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LEGIONELLA MANAGEMENT FOR LONG-TERM CARE FACILITIES

Bureau of Water Supply Protection
Others...

2026

Legionella 101

1. **Legionnaires' disease**
2. *Legionella* in the built environment
3. New York State regulation

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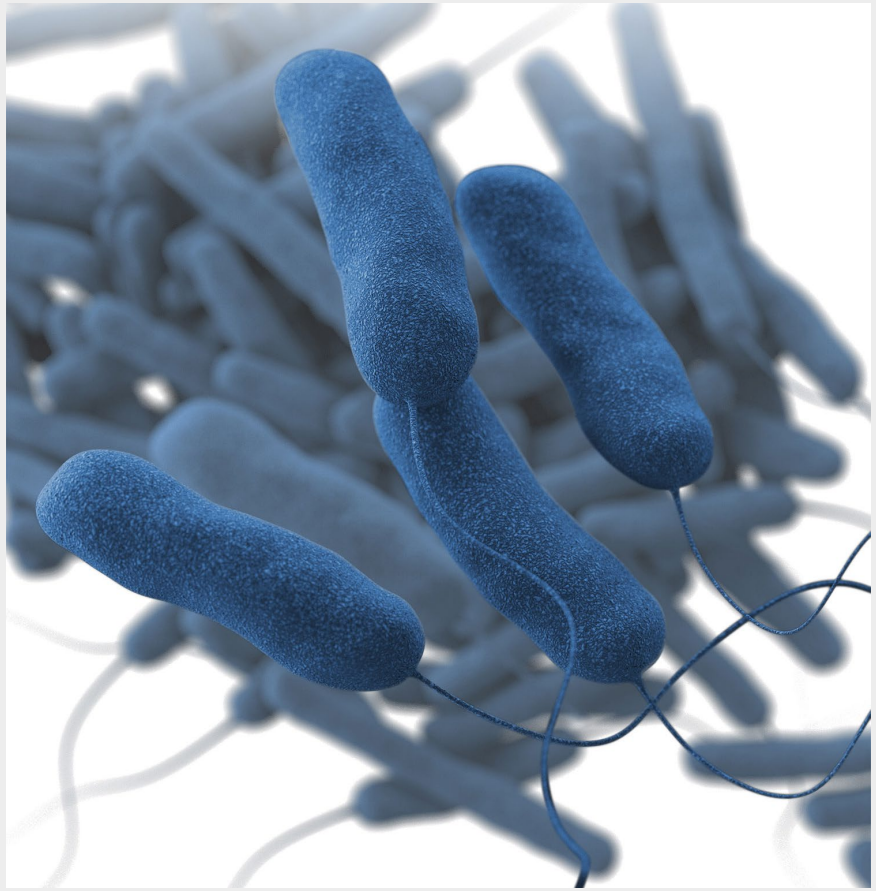
LEGIONELLA

Genus of closely related bacteria

- 50 species, 70 serogroups
- More than half are associated with human disease

Legionella pneumophila = 90% of cases in US

- 15+ serogroups with more being added
- *Legionella pneumophila* serogroup 1 = 50% of all cases



CDC

Leading cause of waterborne infections in the US!

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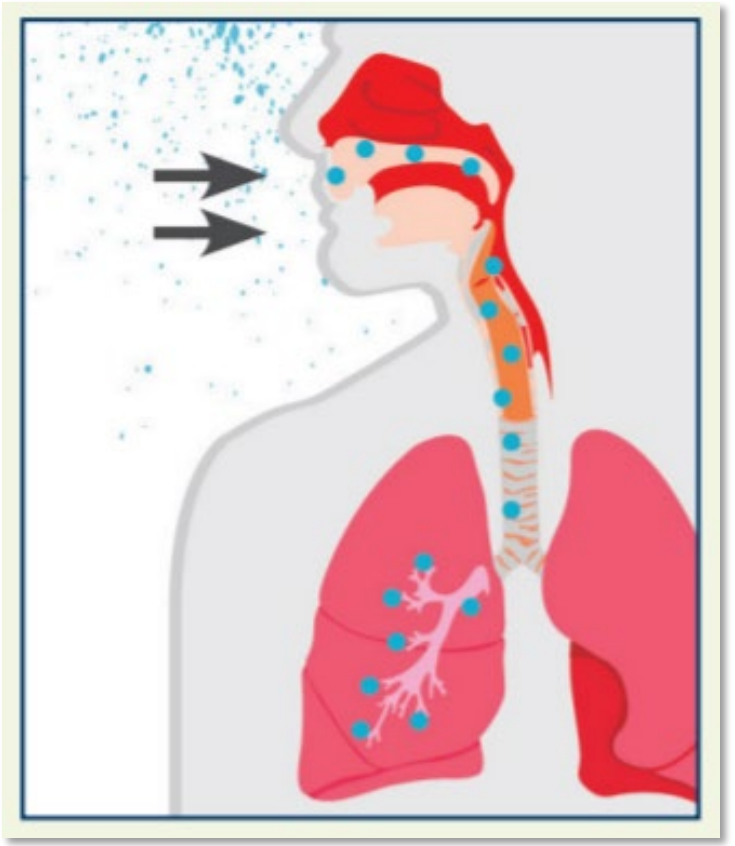
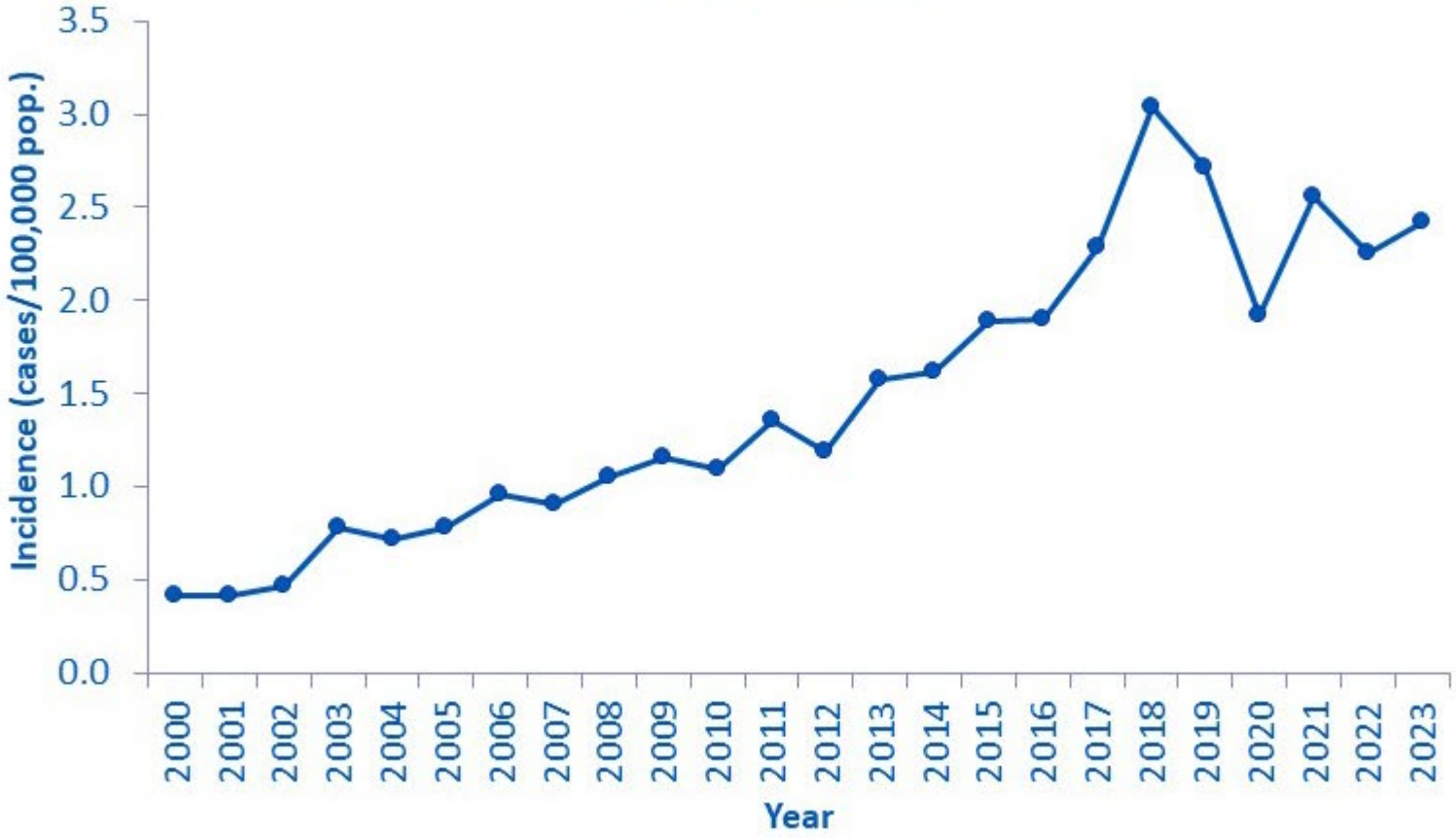
LEGIONELLOSIS

- Infection occurs when people breathe in airborne droplets of water containing the bacteria
  - Aerosolized water from cooling towers, hot tub, showers
  - Aspirating water when drinking
- Symptoms include fever, shortness of breath, (dry) cough, muscle aches and headaches
- Legionellosis classifications:
  - **Legionnaires' Disease**: *Legionella* infection that causes serious/deadly illness (pneumonia)
  - **Pontiac Fever**: *Legionella* infection that causes milder illness without pneumonia ("bad cold" level of illness)
  - **Extrapulmonary legionellosis**: *Legionella* infection in parts of body outside of the lungs (rare)



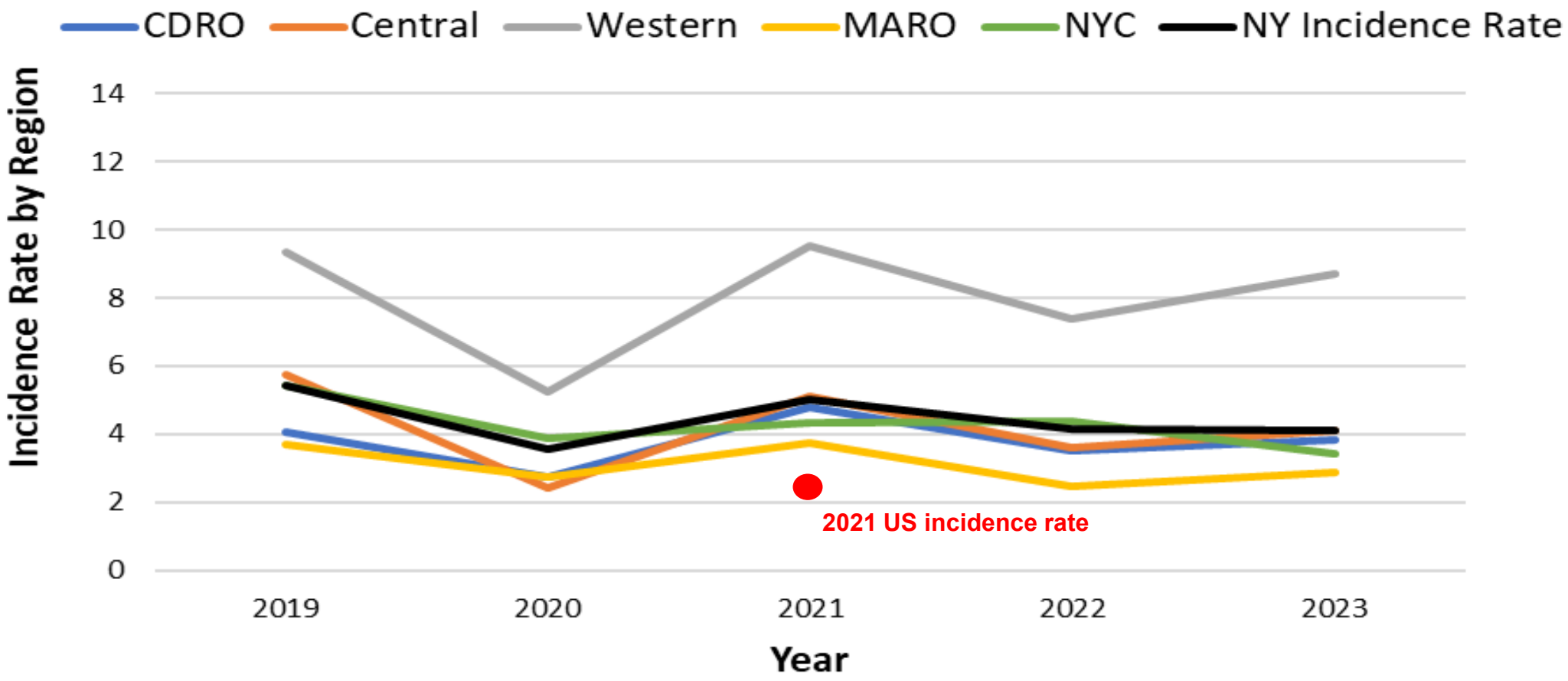
CDC

Legionnaires' Disease in the United States 2000-2023*



*National Notifiable Diseases Surveillance System

Incidence Rate of Confirmed Legionellosis Cases per 100,000 in New York State Regions 2019-2023



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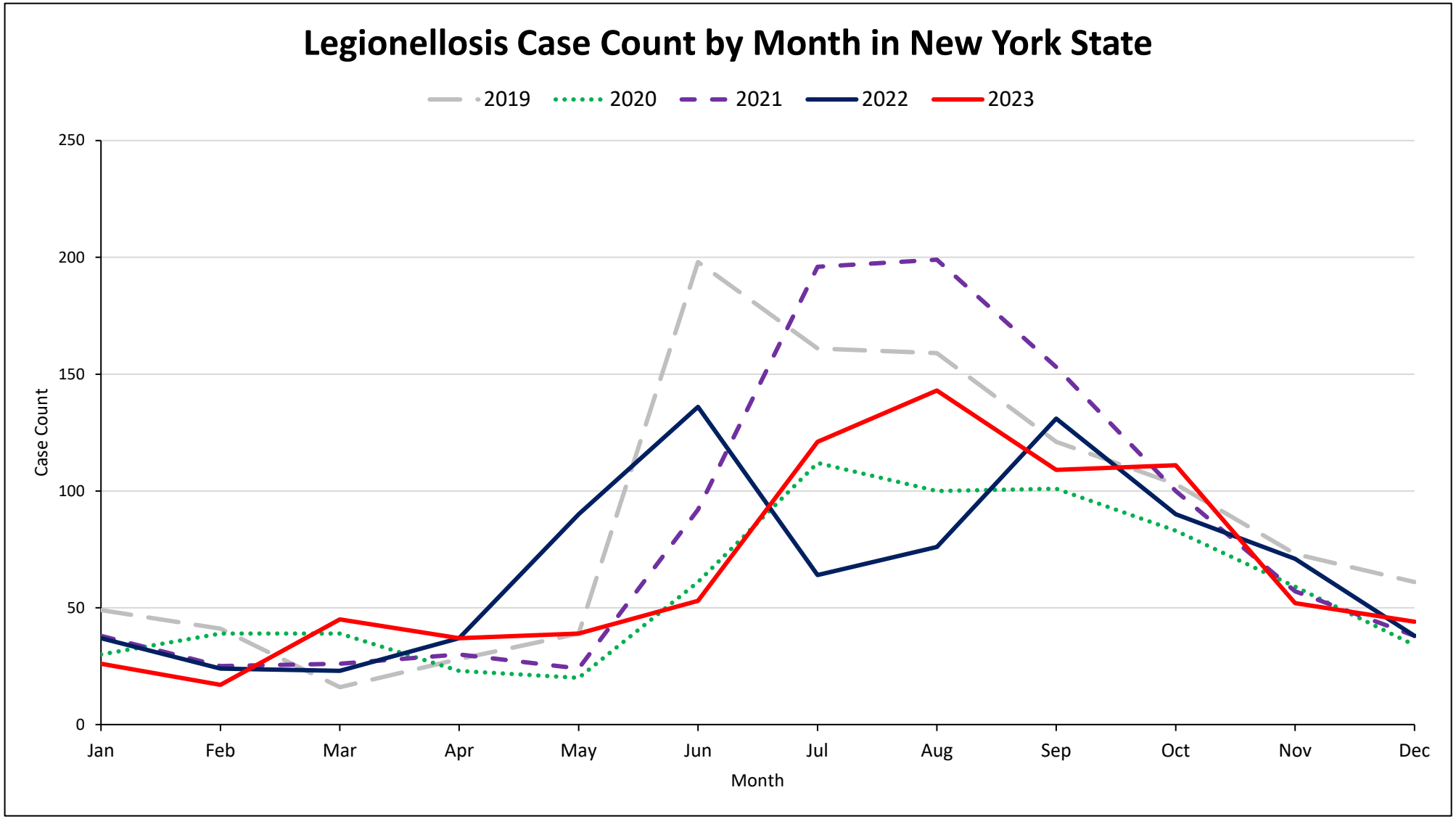

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Legionella 101

1. Legionnaires' disease
2. ***Legionella* in the built environment**
3. New York State regulation

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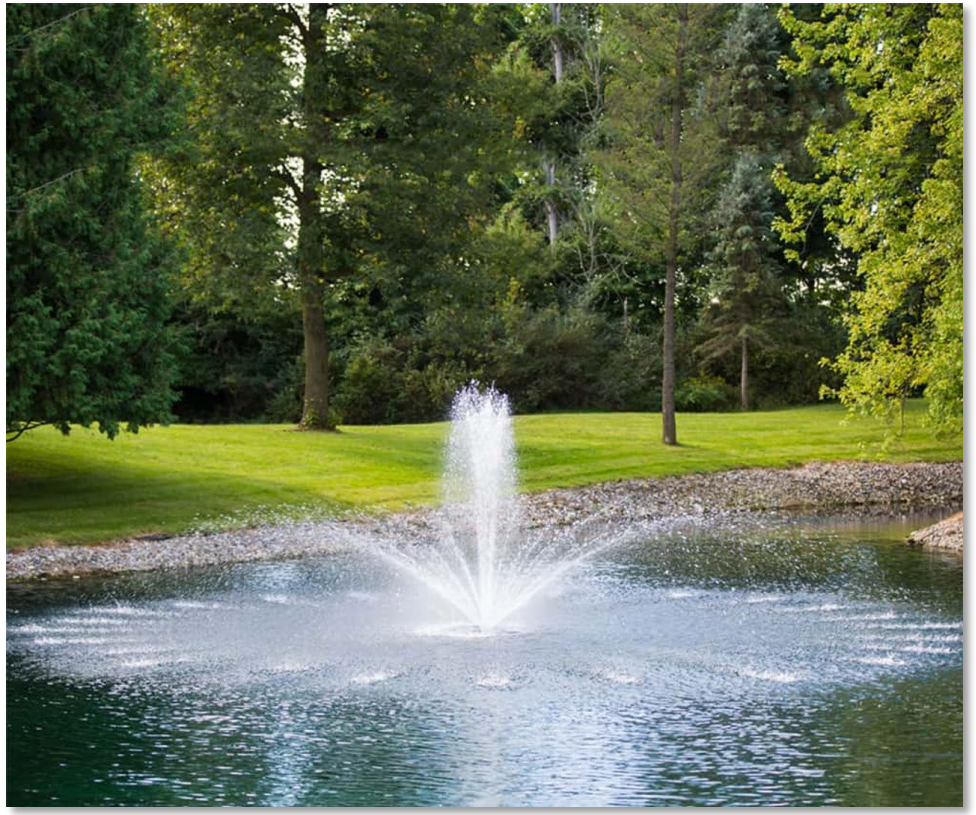
WHERE ARE LEGIONELLA FOUND?

- Part of normal microbial population in water
  - High incidence rates in states that border large water bodies (Great Lakes in particular)
- Can be found in freshwater environments worldwide
  - Most lakes, mud, soil, streams, and subsurface locations
  - Found in groundwater
- **Thrives in thermally modified water**
  - I.e., the built environment



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COMMON SOURCES IN THE BUILT ENVIRONMENT

- **Cooling towers**
  - Recirculating warm water
  - Clouds of contaminated droplets mixed with vapor that are released into the air
  - NYS regulation and registry
- Other thermally modified water (70-110 F)
  - Showers
  - Hot tubs/spas
- Other recirculating water
  - Fountains



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LEGIONELLA IN BUILDING WATER SYSTEMS

- *Legionella* can grow and spread in many areas of a building…



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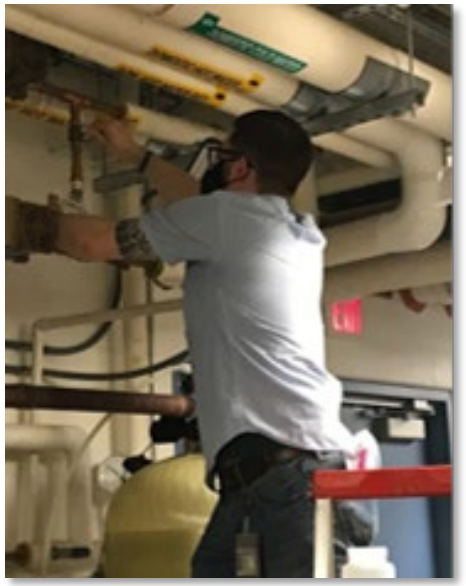
WHERE DO WE LOOK?

- Hot and cold-water storage tanks
- Water heaters
- Expansion tanks
- Water filters
- Faucets and aerators
- **Cooling towers**
- Air handling units
- ***Hot tubs**, jacuzzies*
- **Shower heads, hoses, wands**



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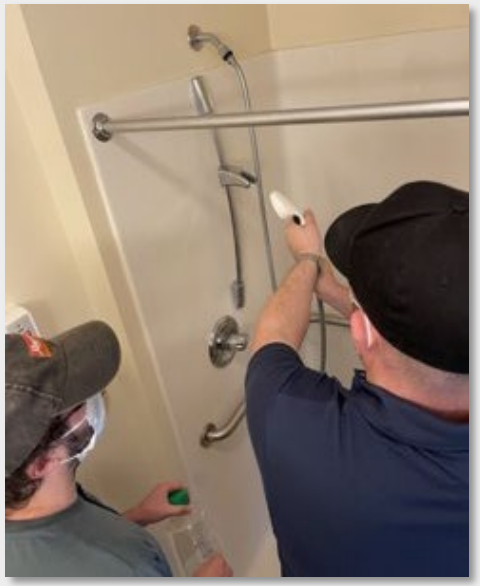
- Medical devices (such as CPAP machines, bronchoscopes, and hydrotherapy equipment)
- Decorative fountains
- Pipes, valves, fittings
- Centrally-installed misters, atomizers, air washers, and humidifiers
- Infrequently used equipment
- **Ice machines** & water dispensers



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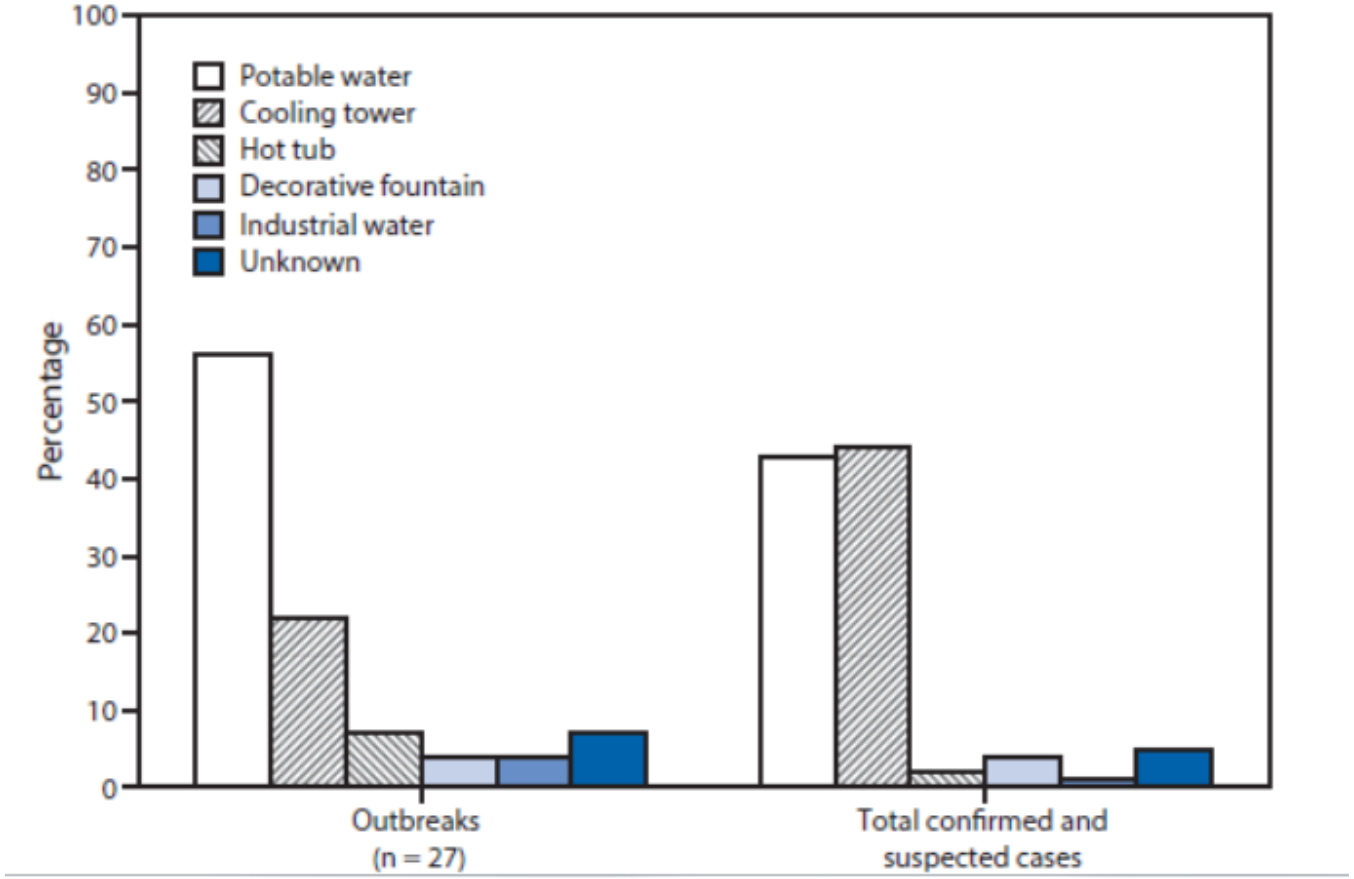
ROLE OF ENVIRONMENTAL SOURCE

Percentage of Outbreaks and Cases of Legionnaires' Disease by Environmental Source – North America, 2000-2014



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CONDITIONS FOR GROWTH

- Water Chemistry
  - Low or no chlorine residual
  - pH of 6 – 8 or higher
- Pipe Conditions
  - Scale
  - Corrosion
  - Sediment
- Flow
  - Low flow = Ideal for growth
  - Intermittent stagnation



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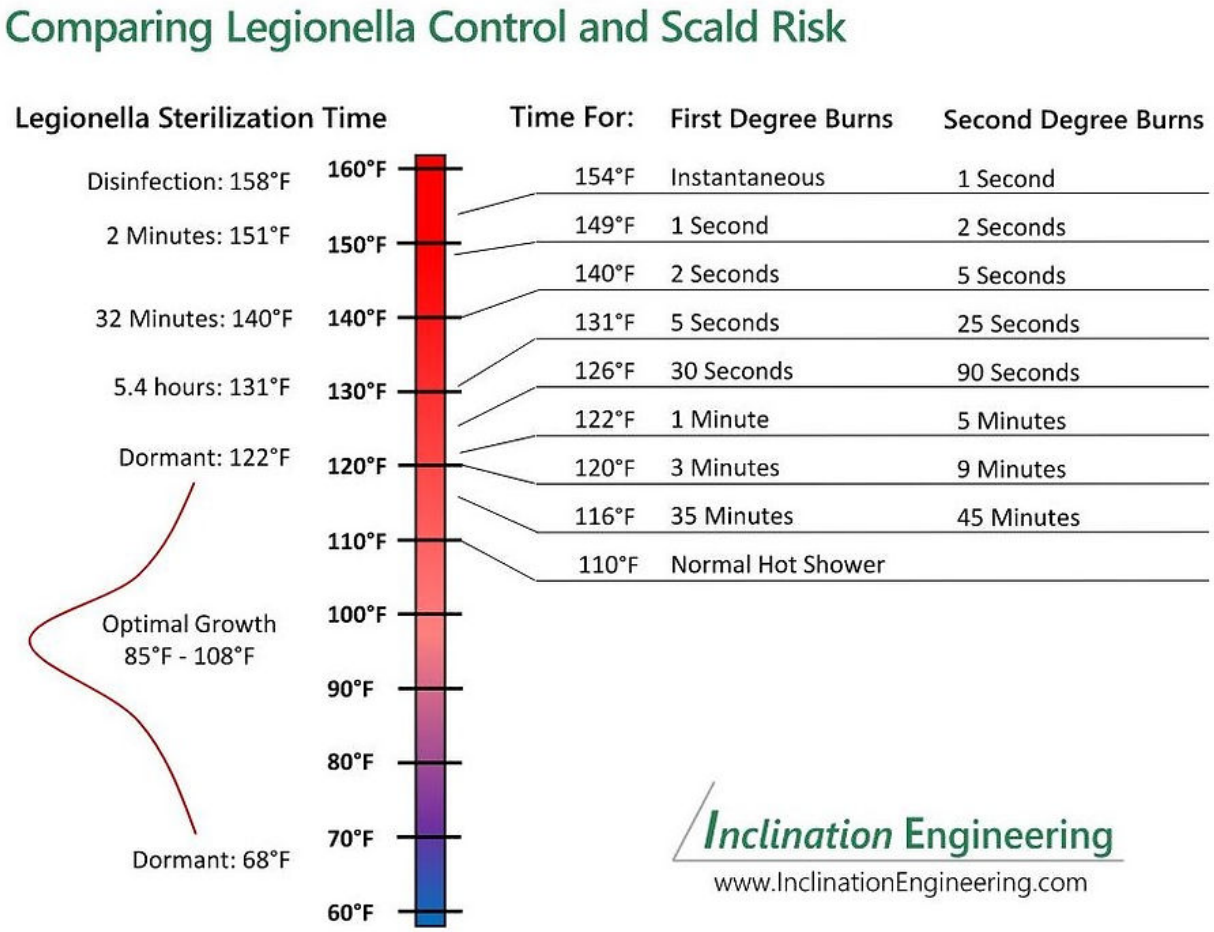
GROWTH & SURVIVAL TEMPS

Temperature (approx.) for **free-floating bacteria**:

- >140°F = fatal
- 120°F – <140°F = survival, but little to no growth
- 80°F – 120°F = ideal for growth

REMEMBER:
Biofilm will protect *Legionella* from high temperatures and disinfectants!



Sources: Sanden, Fields, and Barbaree, et. al., "Viability of Legionella pneumophila in chlorine free water at elevated temperatures." Abstracts of the Annual Meeting of the American Society for Microbiology 1986: 287

Moritz and Henriques, "Study of Thermal Injury: II." American Journal of Pathology 1947; 23: 695-720
Technical Bulletin 34, US Government Memorandum, C.P.S.C.

Inclination Engineering

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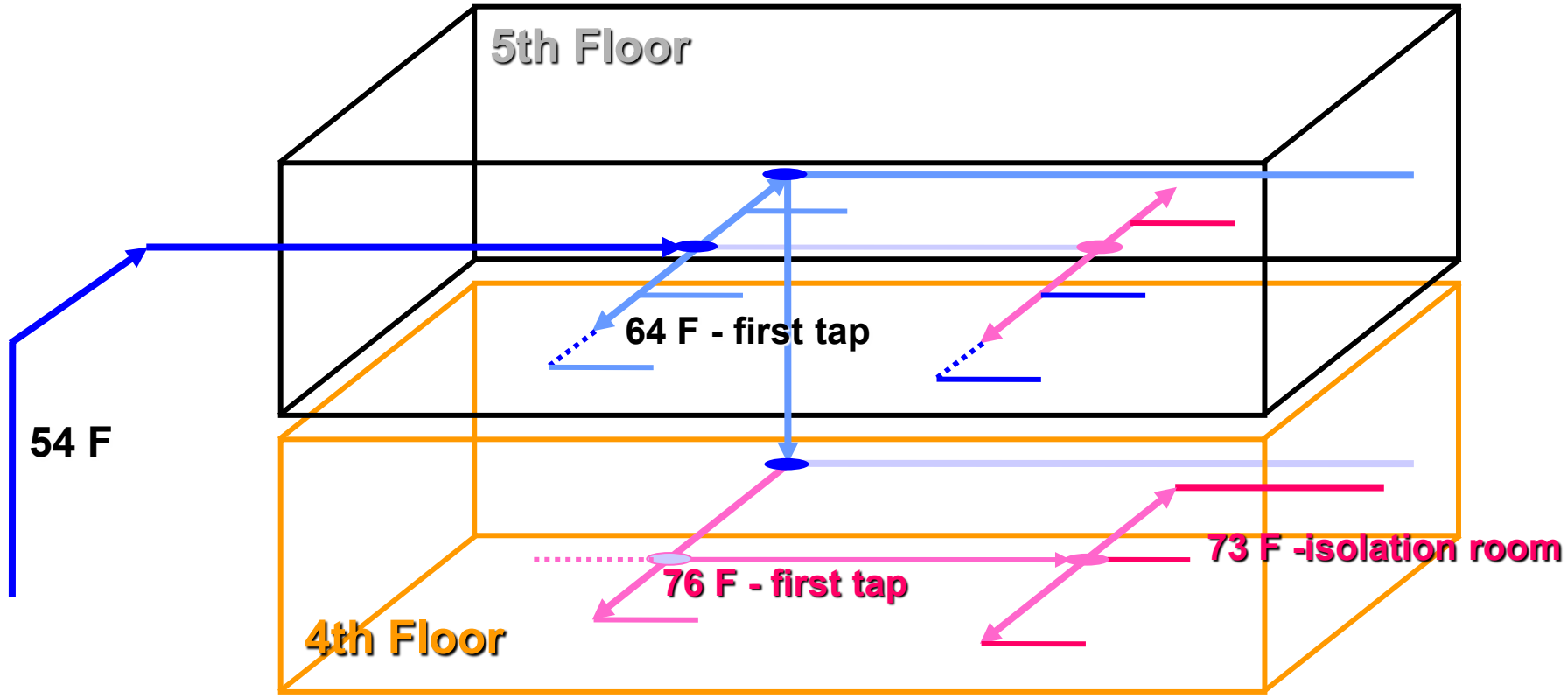
EXAMPLE OF COLD-WATER FLOW



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Shades of blue are cool temperatures; shades of pink/red are warm temperatures.

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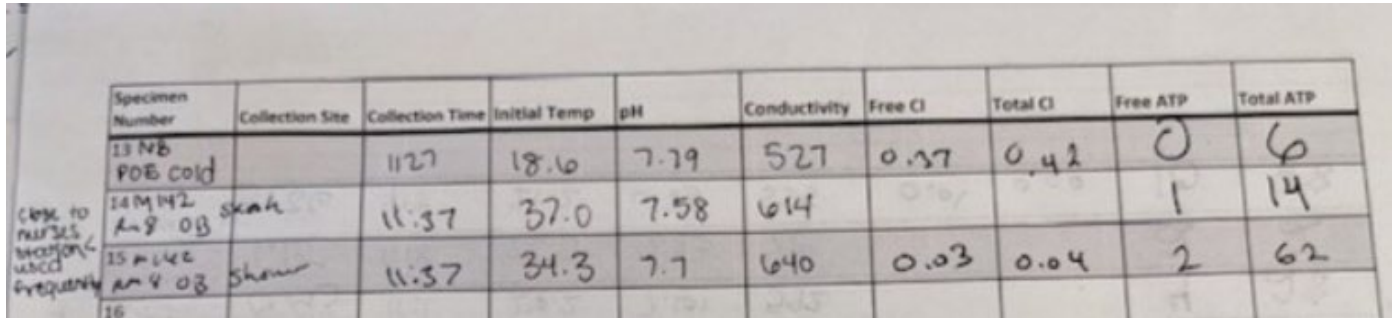
LACK OF A BIOCIDE RESIDUAL

- A key problem in large premise water systems!
- In potable water, there is loss of chlorine residual from the plant to the delivery location
  - Additional loss of residual within the building
- Chlorine isn't very effective against *Legionella* at low doses
  - 2 to 6 ppm needed for good control
- There may be improper or inadequate application of biocides to cooling towers



Specimen Number	Collection Site	Collection Time	Initial Temp	pH	Conductivity	Free Cl	Total Cl	Free ATP	Total ATP
13 NB POE cold		1127	18.6	7.79	527	0.37	0.42	0	6
14 M142 Am OB	sink	11:37	37.0	7.58	614			1	14
15 M142 Am OB	shower	11:37	34.3	7.7	640	0.03	0.04	2	62
16									

close to nurses station/ used frequently

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POSSIBLE TRIGGERS LEADING TO INCREASED OCCURRENCE OR COLONIZATION

- Facility changes to a more vulnerable population
- Low patient or resident census
  - Lack of water movement
  - Can’t deliver treatment chemicals, loss of residual
- Change in building water use patterns
- Disruption in water service
- Construction
- Bad luck!

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Legionella 101

1. Legionnaires' disease
2. *Legionella* in building water systems
3. **New York State regulation**

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10 NYCRR PART 4 PROTECTION AGAINST LEGIONELLA

- Subpart 4-1: Cooling Towers
  - Applies to ALL cooling towers
  - Cooling towers in New York City must also comply with the New York City regulations
  - Appendix 4-A: action level table for remediating cooling towers
- Subpart 4-2: Healthcare Facilities
  - Applies to all Article 28 facilities (hospitals, residential care facilities (aka nursing homes))
  - Non-Article 28 facilities should consider using Subpart 4-2 as guidance
  - Appendix 4-B: action level table for remediating potable water system
- Guidance and other resources are available on the program website
  - https://regs.health.ny.gov/content/part-4-protection-against-legionella

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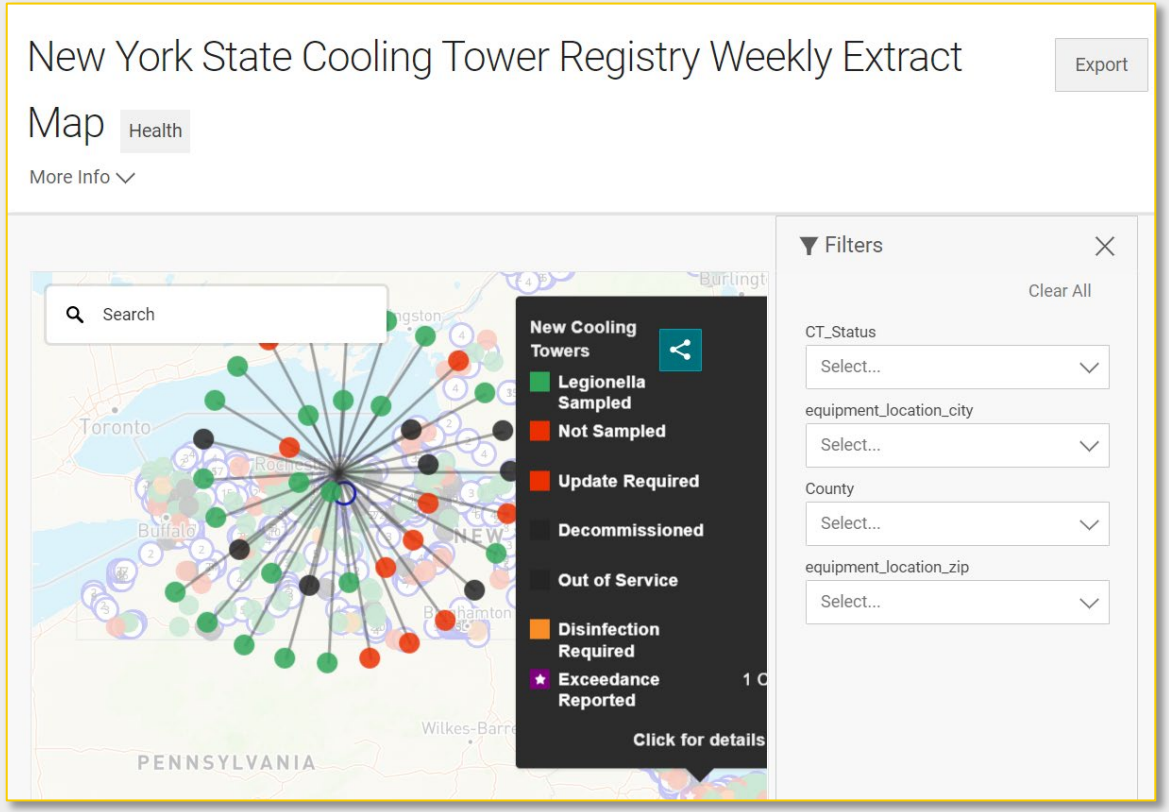
SUBPART 4-1: COOLING TOWERS

1. **Register** cooling towers in statewide registry
2. **Sample** every 90 days while tower is in use
3. **Report** exceedances ≥10,000 cfu/ml
4. **Inspect** and certify
5. Develop and follow a **maintenance plan**



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SUBPART 4-2 AND ARTICLE 28 FACILITIES

- Applies to
  - Buildings of general hospitals that provide in-patient services
  - Buildings of residential healthcare facilities providing a "health related service," such as lodging, board, and physical care
- Does NOT apply to
  - Administrative buildings
  - General hospital buildings that only provide out-patient services
  - Other long-term care facilities, such as assisted living
  - Diagnostic and treatment centers providing only out-patient services
  - Hotels, spas, or other housing facilities such as prisons and apartment complexes

SUBPART 4-2 DEFINITIONS

Covered Facilities

- Healthcare facilities covered under 10 NYCRR Part 4, Subpart 4-2
  - General hospitals
  - Residential healthcare facilities (nursing homes)
- **Defined in Article 28 of Public Health Law**

Potable Water System

- A building water distribution system
- Provides water intended for human contact or consumption

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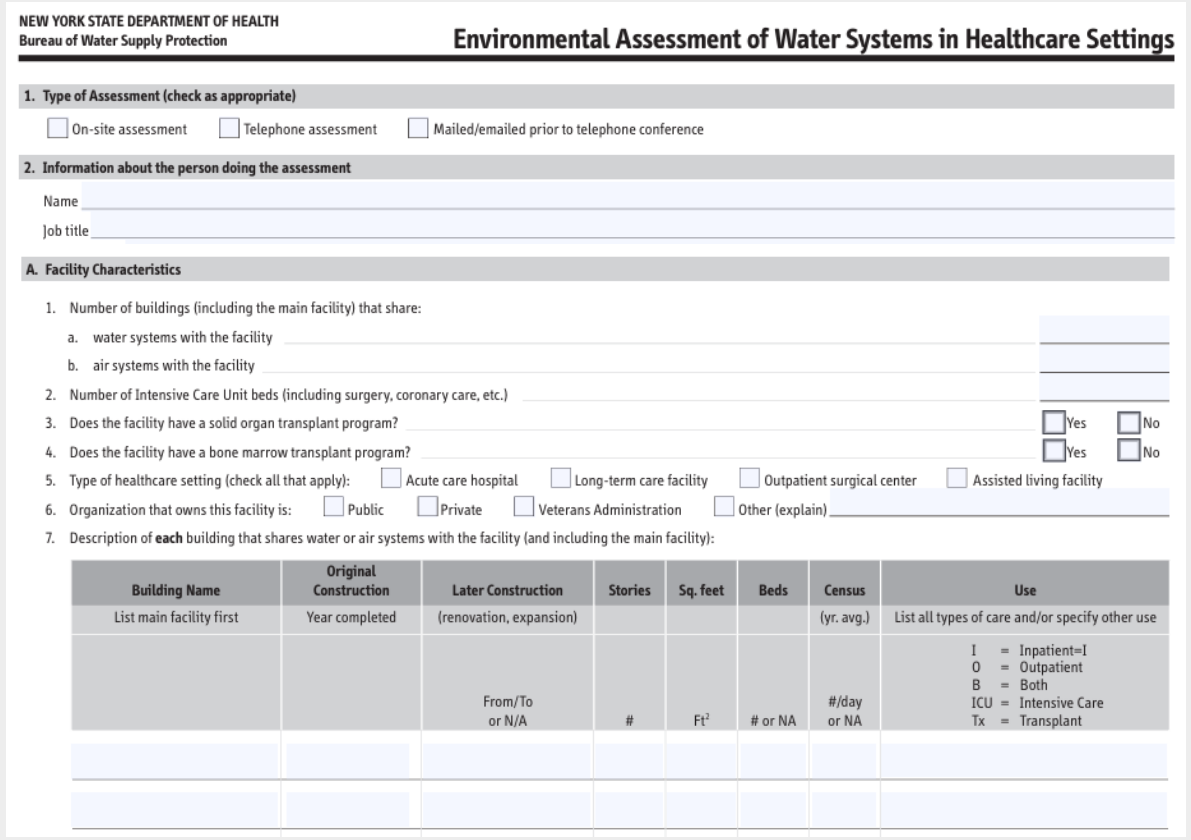
SUBPART 4-2 REQUIREMENTS

1. Update **Environmental Assessment Form** annually
2. Adopt and implement a **water management plan**
3. **Test** for *Legionella*
4. **Report exceedances** ≥ 30% positive samples (ANY amount of ANY species)



NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Environmental Assessment of Water Systems in Healthcare Settings

1. Type of Assessment (check as appropriate)

☐ On-site assessment ☐ Telephone assessment ☐ Mailed/emailed prior to telephone conference

2. Information about the person doing the assessment

Name _____

Job title _____

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 of Intensive Care Unit beds (including surgery, coronary care, etc.) _____
3. Does the facility have a solid organ transplant program? ☐ Yes ☐ No
4. Does the facility have a bone marrow transplant program? ☐ Yes ☐ No
5. Type of healthcare setting (check all that apply): ☐ Acute care hospital ☐ Long-term care facility ☐ Outpatient surgical center ☐ Assisted living facility
6. Organization that owns this facility is: ☐ Public ☐ Private ☐ Veterans Administration ☐ Other (explain) _____
7. Description of **each** building that shares water or air systems with the facility (and including the main facility):

Building Name	Original Construction	Later Construction	Stories	Sq. feet	Beds	Census	Use
List main facility first	Year completed	(renovation, expansion)				(yr. avg.)	List all types of care and/or specify other use
		From/To or N/A	#	Ft^2	# or NA	#/day or NA	I = Inpatient=I O = Outpatient B = Both ICU = Intensive Care Tx = Transplant

NYSDOH Form 5222

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Other Resources

- NYSDOH
  - Main program page
- ASHRAE 188
  - Legionellosis: Risk Management for Building Water Systems
- ASHRAE 514
  - Risk Management for Building Water Systems: Physical, Chemical, and Microbial Hazards
- CDC Training
  - Free 3-hour *Legionella* training based on ASHRAE 188



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