Outsmarting *Legionella*: Effective Surveillance and Response for Health Departments (Part II)

New Jersey Department of Health
Communicable Disease Service
Infection Control, Healthcare, and Environmental Epidemiology Program
Water Systems & Environmental Infection Control Unit
June 10, 2025

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Today's Journey: Part II

Recap Part I
Review key points discussed.

Define an Outbreak
Discuss what triggers an outbreak investigation, outbreaks in NJ, and the roles for public health.

Steps in an Outbreak Investigation
Break down the steps in an outbreak investigation.

Highlight Key Resources
Review essential resources for local health departments.

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Recap Part I

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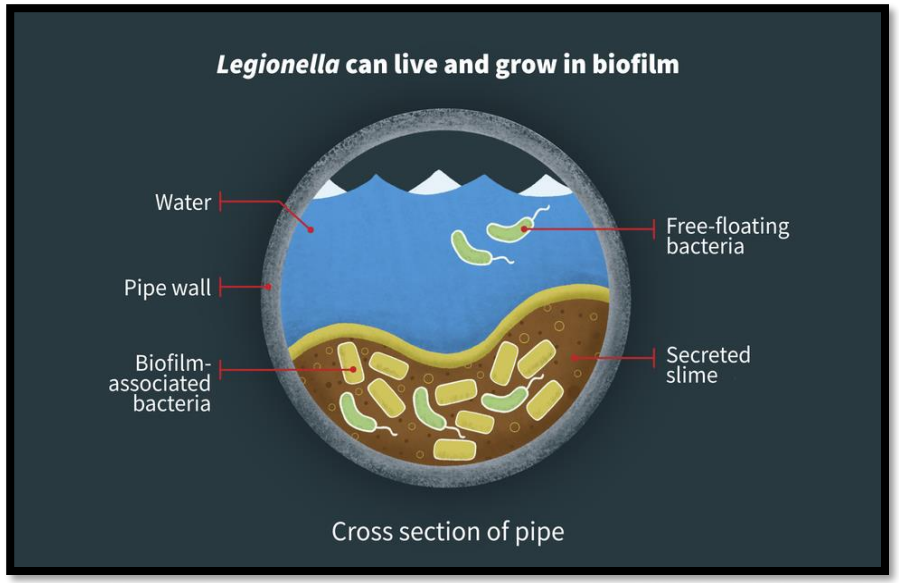
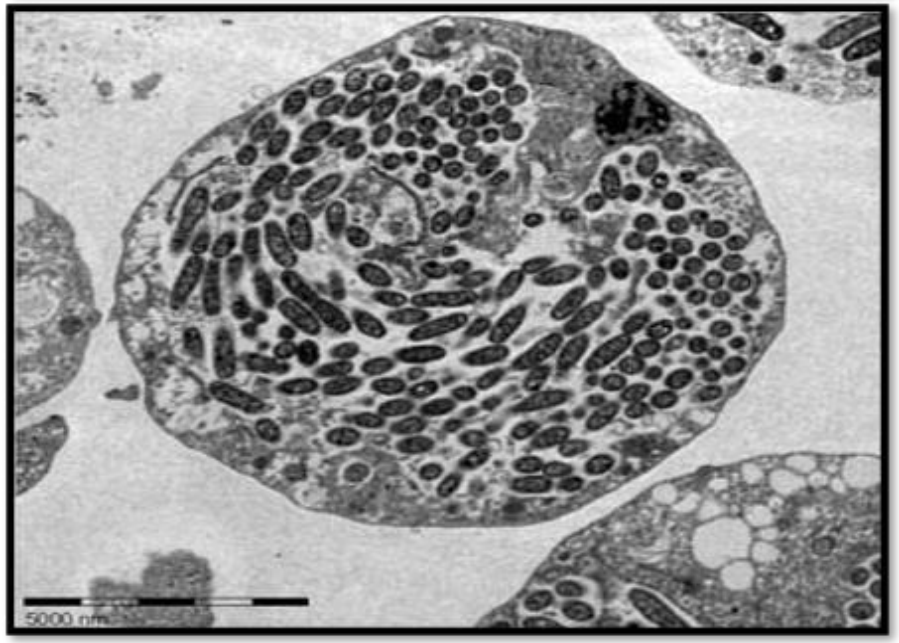
What is L*egionella*?

- Bacterium that causes **legionellosis**
- Found naturally in **freshwater environments**
- 60+ different species
  - –***Legionella pneumophila*** accounts for ~90% of U.S. reported case
- Adheres to surfaces and forms protective **biofilms**
- Survives and reproduces inside **single-celled organisms**
- Grows best in **warm, stagnant water**





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Legionellosis: Umbrella term for infections caused by *Legionella*

	Legionnaires' Disease (LD)	Pontiac Fever (PF)	Extrapulmonary Legionellosis (XPL)
Description	Severe form of pneumonia	Flu-like illness	Can occur as a complication of LD or can occur independently
Attack Rate	Low Attack Rate: 5%	High Attack Rate: 90%	Extremely rare
Mortality Rate	High Mortality Rate: 10-25%	No Mortality	Can vary depending on type of infection and immune status of the patient
Signs & Symptoms	Body aches, Fever, Headache, Cough, SOB	Body aches, Fever, Headache	
Incubation Period	2-14 days after exposure	24 to 72 hours after exposure	
Diagnosis	Pneumonia	No Pneumonia	Infection at a body site outside of the lungs
Treatment	Antibiotics	Self-limiting/ Supportive Care	Antibiotics

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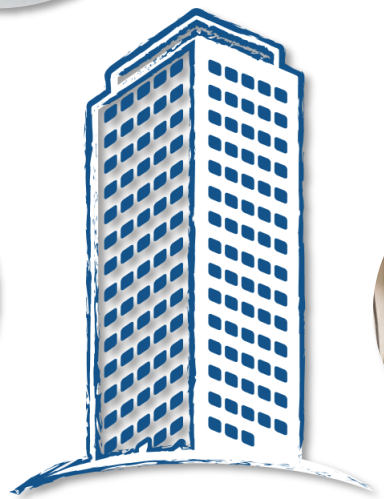
Transmission

- Primary Mode: Inhalation of **aerosolized water droplets**
  - Sources of exposure include:
    - Fixtures of plumbing systems, such as showers and sinks
    - Devices that aerosolize water, such as hot tubs, cooling towers, and decorative fountains
    - Medical equipment with humidification, such as CPAP machines
- Other less common transmission routes:
  - **Aspiration** of contaminated water/ice (i.e., “water goes down the wrong pipe”)
    - Especially in hospitalized or neurologically impaired patients
  - **Direct inoculation** into wounds (rare)
  - **Soil exposure** (linked to *Legionella longbeachae*, rare in US but more common in other countries such as Australia)



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Defining an Outbreak

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What Triggers an Outbreak Investigation?

- The **setting**, **length of stay**, and **number of cases** can impact whether an outbreak investigation is warranted.

Healthcare

- ≥ 1 **presumptive healthcare-associated** case
  - A patient with ≥ 10 days of continuous stay at a healthcare facility 14 days before onset.
- ≥ 2 **possible healthcare-associated** cases within 12 months
  - A patient who spent a portion of the 14 days before symptom onset in one or more healthcare facilities and does not meet the above “presumptive” criteria.
- ≥ 3 possible healthcare-associated cases regardless of time frame

Non-Healthcare

- ≥ 2 cases associated with the same possible source within 12 months
- ≥ 3 cases associated with the same possible source, regardless of time frame

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What Triggers an Outbreak Investigation?

- The **setting**, **length of stay**, and **number of cases** can impact whether an outbreak investigation is warranted.

Community-Associated

- An increase in Legionnaires' disease cases in a certain geographic area beyond what one would normally expect for that time and place.

Special Considerations

- ≥ 1 case at a facility where people generally do not leave the premises and may have limited or no exposures outside the facility.

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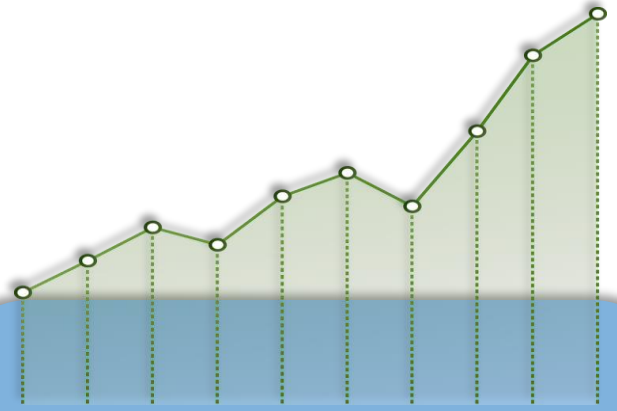
Outbreak Investigations in New Jersey



On average, **20** legionellosis outbreak investigations are conducted annually.

Most outbreak investigations are initiated between **May-September**.

Long-term care facilities account for the highest proportion of outbreak investigations.

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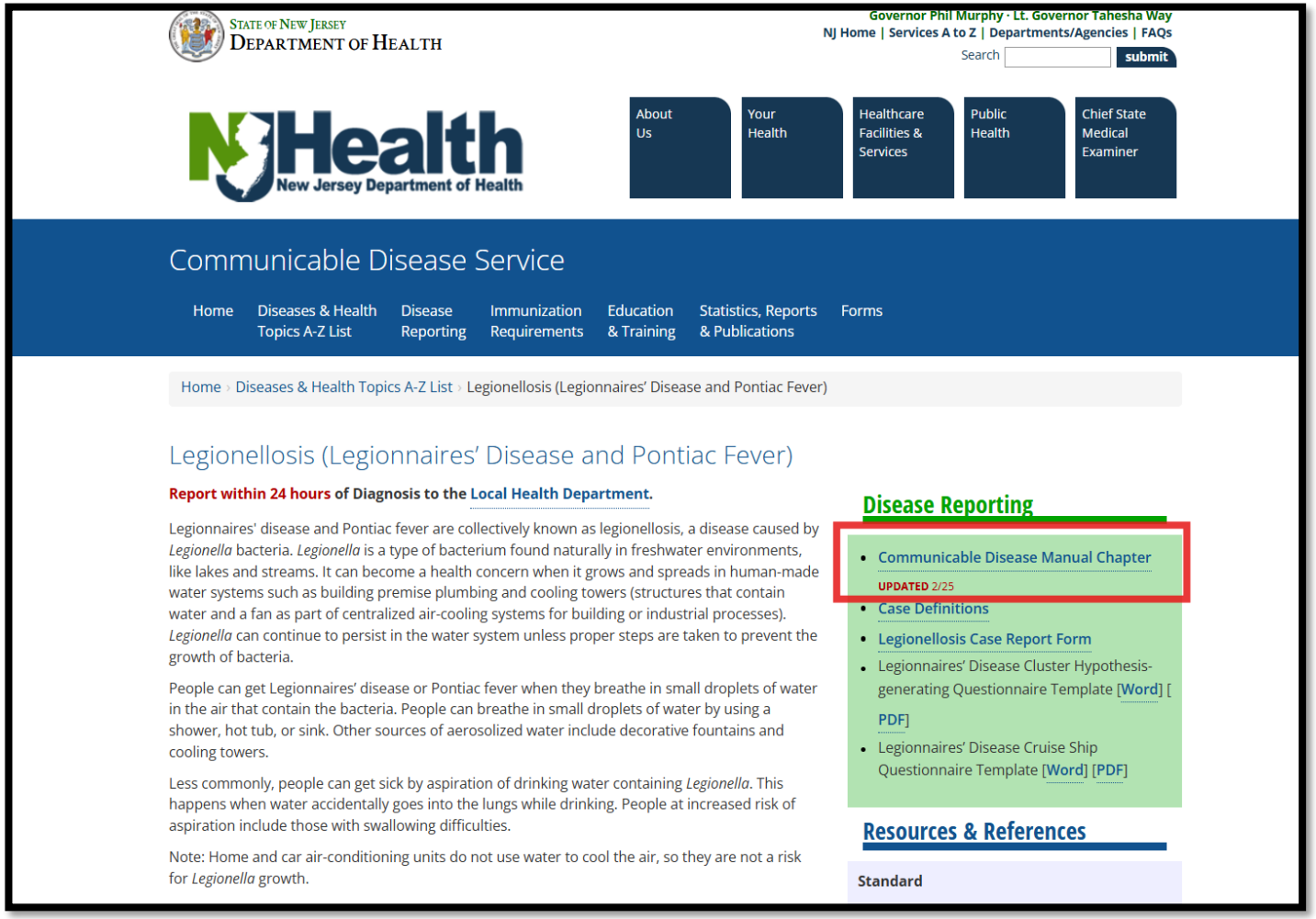
Resources: Outbreak Definitions

1. NJDOH's Communicable Disease Manual Chapter (Defining Outbreaks) *(video)*
2. CDC's Defining Healthcare Facilities and Associated Cases
3. CDC's Investigating Legionnaires' Disease



NJDOH Communicable Disease Manual Chapter

Local Health Department's Role

The NJDOH provides technical support to LHDs during legionellosis outbreak investigations without assuming the lead role. If the outbreak expands (e.g., multiple jurisdictions involved), the investigation may become a joint effort. Additional NJDOH support is available upon request.

Local Health Department's role during an outbreak investigation

- N.J.A.C. 8:57-1.10 requires health officers to investigate communicable disease reports with guidance from the NJ Department of Health (NJDOH) to **determine if an outbreak exists**, **identify the source of the illness**, and **implement control measures to prevent further spread.**

Jurisdiction considerations

- Case-patients may reside in a different jurisdiction from where the exposure occurs.
- Local health departments are responsible for investigating potential sources (e.g., *Legionella* exposure in a building) in their jurisdiction.
- NJDOH may involve multiple health officers, especially when community-wide transmission is suspected.

Key activities expected of the LHD

- **Obtain relevant medical records** (as needed)
- **Coordinate transfer of clinical specimens** to public health laboratories
- **Facilitate communication** (conference calls, site visits with NJDOH)
- **Provide written recommendations** to the affected facility
- **Monitor progress** by following up on environmental sampling and remediation
- **Maintain detailed records** related to the investigation
- **Enforce public health laws** to mitigate health hazards and ensure proper notification

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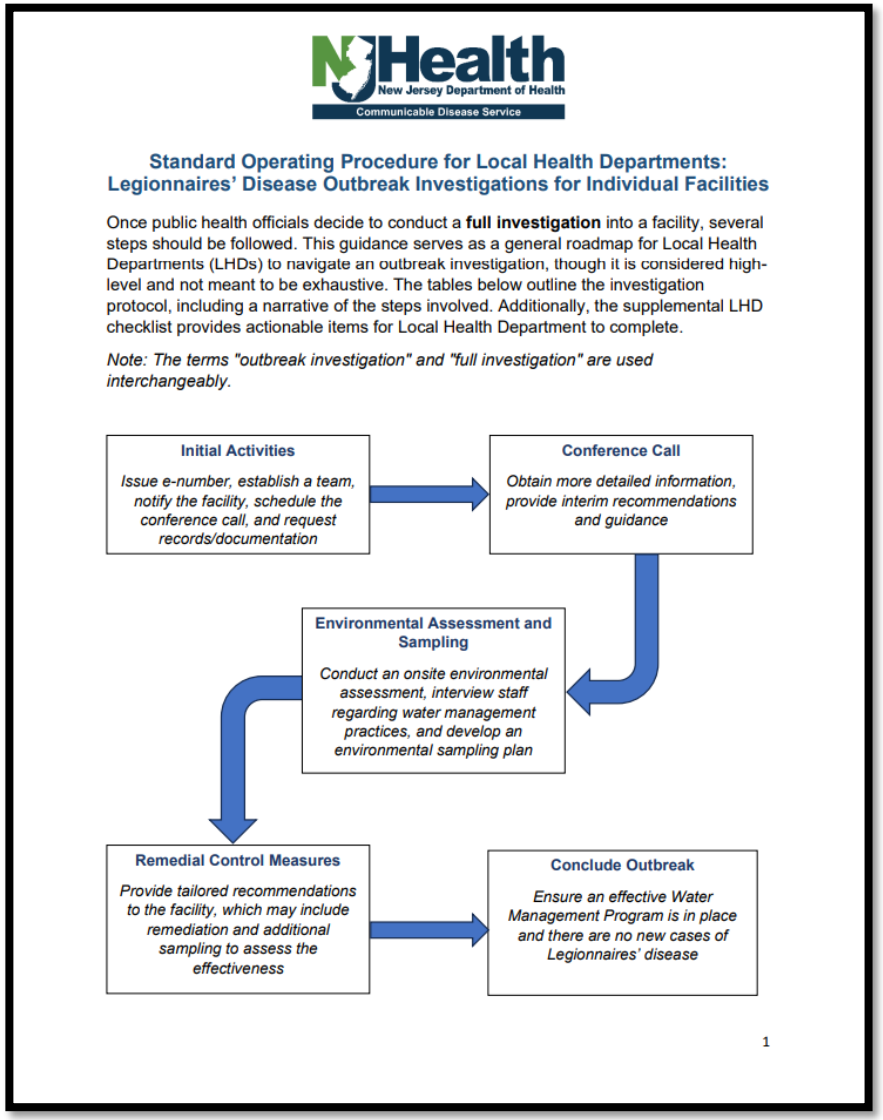
Resources: Local Health Department's Role

1. NJDOH's Communicable Disease Manual Chapter (Roles and Responsibilities)

2. NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations *(video)*



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Standard Operating Procedure for Local Health Departments: Legionnaires' Disease Outbreak Investigations for Individual Facilities

Once public health officials decide to conduct a **full investigation** into a facility, several steps should be followed. This guidance serves as a general roadmap for Local Health Departments (LHDs) to navigate an outbreak investigation, though it is considered high-level and not meant to be exhaustive. The tables below outline the investigation protocol, including a narrative of the steps involved. Additionally, the supplemental LHD checklist provides actionable items for Local Health Department to complete.

Note: The terms "outbreak investigation" and "full investigation" are used interchangeably.

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NJDOH Standard Operating Procedures for LD Outbreaks

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Steps in an Outbreak Investigation

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Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

Site Visit

Conduct an onsite environmental assessment and provide additional recommendations

Remedial Control Measures

Provide tailored recommendations to the facility, including remediation and additional sampling.

Conference Call

Obtain more information and provide interim recommendations

Review Baseline Testing

Review water sampling results for *Legionella* to determine next steps.

Close-Out

Ensure a water management program is in place, that there are no new cases, and that there are no *Legionella* detections.

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Step 1: Initial Activities

☑ Determine if an outbreak is warranted

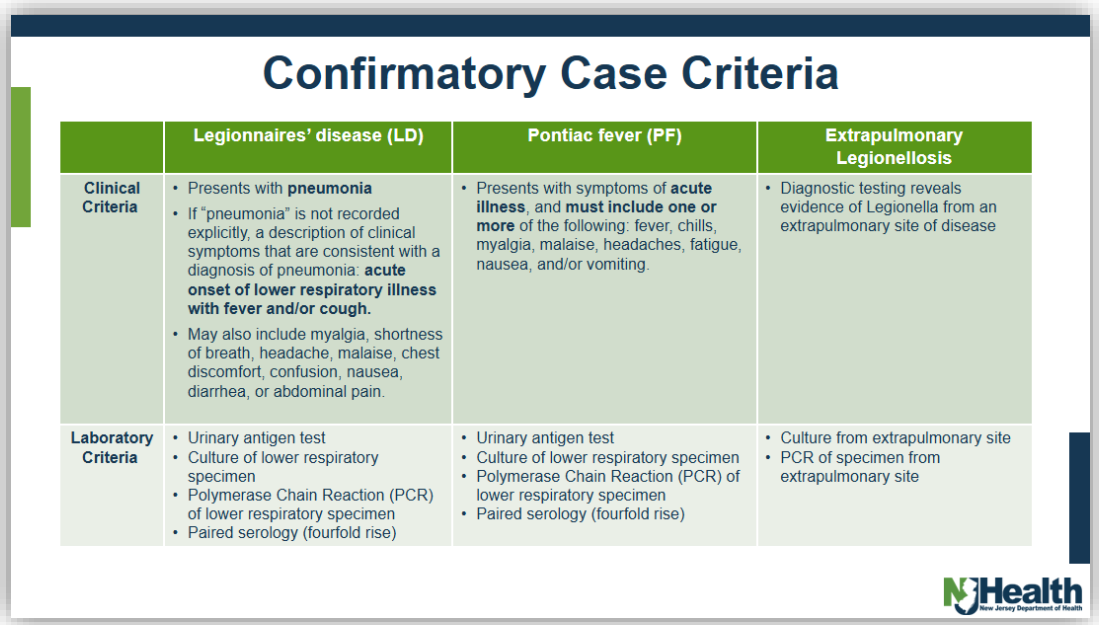
- **Case(s) meet the confirmatory case criteria for legionellosis**
  - For example, for LD, it must be a clinically compatible case (i.e., pneumonia diagnosis) with confirmatory laboratory evidence for *Legionella*
- **Meets NJDOH outbreak criteria**

☑ Establish a team

- **Choose team members to work on the outbreak investigation**
  - Team members typically include Health Officers, REHS staff, and Public Health Nurses
  - NJDOH staff will provide technical assistance and support

☑ Notify the facility

- **Notify the facility manager or owner in writing**
  - NJDOH will provide the LHD team with a tailored "Notification Template Letter"



Confirmatory Case Criteria

	Legionnaires' disease (LD)	Pontiac fever (PF)	Extrapulmonary Legionellosis
Clinical Criteria	• Presents with **pneumonia** • If "pneumonia" is not recorded explicitly, a description of clinical symptoms that are consistent with a diagnosis of pneumonia: **acute onset of lower respiratory illness with fever and/or cough.** • May also include myalgia, shortness of breath, headache, malaise, chest discomfort, confusion, nausea, diarrhea, or abdominal pain.	• Presents with symptoms of **acute illness**, and **must include one or more** of the following: fever, chills, myalgia, malaise, headaches, fatigue, nausea, and/or vomiting.	• Diagnostic testing reveals evidence of Legionella from an extrapulmonary site of disease
Laboratory Criteria	• Urinary antigen test • Culture of lower respiratory specimen • Polymerase Chain Reaction (PCR) of lower respiratory specimen • Paired serology (fourfold rise)	• Urinary antigen test • Culture of lower respiratory specimen • Polymerase Chain Reaction (PCR) of lower respiratory specimen • Paired serology (fourfold rise)	• Culture from extrapulmonary site • PCR of specimen from extrapulmonary site

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Confirmatory case criteria for legionellosis from Part I

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Step 1: Facility Notification Letter Example

Describes why an outbreak investigation is being initiated

Requests the facility to participate in a conference call and complete the *Facility Background Assessment Tool*

Provides the facility with next steps

LHD Template: Notification Letter to a Healthcare Facility Regarding a Presumptive Healthcare-Associated Case of Legionnaires' Disease

[Insert date]

Dear [Name of facility owner/manager and infection preventionist],

On [date], [LHD] received a report of a patient at [facility name] who meets the public health criteria for presumptive healthcare-associated Legionnaires' disease (LD), given that they were a [patient/resident] for 10 or more days during the 14 days before onset of symptoms. The identification of a presumptive healthcare-associated LD case raises concerns about potential ongoing *Legionella* transmission within your facility. To minimize any risk of continued transmission, the [LHD] and the New Jersey Department of Health recommend a full outbreak investigation, in collaboration with your facility's infection control, building maintenance, administration, and risk management teams.

Please provide your availability for a one-hour conference call within the next five business days. Additionally, complete the attached Facility Background Assessment Tool and return it at least 24 hours before the call. Include a copy of the facility's Water Management Program and any environmental *Legionella* test results from the past 12 months.

In the meantime, please take the following actions to identify any additional healthcare-associated cases of LD. Immediately notify the [LHD] if you discover other diagnoses among residents, staff, or visitors. We also recommend implementing immediate control measures to minimize the risk of *Legionella* exposure for building occupants. Further recommendations will follow upon receipt of the Facility Background Assessment Tool.

Case Surveillance

1. **Review facility laboratory records:** Include all clinical (human) *Legionella* testing and any positive results from the past 12 months.
2. **Perform a retrospective chart review:** Look at patient charts for the past 12 months to identify pneumonia cases that could have been healthcare-associated (≥ onset 48 hours after admission). If additional cases are identified, determine if the patients were tested for *Legionella*.
3. **Implement active clinical surveillance**:
   - Systematically identify patients with healthcare-associated pneumonia (onset ≥48 hours after admission).
   - Ensure *Legionella*-specific testing is performed for each of these patients.
   - For patients referred to other hospitals for legionellosis symptoms, request appropriate *Legionella* testing at the receiving hospital.

Immediate Control Measures

1. **Do not provide tap water for drinking to residents/patients at risk of aspiration (i.e., swallowing difficulties),** including use of ice from the facility's ice machines in their beverages and tap water used in dilution/hydration of meals for residents/patients on a soft diet. Provided bottled drinking water instead. Consider this recommendation for other susceptible residents/patients.[1]
   a. Provide sterile water to hematopoietic stem cell or solid-organ transplant patients for tooth brushing, drinking, and flushing their feeding tubes. Use sterile water to flush their feeding tubes.[1,2]
2. **Use only sterile (not distilled) water for filling reservoirs of devices used for nebulization** (e.g., CPAP/BiPAP machines, ventilators, oxygen concentrators, nebulizers). This guidance applies even in absence of an outbreak.[1,2]
   a. Use sterile water when rinsing is needed for nebulization devices and other semicritical respiratory-care equipment, including nebulizer masks and tubing, after they have been cleaned or disinfected.[2]

We appreciate your cooperation and look forward to working with you and your staff to ensure the safety and well-being of your [residents/patients]. If you have any questions, please contact [name and contact details for LHD]. Thank you for your time and attention to this matter.

Sincerely,

[LHD POC name and contact details]

Citations

1. Centers for Disease Control and Prevention. (n.d.). Control measures for *Legionella* in healthcare settings. Retrieved October 24, 2024, from https://www.cdc.gov/investigate-legionella/php/healthcare-resources/control-measures.html
2. Centers for Disease Control and Prevention. (2019). Guideline for preventing healthcare-associated pneumonia, 2003. Retrieved October 24, 2024, from https://www.cdc.gov/infection-control/media/pdfs/Guideline-Healthcare-AssociatedPneumonia-H.pdf

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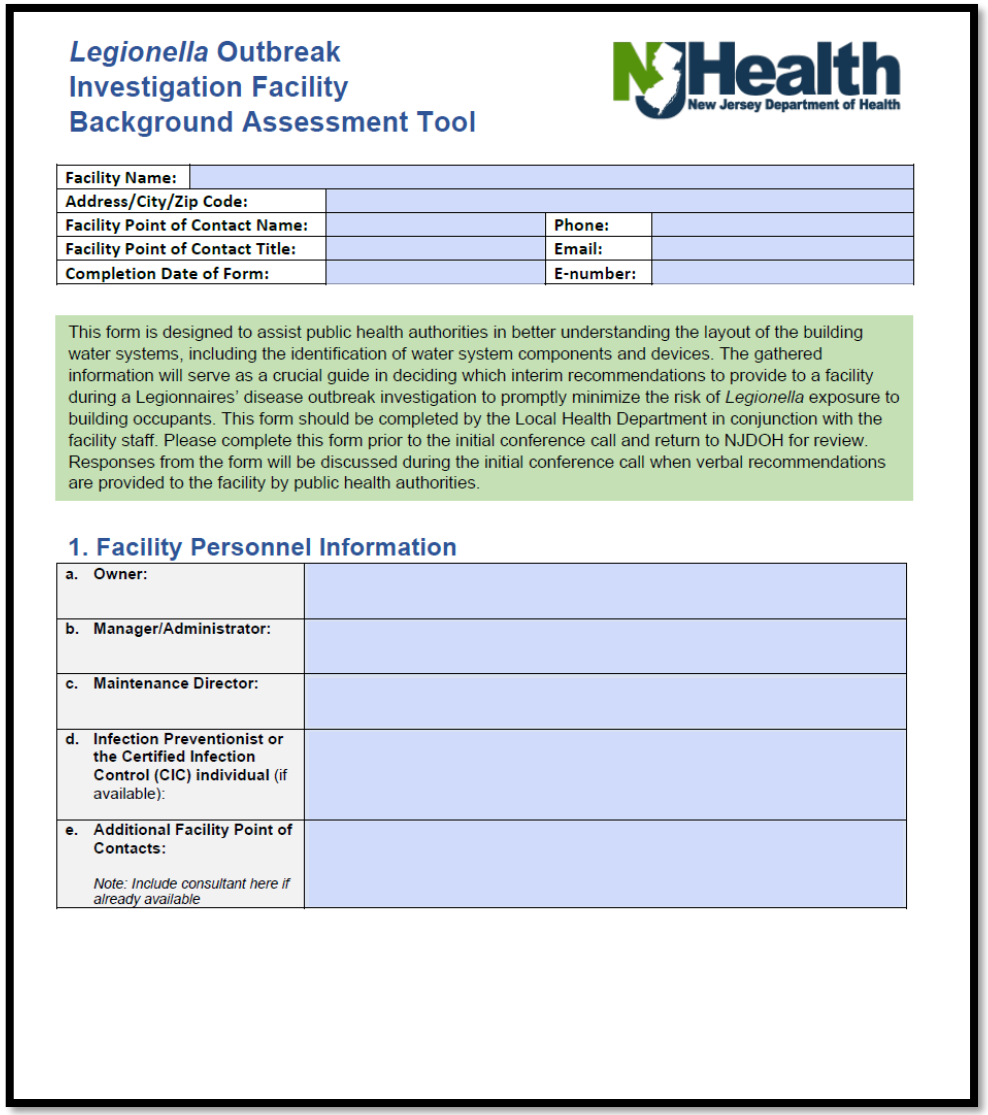
Step 1 Resources: Initial Activities

- NJDOH Legionellosis Webpage: Notification Template Letters
- NJDOH's Communicable Disease Manual Chapter (Notification Letter Templates)
- Facility Background Assessment Tool *(available upon request) (video)*



***Legionella* Outbreak Investigation Facility Background Assessment Tool**

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Facility Name:			
Address/City/Zip Code:			
Facility Point of Contact Name:		**Phone:**	
Facility Point of Contact Title:		**Email:**	
Completion Date of Form:		**E-number:**	

This form is designed to assist public health authorities in better understanding the layout of the building water systems, including the identification of water system components and devices. The gathered information will serve as a crucial guide in deciding which interim recommendations to provide to a facility during a Legionnaires' disease outbreak investigation to promptly minimize the risk of *Legionella* exposure to building occupants. This form should be completed by the Local Health Department in conjunction with the facility staff. Please complete this form prior to the initial conference call and return to NJDOH for review. Responses from the form will be discussed during the initial conference call when verbal recommendations are provided to the facility by public health authorities.

1. Facility Personnel Information

a. **Owner:**	
b. **Manager/Administrator:**	
c. **Maintenance Director:**	
d. **Infection Preventionist or the Certified Infection Control (CIC) individual** (if available):	
e. **Additional Facility Point of Contacts:** *Note: Include consultant here if already available*	

Facility Background Assessment Tool

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Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

Site Visit

Conduct an onsite environmental assessment and provide additional recommendations

Remedial Control Measures

Provide tailored recommendations to the facility, including remediation and additional sampling.

Conference Call

Obtain more information and provide interim recommendations

Review Baseline Testing

Review water sampling results for *Legionella* to determine next steps.

Close-Out

Ensure a water management program is in place, that there are no new cases, and that there are no *Legionella* detections.

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Step 2: Conference Call

NEW UPDATE

The NJDOH offers pre-conference calls with LHDs to review investigation details and prepare for the upcoming meeting with the facility.

☑ Review the completed Facility Background Assessment Tool

- Ensure the facility's Water Management Program (WMP) and *Legionella* testing results are received (if applicable)

☑ Ensure key team members are on the call

- **Facility:** Owner, Management, Facility Engineer, Administration, Infection Preventionist (healthcare only), Maintenance Director
- **LHD:** Health Officer, Disease Investigator, REHS, Public Health Nurse
- **NJDOH:** *Legionella* Team + Regional Epidemiologist + Rapid Response Team Member

☑ Participate in the 1-hour conference call

- Introductions **(LHD)**
- Provide disease background **(LHD/NJDOH)**
- Review clinical details and case investigation findings for healthcare facilities **(LHD)**
- Review the Facility Background Assessment Tool **(NJDOH)**
- Conclude the call with recommendations and next steps **(NJDOH)**

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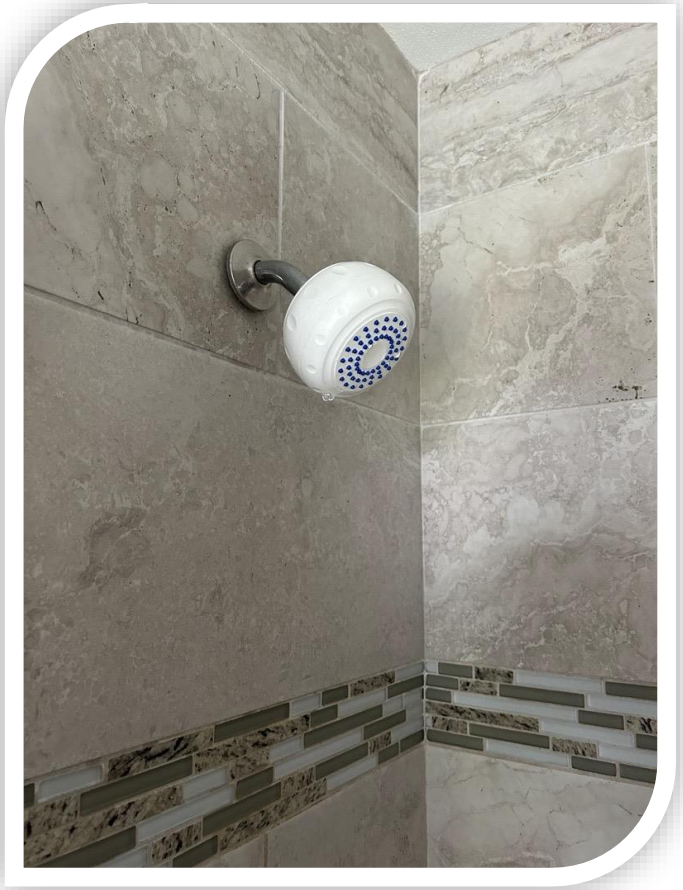
Step 2: Conference Call Recommendations

Hire a Third-Party Consultant with *Legionella*-Specific Experience

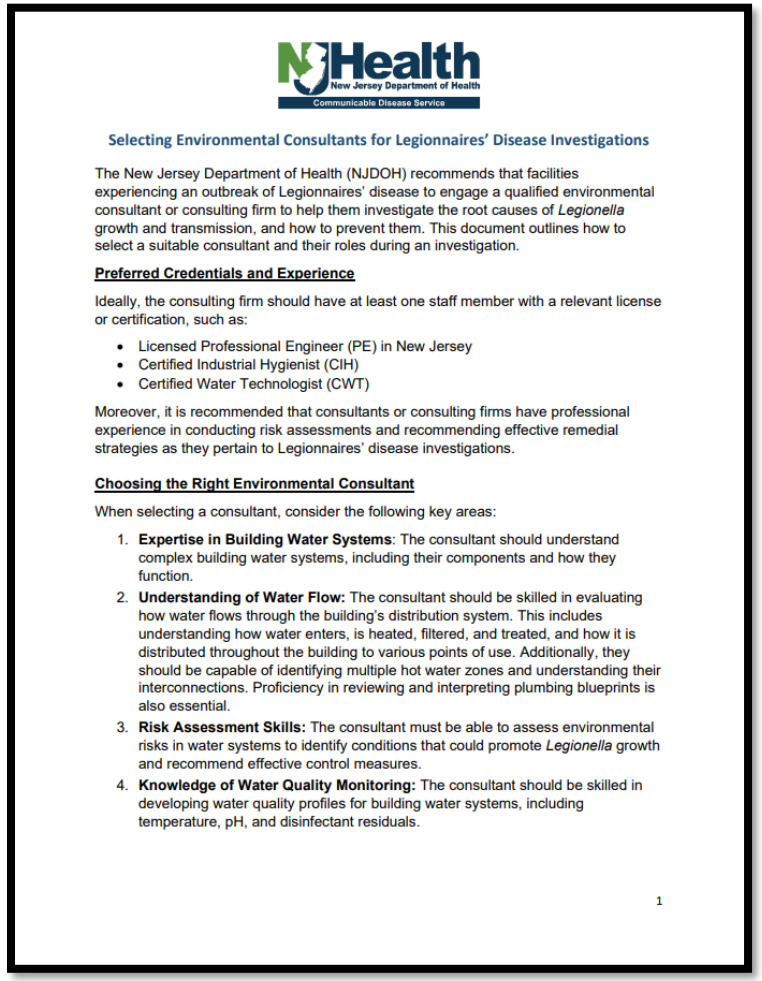
Schedule an On-Site Environmental Assessment



Implement Water Restrictions (e.g., install POU microbial filters on showerheads)

Step 2 Resources: Conference Call

- NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations
- NJDOH's Communicable Disease Manual Chapter (Recommendations)
- NJDOH's Guidance for Selecting Environmental Consultants
- Conference Call Agenda *(available upon request)*
- Conference Call Script *(available upon request)*



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Selecting Environmental Consultants for Legionnaires' Disease Investigations

The New Jersey Department of Health (NJDOH) recommends that facilities experiencing an outbreak of Legionnaires' disease to engage a qualified environmental consultant or consulting firm to help them investigate the root causes of *Legionella* growth and transmission, and how to prevent them. This document outlines how to select a suitable consultant and their roles during an investigation.

Preferred Credentials and Experience

Ideally, the consulting firm should have at least one staff member with a relevant license or certification, such as:

- Licensed Professional Engineer (PE) in New Jersey
- Certified Industrial Hygienist (CIH)
- Certified Water Technologist (CWT)

Moreover, it is recommended that consultants or consulting firms have professional experience in conducting risk assessments and recommending effective remedial strategies as they pertain to Legionnaires' disease investigations.

Choosing the Right Environmental Consultant

When selecting a consultant, consider the following key areas:

1. **Expertise in Building Water Systems**: The consultant should understand complex building water systems, including their components and how they function.
2. **Understanding of Water Flow:** The consultant should be skilled in evaluating how water flows through the building's distribution system. This includes understanding how water enters, is heated, filtered, and treated, and how it is distributed throughout the building to various points of use. Additionally, they should be capable of identifying multiple hot water zones and understanding their interconnections. Proficiency in reviewing and interpreting plumbing blueprints is also essential.
3. **Risk Assessment Skills:** The consultant must be able to assess environmental risks in water systems to identify conditions that could promote *Legionella* growth and recommend effective control measures.
4. **Knowledge of Water Quality Monitoring:** The consultant should be skilled in developing water quality profiles for building water systems, including temperature, pH, and disinfectant residuals.

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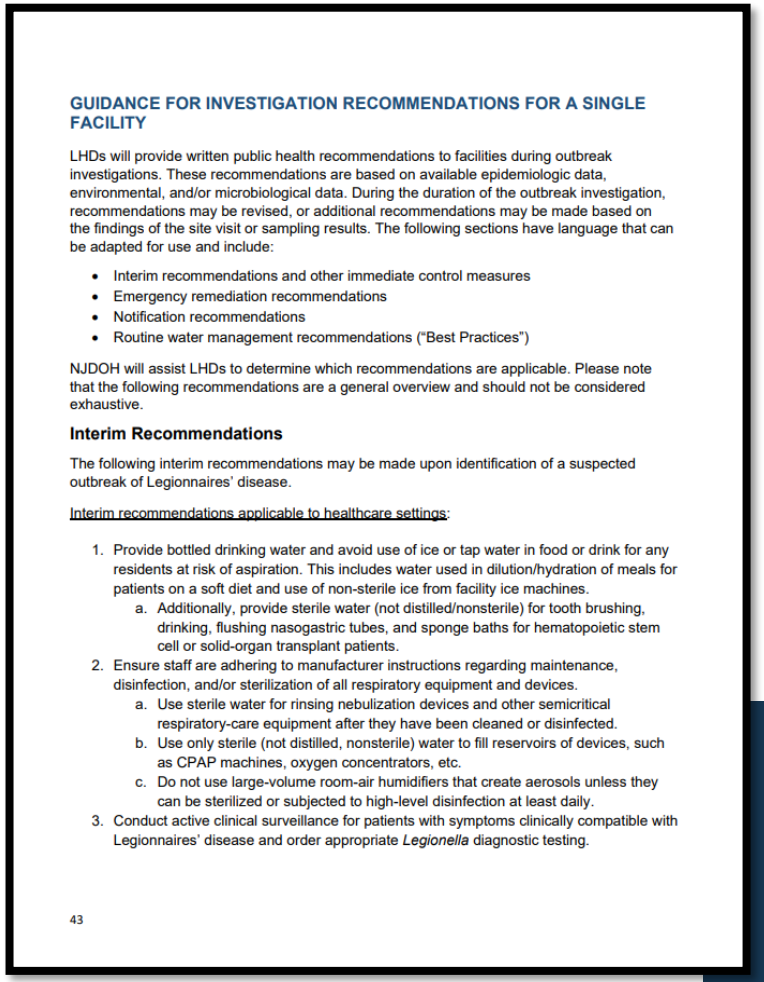
NJDOH Guidance for Selecting a Consultant



GUIDANCE FOR INVESTIGATION RECOMMENDATIONS FOR A SINGLE FACILITY

LHDs will provide written public health recommendations to facilities during outbreak investigations. These recommendations are based on available epidemiologic data, environmental, and/or microbiological data. During the duration of the outbreak investigation, recommendations may be revised, or additional recommendations may be made based on the findings of the site visit or sampling results. The following sections have language that can be adapted for use and include:

- Interim recommendations and other immediate control measures
- Emergency remediation recommendations
- Notification recommendations
- Routine water management recommendations ("Best Practices")

NJDOH will assist LHDs to determine which recommendations are applicable. Please note that the following recommendations are a general overview and should not be considered exhaustive.

Interim Recommendations

The following interim recommendations may be made upon identification of a suspected outbreak of Legionnaires' disease.

Interim recommendations applicable to healthcare settings:

1. Provide bottled drinking water and avoid use of ice or tap water in food or drink for any residents at risk of aspiration. This includes water used in dilution/hydration of meals for patients on a soft diet and use of non-sterile ice from facility ice machines.
   a. Additionally, provide sterile water (not distilled/nonsterile) for tooth brushing, drinking, flushing nasogastric tubes, and sponge baths for hematopoietic stem cell or solid-organ transplant patients.
2. Ensure staff are adhering to manufacturer instructions regarding maintenance, disinfection, and/or sterilization of all respiratory equipment and devices.
   a. Use sterile water for rinsing nebulization devices and other semicritical respiratory-care equipment after they have been cleaned or disinfected.
   b. Use only sterile (not distilled, nonsterile) water to fill reservoirs of devices, such as CPAP machines, oxygen concentrators, etc.
   c. Do not use large-volume room-air humidifiers that create aerosols unless they can be sterilized or subjected to high-level disinfection at least daily.
3. Conduct active clinical surveillance for patients with symptoms clinically compatible with Legionnaires' disease and order appropriate *Legionella* diagnostic testing.

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NJDOH Guidance for Recommendations

Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

Site Visit

Conduct an onsite environmental assessment and provide additional recommendations

Remedial Control Measures

Provide tailored recommendations to the facility, including remediation and additional sampling.

Conference Call

Obtain more information and provide interim recommendations

Review Baseline Testing

Review water sampling results for *Legionella* to determine next steps.

Close-Out

Ensure a water management program is in place, that there are no new cases, and that there are no *Legionella* detections.

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Step 3: Site Visit

☑ Coordinate with key team members to schedule the on-site environmental assessment

- Site visits can last anywhere between 2-4 hours.
- Ensure facility representatives (including maintenance personnel), public health (LHD + NJDOH), and the consultant are confirmed for the site visit.

☑ Send a friendly reminder to all key team members 1-2 days in advance

- Request a completed ***Legionella*** **Environmental Assessment Form** before the site visit.
- Confirm parking details and meeting location

☑ Participate in the walk-through

- NJDOH will lead the site visit using the ***Legionella Environmental Assessment Form***.

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Step 3: Site Visit Agenda

- **Brief introductions**
- Review information **not provided** on the initial call.
- Request documentation not already provided **(e.g., floor plans, Water Management Plan, *Legionella* testing results).**

- Ensure the sampling plan integrates the epidemiological and environmental data.
- Include the following locations:
  - **Centralized locations**
  - **Areas where the case-patient was exposed** (e.g., living space, ice machine, hair salon).
  - **Hazardous locations identified during the assessment.**
  - **Representative number of resident/guest rooms.**

- Utilize the ***Legionella* Environmental Assessment Form** to guide the walk-through.
- **Start** where the incoming water supply enters the building and work your way to the point of use outlets.
- Collect **water quality measurements** throughout the building.

- **Verbally review the site visit recommendations.**

- **LHD sends written recommendations (provided by NJDOH) to the facility.**

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Step 3: Environmental Assessment Form

- Enables public health officials to **gain a better understanding of the facility's water system and water management practices:**

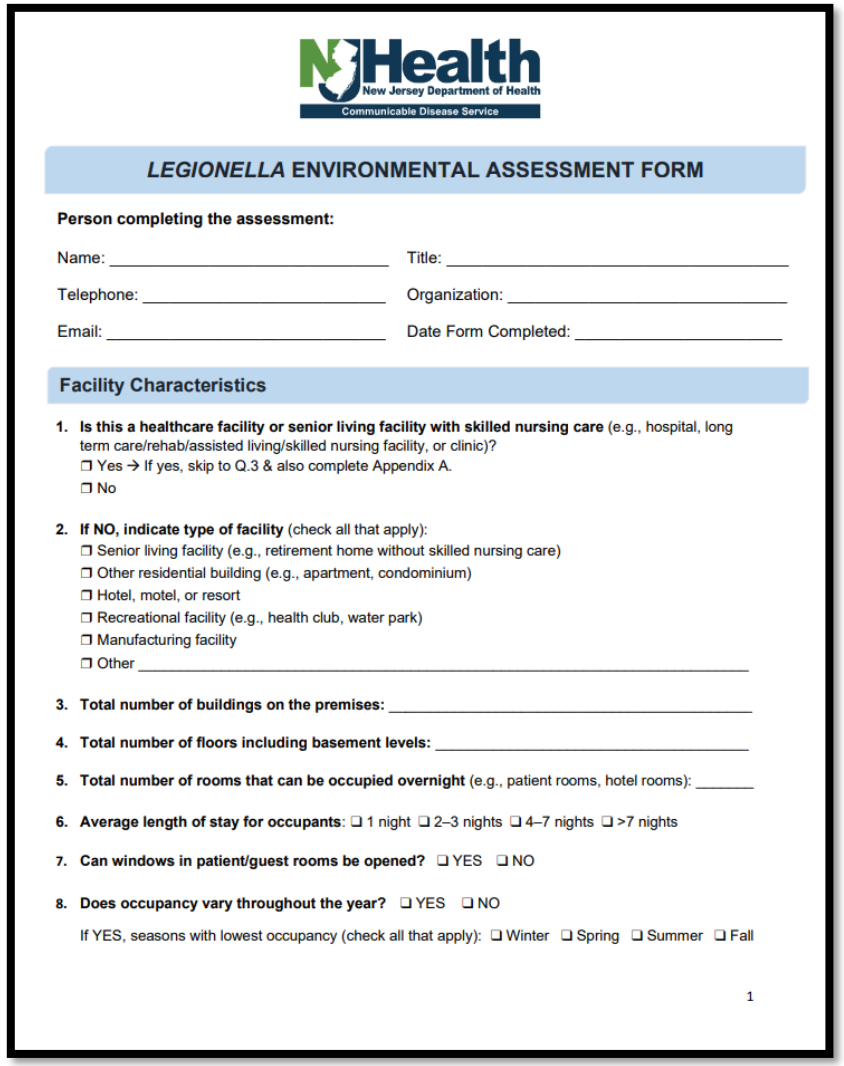
Facility Characteristics

Water Supply Source

Premise Plumbing System

Water System Devices

- **Identifies areas that may be hazardous** and promote *Legionella* growth.
- Aids in developing a **comprehensive sampling plan**.



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***LEGIONELLA* ENVIRONMENTAL ASSESSMENT FORM**

Person completing the assessment:

Name: _____ Title: _____

Telephone: _____ Organization: _____

Email: _____ Date Form Completed: _____

Facility Characteristics

1. **Is this a healthcare facility or senior living facility with skilled nursing care** (e.g., hospital, long term care/rehab/assisted living/skilled nursing facility, or clinic)?
   ❒ Yes → If yes, skip to Q.3 & also complete Appendix A.
   ❒ No
2. **If NO, indicate type of facility** (check all that apply):
   ❒ Senior living facility (e.g., retirement home without skilled nursing care)
   ❒ Other residential building (e.g., apartment, condominium)
   ❒ Hotel, motel, or resort
   ❒ Recreational facility (e.g., health club, water park)
   ❒ Manufacturing facility
   ❒ Other _____
3. **Total number of buildings on the premises:** _____
4. **Total number of floors including basement levels:** _____
5. **Total number of rooms that can be occupied overnight** (e.g., patient rooms, hotel rooms): _____
6. **Average length of stay for occupants**: ❑ 1 night ❑ 2–3 nights ❑ 4–7 nights ❑ >7 nights
7. **Can windows in patient/guest rooms be opened?** ❑ YES ❑ NO
8. **Does occupancy vary throughout the year?** ❑ YES ❑ NO
   If YES, seasons with lowest occupancy (check all that apply): ❑ Winter ❑ Spring ❑ Summer ❑ Fall

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NJDOH Environmental Assessment Form

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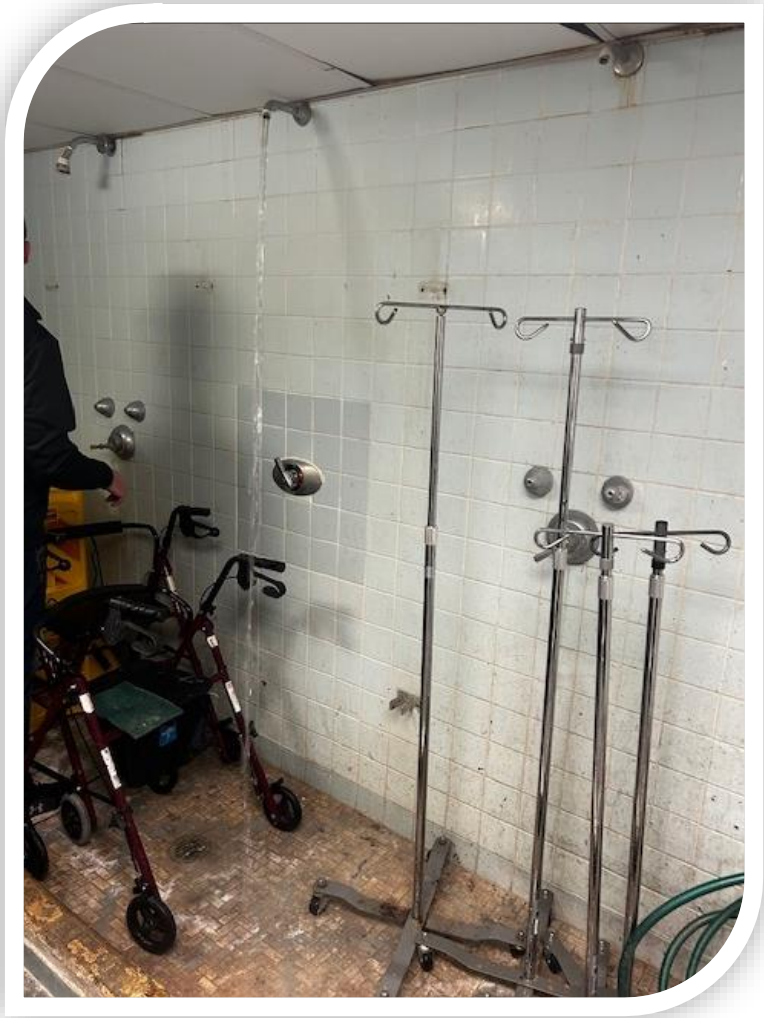
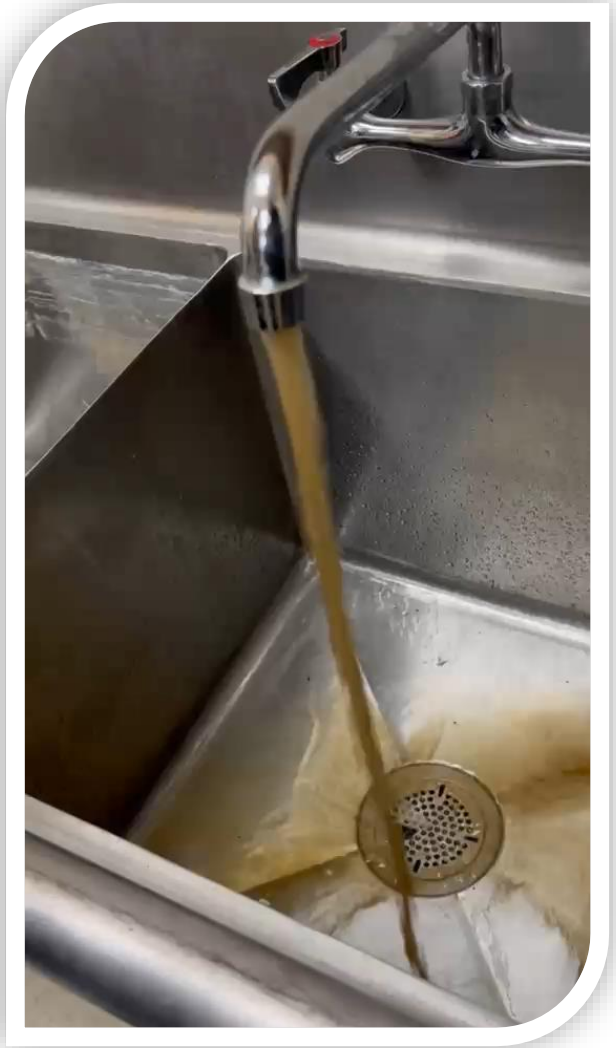
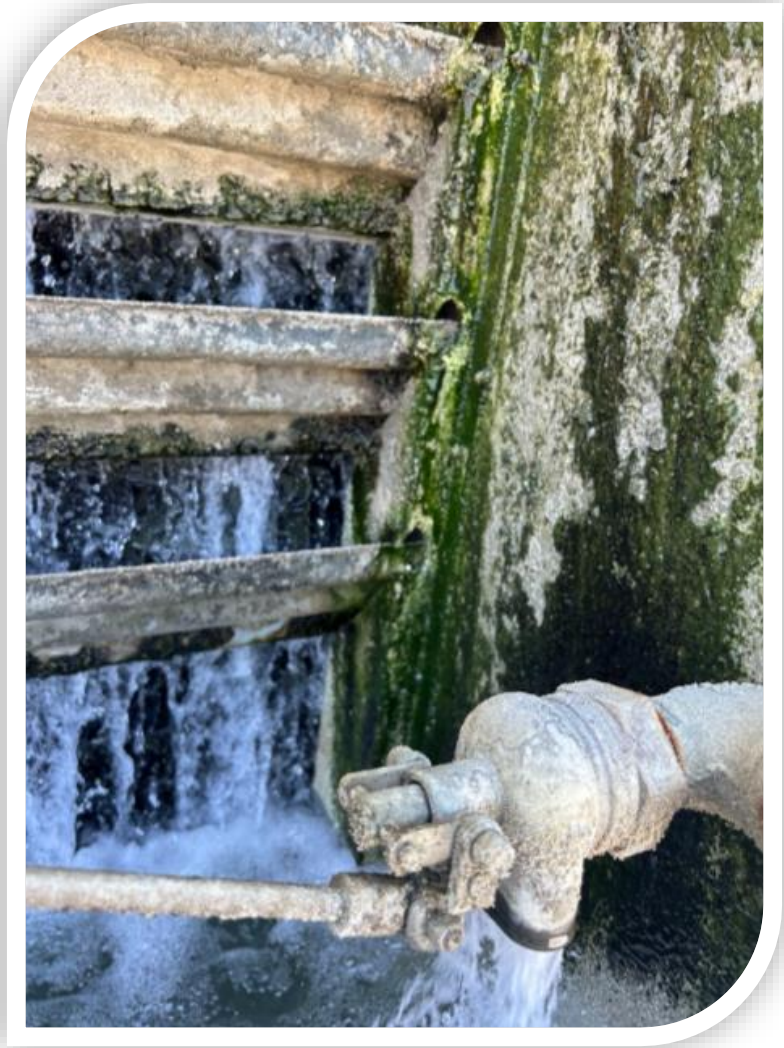
Step 3: From the Field!



Shower Room Used for Storage



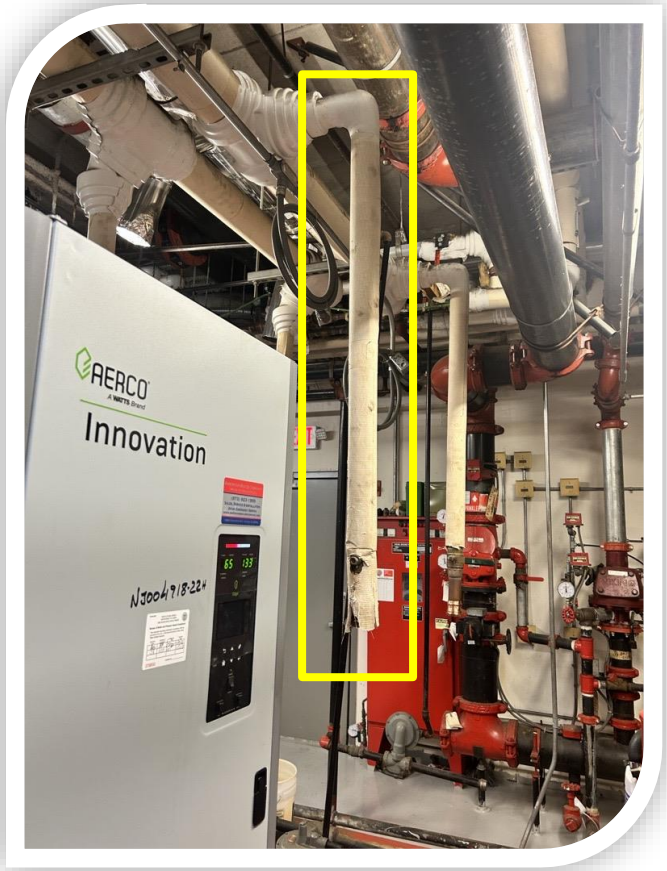
Infrequently Used Sink



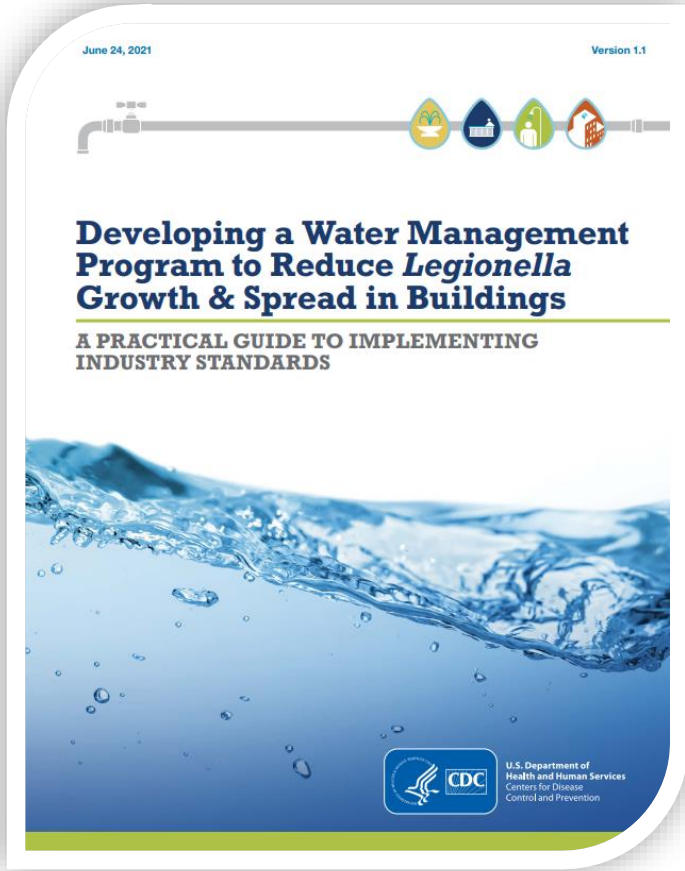
Poorly Maintained Cooling Tower

Step 3: Site Visit Recommendations

Collect Environmental Samples for *Legionella*



Respond to Hazardous Conditions Noted During the Risk Assessment (e.g., Assess the Water System for Dead Legs)



Implement a Water Management Program

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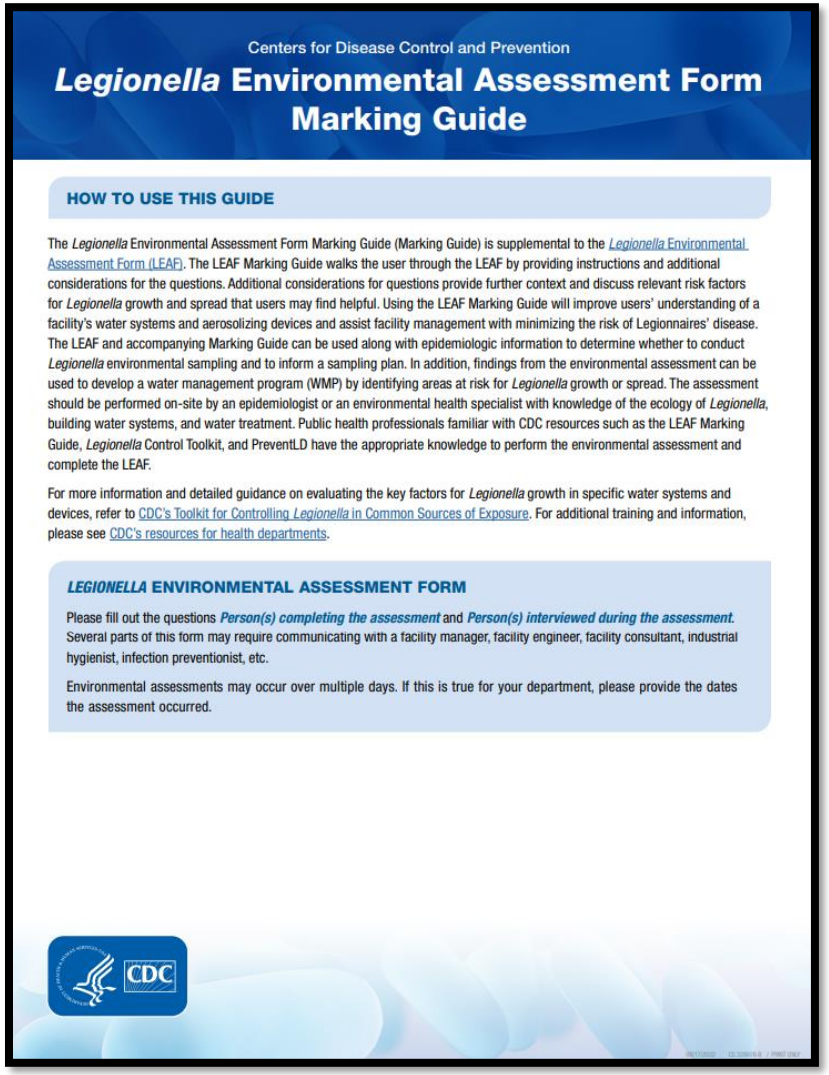
Step 3 Resources: Site Visit

- NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations
- NJDOH's Communicable Disease Manual Chapter (Recommendations)
- CDC Toolkit: *Legionella* Control Toolkit
- NJDOH's *Legionella* Environmental Assessment Form (LEAF)
- CDC *Legionella* Environmental Assessment Form (LEAF) Marking Guide
- NJDOH's Guidance for *Legionella* Sampling and Testing
- CDC Toolkit: Developing a Water Management Program (WMP) to Reduce *Legionella* Growth and Spread in Buildings
- NJDOH's Legionellosis Webpage: Water Management Program (WMP) Template



Centers for Disease Control and Prevention

***Legionella* Environmental Assessment Form Marking Guide**

HOW TO USE THIS GUIDE

The *Legionella* Environmental Assessment Form Marking Guide (Marking Guide) is supplemental to the *Legionella* Environmental Assessment Form (LEAF). The LEAF Marking Guide walks the user through the LEAF by providing instructions and additional considerations for the questions. Additional considerations for questions provide further context and discuss relevant risk factors for *Legionella* growth and spread that users may find helpful. Using the LEAF Marking Guide will improve users' understanding of a facility's water systems and aerosolizing devices and assist facility management with minimizing the risk of Legionnaires' disease. The LEAF and accompanying Marking Guide can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to inform a sampling plan. In addition, findings from the environmental assessment can be used to develop a water management program (WMP) by identifying areas at risk for *Legionella* growth or spread. The assessment should be performed on-site by an epidemiologist or an environmental health specialist with knowledge of the ecology of *Legionella*, building water systems, and water treatment. Public health professionals familiar with CDC resources such as the LEAF Marking Guide, *Legionella* Control Toolkit, and PreventLD have the appropriate knowledge to perform the environmental assessment and complete the LEAF.

For more information and detailed guidance on evaluating the key factors for *Legionella* growth in specific water systems and devices, refer to CDC's Toolkit for Controlling *Legionella* in Common Sources of Exposure. For additional training and information, please see CDC's resources for health departments.

***LEGIONELLA* ENVIRONMENTAL ASSESSMENT FORM**

Please fill out the questions ***Person(s) completing the assessment*** and ***Person(s) interviewed during the assessment.*** Several parts of this form may require communicating with a facility manager, facility engineer, facility consultant, industrial hygienist, infection preventionist, etc.

Environmental assessments may occur over multiple days. If this is true for your department, please provide the dates the assessment occurred.

CDC

CDC Environmental Assessment Form Marking Guide

NJHealth New Jersey Department of Health

Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

Site Visit

Conduct an onsite environmental assessment and provide additional recommendations

Remedial Control Measures

Provide tailored recommendations to the facility, including remediation and additional sampling.

Conference Call

Obtain more information and provide interim recommendations

Review Baseline Testing

Review water sampling results for *Legionella* to determine next steps.

Close-Out

Ensure a water management program is in place, that there are no new cases, and that there are no *Legionella* detections.

NJHealth New Jersey Department of Health

Step 4: Review Baseline Sampling Reports

☑ Finalized Laboratory Report

- Ensure the finalized laboratory report meets NJDOH sampling criteria
- *Beware of laboratory reports reformatted on consultant reports*

☑ Chain of Custody (COC)

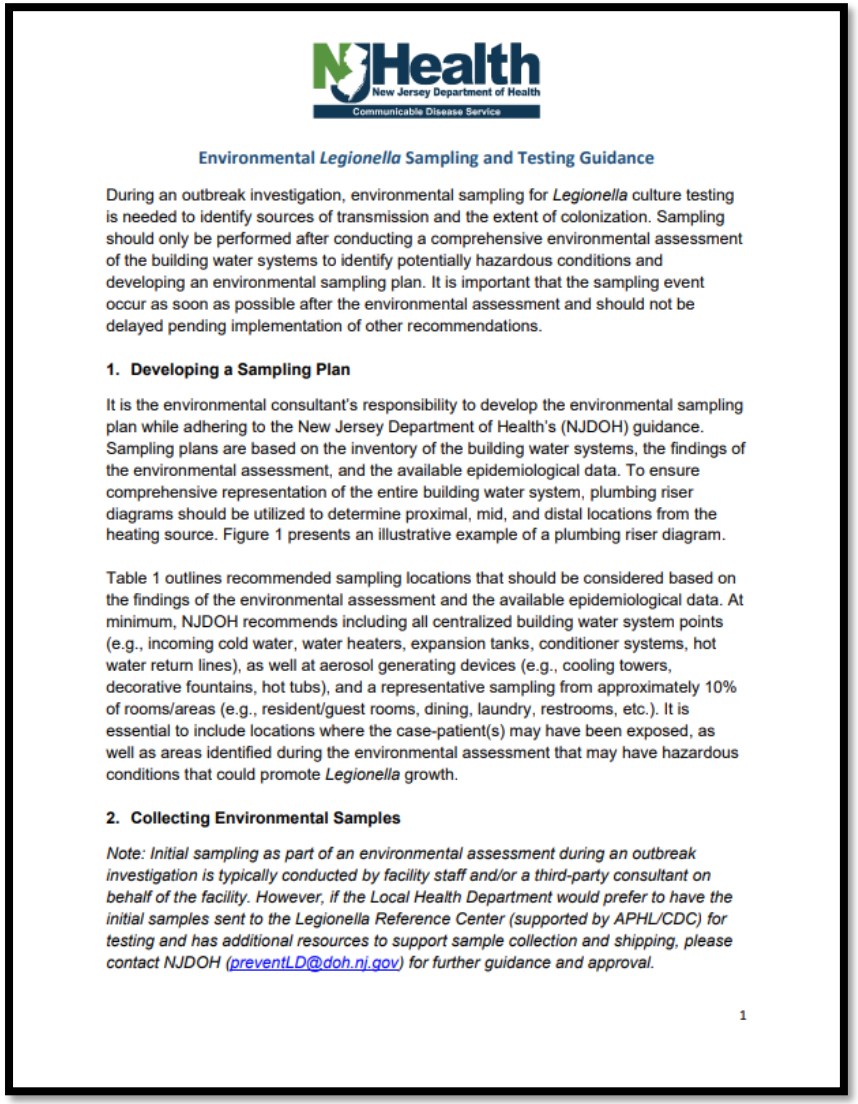
- Serves as a paper trail, ensuring that the integrity and authenticity of the samples are maintained from the point of collection until it reaches the laboratory.
- It includes details such as the sample's unique identifier, collector's name and signature, date and time of collection, storage conditions, and any testing performed.

☑ Water Quality Parameter (WQP) Measurements

- For each sampling location, water quality measurements collected in the field should be documented.
- At minimum, temperature, disinfectant residual, and pH should be measured at each sample location.

Step 4 Resources: Environmental Testing

- NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations
- NJDOH's Guidance for *Legionella* Sampling and Testing
- CDC Procedure and Potential Sampling Sites
- CDC Environmental Sampling Instructional Videos



NJHealth
New Jersey Department of Health
Communicable Disease Service

Environmental *Legionella* Sampling and Testing Guidance

During an outbreak investigation, environmental sampling for *Legionella* culture testing is needed to identify sources of transmission and the extent of colonization. Sampling should only be performed after conducting a comprehensive environmental assessment of the building water systems to identify potentially hazardous conditions and developing an environmental sampling plan. It is important that the sampling event occur as soon as possible after the environmental assessment and should not be delayed pending implementation of other recommendations.

1. Developing a Sampling Plan

It is the environmental consultant's responsibility to develop the environmental sampling plan while adhering to the New Jersey Department of Health's (NJDOH) guidance. Sampling plans are based on the inventory of the building water systems, the findings of the environmental assessment, and the available epidemiological data. To ensure comprehensive representation of the entire building water system, plumbing riser diagrams should be utilized to determine proximal, mid, and distal locations from the heating source. Figure 1 presents an illustrative example of a plumbing riser diagram.

Table 1 outlines recommended sampling locations that should be considered based on the findings of the environmental assessment and the available epidemiological data. At minimum, NJDOH recommends including all centralized building water system points (e.g., incoming cold water, water heaters, expansion tanks, conditioner systems, hot water return lines), as well at aerosol generating devices (e.g., cooling towers, decorative fountains, hot tubs), and a representative sampling from approximately 10% of rooms/areas (e.g., resident/guest rooms, dining, laundry, restrooms, etc.). It is essential to include locations where the case-patient(s) may have been exposed, as well as areas identified during the environmental assessment that may have hazardous conditions that could promote *Legionella* growth.

2. Collecting Environmental Samples

Note: Initial sampling as part of an environmental assessment during an outbreak investigation is typically conducted by facility staff and/or a third-party consultant on behalf of the facility. However, if the Local Health Department would prefer to have the initial samples sent to the Legionella Reference Center (supported by APHL/CDC) for testing and has additional resources to support sample collection and shipping, please contact NJDOH (preventLD@doh.nj.gov) for further guidance and approval.

1

NJDOH's *Legionella* Sampling and Testing Guidance

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Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

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Conference Call

Obtain more information and provide interim recommendations

Review Baseline Testing

Review water sampling results for *Legionella* to determine next steps.

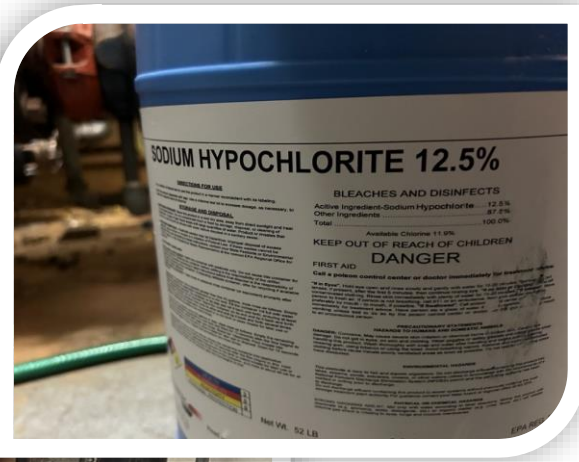
Close-Out

Ensure a water management program is in place, that there are no new cases, and that there are no *Legionella* detections.

NJHealth New Jersey Department of Health

Step 5:Chemical Shock Remediation (Potable)

- **What is a chemical shock remediation?**
  - Chemical disinfectants are used for a relatively short period, frequently at concentrations well above maximum levels permitted for potable water.
- **Who should perform a chemical shock remediation?**
  - A licensed water treatment professional with *Legionella* remediation experience.
  - The facility and water treatment professional should review NJDOH's Remediation Guidance before the chemical shock.
- **When does public health recommend a chemical shock remediation during an investigation?**
  - Strong epidemiological data
  - Sample results indicate the presence of viable *Legionella* bacteria
  - Poor water management practices were identified during the site visit
- **Considered a temporary measure**
  - Recolonization is likely to occur if root causes are not addressed



Chemicals Used During the Remediation

Chemical Shock Remediation Equipment

Step 5: Post-Remediation Schedule (Potable)

5

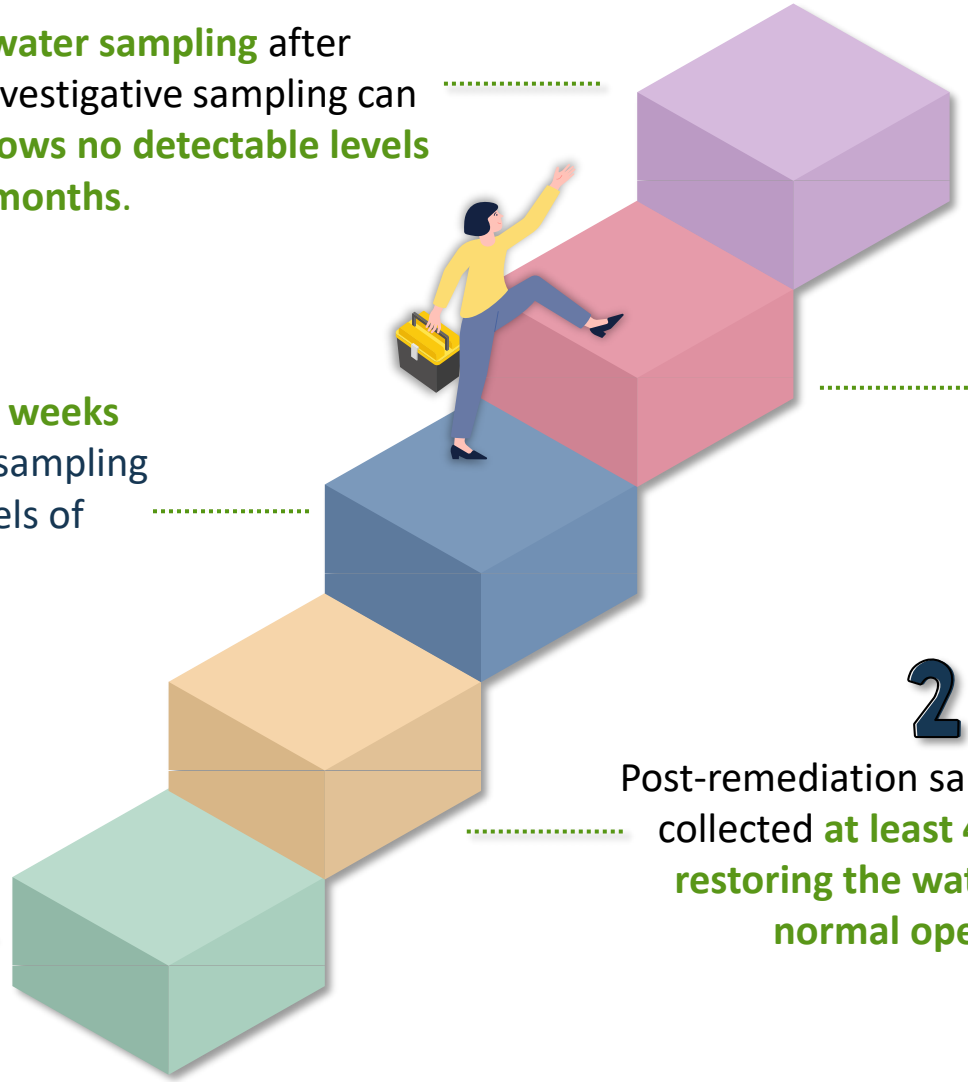
Transition to **monthly water sampling** after consulting with the LHD. Investigative sampling can **conclude once sampling shows no detectable levels for three months**.

4

Possible root causes should be investigated for **any location that has detectable levels of *Legionella*.**

3

Sampling will occur **every 2 to 3 weeks** until there are three consecutive sampling events with no detectable levels of *Legionella*.



2

Post-remediation samples should be collected **at least 48 hours after restoring the water system to normal operation.**

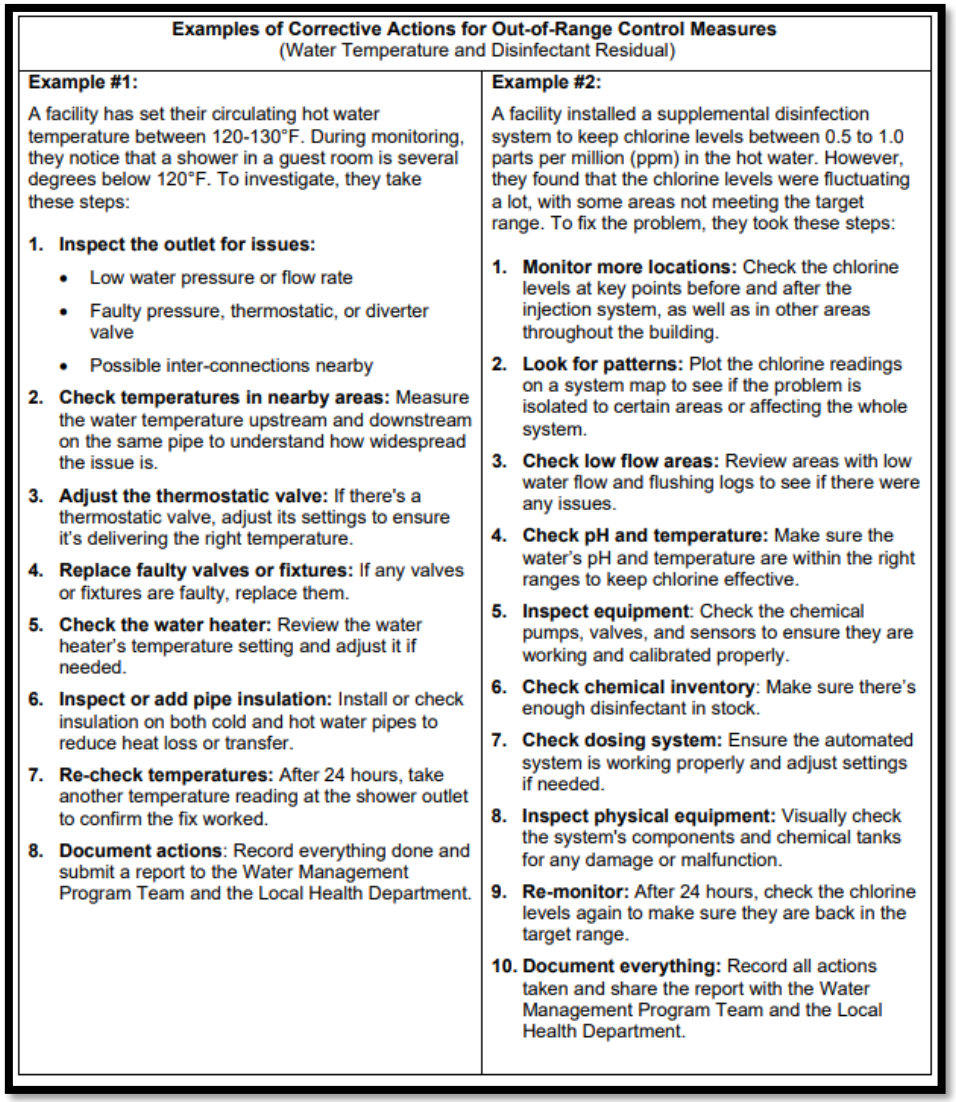
1

Ensure **a licensed professional** performs the chemical shock remediation **after reviewing NJDOH guidance.**

NJHealth New Jersey Department of Health

Step 5 Resources: Chemical Shock Remediation

- NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations
- NJDOH's Communicable Disease Manual Chapter (Remediation Guidance)
- NJDOH's Guidance for Responding to Post-Remediation Environmental *Legionella* Detections



Examples of Corrective Actions for Out-of-Range Control Measures
(Water Temperature and Disinfectant Residual)

Example #1:

A facility has set their circulating hot water temperature between 120-130°F. During monitoring, they notice that a shower in a guest room is several degrees below 120°F. To investigate, they take these steps:

1. **Inspect the outlet for issues:**
   - Low water pressure or flow rate
   - Faulty pressure, thermostatic, or diverter valve
   - Possible inter-connections nearby
2. **Check temperatures in nearby areas:** Measure the water temperature upstream and downstream on the same pipe to understand how widespread the issue is.
3. **Adjust the thermostatic valve:** If there's a thermostatic valve, adjust its settings to ensure it's delivering the right temperature.
4. **Replace faulty valves or fixtures:** If any valves or fixtures are faulty, replace them.
5. **Check the water heater:** Review the water heater's temperature setting and adjust it if needed.
6. **Inspect or add pipe insulation:** Install or check insulation on both cold and hot water pipes to reduce heat loss or transfer.
7. **Re-check temperatures:** After 24 hours, take another temperature reading at the shower outlet to confirm the fix worked.
8. **Document actions**: Record everything done and submit a report to the Water Management Program Team and the Local Health Department.

Example #2:

A facility installed a supplemental disinfection system to keep chlorine levels between 0.5 to 1.0 parts per million (ppm) in the hot water. However, they found that the chlorine levels were fluctuating a lot, with some areas not meeting the target range. To fix the problem, they took these steps:

1. **Monitor more locations:** Check the chlorine levels at key points before and after the injection system, as well as in other areas throughout the building.
2. **Look for patterns:** Plot the chlorine readings on a system map to see if the problem is isolated to certain areas or affecting the whole system.
3. **Check low flow areas:** Review areas with low water flow and flushing logs to see if there were any issues.
4. **Check pH and temperature:** Make sure the water's pH and temperature are within the right ranges to keep chlorine effective.
5. **Inspect equipment**: Check the chemical pumps, valves, and sensors to ensure they are working and calibrated properly.
6. **Check chemical inventory**: Make sure there's enough disinfectant in stock.
7. **Check dosing system:** Ensure the automated system is working properly and adjust settings if needed.
8. **Inspect physical equipment:** Visually check the system's components and chemical tanks for any damage or malfunction.
9. **Re-monitor:** After 24 hours, check the chlorine levels again to make sure they are back in the target range.
10. **Document everything:** Record all actions taken and share the report with the Water Management Program Team and the Local Health Department.

NJDOH's Responding to Post-Remediation *Legionella* Detections Guidance

Outbreak Investigation Roadmap (Building)

Initial Activities

Determine if an outbreak is warranted, establish a team, and notify the facility

Site Visit

Conduct an onsite environmental assessment and provide additional recommendations

Remedial Control Measures

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Review water sampling results for *Legionella* to determine next steps.

Close-Out

Ensure a Water Management Program is in place, that there are no new cases, and that there are no *Legionella* detections.

NJ Health
New Jersey Department of Health

Step 6: When is an Outbreak Investigation Over?

☑ No new cases of Legionnaires' disease

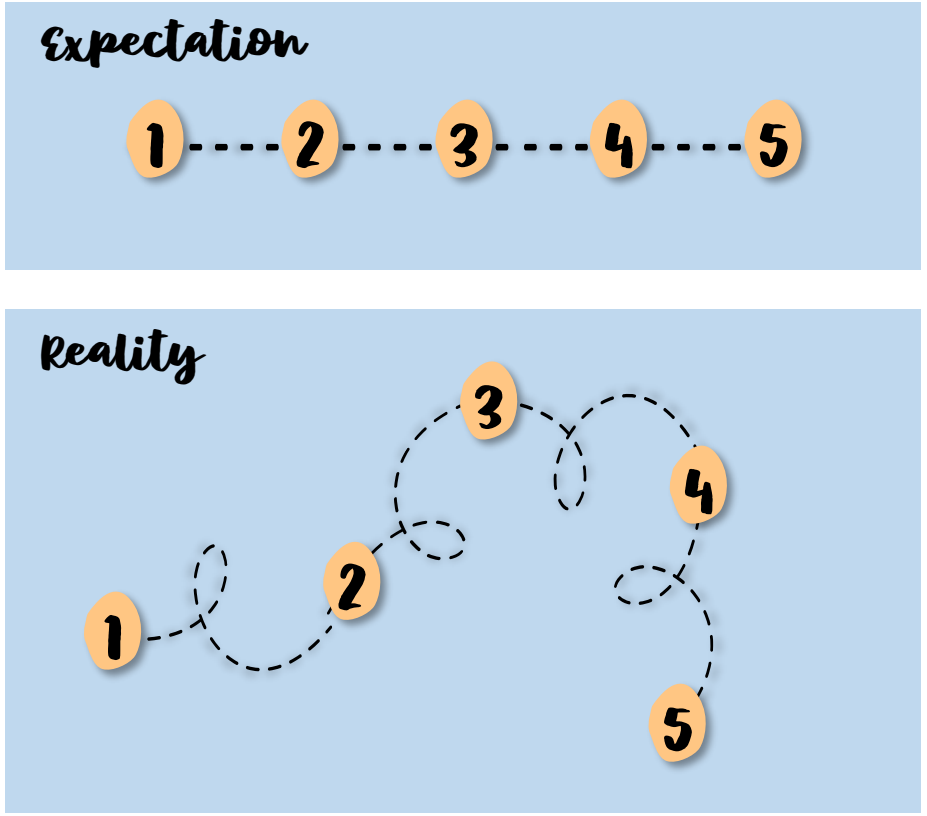
- Identifying no new cases during careful monitoring and following the implementation of long-term control strategies.

☑ No detections of *Legionella* during a specified timeframe

- Identification of any *Legionella* species indicates that the system provides conditions favorable for growth.
- *Legionella* should not be detected during the designated monitoring timeframe (e.g., post-remediation sampling).

☑ Implementation of a comprehensive Water Management Program (WMP)

- An effective WMP should be in place before declaring the end of any outbreak.



Building Investigation Timeline

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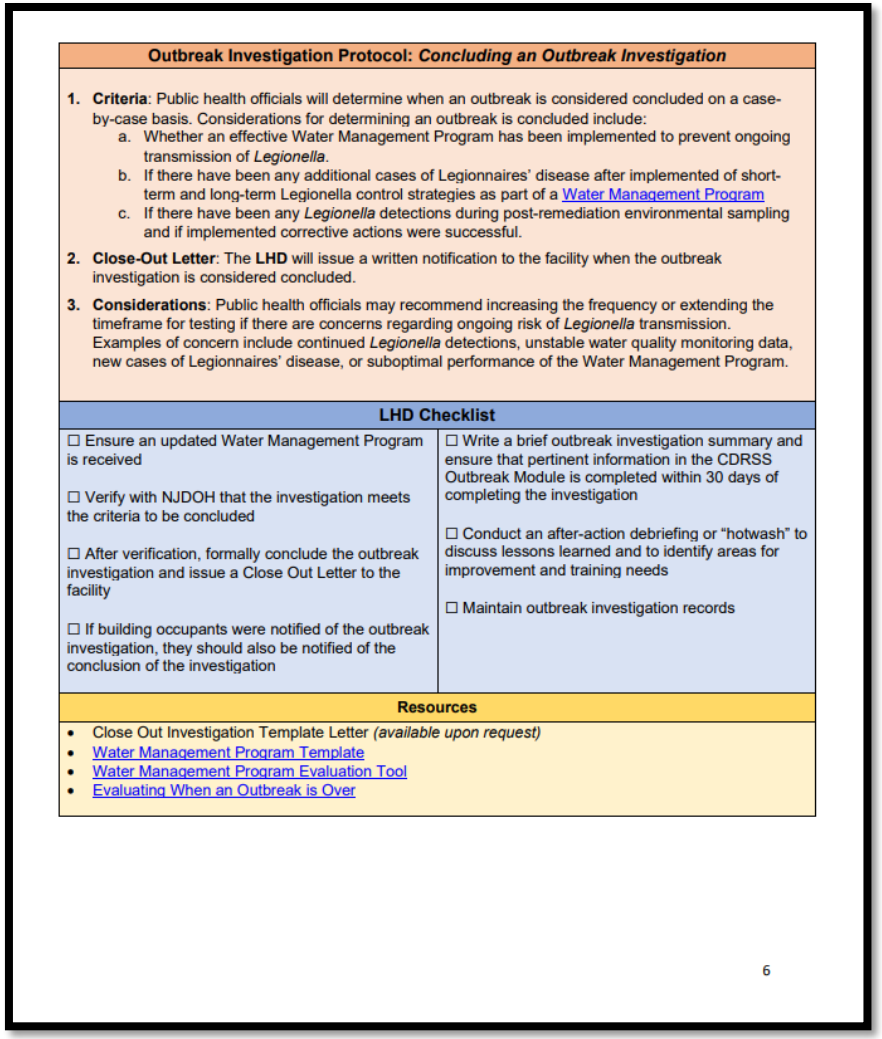
Step 6 Resources: Close-Out

- NJDOH's Standard Operating Procedures for Legionnaires' Disease Outbreak Investigations
- CDC Guidance for Evaluating When an Outbreak is Over
- Close-Out Investigation Template Letter *(available upon request)*



Outbreak Investigation Protocol: *Concluding an Outbreak Investigation*

1. **Criteria**: Public health officials will determine when an outbreak is considered concluded on a case-by-case basis. Considerations for determining an outbreak is concluded include:
   a. Whether an effective Water Management Program has been implemented to prevent ongoing transmission of *Legionella*.
   b. If there have been any additional cases of Legionnaires' disease after implemented of short-term and long-term Legionella control strategies as part of a Water Management Program
   c. If there have been any *Legionella* detections during post-remediation environmental sampling and if implemented corrective actions were successful.
2. **Close-Out Letter**: The **LHD** will issue a written notification to the facility when the outbreak investigation is considered concluded.
3. **Considerations**: Public health officials may recommend increasing the frequency or extending the timeframe for testing if there are concerns regarding ongoing risk of *Legionella* transmission. Examples of concern include continued *Legionella* detections, unstable water quality monitoring data, new cases of Legionnaires' disease, or suboptimal performance of the Water Management Program.

LHD Checklist

☐ Ensure an updated Water Management Program is received	☐ Write a brief outbreak investigation summary and ensure that pertinent information in the CDRSS Outbreak Module is completed within 30 days of completing the investigation
☐ Verify with NJDOH that the investigation meets the criteria to be concluded	☐ Conduct an after-action debriefing or "hotwash" to discuss lessons learned and to identify areas for improvement and training needs
☐ After verification, formally conclude the outbreak investigation and issue a Close Out Letter to the facility	☐ Maintain outbreak investigation records
☐ If building occupants were notified of the outbreak investigation, they should also be notified of the conclusion of the investigation	

Resources

- Close Out Investigation Template Letter *(available upon request)*
- Water Management Program Template
- Water Management Program Evaluation Tool
- Evaluating When an Outbreak is Over

6

LHD SOP for Outbreak Investigations

NJHealth New Jersey Department of Health

Facility Close-Out Letter Example

Provides a summary of the investigation

Highlights the importance of having a WMP

Recommends *Legionella* sampling to validate the WMP

[Facility Name]
[Street Address]
[City, State, Zip]

Dear [Facility Point of Contact]:

In [Month and Year], the [LHD], in conjunction with the New Jersey Department of Health (NJDOH), initiated an outbreak investigation following the identification of a laboratory-confirmed case of Legionnaires' disease among a resident of [Facility Name] located at [Facility Address]. Per public health protocols, one or more cases of Legionnaires' disease at an assisted living facility, or other vulnerable setting where a person may not leave the premises, is treated with the same considerations as a healthcare-associated outbreak and warrants further investigation.

In response, your facility followed recommendations from local and state health officials, including [implementing control measures, performing a chemical shock remediation, and completing post-remediation environmental sampling for *Legionella* analysis]. **Based on the finalized environmental sampling results, this outbreak investigation is considered concluded, and the [LHD] will no longer be actively following-up with your facility.**

It is important that your facility continues to maintain a healthy building water system. **The key to preventing Legionnaires' disease is to implement a comprehensive Water Management Program (WMP) to ensure that building water systems and devices are well maintained to reduce the risk of *Legionella* growth and transmission.**

Please note, the [LHD] and NJDOH do not review WMPs for completeness and adherence to guidelines and standards. It is your responsibility to continue to implement and maintain an adequate WMP to ensure *Legionella* growth is well controlled. This includes adjusting the WMP when there are changes made to the building water system(s), water management team, established control measures, and/or new or revised standard/guidelines are issued. At this time, it is recommended to **conduct a thorough review of your WMP to ensure adherence to national standards and guidelines** (see resources listed below).

Additionally, it is strongly recommended to **implement routine environmental sampling (i.e., sampling in the absence of disease) for *Legionella* culture in conjunction with a CDC Environmental *Legionella* Isolation Techniques Evaluation (ELITE) member laboratory to validate the effectiveness of your WMP**. At minimum, the NJDOH recommends that environmental sampling for *Legionella* occur quarterly (i.e., every three months). Your facility should consider increasing the frequency of environmental sampling when control limits are not being met or when other hazardous conditions are identified.

If *Legionella* are identified during routine environmental sampling, please refer to CDC's Multifactorial Approach to Performance Indicator Interpretation Table for interpreting testing results and CDC's Routine Testing Module for suggested response activities when routine environmental sampling results indicate that *Legionella* growth is not well controlled.

Please immediately report any potential Legionnaires' disease diagnoses among [residents, staff, or visitors] of your facility to the [LHD]. If you have any questions regarding this notice, please contact [LHD] at [LHD Contact Information].

Sincerely,

[LHD Point of Contact]

Resources:

- ANSI/ ASHRAE Standard 188, Legionellosis: Risk Management for Building Water Systems available for purchase or free online preview
- ASHRAE Guideline 12, Managing the Risk of Legionellosis Associated with Building Water Systems available for purchase or free online preview
- Centers for Disease Control and Prevention's Toolkit for Controlling *Legionella* in Common Sources of Exposure available at https://www.cdc.gov/control-legionella/php/toolkit/control-toolkit.html
- Centers for Disease Control and Prevention's Toolkit for Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings available at https://www.cdc.gov/control-legionella/php/toolkit/wmp-toolkit.html

Provides the facility with additional resources

NJHealth New Jersey Department of Health

BONUS: Non-Compliant Facilities

☑ Document, document, document!

- Create a timeline of key events related to the facility's challenges in implementing public health recommendations (e.g., lack of responsiveness, significant delays in investigative processes).

☑ Visit the facility in person

- If the facility is unresponsive to emails or phone calls, visit in person to re-establish communication.

☑ Reference Statute P.L. 2024, c.66

- Send an email to facility management with reference to the new statute signed into law on September 12, 2024.
- Violators of the bill may be subject to a civil penalty

Statute P.L. 2024, c.66

c. The Department of Health shall develop procedures and guidelines regarding suspected outbreaks of Legionnaires' disease and the case investigation of reported diagnoses of Legionnaires' disease pursuant to subsection b. of this section, including, but not limited to:

(1) documentation of any disruption of the public community water system, as defined in section 1 of P.L.2024, c.66 (C.58:12A-12.10), of the water system serving the primary residence of the individual with a confirmed case of Legionnaires' disease or other water exposure points identified pursuant to paragraph (3) of this subsection;

(2) provisions for the investigation of potential sources of exposure to *Legionella* bacteria from fixtures, water-using equipment, or features at the individual's residence including water exposures external to the residence such as irrigation, hoses, or water-based equipment and devices;

(3) provisions for the investigation of potential sources of exposure to *Legionella* bacteria from water exposure points in locations the individual visited in the 14 days preceding infection, if appropriate; and

(4) procedures for determining when sampling of water fixtures identified as potential sources of exposure in paragraphs (2) and (3) of this subsection shall be performed and procedures for performing such sampling.

d. As part of an investigation of a confirmed case of Legionnaires' disease, the Department of Health or the local health officer may require the owner or operator of a building suspected to be a source of *Legionella* bacteria exposure to test and mitigate the presence of *Legionella* bacteria consistent with the procedures and guidelines established by the department. The owner or operator shall report to the department the results of any environmental testing performed as part of the investigation. For the purposes of this subsection "building" shall not include any residential property with four or fewer dwelling units.

NJ Health New Jersey Department of Health

Thank You – Any Questions?

Link: Webinar Resource Videos

https://www.nj.gov/health/cd/topics/legion.shtml

(609) 826 - 5964

preventld@doh.nj.gov