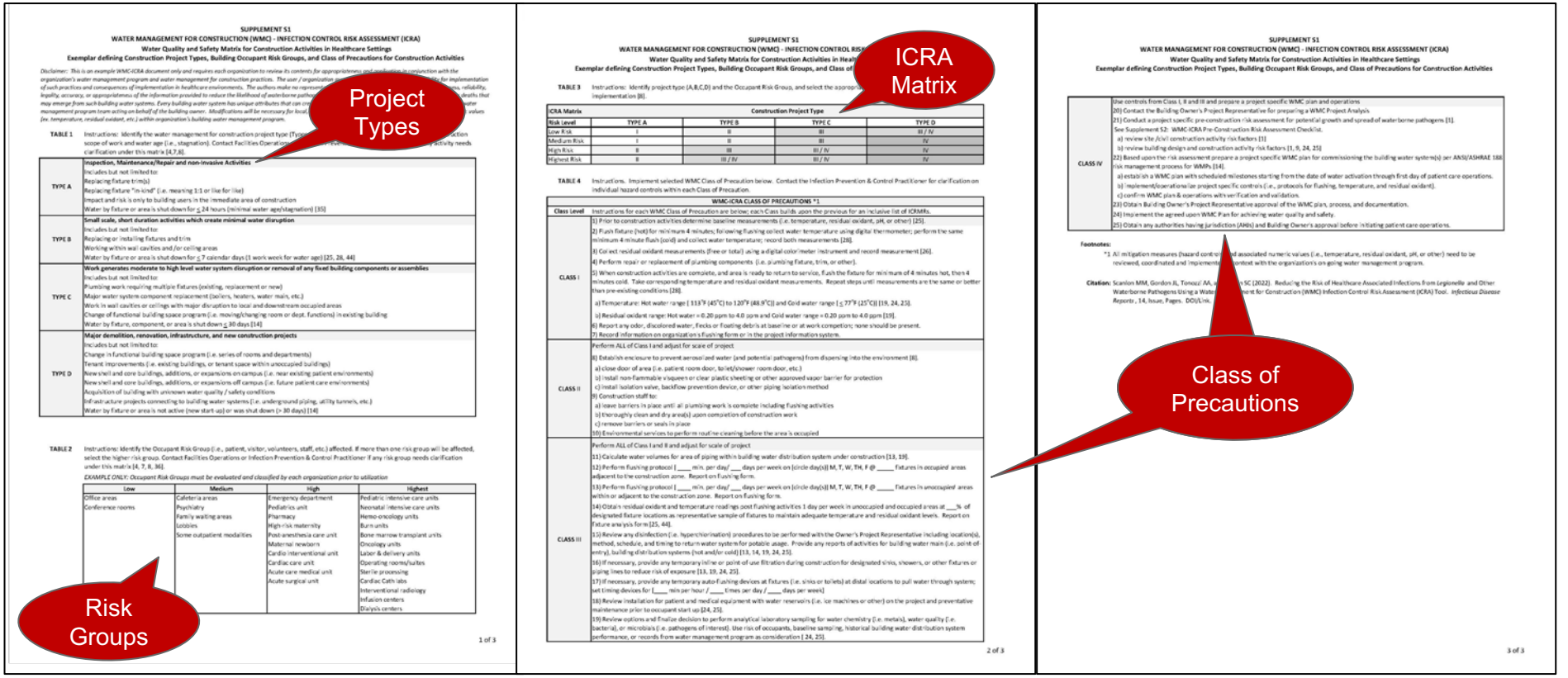
WMC-ICRA Tool Tables & Forms



SUPPLEMENT S1
WATER MANAGEMENT FOR CONSTRUCTION (WMC) - INFECTION CONTROL RISK ASSESSMENT (ICRA)
Water Quality and Safety Matrix for Construction Activities in Healthcare Settings
Exemplar defining Construction Project Types, Building Occupant Risk Groups, and Class of Precautions for Construction Activities

TABLE 1 Instructions: Identify the water management for construction project type (Type A, B, C, D) based on the scope of work and water age (i.e., stagnation). Contact Facilities Operations or Infection Prevention & Control Practitioner if activity needs clarification under this matrix [4,7,8].

TYPE A	**Inspection, Maintenance/Repair and non-invasive Activities** Includes but not limited to: Replacing fixture trim(s) Replacing fixture "in-kind" (i.e. meaning 1:1 or like for like) Impact and risk is only to building users in the immediate area of construction Water by fixture or area is shut down for ≤ 24 hours (minimal water age/stagnation) [35]
TYPE B	**Small scale, short duration activities which create minimal water disruption** Includes but not limited to: Replacing or installing fixtures and trim Working within wall cavities and /or ceiling areas Water by fixture or area is shut down for ≤ 7 calendar days (1 work week for water age) [25, 28, 44]
TYPE C	**Work generates moderate to high level water system disruption or removal of any fixed building components or assemblies** Includes but not limited to: Plumbing work requiring multiple fixtures (existing, replacement or new) Major water system component replacement (boilers, heaters, water main, etc.) Work in wall cavities or ceilings with major disruption to local and downstream occupied areas Change of functional building space program (i.e. moving/changing room or dept. functions) in existing building Water by fixture, component, or area is shut down ≤ 30 days [14]
TYPE D	**Major demolition, renovation, infrastructure, and new construction projects** Includes but not limited to: Change in functional building space program (i.e. series of rooms and departments) Tenant improvements (i.e. existing buildings, or tenant space within unoccupied buildings) New shell and core buildings, additions, or expansions on campus (i.e. near existing patient environments) New shell and core buildings, additions, or expansions off campus (i.e. future patient care environments) Acquisition of building with unknown water quality / safety conditions Infrastructure projects connecting to building water systems (i.e. underground piping, utility tunnels, etc.) Water by fixture or area is not active (new start-up) or was shut down (> 30 days) [14]

TABLE 2 Instructions: Identify the Occupant Risk Group (i.e., patient, visitor, volunteers, staff, etc.) affected. If more than one risk group will be affected, select the higher risk group. Contact Facilities Operations or Infection Prevention & Control Practitioner if any risk group needs clarification under this matrix [4, 7, 8, 36].

EXAMPLE ONLY: Occupant Risk Groups must be evaluated and classified by each organization prior to utilization

Low	Medium	High	Highest
Office areas Conference rooms	Cafeteria areas Psychiatry Family waiting areas Lobbies Some outpatient modalities	Emergency department Pediatrics unit Pharmacy High-risk maternity Post-anesthesia care unit Maternal newborn Cardio interventional unit Cardiac care unit Acute care medical unit Acute surgical unit	Pediatric intensive care units Neonatal intensive care units Hemo-oncology units Burn units Bone marrow transplant units Oncology units Labor & delivery units Operating rooms/suites Sterile processing Cardiac Cath labs Interventional radiology Infusion centers Dialysis centers

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SUPPLEMENT S1
WATER MANAGEMENT FOR CONSTRUCTION (WMC) - INFECTION CONTROL RISK ASSESSMENT (ICRA)
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TABLE 3 Instructions: Identify project type (A,B,C,D) and the Occupant Risk Group, and select the appropriate implementation [8].

ICRA Matrix	Construction Project Type			
Risk Level	TYPE A	TYPE B	TYPE C	TYPE D
Low Risk	I	II	III	III / IV
Medium Risk	I	II	III	IV
High Risk	II	III	III / IV	IV
Highest Risk	II	III / IV	III / IV	IV

TABLE 4 Instructions. Implement selected WMC Class of Precaution below. Contact the Infection Prevention & Control Practitioner for clarification on individual hazard controls within each Class of Precaution.

WMC-ICRA CLASS OF PRECAUTIONS *1	
Class Level	Instructions for each WMC Class of Precaution are below; each Class builds upon the previous for an inclusive list of ICRMRs.
CLASS I	1) Prior to construction activities determine baseline measurements (i.e. temperature, residual oxidant, pH, or other) [25]. 2) Flush fixture (hot) for minimum 4 minutes; following flushing collect water temperature using digital thermometer; perform the same minimum 4 minute flush (cold) and collect water temperature; record both measurements [28]. 3) Collect residual oxidant measurements (free or total) using a digital colorimeter instrument and record measurement [26]. 4) Perform repair or replacement of plumbing components (i.e. plumbing fixture, trim, or other). 5) When construction activities are complete, and area is ready to return to service, flush the fixture for minimum of 4 minutes hot, then 4 minutes cold. Take corresponding temperature and residual oxidant measurements. Repeat steps until measurements are the same or better than pre-existing conditions [28]. a) Temperature: Hot water range [113°F (45°C) to 120°F (48.9°C)] and Cold water range [≤ 77°F (25°C)] [19, 24, 25]. b) Residual oxidant range: Hot water = 0.20 ppm to 4.0 ppm and Cold water range = 0.20 ppm to 4.0 ppm [19]. 6) Report any odor, discolored water, flecks or floating debris at baseline or at work completion; none should be present. 7) Record information on organization's flushing form or in the project information system.
CLASS II	Perform ALL of Class I and adjust for scale of project 8) Establish enclosure to prevent aerosol and water (and potential pathogens) from dispersing into the environment [8]. a) close door of area (i.e. patient room door, toilet/shower room door, etc.) b) Install non-flammable visqueen or clear plastic sheeting or other approved vapor barrier for protection c) Install isolation valve, backflow prevention device, or other piping isolation method 9) Construction staff to: a) leave barriers in place until all plumbing work is complete including flushing activities b) thoroughly clean and dry area(s) upon completion of construction work c) remove barriers or seals in place 10) Environmental services to perform routine cleaning before the area is occupied
CLASS III	Perform ALL of Class I and II and adjust for scale of project 11) Calculate water volumes for area of piping within building water distribution system under construction [13, 19]. 12) Perform flushing protocol [____ min. per day/ ___ days per week on [circle day(s)] M, T, W, TH, F @ _____ fixtures in occupied areas adjacent to the construction zone. Report on flushing form. 13) Perform flushing protocol [____ min. per day/ ___ days per week on [circle day(s)] M, T, W, TH, F @ _____ fixtures in unoccupied areas within or adjacent to the construction zone. Report on flushing form. 14) Obtain residual oxidant and temperature readings post flushing activities 1 day per week in unoccupied and occupied areas at ___% of designated fixture locations as representative sample of fixtures to maintain adequate temperature and residual oxidant levels. Report on fixture analysis form [25, 44]. 15) Review any disinfection (i.e. hyperchlorination) procedures to be performed with the Owner's Project Representative including location(s), method, schedule, and timing to return water system for potable usage. Provide any reports of activities for building water main (i.e. point-of-entry), build distribution systems (hot and/or cold) [13, 14, 19, 24, 25]. 16) If necessary, provide any temporary inline or point of use filtration during construction for designated sinks, showers, or other fixtures or piping lines to reduce risk of exposure [13, 19, 24, 25]. 17) If necessary, provide any temporary auto-flushing devices at fixtures (i.e. sinks or toilets) at distal locations to pull water through system; set timing devices for [____ min per hour / ____ times per day / ____ days per week] 18) Review installation for patient and medical equipment with water reservoirs (i.e. ice machines or other) on the project and preventative maintenance prior to occupant start up [24, 25]. 19) Review options and finalize decision to perform analytical laboratory sampling for water chemistry (i.e. metals), water quality (i.e. bacteria), or microbials (i.e. pathogens of interest). Use risk of occupants, baseline sampling, historical building water distribution system performance, or records from water management program as consideration [24, 25].

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SUPPLEMENT S1
WATER MANAGEMENT FOR CONSTRUCTION (WMC) - INFECTION CONTROL RISK ASSESSMENT (ICRA)
Water Quality and Safety Matrix for Construction Activities in Healthcare Settings
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CLASS IV	Use controls from Class I, II and III and prepare a project specific WMC plan and operations 20) Contact the Building Owner's Project Representative for preparing a WMC Project Analysis 21) Conduct a project specific pre-construction risk assessment for potential growth and spread of waterborne pathogens [1]. See Supplement S2: WMC-ICRA Pre-Construction Risk Assessment Checklist. a) review site /civil construction activity risk factors [1] b) review building design and construction activity risk factors [1, 9, 24, 25] 22) Based upon the risk assessment prepare a project specific WMC plan for commissioning the building water system(s) per ANSI/ASHRAE 188 risk management process for WMPs [14]. a) establish a WMC plan with scheduled milestones starting from the date of water activation through first day of patient care operations. b) Implement/operationalize project specific controls (i.e., protocols for flushing, temperature, and residual oxidant). c) confirm WMC plan & operations with verification and validation. 23) Obtain Building Owner's Project Representative approval of the WMC plan, process, and documentation. 24) Implement the agreed upon WMC Plan for achieving water quality and safety. 25) Obtain any authorities having jurisdiction (AHJs) and Building Owner's approval before initiating patient care operations.

Footnotes:

*1 All mitigation measures (hazard control[illegible] associated numeric values (i.e., temperature, residual oxidant, pH, or other) need to be reviewed, coordinated and implemented [illegible]ontext with the organization's on-going water management program.

Citation: Scanlon MM, Gordon JL, Tonozzi AM, [illegible]n SC (2022). Reducing the Risk of Healthcare Associated Infections from *Legionella* and Other Waterborne Pathogens Using a Water[illegible]ent for Construction (WMC) Infection Control Risk Assessment (ICRA) Tool. *Infectious Disease Reports*, 14, Issue, Pages. DOI/Link

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Is Your Water Management Program Already Aligned with Joint Commission Requirements?

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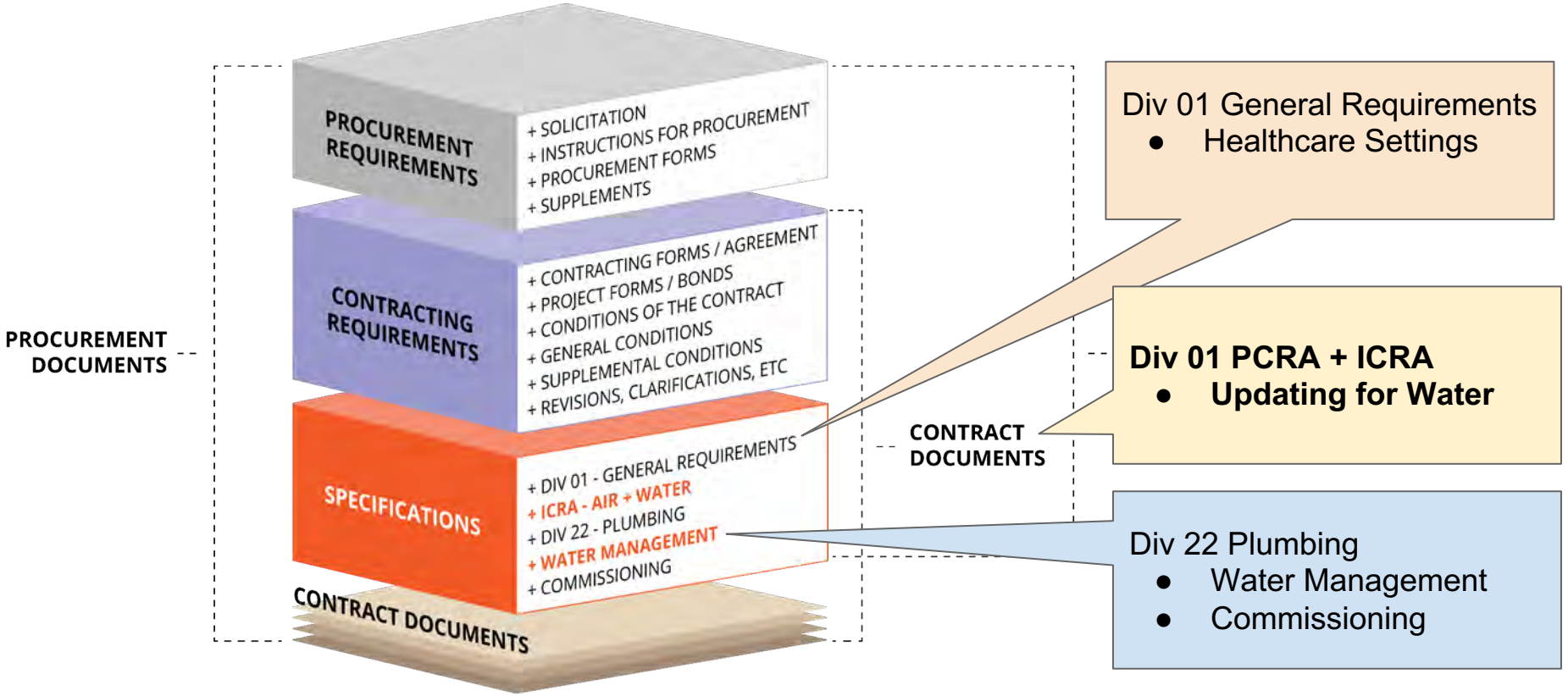
Integrating WMC Construction Tools



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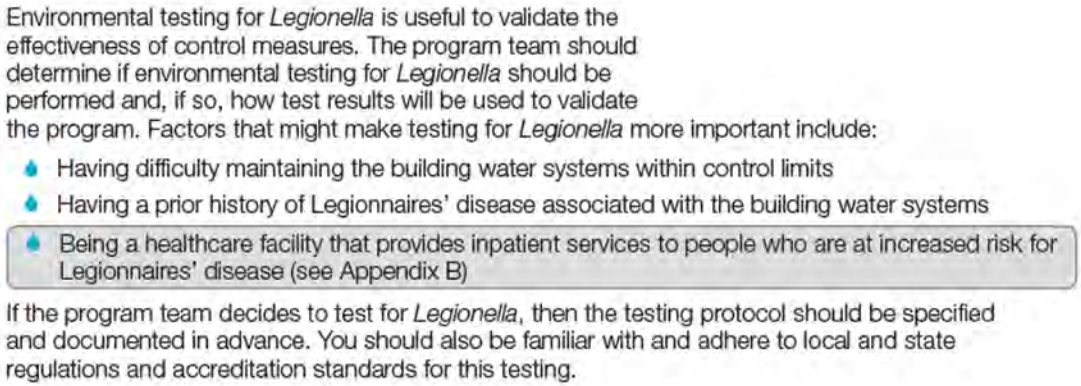
EC 02.05.02 Additional Notes

1. The Joint Commission does not require culturing for *Legionella* or other water-borne pathogens.
2. Refer to ANSI/ASHRAE Standard 188-2018, the CDC Toolkit and ASHRAE Guideline 12-2020 for further water management program guidance.



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

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

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

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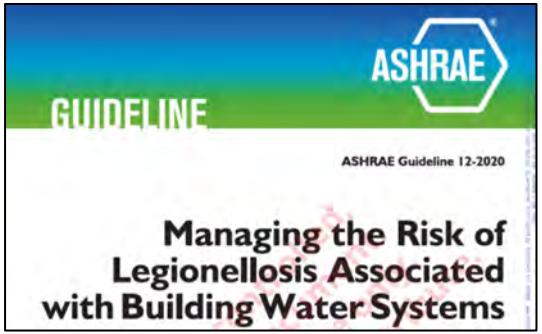
Guidance Documents Referenced



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Best Practices for Verification

- Controls are applied and documented as designed
- Controls meet control limits and corrective actions are documented if they are not
- Controls are performed on the frequency as noted in the program and are documented and documented if they are not
- Controls are verified by a person or department who is not responsible for the control
- Verification is documented

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Best Practices for Validation

- Type is defined by the Team.
- Performed after the program has been verified
- Data is collected from specifically chosen areas to best understand the water system
- Performed at a regular frequency, as defined by the Team
- Criteria is defined by the team.
- Responses are taken and documented if validation results do not meet criteria.

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Q&A

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