Legionnaires' Disease Update

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Healthcare-Associated Infections (HAI) Prevention Program
Bureau of Communicable Diseases (BCD)
Division of Public Health

Agenda

- Background and clinical features
- Disease burden and transmission
- Prevention and Water Management Programs

Background

Legionnaires' Disease: Background

- Atypical pneumonia caused by *Legionella* bacteria

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Legionnaires' Disease: Background

- Atypical pneumonia caused by *Legionella* bacteria
- Grows and spreads in building water systems
- Facilities can prevent Legionnaires' disease with a Water Management Program

Clinical Features

Symptoms: 2023 Data

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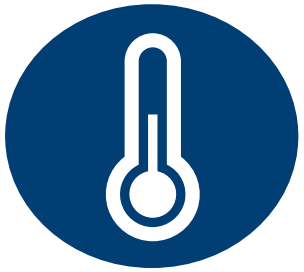
74% presented with **cough**

65% presented with **shortness of breath**



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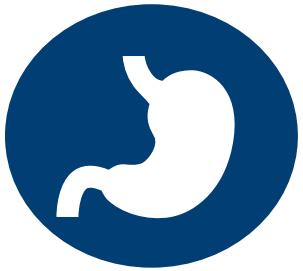
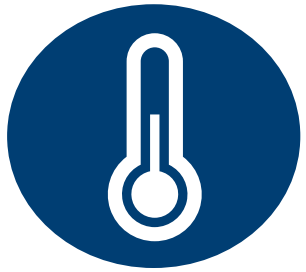


59% presented with **gastrointestinal symptoms**, such as diarrhea

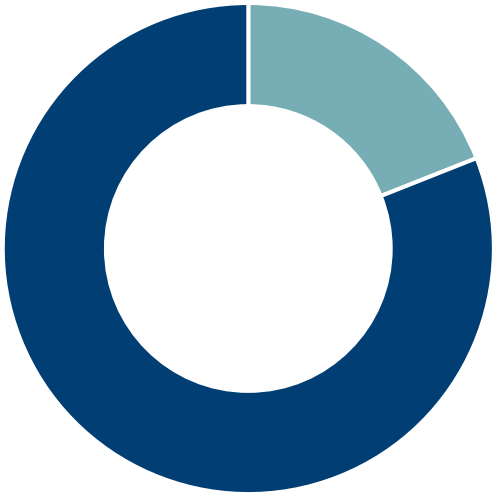


75% presented with **fever**

33% presented with **altered mental status**

22% presented with **chest pain**

Underlying Conditions: 2023 Data



81% of cases were **50 years** or older

Diagnostic Imaging

Diagnostic imaging (radiographs, CT) alone cannot diagnose Legionnaires' disease, but is **useful for diagnosing and characterizing** pneumonia

Confirmatory Diagnostic Testing

Urine antigen test (UAT)

This test **only** detects *Legionella pneumophila* serogroup 1.

Confirmatory Diagnostic Testing

Urine antigen test (UAT)

PCR

Culture

These tests must be resulted from **sputum** or **lower respiratory specimens.**

Diagnostic Testing: *Legionella* Culture

A note on culture:
Legionella does not grow on routine respiratory cultures. It must be specifically ordered.

Treatment

Legionnaires' disease can be treated with antibiotics: **respiratory fluoroquinolones** or **macrolides**

Prognosis

Case fatality rate is approximately **5-10%**. Prognosis is best with diagnosis and treatment at time of admission.

Source: National Library of Medicine article

Prognosis: Patients with Underlying Medical Conditions

From 2023 data, Wisconsin patients were more likely to die from their illness if they had **underlying medical conditions**.

Prognosis: Recipients of Health Care

Case fatality rate is higher in cases that had **inpatient** health care or resided in a **long-term care facility** during the exposure period.

Disease Burden and Trends

Legionnaires' Disease is Reportable

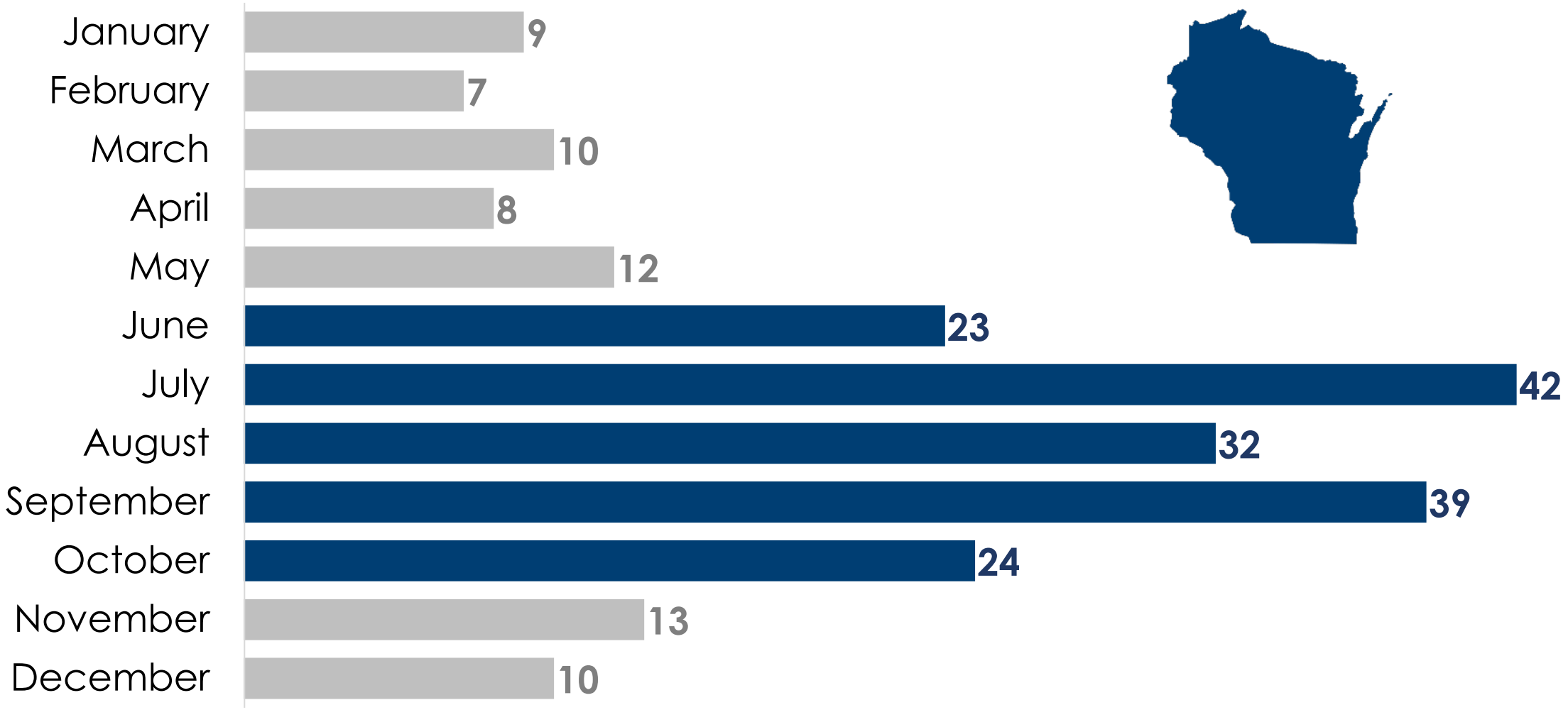
Health care providers are **required** to report a Legionnaires' disease case to public health **within 72 hours** upon recognition.

Lab-Confirmed Legionnaires' Disease Cases

From **2019– 2023** Wisconsin averaged **227** cases per year.

Seasonality of Legionnaires' Disease

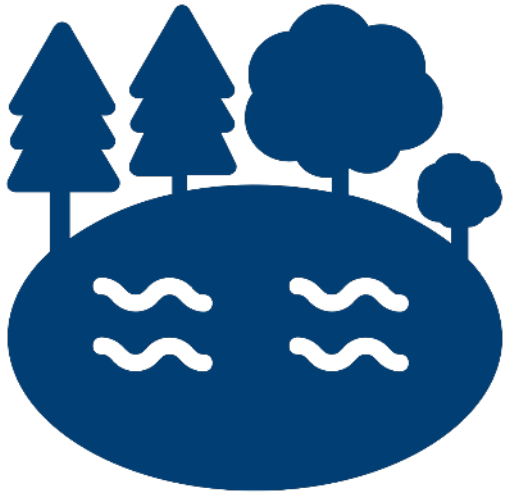
Average confirmed Legionnaires' disease cases by month, 2019–2023



Sporadic cases of Legionnaires' disease are most often reported in the **summer** and **fall.**

Transmission

Legionella Bacteria: Growth Conditions



Legionella naturally occur in fresh water

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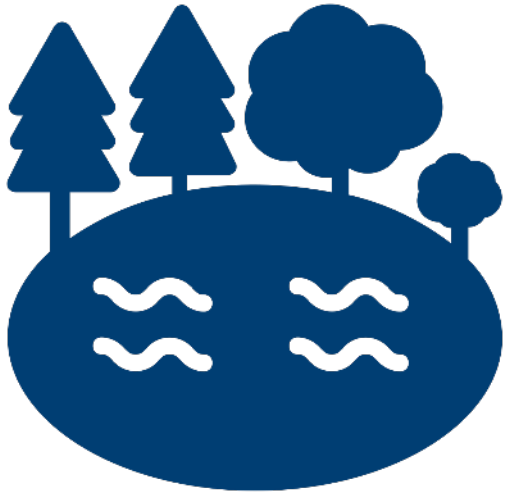

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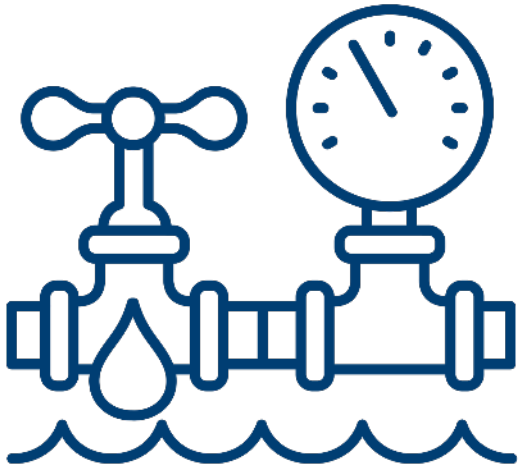

Public water systems or private wells deliver incoming water to buildings

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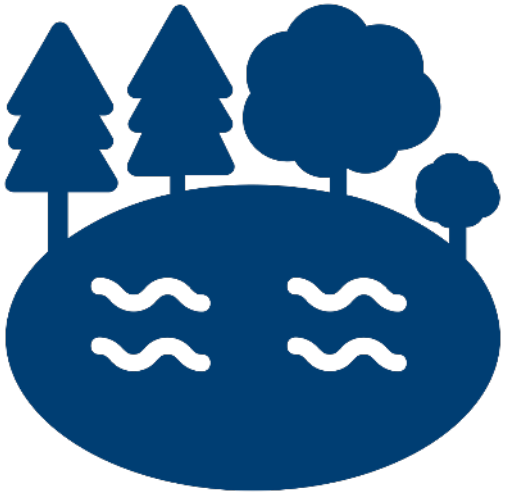

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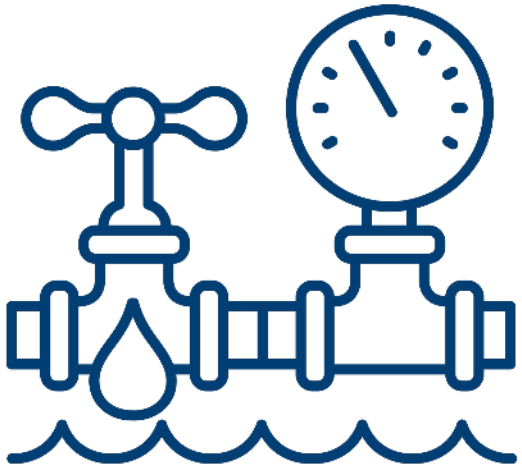

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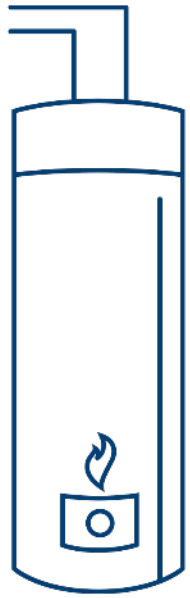

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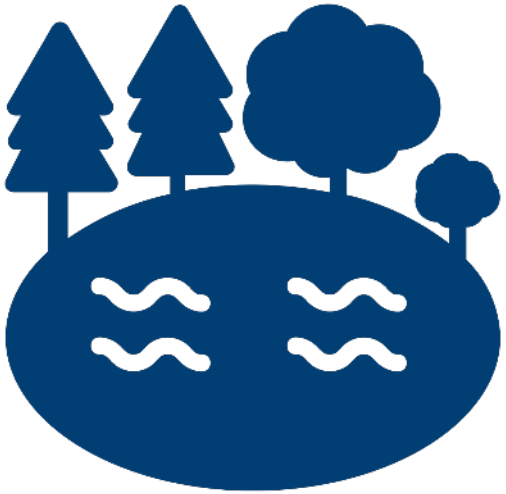

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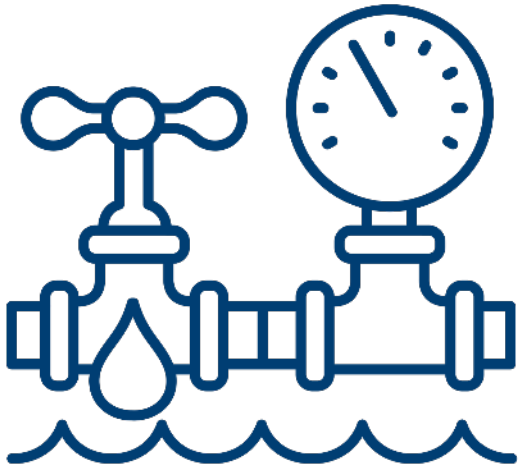

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The Hot Water Dilemma

Anti-scald regulations

Prevent *Legionella*

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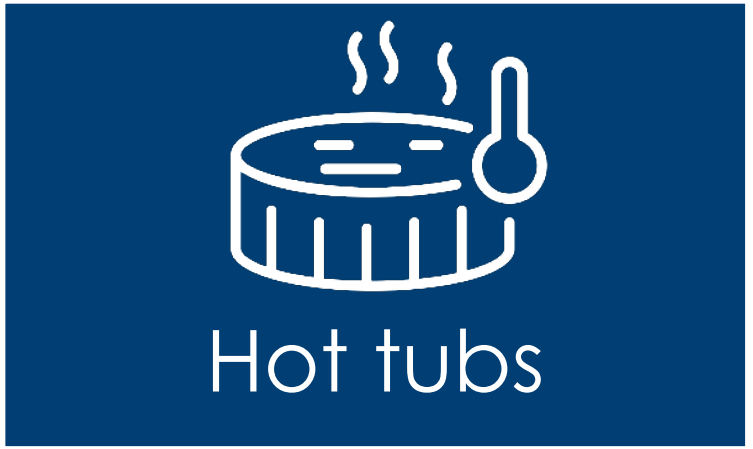

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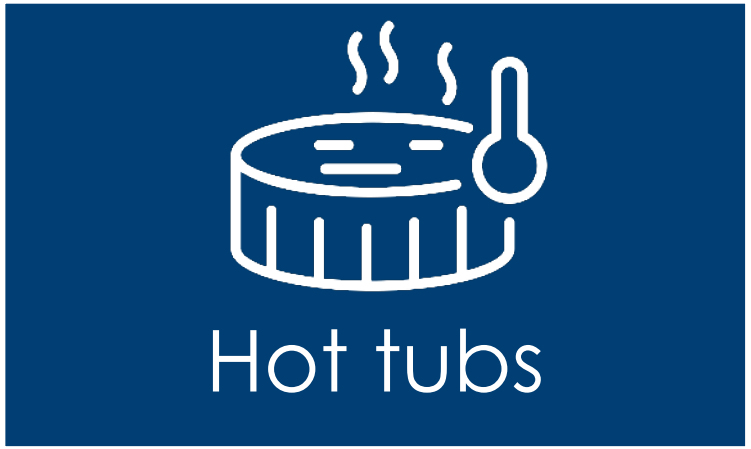

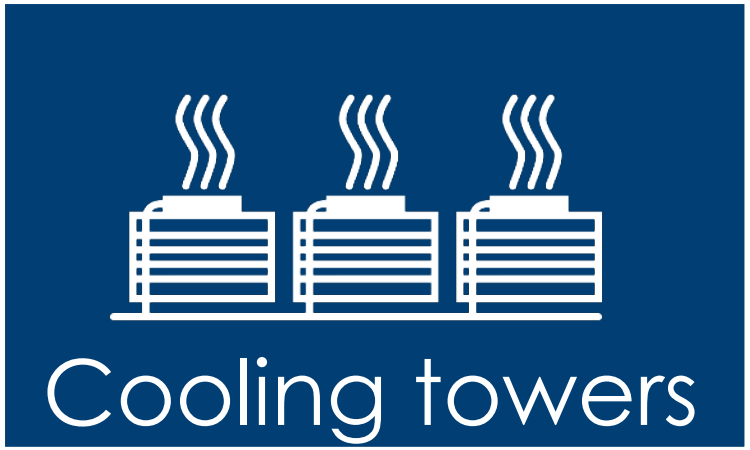

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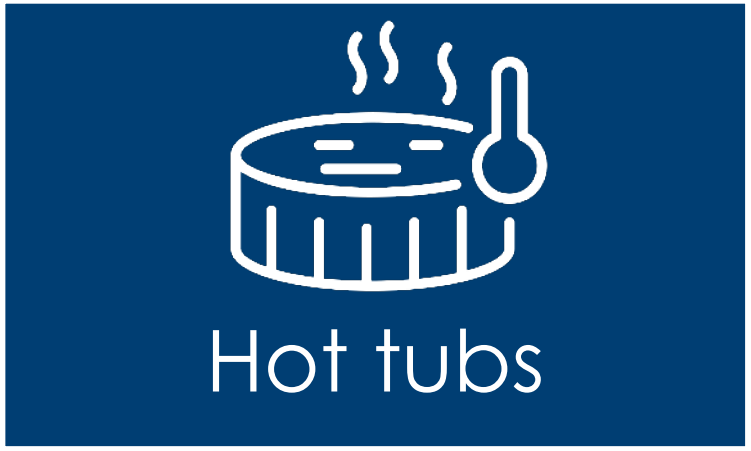

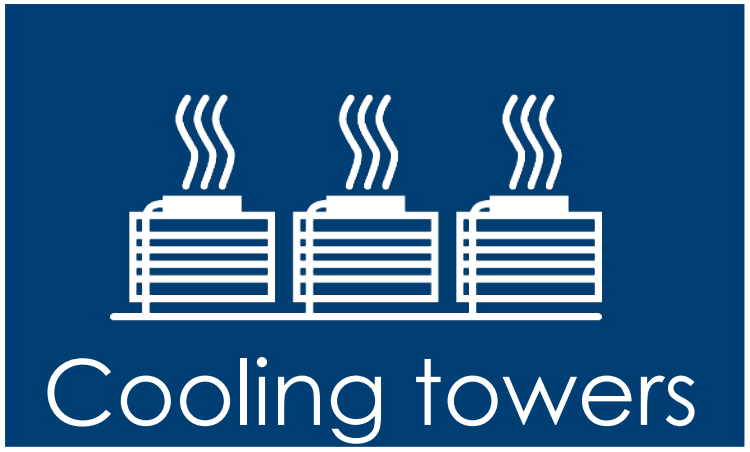

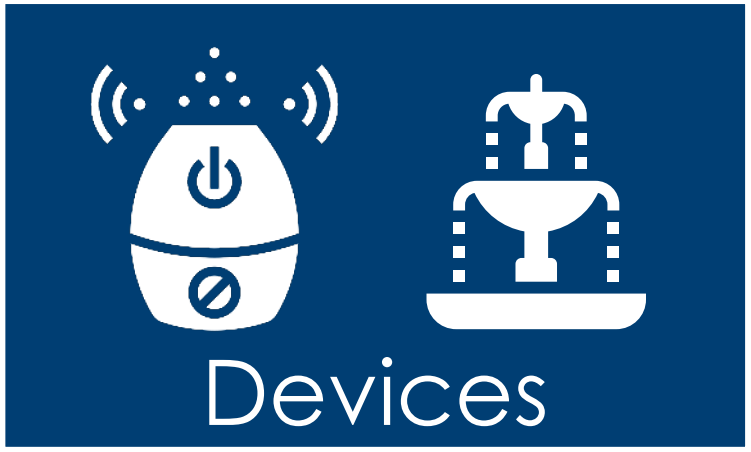

Prevention: Water Management Programs

What is a WMP?

- **Water Management Program (WMP):** the risk management plan for the prevention and control of legionellosis associated with building water systems, including documentation of the plan's implementation and operation.

Requirement for Health Care Facilities

The Centers for Medicare and Medicaid Services (CMS) and the Joint Commission **require hospitals and nursing homes** to have **water management programs**.

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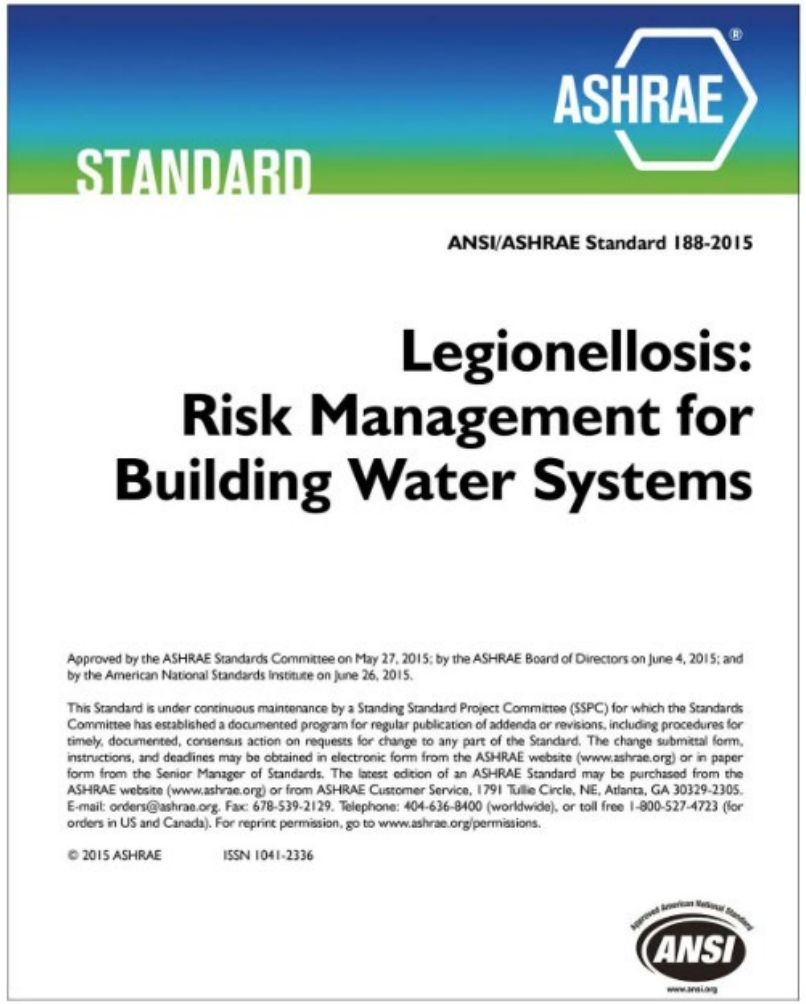
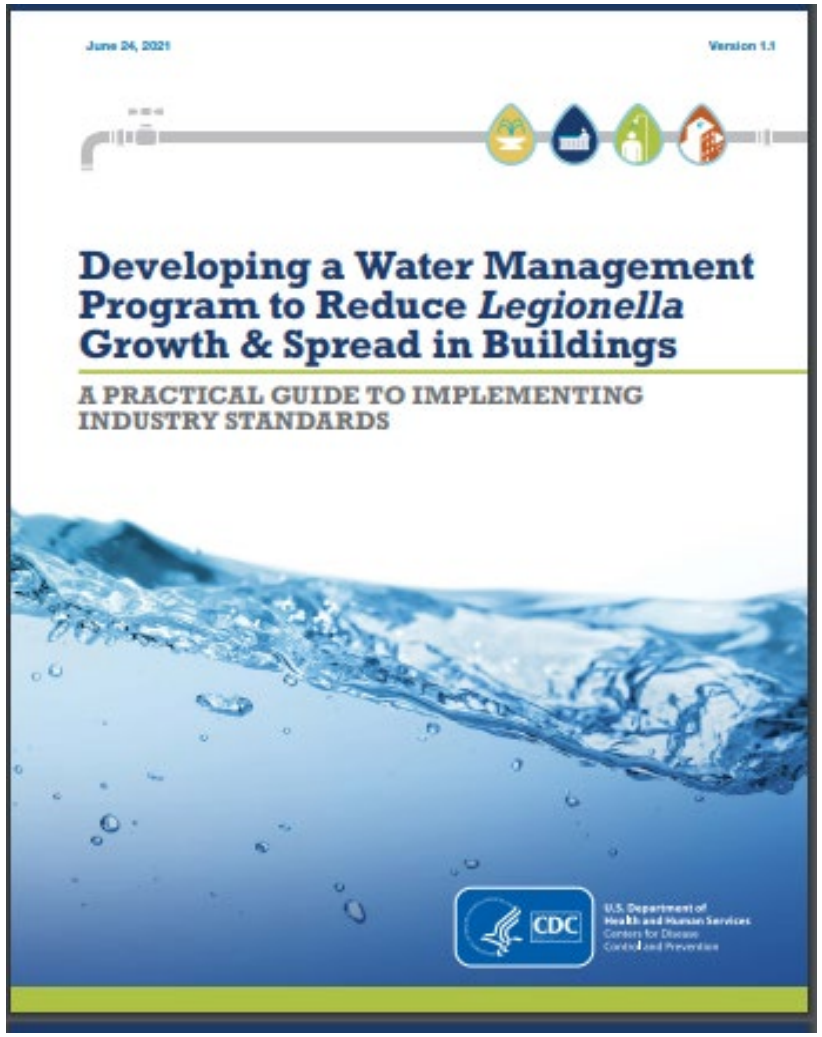
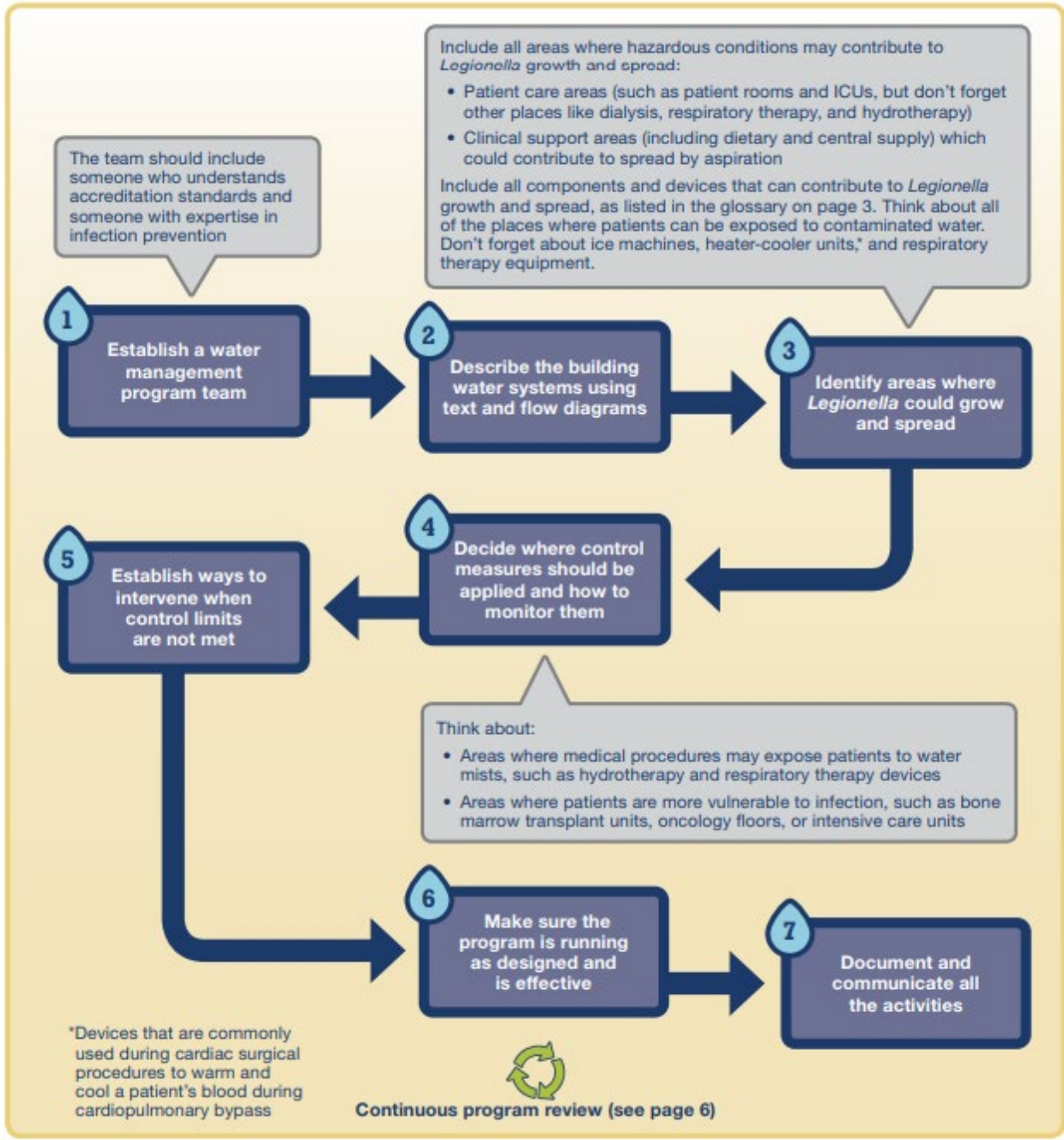
Note: This does not include assisted living facilities.

National Standards for Water Management Programs

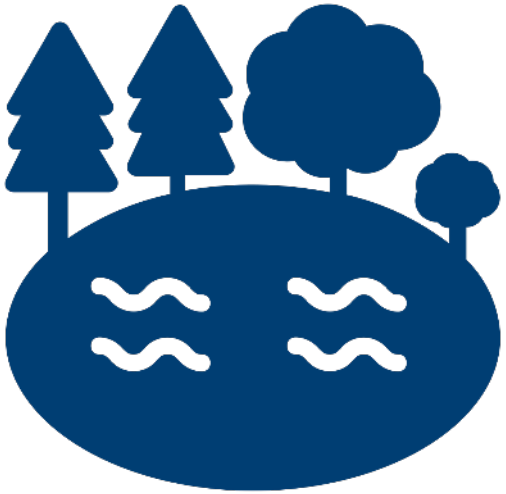




Elements of a Water Management Program (WMP)



Legionella Bacteria: Growth Conditions



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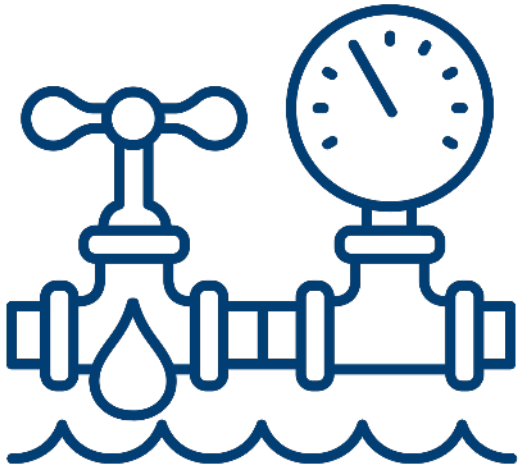

Public water systems or private wells deliver incoming water to buildings

Water is delivered to fixtures and devices for use

In general, municipal water systems in Wisconsin are **not required** to disinfect water supplied to customers.

*See DNR Municipal Water Disinfection List

Combined Potable Water and Fire System

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***Legionella* grow and amplify in water 77°F to 113°F**

Stagnation and **biofilm** formation contribute to *Legionella* growth

Legionella is transmitted by **inhalation** or **aspiration** of contaminated water

Main Thermostatic Mixing Valve

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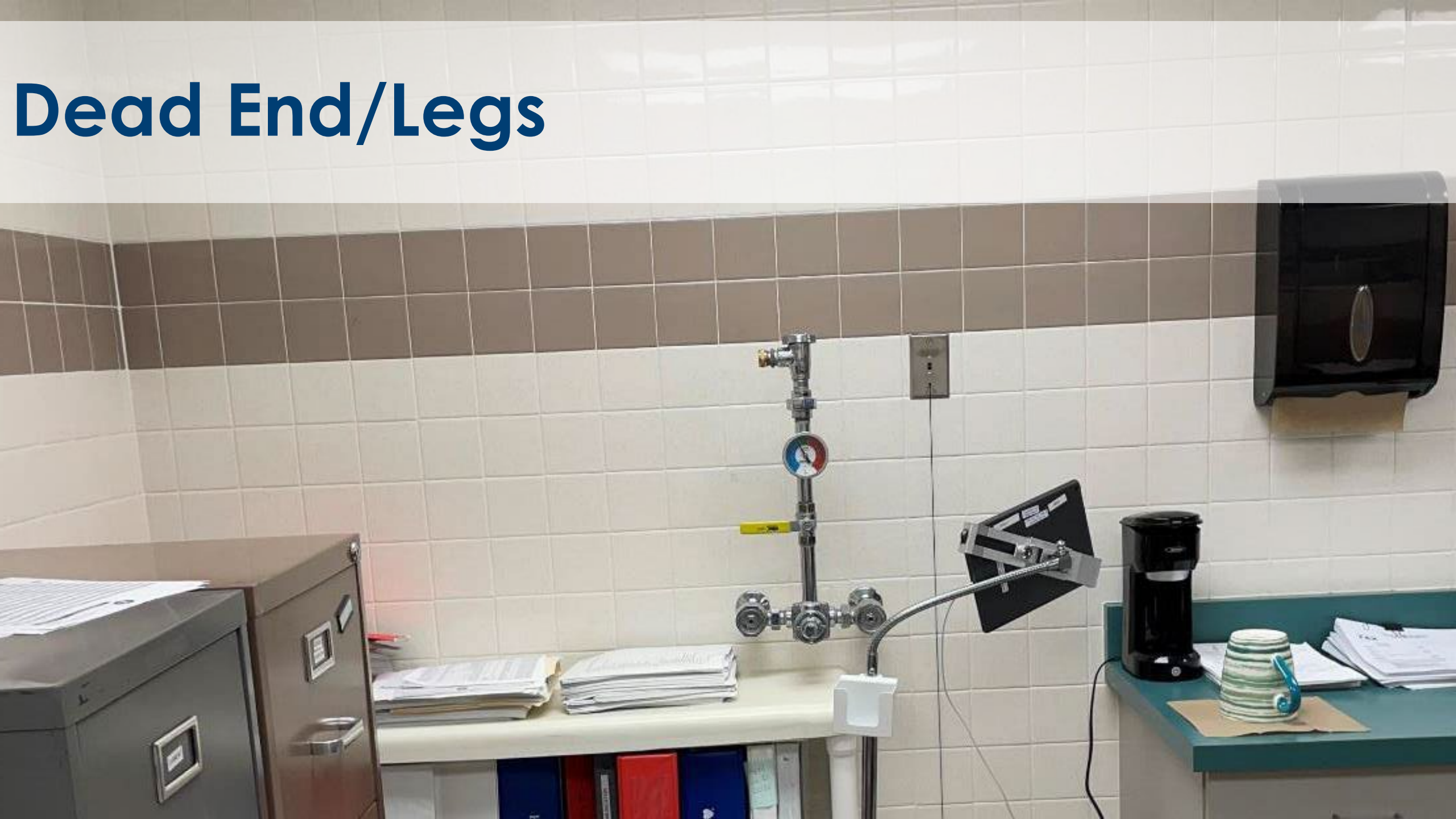

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Ice Machines

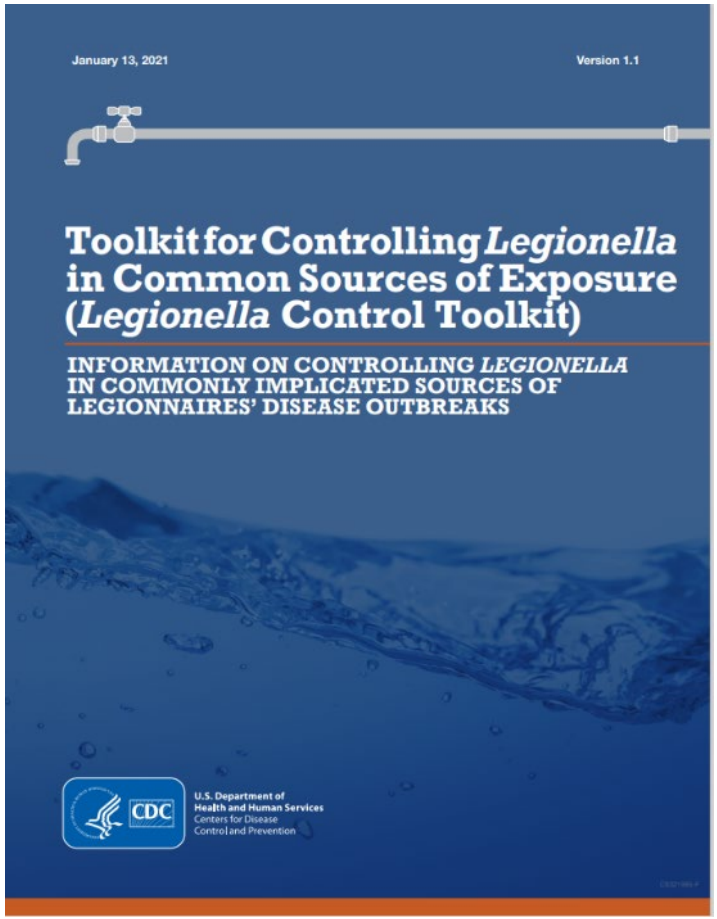
Maintenance and cleaning per manufacturer instructions

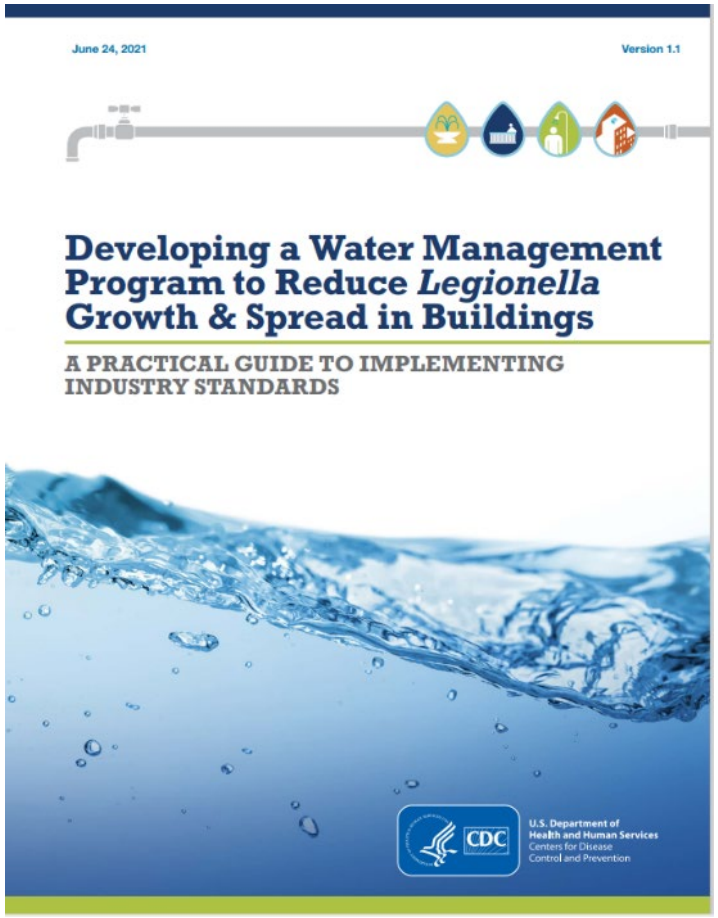
Cooling Towers

Helpful Water Management Program Resources

CDC Water Infection Control Risk Assessment Form

Helpful Water Management Program Resources





[CDC Legionella Control Toolkit]

and

[CDC Water Management Program Toolkit]

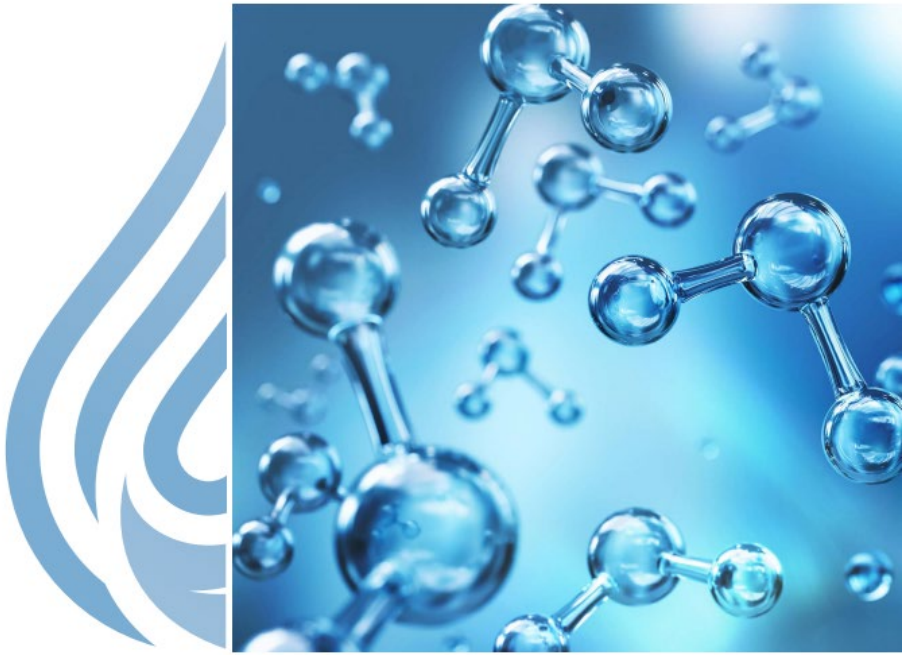
Helpful Water Management Program Resources

CSTE

Water Management Program (WMP)

Evaluation Tool

[CDC Water Management Program Evaluation Tool]



Questions?

Bonus Slides

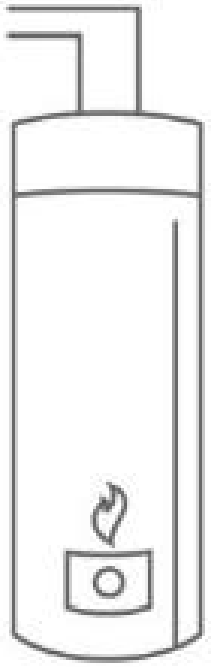
Example B: Main Thermostatic Mixing Valve Failure

The Hot Water Dilemma

Anti-scald regulations

Prevent *Legionella*

Typical Flow Diagram of Hot Water Distribution System in The Three Facilities



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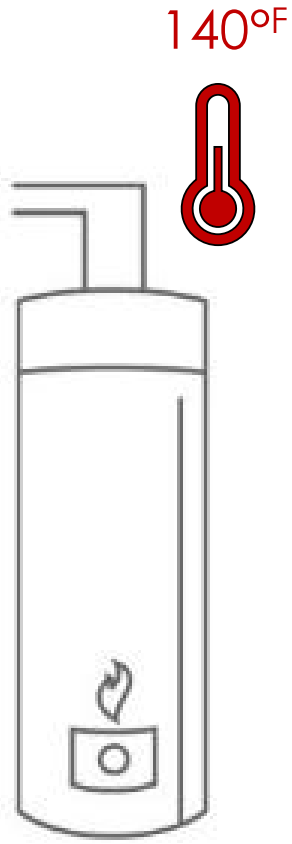

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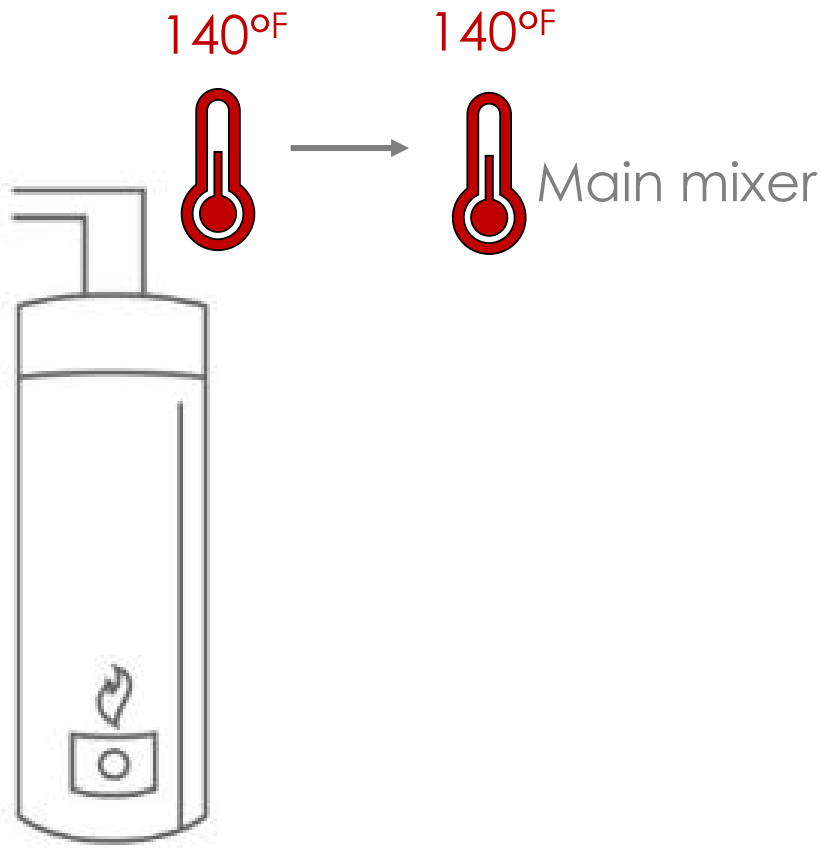

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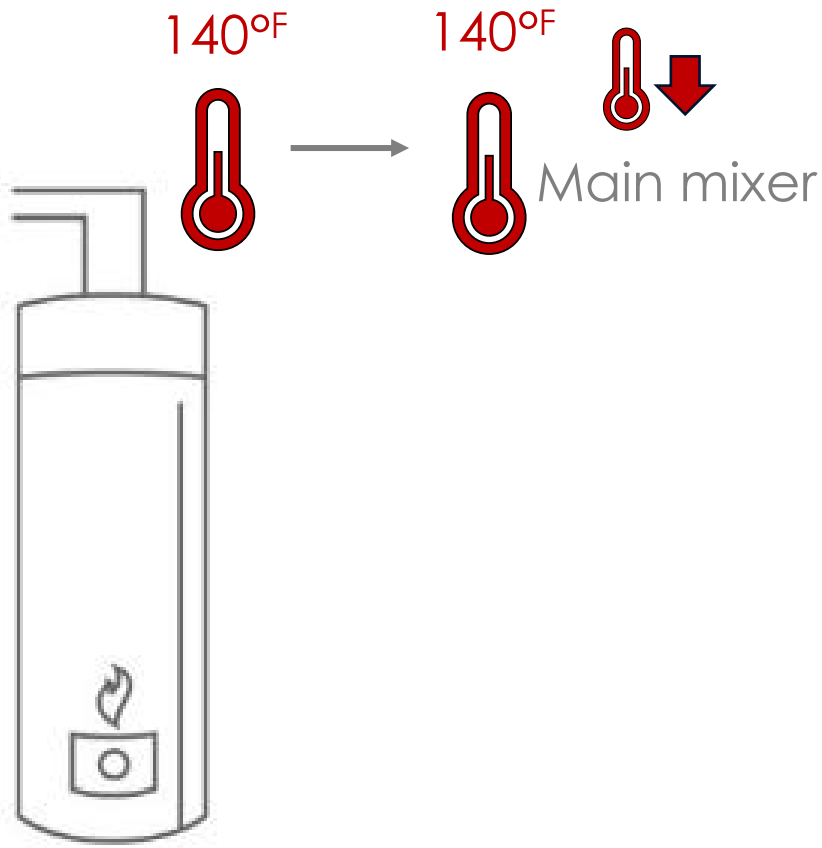

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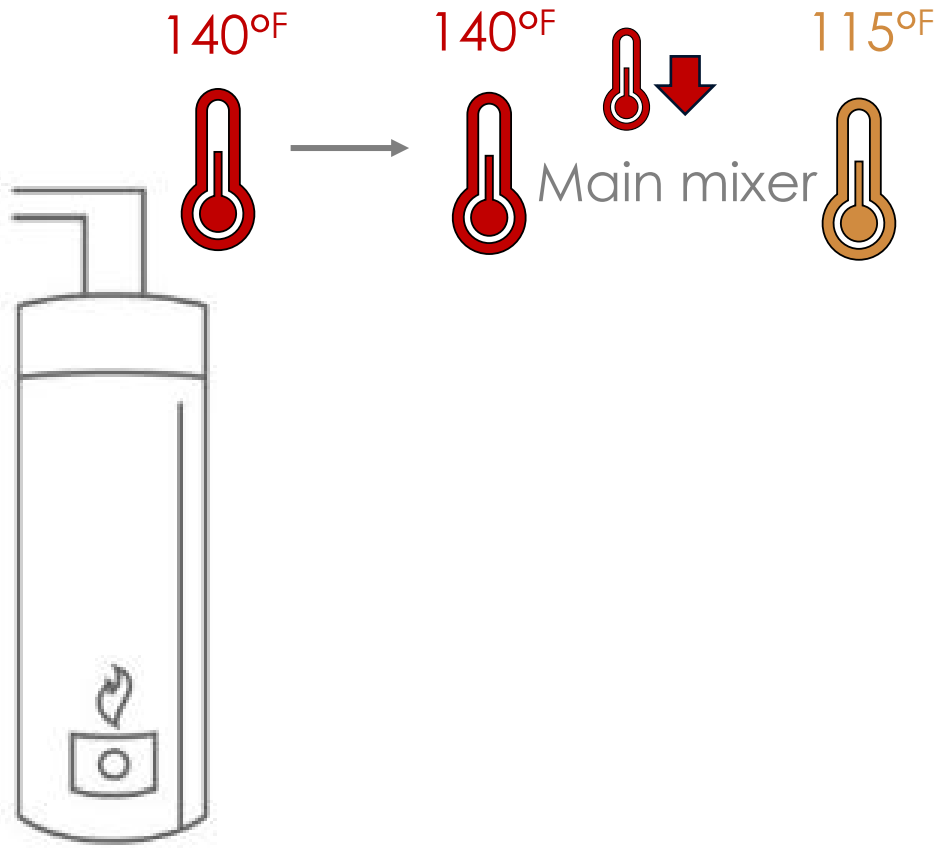

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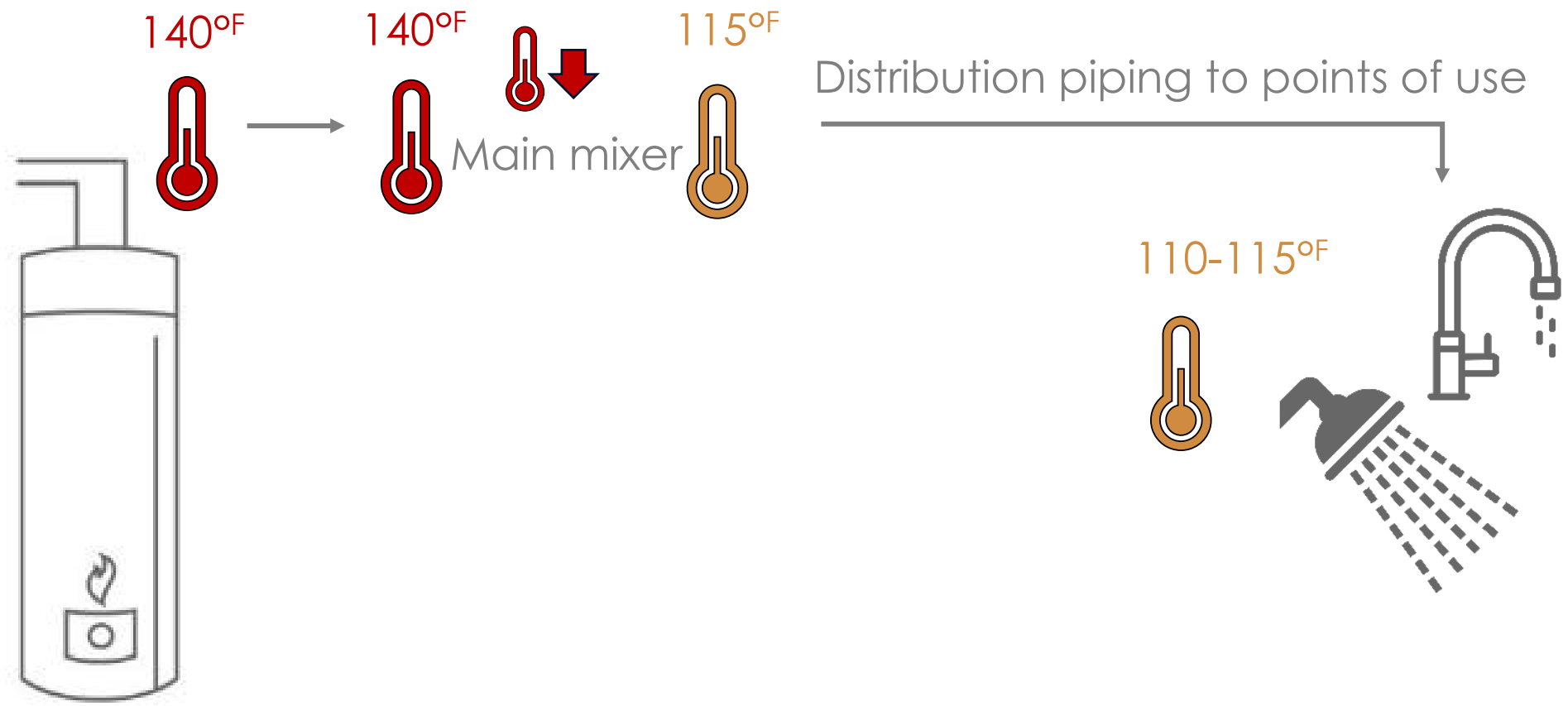

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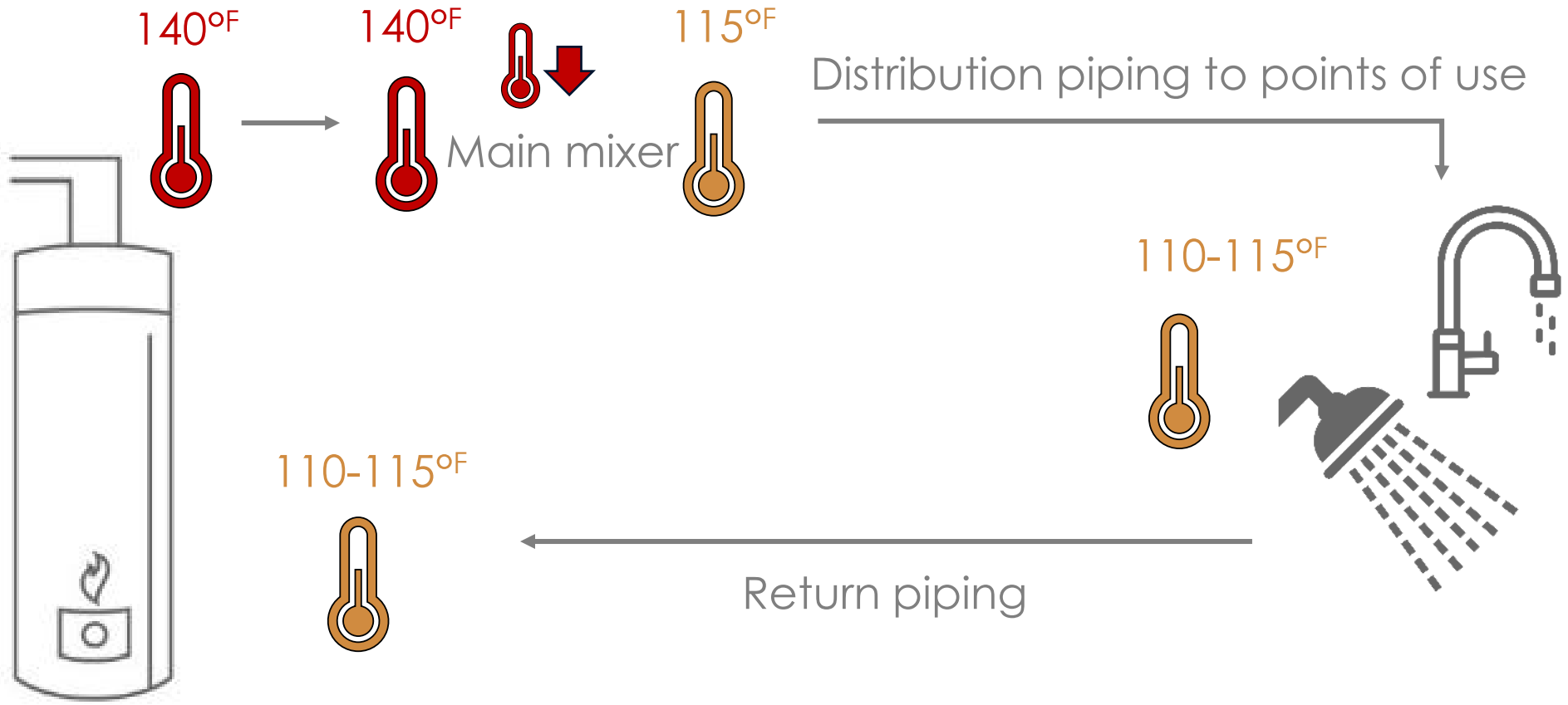

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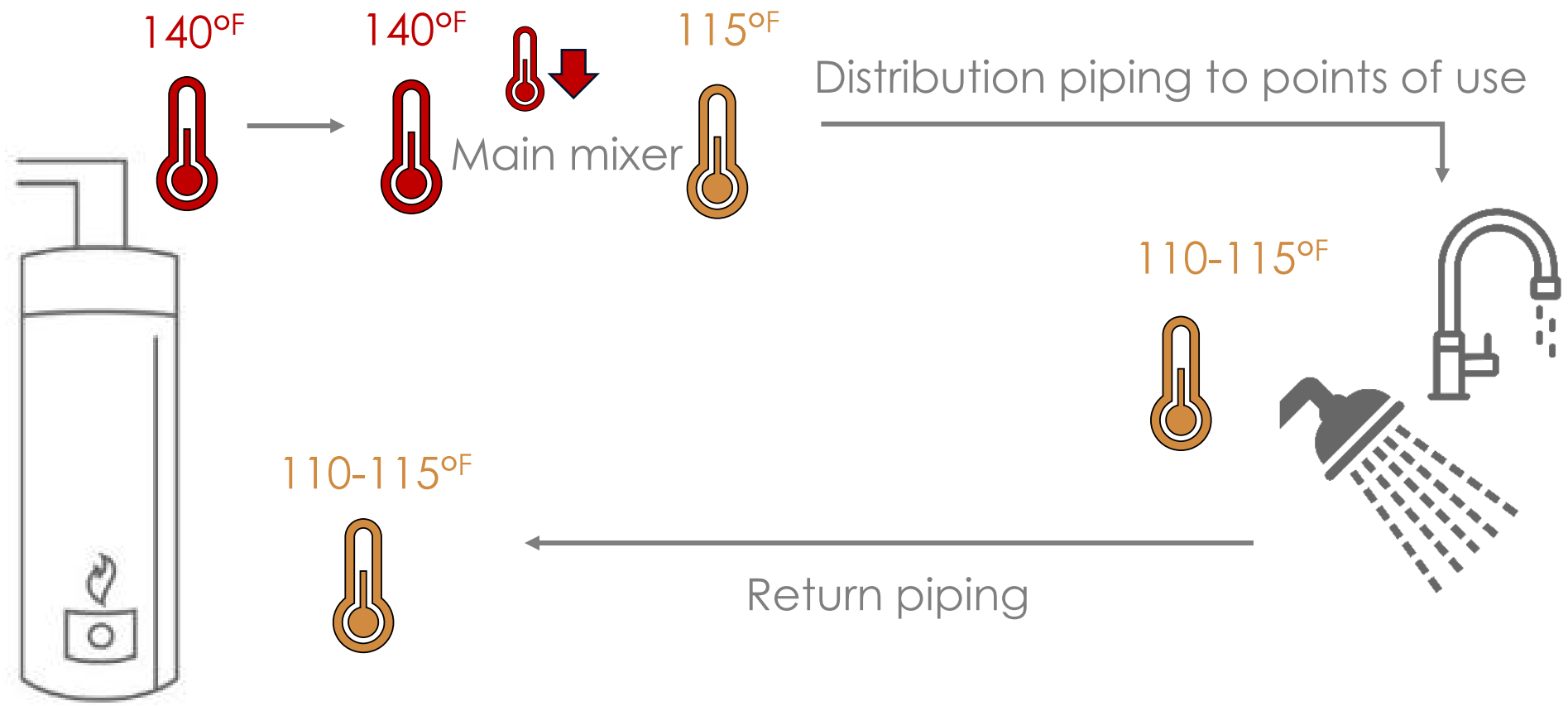


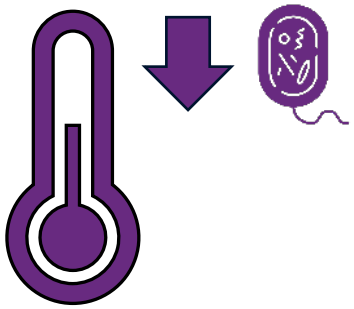
*Note: This design would **not** meet the conditions for thermal disinfection in health care and related facilities (SPS 382.50(3)(b)6.) for buildings constructed after May 1st, 2003.

Example B: What Went Wrong

Equipment Failure

Human Error

Process Failure



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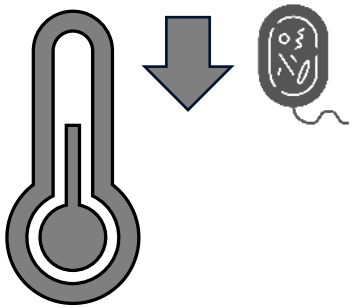
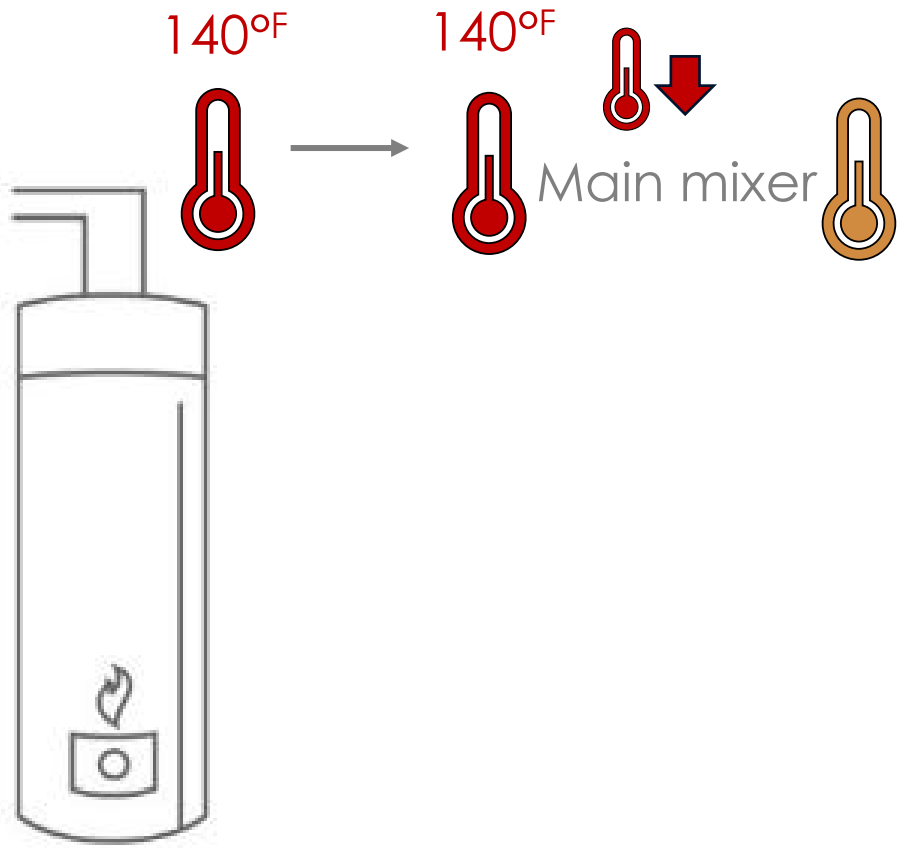


Flow Diagram of Possible Consequences of Main Mixer Failure



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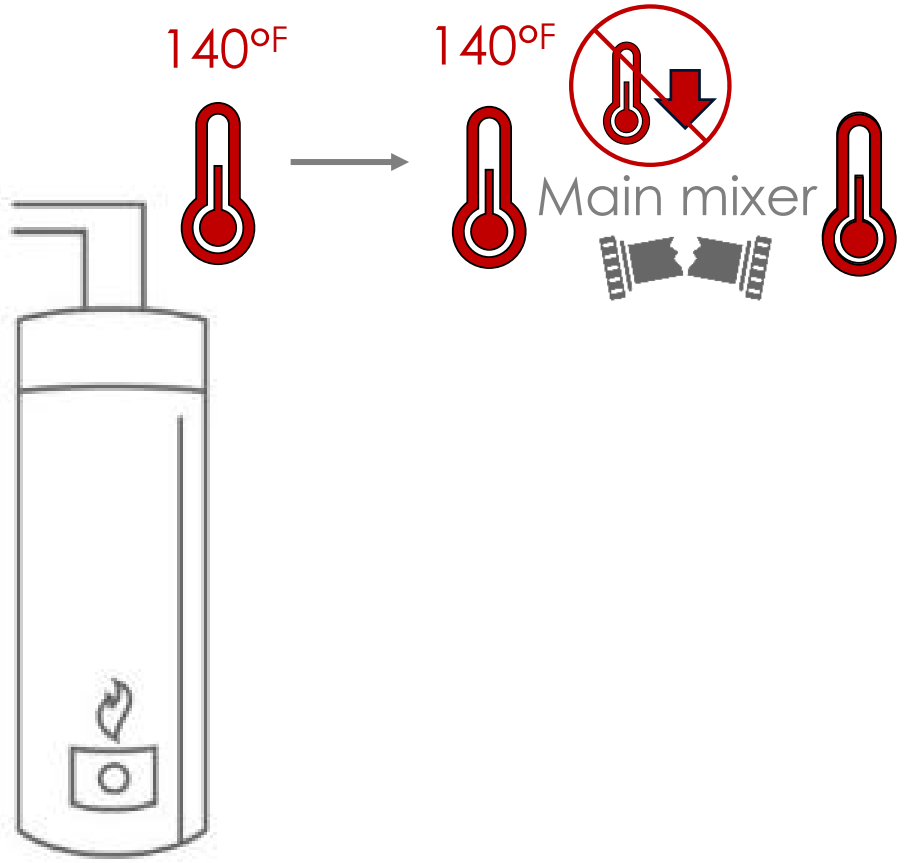

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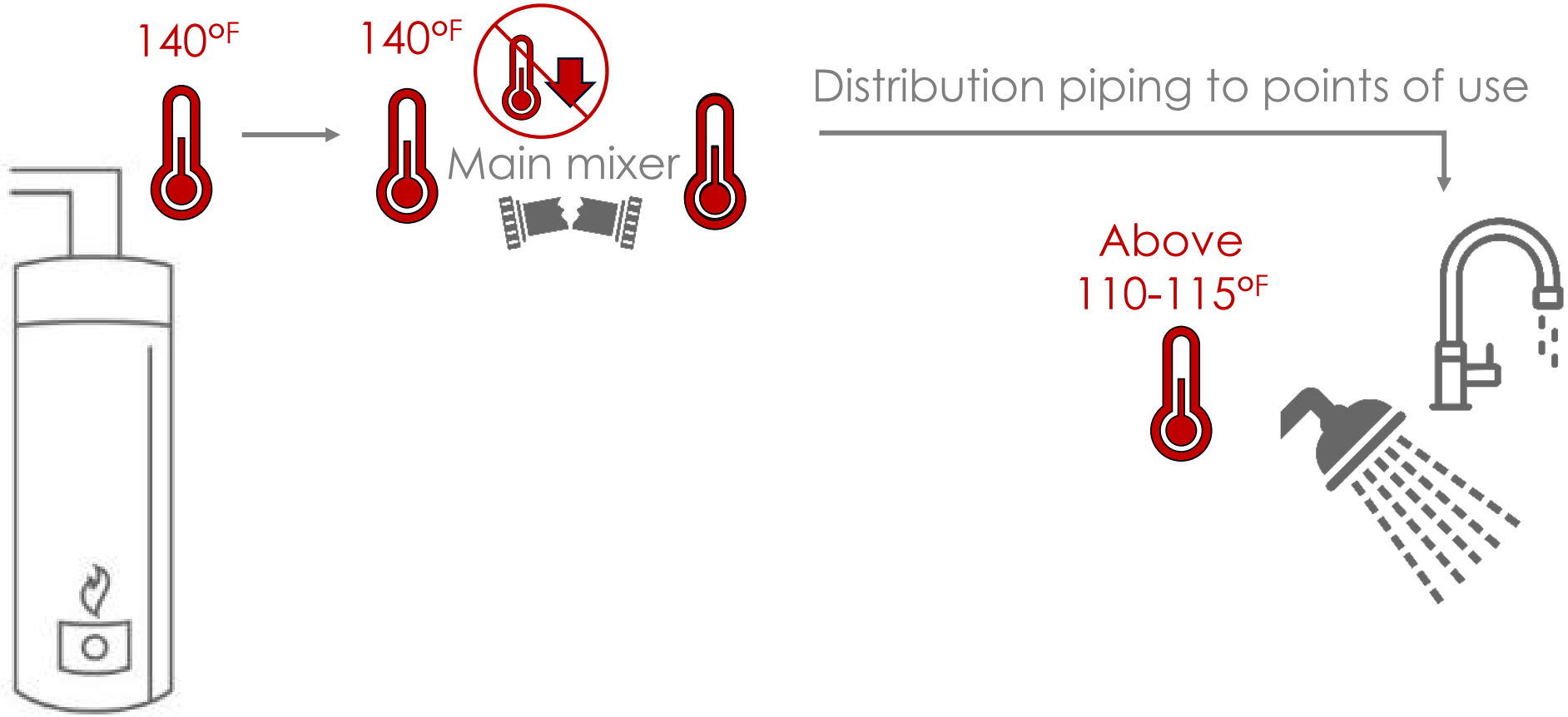

Hot water temperatures accessible to patients or residents **must be** between **110-115°F** in health care facilities to **prevent scalding**.

*Per Wisconsin Plumbing Code: SPS 382.50(3)(ag)

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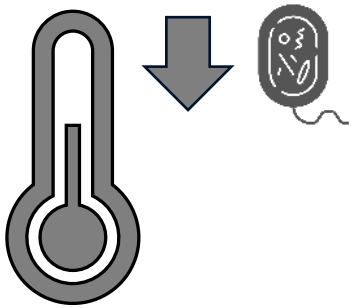

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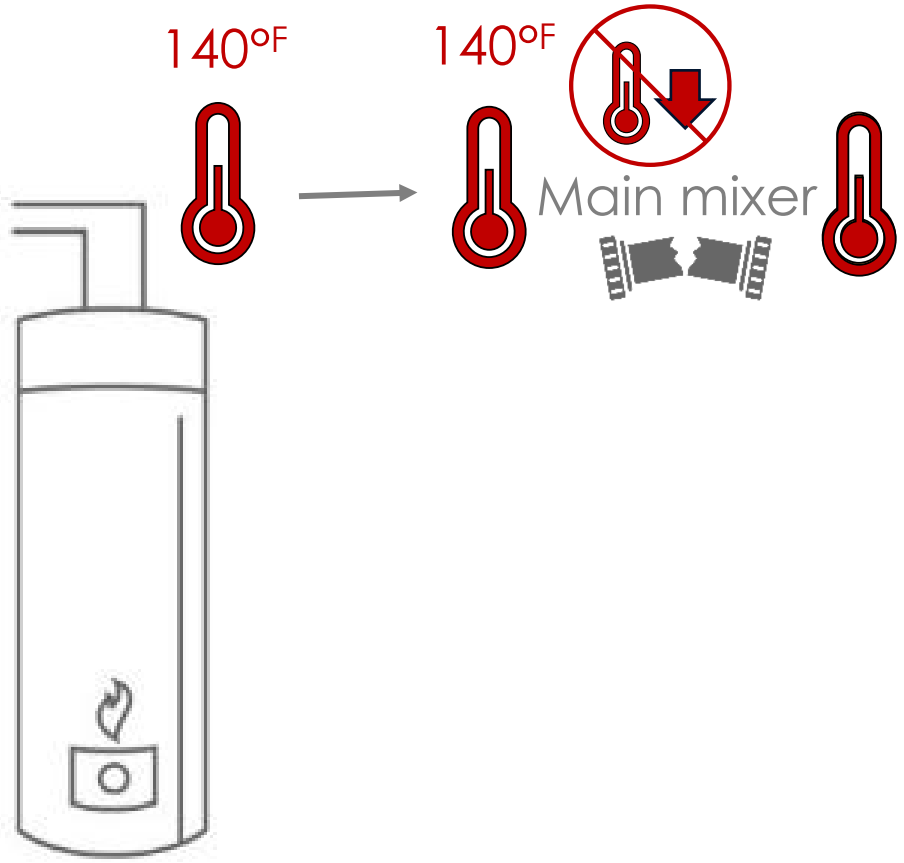

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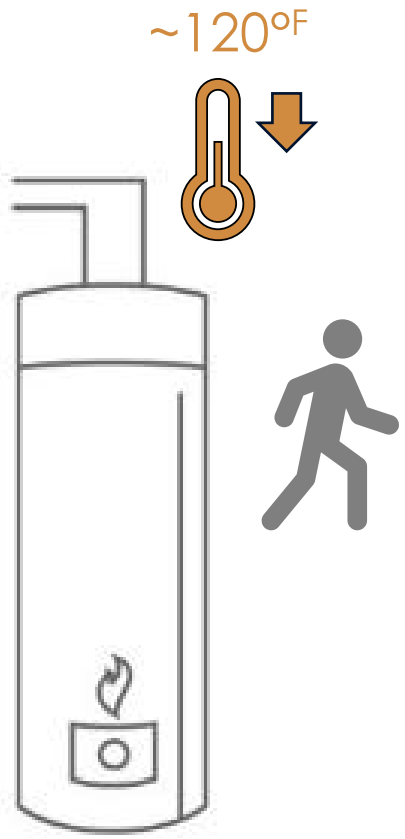

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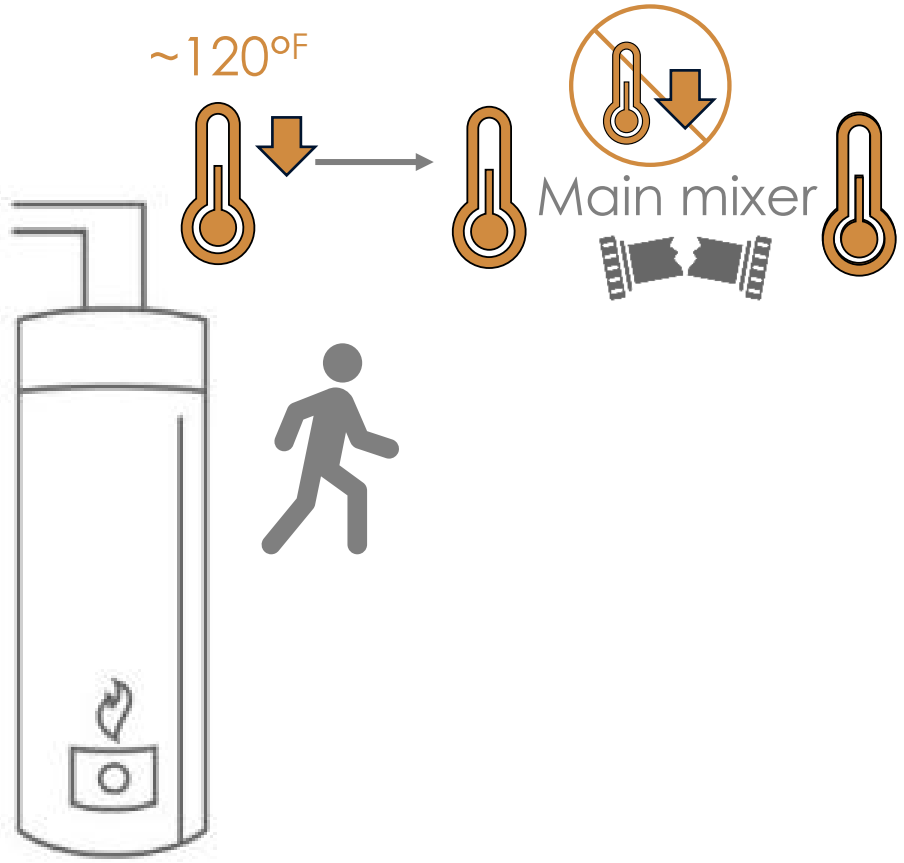

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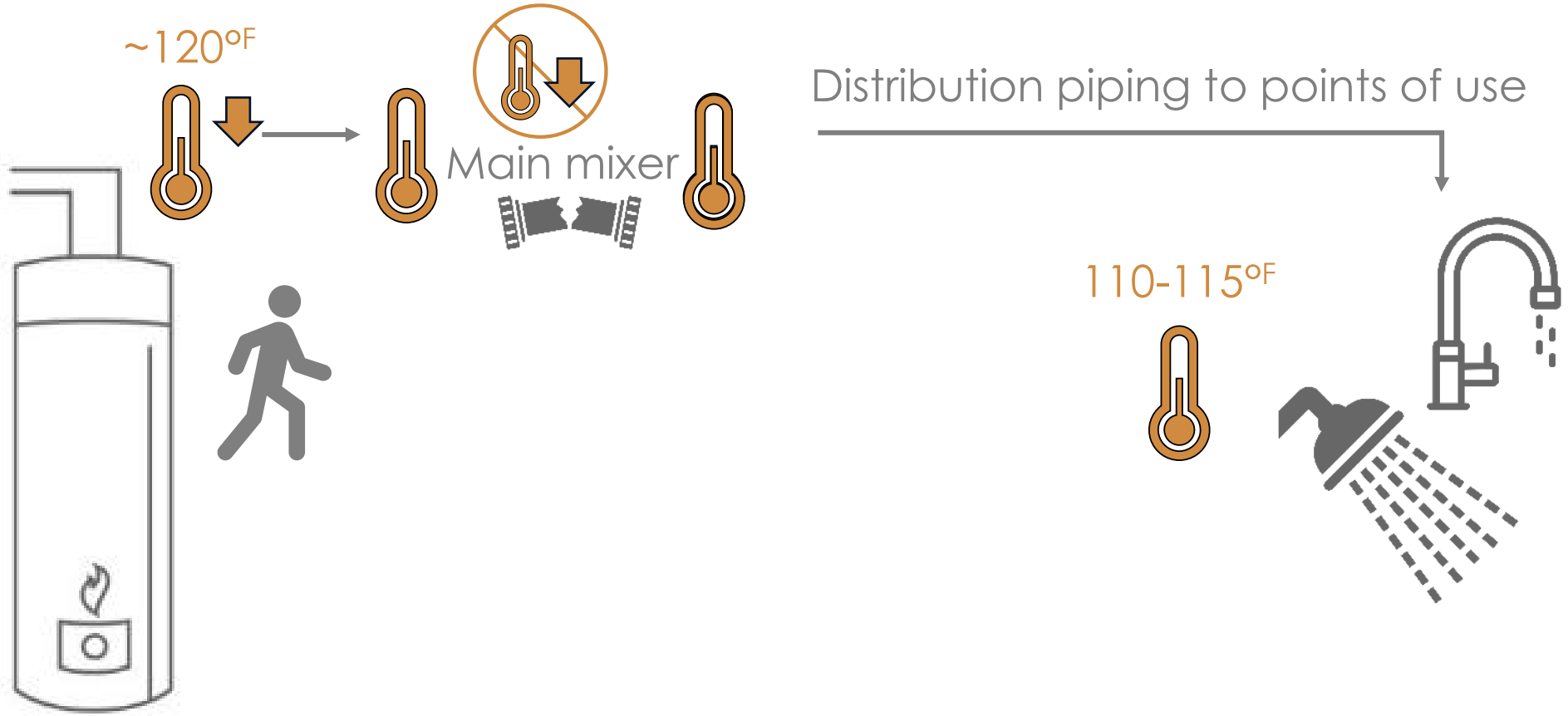


As of October 1, 2023, hot water temperatures **must be initiated and stored** at a minimum of **140°F** in all new health care facilities*.

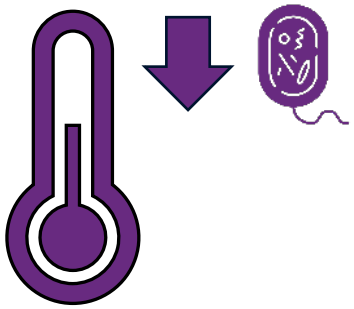
*Per Wisconsin Plumbing Code: SPS 382.50(3)(ag)

Example B: What Went Wrong

Equipment Failure

Human Error

Process Failure



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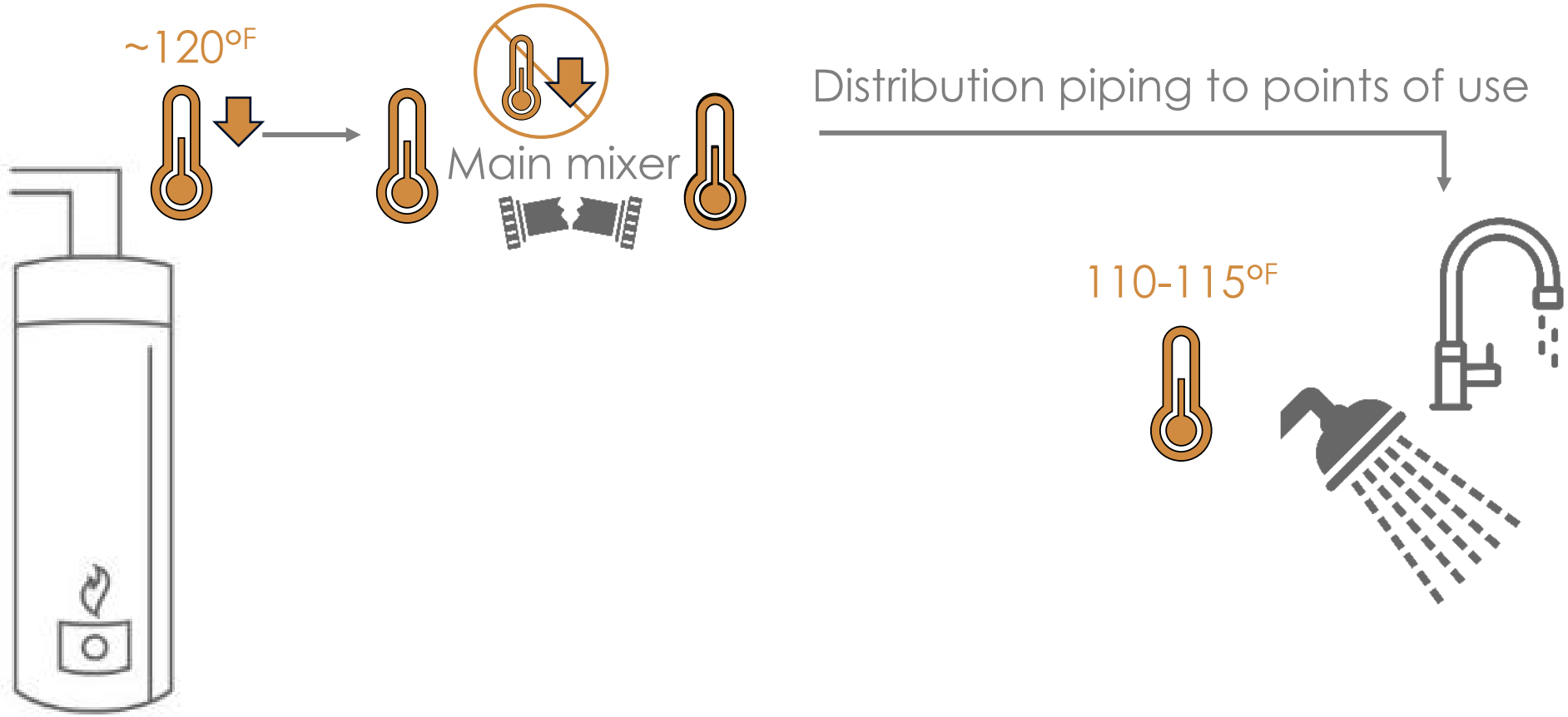

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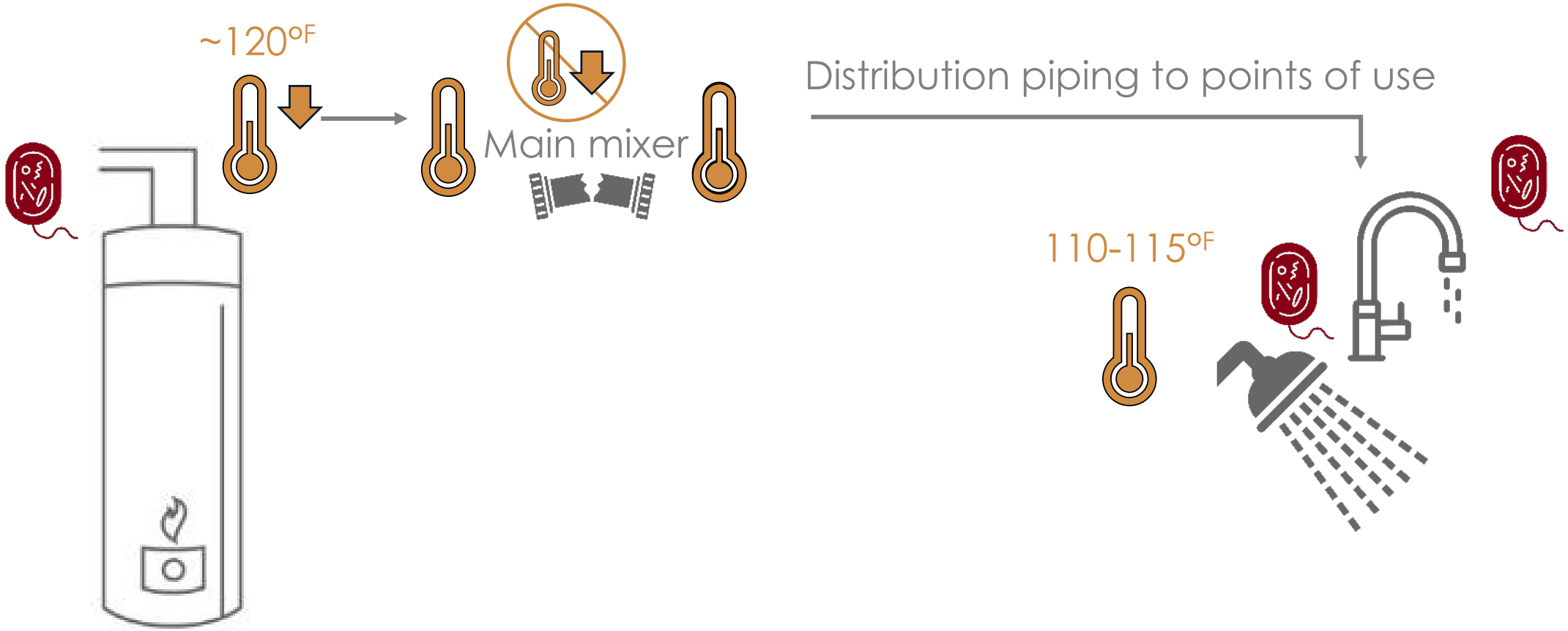

Example B: Main Thermostatic Mixing Valve Failure

Temperatures within the *Legionella* growth zone likely led to **amplification** and **colonization** of these hot water distribution systems.

As of May 1, 2003, Wisconsin Plumbing Code requires health care facilities to initiate hot water at 140°F and **return at a minimum of 124°F** if using thermal disinfection only.

*Per Wisconsin Plumbing Code: SPS 382.50(3)(ag)