BUILDING WATER SYSTEM MANAGEMENT

1. **Environmental assessment**
2. Water management plan essentials

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ENVIRONMENTAL ASSESSMENT OVERVIEW

- Identify facility water system **vulnerabilities**
- Determine extent of routine **maintenance**
- Inform the development of a water management **plan**

- Used to determine elements of environmental recommendations
- Note: A “facility” may have multiple buildings and/or water systems!

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ENVIRONMENTAL ASSESSMENT FORM

- Facility characteristics
- Outside water supply
- Building potable water system design
- Cooling towers and evaporative condensers (if applicable)
- Regulated under Subpart 4-1
- Construction and water service events
- NYSDOH Form 5222



Construction Equipment Guide

What could disrupt or cause changes to the building's water system?

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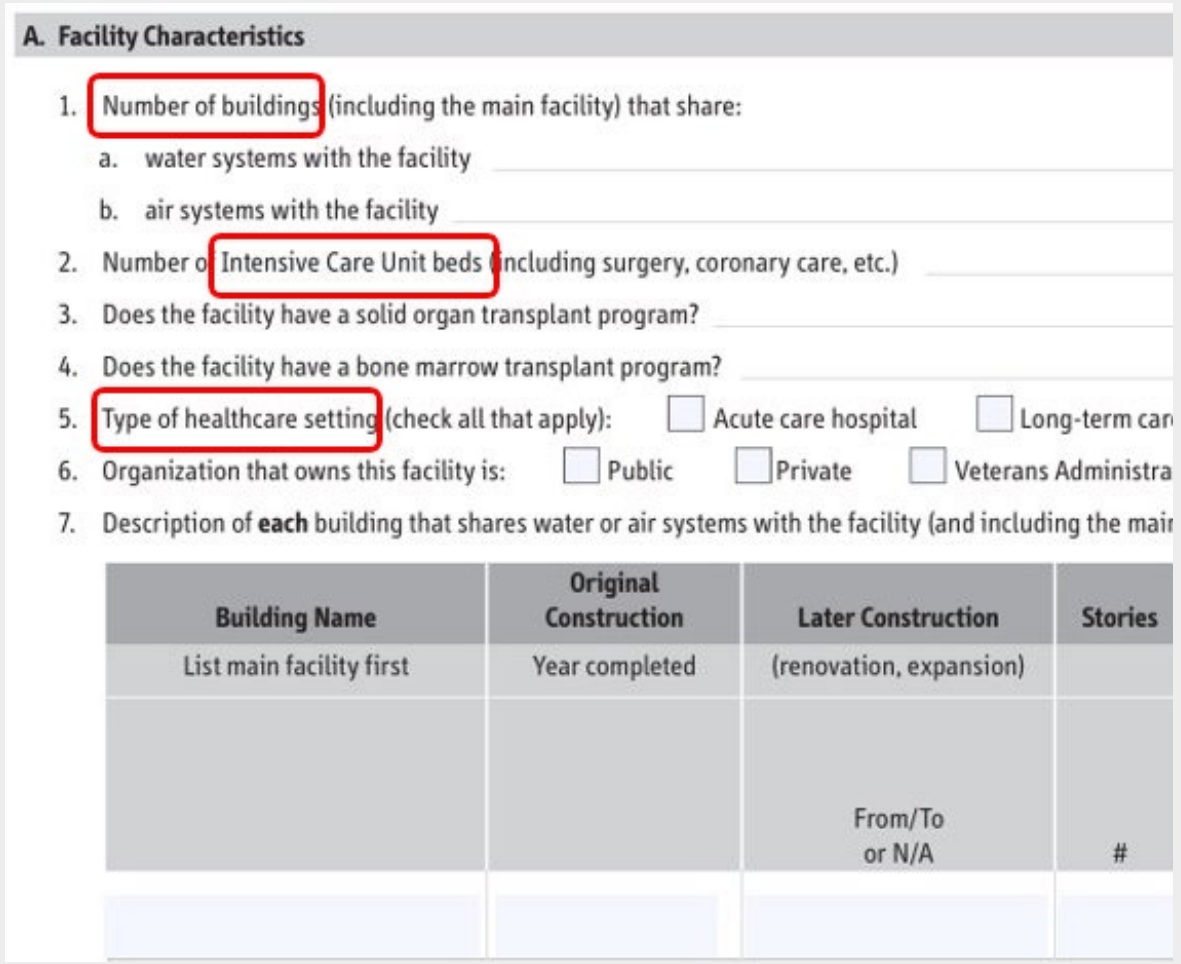
SECTION A: FACILITY CHARACTERISTICS

- Can **windows** be opened? Are any cooling towers visible from them?
- Any **water features** or aerosol generating devices?
- Whirlpools or **spas**?
- ***Legionella***
  - Any history of cases?
  - Existing water management program?



A. Facility Characteristics

1. Number of buildings (including the main facility) that share:
   a. water systems with the facility
   b. air systems with the facility
2. Number o Intensive Care Unit beds (including surgery, coronary care, etc.)
3. Does the facility have a solid organ transplant program?
4. Does the facility have a bone marrow transplant program?
5. Type of healthcare setting (check all that apply): ☐ Acute care hospital ☐ Long-term car
6. Organization that owns this facility is: ☐ Public ☐ Private ☐ Veterans Administra
7. Description of **each** building that shares water or air systems with the facility (and including the mai

Building Name	Original Construction	Later Construction	Stories
List main facility first	Year completed	(renovation, expansion)	
		From/To or N/A	#

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SECTION B: OUTSIDE WATER SUPPLY

B. Outside water supply

1. What is the source of the water used by the facility? *(Check all that apply)*

☐ Public water supply ☐ Well ☐ Other _____

If the facility is served by a public water supply, please answer the remaining questions (2 through 4 below), otherwise skip to section C.

2. Name of supplier

3. How is municipal water disinfected?

☐ Chlorine ☐ Monochloramine ☐ Other _____ ☐ Don't Know

4. Has treatment of the public water supply changed in the last six months? ☐ Yes ☐ No

If **yes,** specify _____

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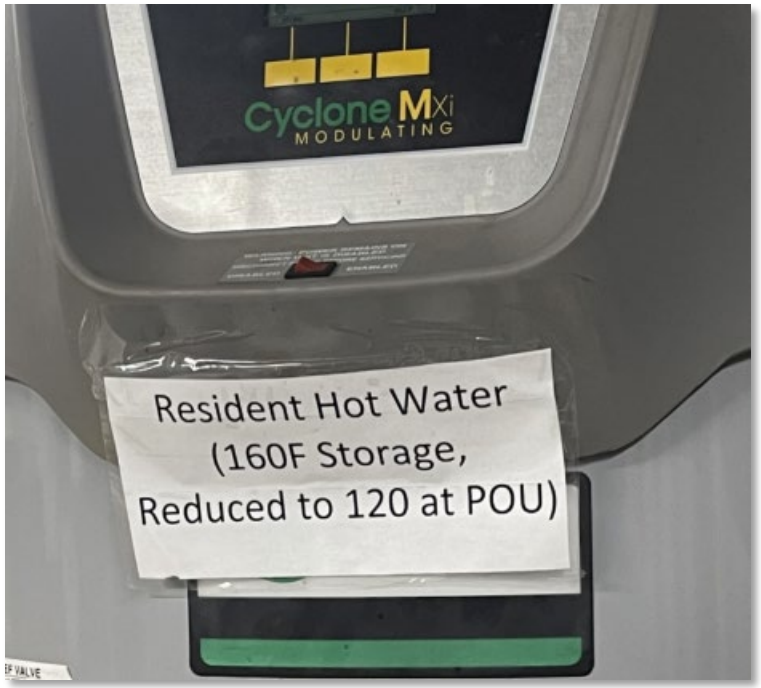
SECTION C: BUILDING SYSTEM DESIGN

- Check hot and cold **temps**
  - Coldest hot water
  - Warmest cold water
- Monitor **hot water** heating system
  - Recirculation, storage tanks
  - Mixing valves
- **Ice machines**
  - A surprising source of Legionella!
  - Beware of carbon activated filters





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SECTION C: BUILDING SYSTEM DESIGN

- Describe water treatment
  - Free chlorine residuals
  - Water softener?
  - Supplemental disinfection system in use?





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SECTION D: COOLING TOWERS

- **ALL facilities with cooling towers** (not just Article 28's) must comply with Subpart 4-1
  - Water source
  - Routine maintenance
  - Special treatments
  - Dates of events





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SECTION E: CONSTRUCTION AND WATER SERVICE EVENTS

- Construction
  - Any construction, renovations on campus
  - Any standing water in unoccupied buildings/areas
  - Nearby building or road construction, e.g., jack hammering
- Water service events
  - Boil Water notices
  - Changes to water quality (color, taste)

Pay attention to ANYTHING that can change or disrupt the system's physical, chemical, and/or biological status quo

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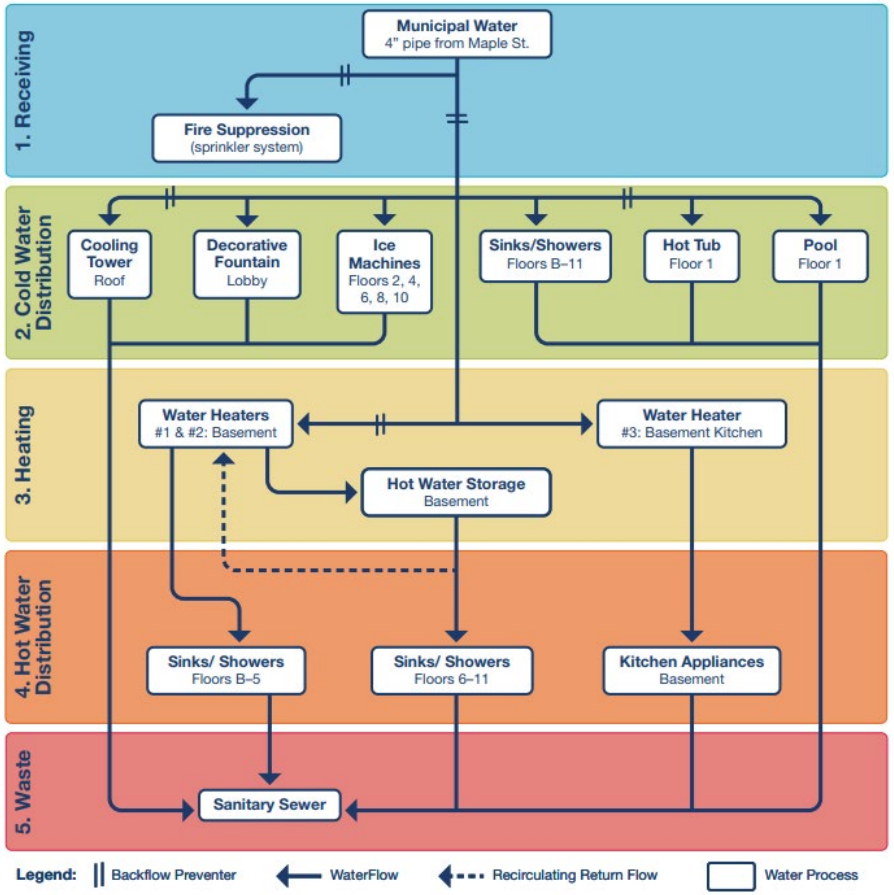
ADDITIONAL COMMENTS AND SUPPLEMENTAL INFORMATION

- Space for more comments, details – not mandatory
- Supplemental Information:
  - **Flow diagram** – important from our perspective:
  - Locations of inlet, storage tanks, treatment unit
  - Overall setup: loops vs. risers
  - Diagram/plan showing the location of cooling towers
- Always include the date of assessment



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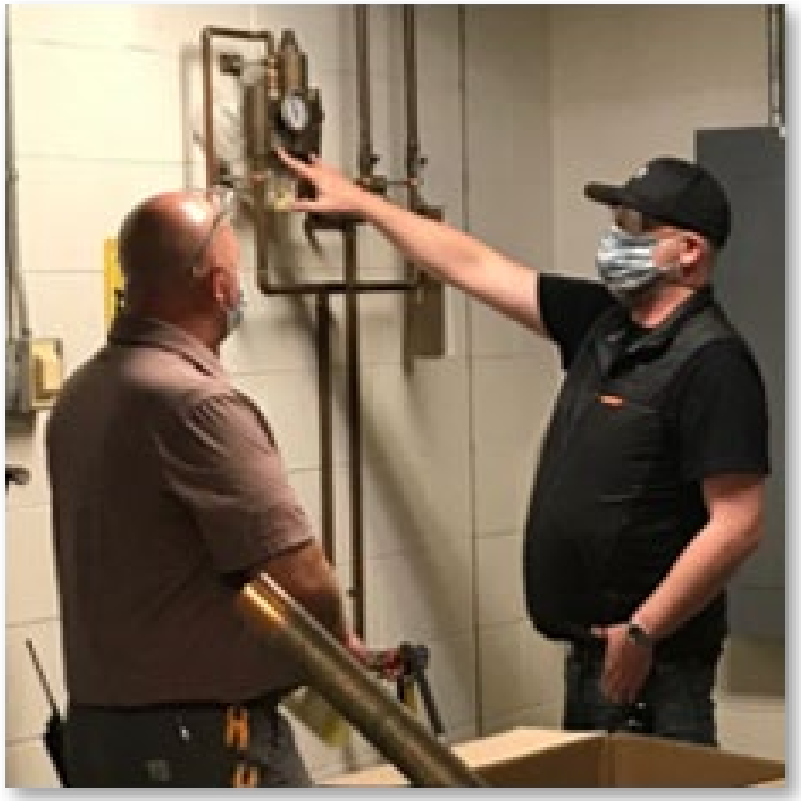
ENVIRONMENTAL ASSESSMENT: FINAL THOUGHTS

- Provides important information in absence of site visit
- Imposes a regular review of the facility's characteristics, repairs, updates
- Useful to:
  - Outside Agencies
  - Water treatment consultants, vendors
  - Facility staff



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BUILDING WATER SYSTEM MANAGEMENT

1. Environmental assessment
2. **Water management plan essentials**

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WATER MANAGEMENT PLAN

- A **living document** that outlines your processes for monitoring, managing, and remediating your water system
  - Should be updated annually and after critical events (e.g., construction)
- Based on the findings of your environmental assessment
  - Many templates available
  - NYSDOH Sampling and Management Plan
  - CDCDC Water Management Program Toolkit
  - Your water treatment consultant

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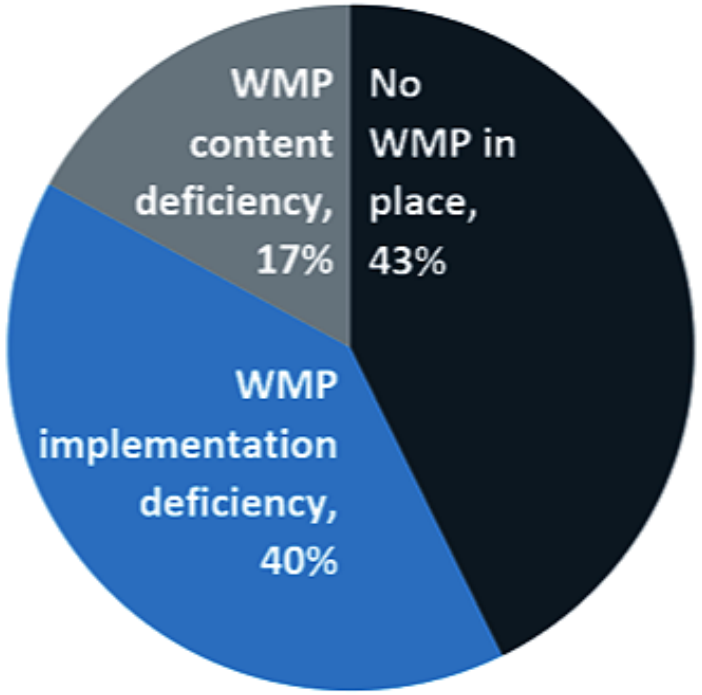
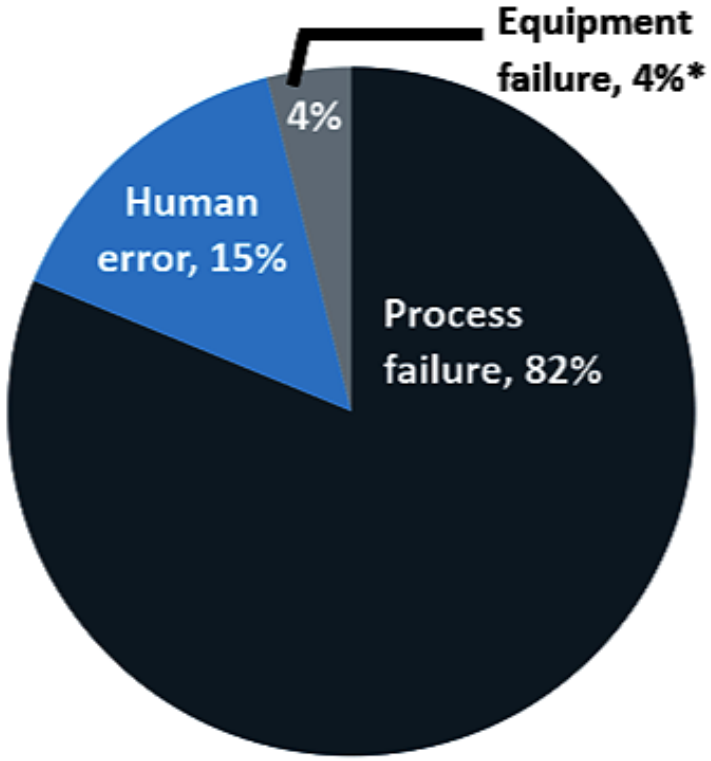
WATER MANAGEMENT PREVENTS DEFICIENCIES

Most WMP deficiencies associated with outbreaks were due to missing or improperly implemented WMPs.



Most environmental deficiencies were due to process failure.



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WATER MANAGEMENT PLAN CHECKLIST

Facility Information
- ☐ Facility Location
- ☐ Facility Phone Number
- ☐ Point of Contact (address, number, email)

Developer of Sampling and Management Plan (Company)
- ☐ Point of Contact for Company or Organization
- ☐ Address/Number of Company
- ☐ Effective Date of SMP

Personnel Roles and Responsibilities
- ☐ SMP Team Members
- ☐ SMP Team Functions
- ☐ SMP Contact Information (Address/Number/Email)

Building Water Systems Descriptions
- ☐ Potable Water Systems List
- ☐ Potable Water Systems Detailed Descriptions

Legionella Sampling Plan
- ☐ Sampling Locations for Domestic Hot Water in a Facility
- ☐ Non-Medical Equipment Sampling
- ☐ Infrastructure Equipment Sampling
- ☐ Cold Water Inlet Sample
- ☐ Hot Water Return/Supply Samples

Potable Water System Monitoring
- ☐ Potable Water System Maintenance
  - ☐ Temperatures,
  - ☐ Disinfectants
  - ☐ Control Measures
  - ☐ Corrective Actions
- ☐ Hot Potable Water System Maintenance
- ☐ Cold Potable Water System Maintenance

Procedures for Responding to Sampling Exceedances
- ☐ Short-term Response
- ☐ Long-term Response
- ☐ Re-sampling Procedure
- ☐ NYSDOH Contact Procedure Listed (e.g. hcf.legionella@health.ny.gov required)

☐ **Procedures in Event of Nosocomial Illnesses**

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1: FACILITY AND TEAM INFORMATION

- Address
- Point of contact
- Plan developer and contact information
- Source of potable water
- Number of hot/cold water systems

- Team members
  - Names/Titles
  - Contact information (phone, email, etc.)
- Roles
  - Administrator
  - Facilities/Engineering
  - Clinical/Infection Control
  - Lab
  - Consultant

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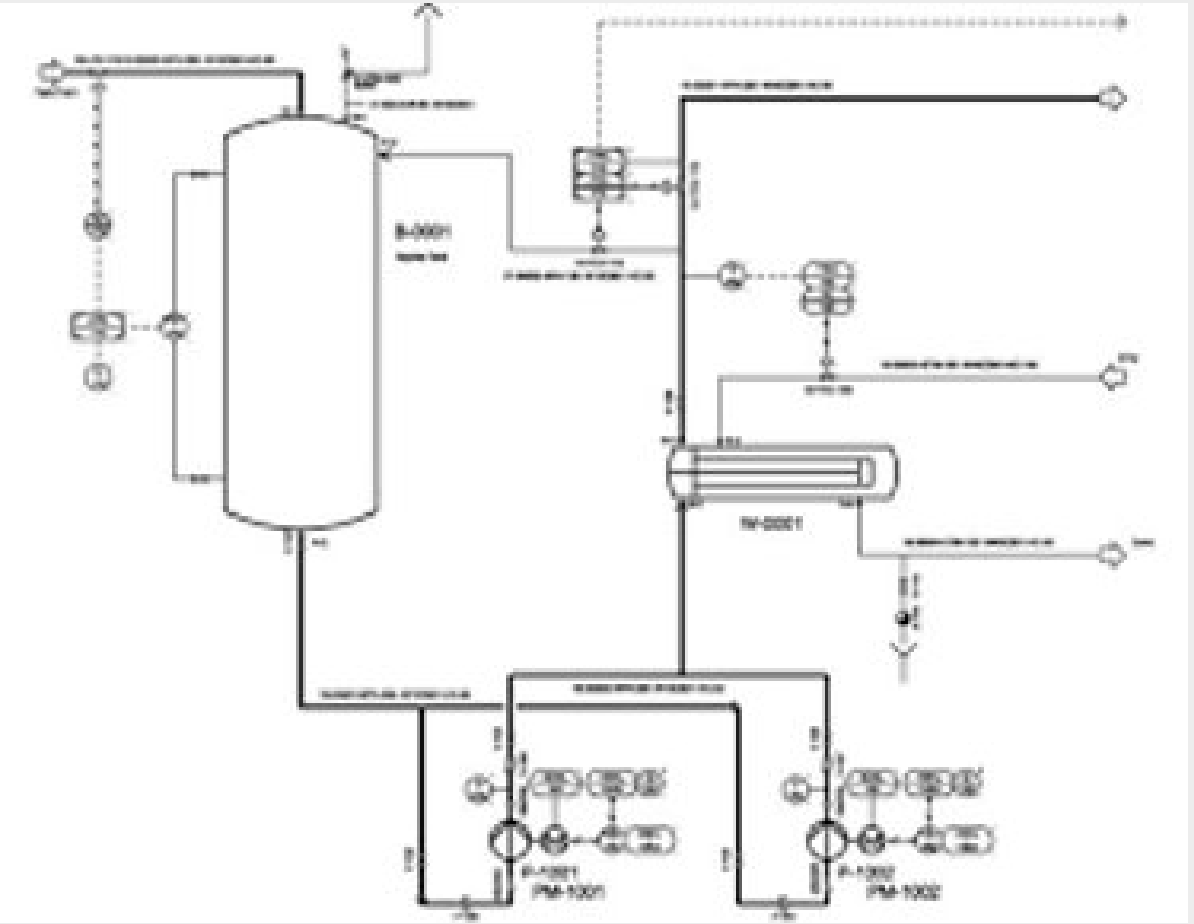
2: WATER SYSTEM DESCRIPTION

- Provide detailed written description and flow or process and instrumentation diagram
- Designations for water systems
- Location and purpose

3.1 POTABLE WATER SYSTEMS LIST

Water system designation	Location or portion of building	Purpose
City of [redacted] Domestic Water Supply	Entire Campus	Supply Domestic Cold water to the Hospital
Circulating Hot Water System	E-Building	Supply Circulating Hot Water to the Hospital CTICU Department
Circulating Hot Water System	[redacted] Buildings Hot Water Distribution System	Supply Circulating Hot Water to the Hospitals Medical and Radiation Oncology Departments



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3: LEGIONELLA SAMPLING PLAN

- **Specific** sampling points (inlets, outlet, return)
- **Representative** of the facility and facility size
  - Include non-medical equipment (laundry, beauty parlors, kitchens, etc.)
  - Include infrastructure equipment (sprinklers, fountains, spas, etc.)
  - Cooling towers have separate (required) documentation
- Sampling plan guidance on our website



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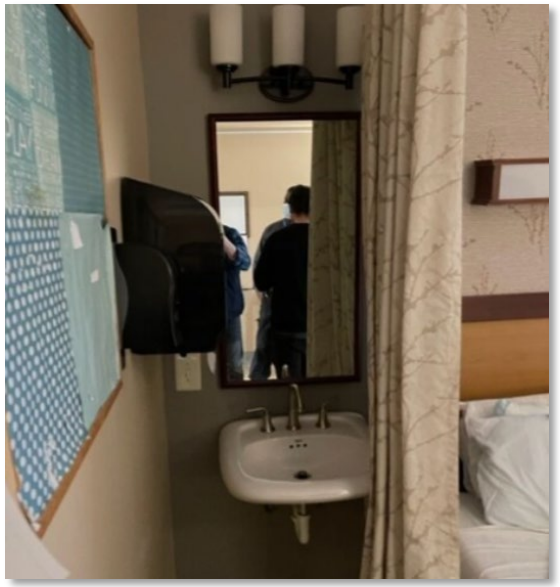

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4: SYSTEM MONITORING

- List monitoring sites and frequency on diagram
- Control limits at each location
  - Acceptable ranges or limits
- Temperature profile
- Corrective actions
- Outside-the-box monitoring
  - Recent fires or fire department training facility nearby?
  - Intensive water use can disrupt the public water system downstream
  - Decorative fountains should be in the plan



American Fire Training Systems



Kusser USA

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5: SYSTEM MAINTENANCE

- Provide separate sections/descriptions
- Show hot and cold systems on diagram
- Add temperature and/or disinfectant concentration values at test points
- Include copper and silver ions
- Identify dead ends
- List procedures used or actions taken to maintain the hot/cold water distribution system, e.g., flushing, chlorination, etc.



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Location Designator	System component	Procedure/action
SMH B.1250	Domestic Cold Pump Skid	• Chlorination – Supplied by the City of Rochester Supply ○ Cl_2 0.05-0.7 ppm, max 4.0 ppm • Run water in patient rooms while being cleaned

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6: SAMPLING EXCEEDANCES

- Procedures that are implemented when a threshold of sample sites are positive for *Legionella*
  - Regulated facilities:
    - Threshold: ≥30% for regulated facilities
    - Immediately notify the New York State Department of Health hcf.legionella@health.ny.gov
- Include short- and long-term response (example):

Procedure designator	Description of procedure/activity
1	Check ClO_2 levels (0.05 – 0.40 ppm) Increase if necessary. If positive sample is in the hot water check temperature 110 – 125°. Adjust as necessary.
2	Flush all fixtures affected thoroughly
3	Re-sample all affected fixtures - continue flushing until a "No Legionella Isolated" result is obtained and fixture is turned over for normal use.
4	If positive legionella cultures persist – spot chlorination of the water line that feeds the area that is having the problem. Then follow the steps before: 1. Flush 2. Re-sample 3. Continue to flush while waiting for sample results 4. When "No Legionella Isolated" is resulted turn fixtures back over for normal use

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7: ILLNESS RESPONSE

- Describe in **facility-specific detail** the steps taken to further prevent the growth and potential exposure of *Legionella*
- The state and local health departments must be notified when a case of legionellosis is confirmed
  - Listing the notification requirements in the procedures is required!
  - Can be done as a table, description or combination

Procedure designator	Procedure/activity
1	Legionella culture results routinely monitored, documented and shared with DOH as necessary
2	Bottled potable water
3	High risk patients excluded from showering until water treatment completed
4	Review policies with clinical staff and investigate violations



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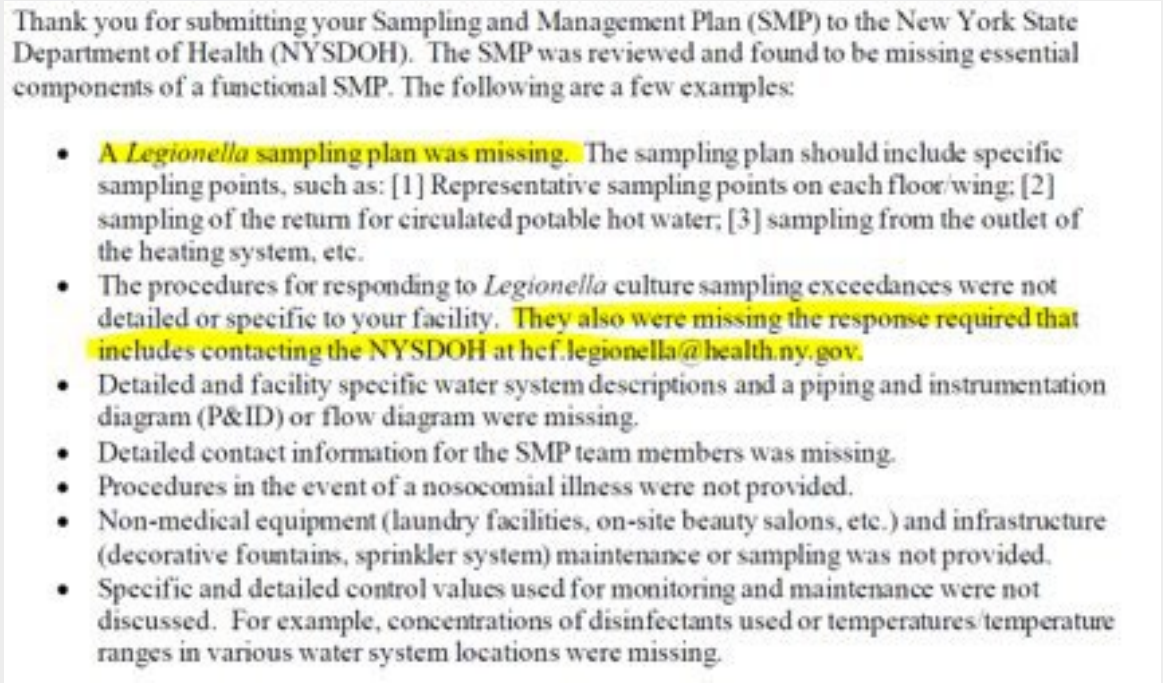
8: PLAN REVIEW

- New York State Department of Health reviews plans from regulated Article 28 facilities with **cases**
- Standardized review protocol and scoresheet
- Letter with **feedback and recommendations** sent in response to insufficient plans



Thank you for submitting your Sampling and Management Plan (SMP) to the New York State Department of Health (NYSDOH). The SMP was reviewed and found to be missing essential components of a functional SMP. The following are a few examples:

- A *Legionella* sampling plan was missing. The sampling plan should include specific sampling points, such as: [1] Representative sampling points on each floor/wing; [2] sampling of the return for circulated potable hot water; [3] sampling from the outlet of the heating system, etc.
- The procedures for responding to *Legionella* culture sampling exceedances were not detailed or specific to your facility. They also were missing the response required that includes contacting the NYSDOH at hcf.legionella@health.ny.gov.
- Detailed and facility specific water system descriptions and a piping and instrumentation diagram (P&ID) or flow diagram were missing.
- Detailed contact information for the SMP team members was missing.
- Procedures in the event of a nosocomial illness were not provided.
- Non-medical equipment (laundry facilities, on-site beauty salons, etc.) and infrastructure (decorative fountains, sprinkler system) maintenance or sampling was not provided.
- Specific and detailed control values used for monitoring and maintenance were not discussed. For example, concentrations of disinfectants used or temperatures/temperature ranges in various water system locations were missing.

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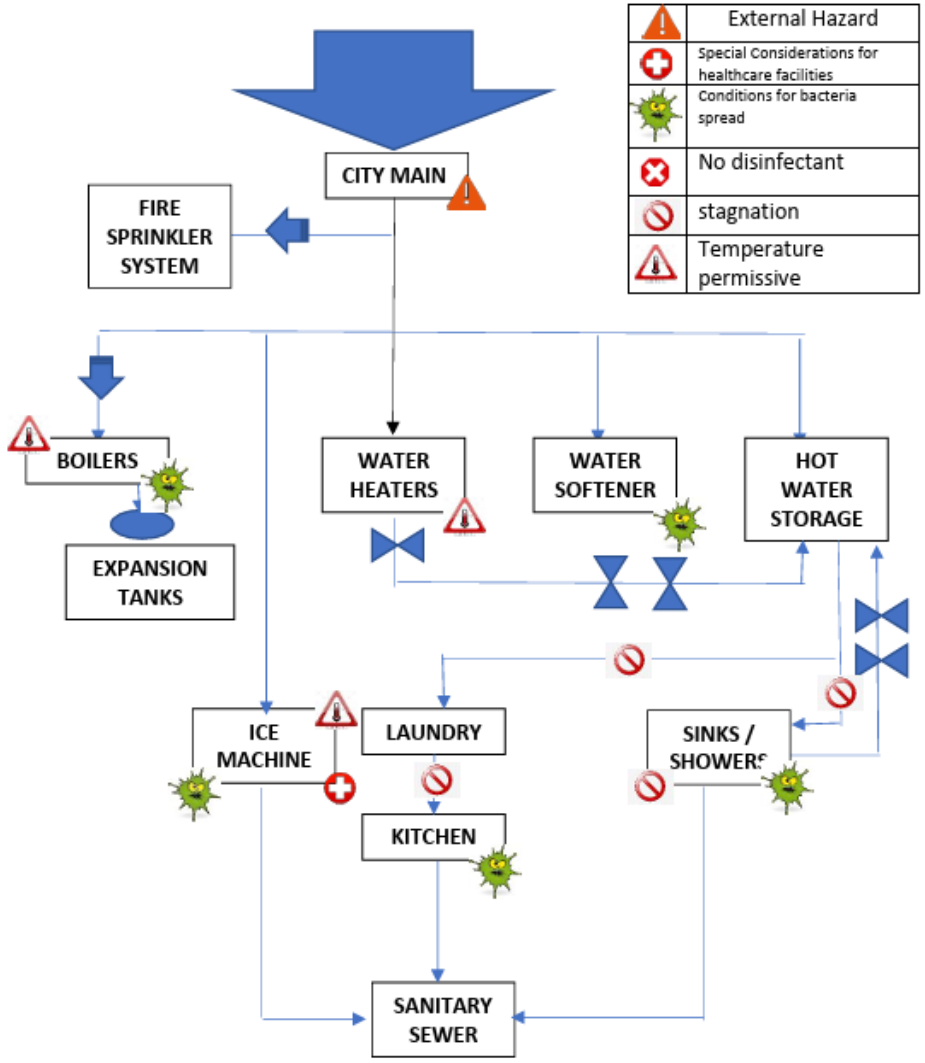
8: KEY COMPONENTS OF A SUFFICIENT PLAN

1. Current team member contact information with team functions assigned
2. **Facility-specific** information included

   A GENERIC PLAN DOESN'T HELP YOU!
3. Flow diagram/Piping and instrumentation diagrams
4. Sampling site table with specific locations
5. Maintenance, monitoring, corrections, exceedances and nosocomial illness



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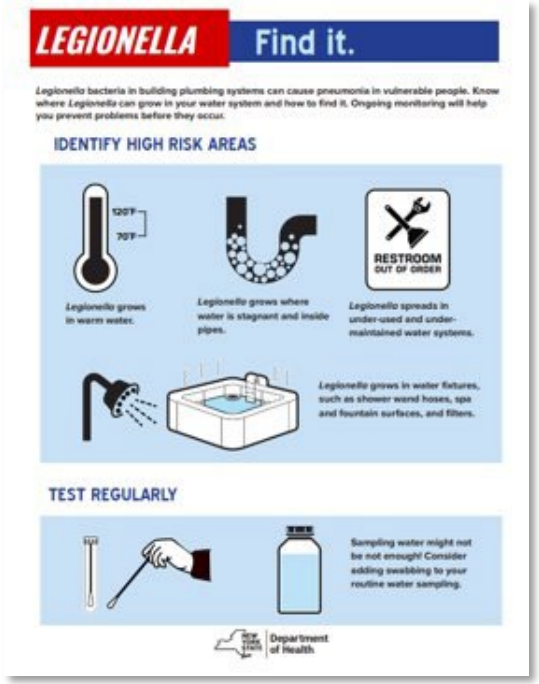
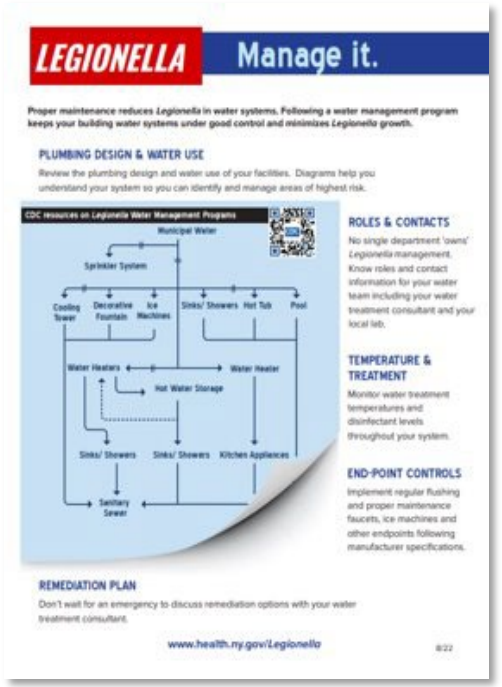
Other Water Management Learning Resources

1. Program Page
2. Standard 188-2021, Legionellosis:
   Risk Management for Building Water Systems establishes minimum legionellosis
   risk management requirements for building water systems
3. Centers for Disease Control and Prevention free Legionella training





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